

Sensors, Limit Switches, and Connector Cables

Photoelectric, Proximity, and Ultrasonic Sensors

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NOTE: Sensors described in this catalog are designed to be used for standard industrial presence sensing applications. These sensors do not include the self-checking redundant circuitry necessary to allow their use in safety applications.

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Schneider Electric: Shaping the Future of Sensors

Schneider Electric is the first control and automation products manufacturer in the world to introduce a comprehensive family of discrete sensor products—photoelectric, proximity, and limit switches—built upon a common technology platform that combines intelligence and modularity. Because this uniform approach to sensor design is so unique, we call it Global Detection.

What is Global Detection?

Detection is an essential function to control and automate equipment within an industrial environment. It has many variations based on different machinery requirements.

Traditionally, each sensor has been specific to an application—made by specialists who focused on a single detection technology—with all the advantages and disadvantages inherent in that technology.

Global Detection is Schneider Electric's solution to that dilemma: a family of discrete sensing products built on a common technology platform. What makes Global Detection possible is a new Osiconcept™ approach, which combines smart technologies to simplify sensor selection, stocking, installation, setup, and maintenance. OSI stands for **Offering Simplicity through Innovation**.

Combining sophistication and simplicity was our primary objective in creating this new technology and product platform: selection, installation, setup, and maintenance were made as easy as possible. The second objective was availability: maximizing the number of solutions while minimizing the product catalog numbers. A third objective was adaptability: products that meet all the environmental constraints for a wide variety of installations.

We also added a fourth dimension—aesthetics—with uniform shapes, a compact body style, and a uniform blue color across all products. This is important for machine builders who want to present an image of engineering and manufacturing quality to their customers.

Innovation: Products that adapt to their environment

XS—Proximity Sensors

Conventional inductive proximity sensors can be the source of many types of application difficulties. Apart from their size, they are also sensitive to metal environments, meaning that some flush-mounted types must be shielded, while others may be unshielded. This causes variances in performance. Setup and mounting can be both difficult and time consuming.

The new Telemecanique® XS Rectangular proximity sensor line, part of the Schneider Electric Global Detection family, has been designed to eliminate all these problems. With the flattest rectangular body size available, these compact sensors integrate easily into a machine or process. The advanced microprocessor design of these **auto-adaptable proximity sensors** allows them to easily adjust to deliver maximum sensing distance, whatever the metal environment or mounting approach.

When the user presses a button, the product runs in teach mode to set the maximum sensing distance. With quick attachment mounting brackets, these sensors can be quickly installed or replaced. Once in place, there is no need to mechanically adjust their position, as tuning or precise detection is integral to the sensor. Efficiency, performance, mounting time, and flexibility have all been considered in the design of these proximity sensors to ensure maximum productivity.

XU—Photoelectric Sensors

Photoelectric sensors present some equally difficult challenges. Different sensors have been required depending on the target material—whether matte finish or reflective surfaces, light or dark colors—and the overall environment. This complicates sensor selection, leading to a great deal of trial and error. Sensor positioning and definition of the sensing range have also been difficult to determine, particularly in three dimensions, which require special mountings and protection, increasing installation costs.

Osiconcept™ Sensors Introduction

By applying the Osiconcept approach to photoelectric sensors, Schneider Electric has considerably increased their capabilities. This new XU family of Multi-Mode™ **photoelectric sensors** can do it all, operating accurately in diffuse environments and with background suppression. This unique line of photoelectric sensors combines maximum flexibility and precision. Each sensor can function in five sensing modes and two output states (NO or NC). This flexibility can reduce the typical number of product part numbers required by a factor of 10.

To increase the sensing distance from the diffuse, simply add a reflector or a transmitter and the sensor changes to retro-reflective or thru-beam mode, whichever is required. The idea of light or dark switching is no longer relevant. The targeted object has only to be detected in order to activate the output (or the reverse). The customer decides if it should be N.O. or N.C. Built-in intelligence allows the sensor to run a teach mode setup for quick installation, with the option of a second precise teach setting for very accurate and reliable detection. The sensor is capable of adapting to any surrounding environment.

Accurate setting of the sensing range is achieved without using any particular accessories. If the object to be detected is moved closer within the detection zone, just press a button and the sensor learns this modification. Also, if the object is translucent, whatever the detection method, it is simply placed in position, the adjustment button is pressed and the sensor adjusts accordingly. Mounting brackets are standard across the product line. Options include protective covers and a 3-D indexing system for setup adjustment in any direction.

Innovation: Modular approach adds flexibility

XC—Limit Switches

The Osiconcept principle has also been adapted to limit switches. The limited integration of operating heads, bodies, and contact blocks from most manufacturers can make it difficult to find exactly the right components for the configuration required for a particular application. With the new XC family of limit switches from Schneider Electric, however, the complete **modularity** of the bodies, contact blocks, operating heads, and cable entries simplifies any configuration.

More than 40 metal operating heads, completely interchangeable, can be combined with five different body styles and six conduit entries, all of which conform to standards and local customs on a worldwide basis. Limit switch components that enable up to 5,000 different configurations will be available anywhere in the world from Schneider Electric, normally within 48 hours.

The new XC limit switches are the only ones on the market with snap action contact blocks (three or four contacts) with direct opening operation. Product cabling has been simplified, reducing electrical connection time by up to 40 percent. Operating heads and levers with 3-D orientation also make installation simpler and enable mounting these limit switches in any position for accurate cam actuation.

All the new Square D® and Telemecanique® **Global Detection** products are entirely compatible with the Schneider Electric Transparent Factory: a new approach to factory management based on Ethernet and Web technologies.

This global approach to discrete sensing technology and product design means machine builders can improve performance by having less complex and more intelligent machines; distributors can improve their customer expertise with a more efficient product line offering, simplified selection, and improved selling potential; and finally, users on the factory floor can improve performance by reducing maintenance time with products that are simpler and have unparalleled flexibility.

Osiconcept™ Sensors

Environmental Protection Classification

Enclosures

An enclosure is a surrounding case constructed to provide a degree of protection for personnel against incidental contact with the enclosed equipment, and to provide a degree of protection for the enclosed equipment against specified environmental conditions.

Below is a brief description of the more common types of enclosures used by the electrical industry relating to their environmental capabilities. Refer to the appropriate sections of the standard publication for more information regarding applications, features, and design books.

Definition pertaining to nonhazardous locations

Type 1 Enclosure

Type 1 enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment.

Type 2 Enclosure

Type 2 enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.

Type 3 Enclosure

Type 3 enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, sleet, external ice formation, and falling dirt.

Type 3R Enclosure

Type 3R enclosures are intended for outdoor use primarily to provide a degree of protection against falling dirt, rain, sleet and external ice formation.

Type 3S Enclosure

Type 3S enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, sleet, and falling dirt, and to provide for operation of external mechanisms when ice laden.

Type 4 Enclosure

Type 4 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water, falling dirt, sleet, snow, and formation of ice on the enclosure.

Type 4X Enclosure

Type 4X enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water, falling dirt, sleet, snow, and formation of ice on the enclosure.

Type 5 Enclosure

Type 5 enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, dripping, and light splashing.

Type 6 Enclosure

Type 6 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against dust, falling dirt, dripping, light splashing, and the entry of water during occasional temporary submersion at a limited depth.

Type 6P Enclosure

Type 6P enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against dust, falling dirt, dripping, light splashing, and the entry of water during prolonged submersion at a limited depth.

Type 11 Enclosure

Type 11 enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt and dripping noncorrosive liquids.

Type 12K Enclosure

Type 12K enclosures with knockouts are intended for indoor use primarily to provide a degree of protection against dust, falling dirt and dripping noncorrosive liquids other than at knockouts.

Type 13 Enclosure

Type 13 enclosures are intended for indoor use to provide a degree of protection against lint, dust, NEMA Type 12, external condensation and spraying of water, oil and noncorrosive liquids.

The IEC publications 144, 529, and the standard DIN 40050 define the degrees of protection provided by electrical enclosures—with respect to persons, equipment within the enclosure, and the ingress of water—and enable this to be expressed by the letter IP followed by two numerals. The standard NFC 20-010 also defines the mechanical protection given by the enclosure (3rd numeral).

Example: IP559 (The table below explains the numerals.)

These standards do not apply to protection against the risk of explosion or conditions such as humidity, corrosive gases, fungi or vermin.

Certain equipment intended to be mounted in enclosures also contributes to the degree of protection achieved.

Example: push buttons on enclosures

In this case the equipment will only conform with the standard when it is correctly mounted.

Different parts of equipment can have different degrees of protection and still comply with the standards.

Example: an opening in the base of an enclosure

	1st Characteristic Numeral Protection against contact and penetration of solid bodies. Conforming to IEC, NF, DIN	2nd Characteristic Numeral Protection against the penetration of liquids. Conforming to IEC, NFC, DIN	3rd Characteristic Numeral Protection against mechanical damages. Conforming to NFC. ■		
			Mass, kg	Height of fall, m	Impact energy, J
0	Non-protected	Non-protected	Non-protected		
1	Protection against solid objects greater than 50 mm	Protection against dripping water	0.15	0.15	0.225
2	Protection against solid objects greater than 12 mm	Protection against dripping water when tilted up to 15°	0.15	0.25	0.375
3	Protection against solid objects greater than 1 mm	Protection against rain	0.25	0.20	0.50
4	Protection against solid objects	Protection against splashing water greater than 1 mm	—	—	—
5	Dust protected	Protection against water jets	0.50	0.40	2
6	Dust tight	Protection against heavy seas	—	—	—
7	—	Protection against the effects of immersion	1.50	0.40	6
8	—	Protection against immersion in cutting oils▲	—	—	—
9	—	—	5	0.40	20

■ Defined within conditions of hammer testing.

▲ Degree of protection undefined by the IEC standard. Left to the manufacturers and users to define it. Telemecanique® brand defines it as cuffing oil proof.

Photoelectric Sensors

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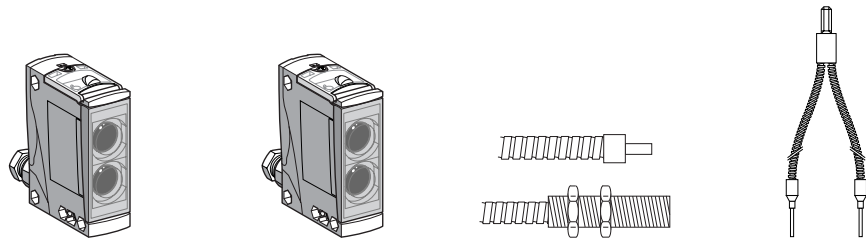
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Photoelectric Sensors Selection Guide

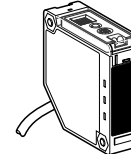
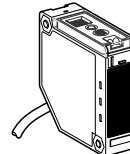
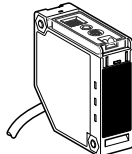
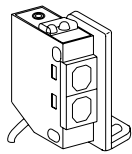
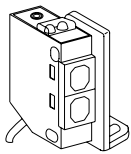


		XUA Miniature Precision	XU 18 mm Classic	XUB 18 mm Multi-Mode	XUB 18 mm
Style		Tubular Ultra-Short 8 mm Diameter	Tubular 18 mm Diameter	Tubular 18 mm Diameter	Tubular 18 mm Diameter
Housing	Material	Metal	Metal and Plastic	Metal and Plastic	Metal and Plastic
	NEMA Type	4, 6, 6P, 12, 13	4X (indoor), 12	4X (indoor), 12	4X (indoor), 12
	CENELEC	IP67	IP67	IP67	IP67
Maximum Sensing Range	Thru-Beam	2 m (6.6 ft)	20 m (65.6 ft)	15 m (49.2 ft)	15 m (49.2 ft)
	Retroreflective Polarized	—	4 m (13.1 ft)	2 m (6.6 ft)	2 m (6.6 ft)
	Non-Polarized	—	6 m (19.7 ft)	—	4 m (13.1 ft)
	Proximity Diffuse (Standard/Short Range)	50 mm (1.9 in.)	600 mm (23.6 in.) / 150 mm (5.9 in.)	300 mm (1 ft) / 120 mm (4.8 in.)	600 mm (23.6 in.) / 100 mm (3.9 in.)
Glass Fiber Optics Option		No	No	No	No
Output		DC	AC, DC	DC, AC/DC	DC
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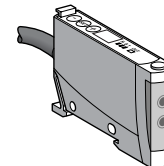
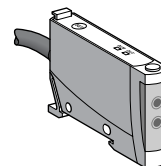
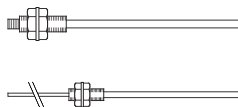
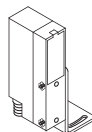
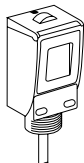


		XUX	XUX Multi-Mode	XUFA	XUFS
Style		Compact Rectangular	Compact Rectangular	Glass Fiber Optic Cables	Glass Fiber Optic Cables
Housing	Material	Plastic	Plastic	Glass	Glass
	NEMA Type	1, 3, 4, 6, 12, 13	1, 3, 4, 6, 12, 13	—	—
	CENELEC	IP67	IP67	—	—
Maximum Sensing Range	Thru-Beam	40 m (130 ft)	40 m (130 ft)	700 mm (28 in.)	250 mm (9.84 in.)
	Retroreflective Polarized	11 m (36 ft)	11 m (36 ft)	—	—
	Non-Polarized	14 m (45 ft)	—	—	—
	Proximity Diffuse (Standard/Short Range)	2.1 m (7.9 ft)	2 m (6.6 ft) / 1.3 m (4.2 ft)	150 mm (5.9 in.)	87 mm (3.44 in.)
Glass Fiber Optics Option		No	No	—	—
Output		DC	DC, AC/DC	—	—
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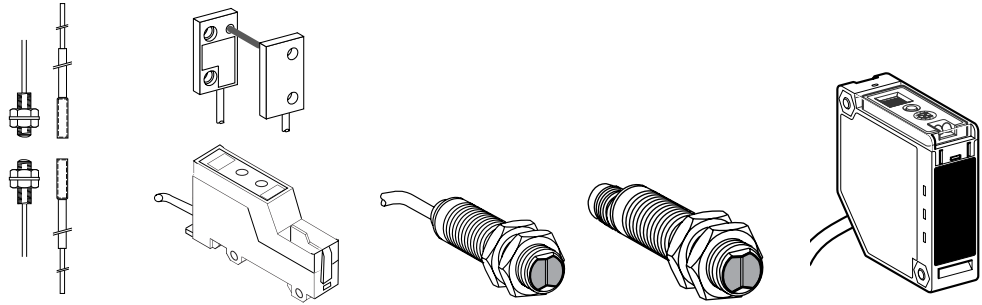


XUMA Multi-Mode	XUM	XUK	XUK Multi-Mode	XUK Classic
Miniature Rectangular	Miniature Rectangular	SubCompact	SubCompact Universal	SubCompact Universal
Plastic	Plastic	Plastic	Plastic	Plastic
1, 3, 4, 6, 6P, 12, 13	1, 3, 4, 6, 6P, 12, 13	3, 4, 4X, 6, 12, 13	3, 4, 4X, 6, 12, 13	3, 4, 4X, 6, 12, 13
IP67	IP67	IP65	IP65	IP65
14 m (45.9 ft)	8 m (26.2 ft)	30 m (98.4 ft)	30 m (98.4 ft)	30 m (98.4 ft)
3 m (9.8 ft)	2 m (6.6 ft)	5 m (16.4 ft)	4 m (13.1 ft)	6 m (19.7 ft)
—	4 m (13.1 ft)	9 m (29.5 ft)	0.8 m (2.6 ft)	10 m (32.8 ft)
40 cm (15.7 in.) / 10 cm (3.9 in.)	40 cm (15.7 in.)	1 m (3.3 ft)	300 mm (11.8 in.)	1.5 m (4.9 ft)
No	No	No	No	No
DC	DC	DC	DC, AC/DC	AC/DC, DC
48	50	54	52	92

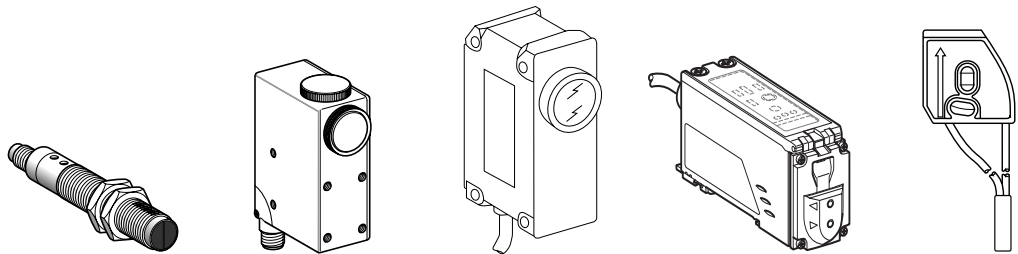


XUC	XUL	XUFN	XUDA1 Self-Teach	XUDA2 Self-Teach
Compact Universal	SubCompact Rectangular	Plastic Fiber Optic Cables	Fiber Optic Amplifier	Fiber Optic Amplifier
Plastic	Plastic	Plastic	Plastic	Plastic
3, 4, 4X, 6, 6P, 12, 13	1, 3, 4, 6, 6P, 12, 13	—	1, 3, 4, 6, 12, 13	1, 3, 4, 6, 12, 13
IP67	IP67	—	IP66	IP66
60 m (196.8 ft)	10 m (32.8 ft)	250 mm (9.84 in.)	see Fiber Optics	see Fiber Optics
9 m (29.5 ft)	5 m (16.4 ft)	—	—	—
—	8 m (26.2 ft)	—	—	—
1.2 m (3.9 ft) adj.	0.7 m (2.3 ft)	87 mm (3.44 in.)	see Fiber Optics	see Fiber Optics
—	No	—	Yes	Yes
AC/DC, DC	AC/DC, DC	—	DC	DC
94	96	102	60	60

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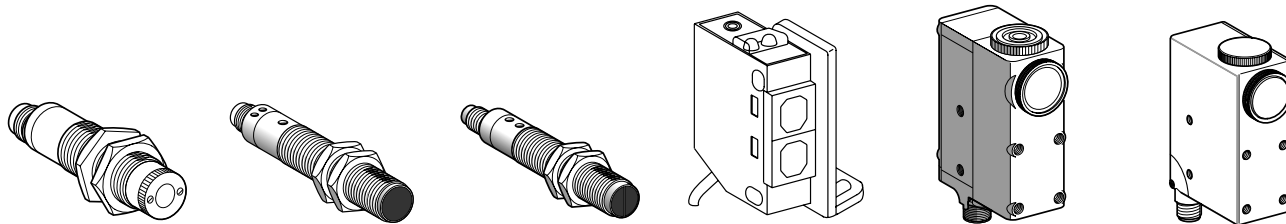


		XU FN	XU VK	XU	XU B	XU KT
Style		Application specific	Optical Sensing Heads and Amplifiers	Tubular 18 mm Diameter	Transparent Material Detection	Transparent Material Detection
Housing	Material	Plastic	Plastic	Stainless Steel	Plastic	Plastic
	NEMA Type	—	—	4X, 12	—	3, 4, 4X, 6, 12, 13
	CENELEC	—	Amplifiers IP50; Heads IP50, 66, 67	IP67	IP67	IP67
Maximum Sensing Range	Thru-Beam	1.5 m (4.9 ft)	7.3 m (24 ft)	15 m (49.2 ft)	—	—
	Retroreflective Polarized	—	—	2 m (6.6 ft)	—	1.5 m (4.9 ft)
	Non-Polarized	—	2.5 m (8 ft)	4 m (13.1 ft)	800 mm (31.5 in.)	—
	Proximity Diffuse (Standard/Short Range)	95 mm (3.74 in.)	125 mm (5 in.)	100 mm (3.9 in.)	—	—
Glass Fiber Optics Option		—	Yes	No	No	No
Output		—	AC, DC	DC	DC	DC
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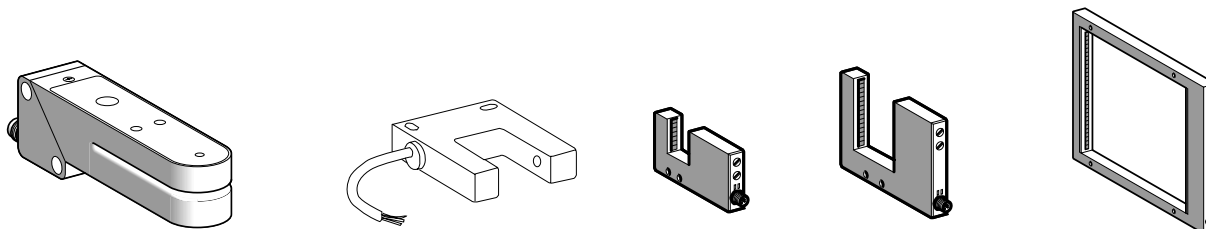


		XU 18	XU RU	XU RC3	XU RC4	XU FN
Style		Ultraviolet	Ultraviolet Self-Teach	Full Color Sensor	Fiber Optic Full Color Sensor	Convergent Beam Fiber Optic Cables
Housing	Material	Nickel-Plated Brass	Diecast Zinc	Aluminum	Aluminum	Plastic
	CENELEC	IP67	IP67	IP67	IP67	—
Maximum Sensing Range	Thru-Beam	—	—	—	—	30 mm (1.18 in.) Convergent
	Retroreflective Polarized	—	—	—	—	—
	Non-Polarized	—	—	—	see Fiber Optics	—
	Proximity Diffuse (Standard/short range)	20 mm (0.79 in.)	20 mm (0.79 in.)	40 to 60 mm (1.57 to 2.36 in.)	see Fiber Optics	—
Glass Fiber Optics Option		No	No	Yes	Yes	—
Output		DC	DC	DC	DC	—
Page		76	122	124	124	104

Photoelectric Sensors Selection Guide



XU 18 mm	XU 18 mm	XU 18 mm	XUM	XURK	XURK
Laser	High Excess Gain	Analog	Color Mark	Color Mark Registration	Self-Teaching Color Mark
Plastic	Nickel-Plated Brass	Nickel-Plated Brass	Plastic	Diecast Zinc	Diecast Zinc
—	3, 4, 4X, 6, 12, 13	3, 4, 4X (indoor), 6, 12, 13	1, 3, 4, 6, 6P, 12, 13	—	—
IP67	IP67	IP67	IP67	IP67	IP67
100 m (328.1 ft)	70 m (229.6 ft)	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	50 to 400 mm (2.0 to 15.7 in.)	15 mm (0.6 in.)	9 mm (0.354 in.)	9 mm (0.354 in.)
No	No	No	No	No	No
DC	DC	PNP Analog	DC	DC	DC
78	72	74	114	118	120



XUVK	XUV	XUVF	XUVF
Self-Teaching Label Detection Fork	Self Contained Fork	Dynamic Fork	Dynamic Frame Sensors
Zinc Alloy	Plastic	Aluminum	Aluminum
IP65	IP54	IP65	IP65
2 mm (0.079 in.)	30 mm (1.18 in.)	60 x 60 mm (2.36 x 2.36 in.)	200 x 250 mm (7.87 x 9.84 in.)
—	—	—	—
—	—	—	—
—	—	—	—
No	No	No	No
DC	DC	DC	DC
126	128	130	132

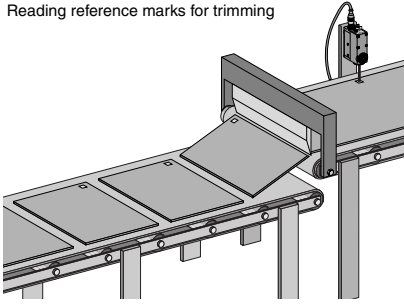
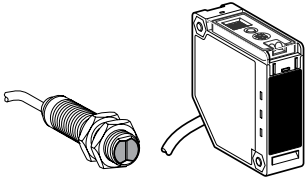
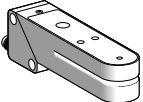
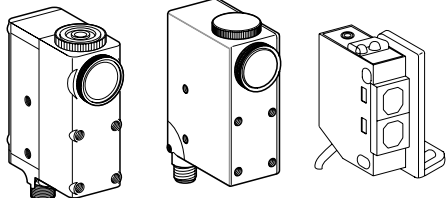
Reflectors Page 136
 Accessories Page 137
 Beam Patterns Pages 141–142
 Dimensions Pages 142–145
 Application Information Pages 20–27, 150–160

Photoelectric Sensors

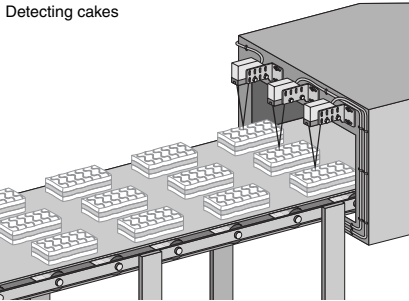
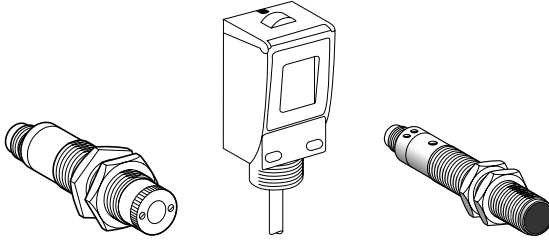
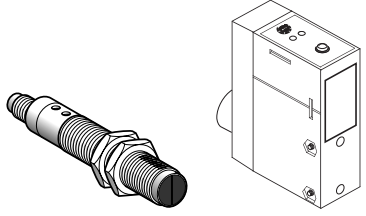
Selection Guide

for Specific Applications

Packaging Machinery

 <p>Reading reference marks for trimming</p>		Transparent Material Detection		Opaque Label Detection	Color Mark Registration		
							
Style		XUB	XUKT	XUVK	XURK	XURK	XUM
		Tubular 18 mm Diameter	Transparent Material Detection	Label Detection Fork	Color Mark	Self-Teaching Color Mark	Color Mark
		Nickel-Plated Brass	PMMA	Zinc Alloy	ZAMAC	Diecast Zinc	ABS/PC
Housing	Material	—	3, 4, 4X, 6, 12, 13	—	—	—	1, 3, 4, 6, 6P, 12, 13
	NEMA Type	—	—	—	—	—	—
	CENELEC	IP67	IP65	IP67	IP67	IP67	IP67
Maximum Sensing Range	Thru-Beam	—	—	2 mm (0.08 in.)	—	—	—
	Retroreflective Polarized	—	2 m (6.6 ft)	—	—	—	—
	Non-Polarized	990 mm (39 in.)	—	—	—	—	—
	Proximity Diffuse (Standard/Short range)	—	—	—	9 mm (0.35 in.)	9 mm (0.35 in.)	15 mm (0.6 in.)
Glass Fiber Optics Option		No	No	No	No	No	—
Output		DC	DC	DC	DC	DC	DC
Page		80	112	126	118	120	114

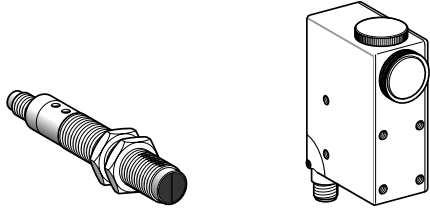
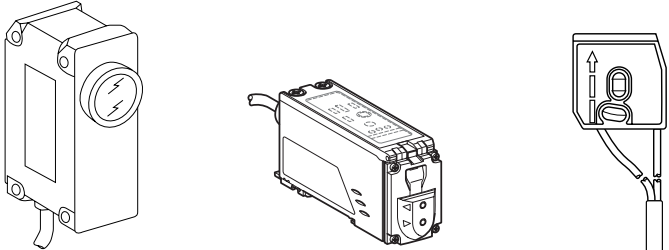
Material Handling

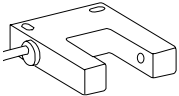
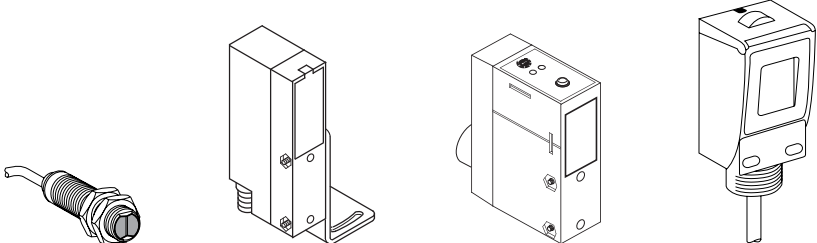
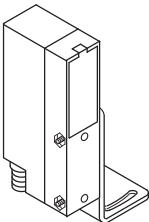
 <p>Detecting cakes</p>		Long Range Sensing			Analog	
						
Style		XU 18 mm	XUC	XU 18 mm	XU 18 mm	XUJ
		Laser (pair)	Thru-Beam	High Excess Gain	Analog	Analog
Housing	Material	ABS/PMMA	Plastic	Nickel-Plated Brass	Nickel-Plated Brass	Plastic
	NEMA Type	—	3, 4, 4X, 6, 6P, 12, 13	3, 4, 4X, 6, 12, 13	3, 4, 4X (indoor), 6, 12, 13	1, 3, 6, 12, 13
	CENELEC	IP67	IP67	IP67	IP67	IP67
Maximum Sensing Range	Thru-Beam	100 m (328.1 ft)	60 m (196.8 ft)	70 m (229.6 ft)	—	—
	Retroreflective Polarized	—	9 m (29.5 ft)	—	—	—
	Non-Polarized	—	—	—	—	—
	Proximity Diffuse (Standard/Short Range)	—	1.2 m (3.9 ft) adj.	—	50 to 400 mm (2.0 to 15.7 in)	20 to 80 mm (7.9 to 31.5 in)
Glass Fiber Optics Option		No	No	No	No	No
Output		DC	AC/DC, DC	DC	PNP Analog	PNP Analog
Page		78	94	72	74	98

Photoelectric Sensors

Selection Guide

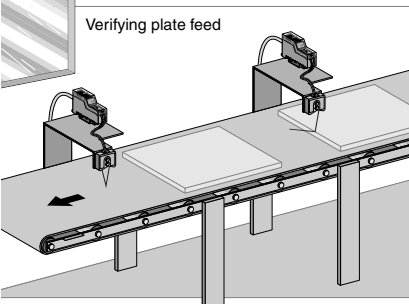
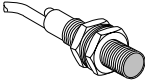
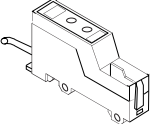
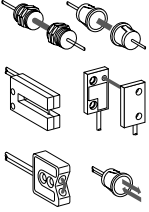
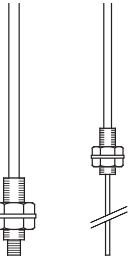
for Specific Applications

Ultraviolet Invisible Mark Detection		Full Color Detection		
				
XU 18	XURU	XURC3	XURC4	XUFN
Ultraviolet	Ultraviolet Self-Teach	Full Color Sensor	Fiber Optic Full Color Sensor	Convergent Beam Fiber Optic Cables
Nickel-Plated Brass	Diecast Zinc	Aluminum	Aluminum	Plastic
—	—	—	—	—
IP67	IP67	IP67	IP65	—
—	—	—	—	30 mm (1.18 in.) Convergent
—	—	—	—	—
—	—	—	see Fiber Optics	—
20 mm (0.79 in.)	20 mm (0.79 in.)	40 to 60 mm (1.57 to 2.36 in.)	see Fiber Optics	—
No	No	No	Yes	—
DC	DC	DC	DC	—
76	122	124	124	104

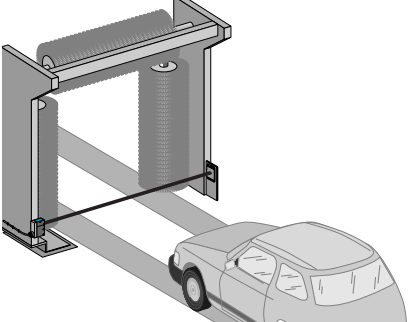
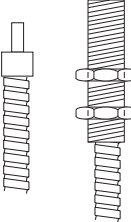

Flag Detection	Background Suppression				Short Range Background Suppression
					
XUVH	XU 18 mm Classic	XUL	XUJ Universal	XUC	XUL
Self Contained Fork	Background Suppression	Subcompact Rectangular	Standard Rectangular	Compact Universal	Subcompact Rectangular
ABS/PMMA	Metal or Plastic	ABS/PC	PEI	Plastic	ABS/PC
—	4X, 12	1, 3, 4, 6, 6P, 12, 13	1, 3, 6, 12, 13	3, 4, 4X, 6, 6P, 12, 13	1, 3, 4, 6, 6P, 12, 13
IP54	IP67	IP67	IP67	IP67	IP67
30 mm (1.18 in.)	—	10 m (32.8 ft)	13 m (42.6 ft)	60 m (196.8 ft)	—
—	—	5 m (16.4 ft)	9 m (29.5 ft)	9 m (29.5 ft)	—
—	150 mm (5.9 in.)	8 m (26.2 ft)	9 m (29.5 ft)	—	—
—	150 mm (5.9 in.)	0.7 m (2.3 ft)	1.2 m (48 in.) / 70 cm (27 in.)	1.2 m (3.9 ft) adj.	0.25 m (0.8 ft)
No	No	No	No	No	No
DC	AC/DC, DC	AC/DC, DC	AC/DC, DC, Analog	AC/DC, DC	DC
128	76–79	96	98	94	96

Photoelectric Sensors Selection Guide for Specific Applications

Assembly Equipment

		Miniature		Separate Optical Heads and Amplifiers		Fiber Optics and Amplifiers			
									
Style		XUA Miniature Precision		XUV		XUVN		XUFN	
		Tubular Ultra-Short 8 mm Diameter		Amplifier for Separate Optical Head		Separate Optical Heads		Plastic Fiber Optic Cables	
Housing	Material	Nickel-Plated Brass		ABS		—		—	
	NEMA Type	4X, 6P		1, 5		—		—	
	CENELEC	IP67		IP50		—		—	
Maximum Sensing Range	Thru-Beam	2 m (6.6 ft)		—		7.3 m (24 ft)		250 mm (9.84 in.)	
	Retroreflective Polarized	—		—		—		—	
	Non-Polarized	—		—		2.5 m (8 ft)		—	
	Proximity Diffuse (Standard/Short range)	50 mm (1.9 in.)		—		—		87 mm (3.44 in.)	
Glass Fiber Optics Option		No		Yes		—		—	
Output		DC		AC/DC		125 mm (5 in.)		—	
Page		62		108		106		102	

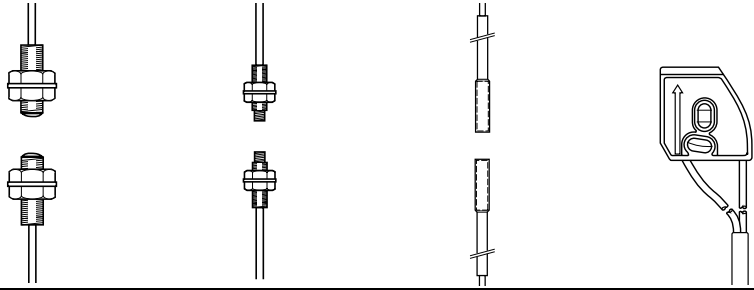
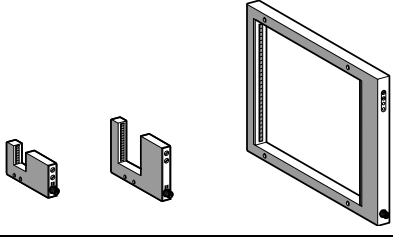
Harsh Environment

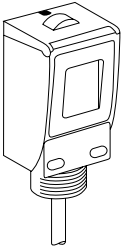
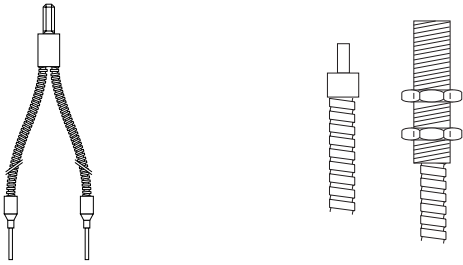

		Washdown		Metal Bodies			
							
Style		XUFA		XUA Miniature Precision		Classic XU 18 mm	
		Glass Fiber Optic Cables		Tubular Ultra-Short 8 mm diameter		Tubular 18 mm diameter	
Housing	Material	Glass		Metal		Metal	
	NEMA Type	—		4X, 6P		4X, 12	
	CENELEC	—		IP67		IP67	
Maximum Sensing Range	Thru-Beam	1.39 m (4.6 ft)		4 m (13.1 ft)		—	
	Retroreflective Polarized	—		—		—	
	Non-Polarized	—		—		—	
	Proximity Diffuse (Standard/Short Range)	200 mm (7.9 in.)		60 mm (2.4 in.)		150 mm (5.9 in.)	
Glass Fiber Optics Option		—		No		No	
Output		—		DC		AC/DC, DC	
Page		100		62		72	

Photoelectric Sensors

Selection Guide

for Specific Applications

Specialty Fiber Optics				Dynamic Sensing	
					
XUFN•P	XUFN•S	XUFN•T	XUFN•L	XUVF	XUVF
High Power Fiber Optic Cables	Soft Fiber Optic Cables	Teflon® Coated Fiber Optic Cables	Convergent Fiber Optic Cables	Dynamic Fork	Dynamic Frame Sensors
Plastic	Plastic	Plastic with Teflon	Plastic	Aluminum	Aluminum
—	—	—	—	—	—
IP64	IP64	IP671	IP65	IP65	IP65
300 mm (11.8 in.)	100 mm (3.93 in.)	1 m (39.3 in.)	1.5 mm (4.9 ft)	60 x 60 mm (2.36 x 2.36 in.)	200 x 250 mm (7.87 x 9.84 in.)
—	—	—	—	—	—
—	—	—	—	—	—
95 mm (3.74 in.)	55 mm (2.16 in.)	70 mm (2.75 in.)	30 mm (1.18 in.)	—	—
—	—	—	—	No	No
—	—	—	—	DC	DC
104	104	104	104	130	132

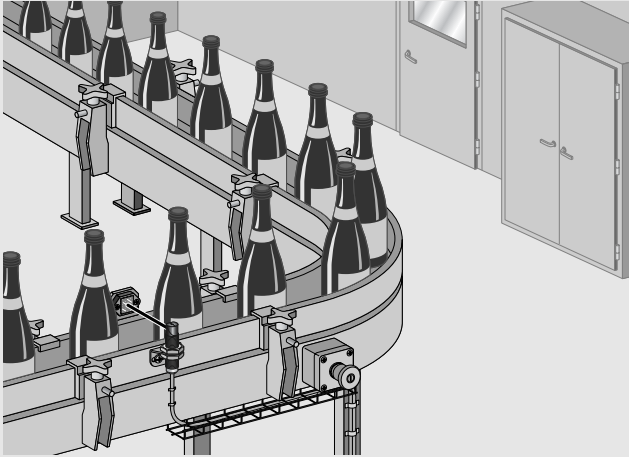
Outdoor	High Temperature		Corrosive Environment
			
XUC	XUFS	XUFA	XUFN•T
NEMA Type 4X Outdoor	Glass Fiber Optic Cables	Glass Fiber Optic Cables	Teflon Coated Fiber Optic Cables
Plastic	Glass	Glass	Plastic with Teflon
3, 4, 4X, 6, 6R, 12, 13	—	—	—
IP67	—	—	IP67
60 m (196.8 ft)	250 mm (9.84 in.)	700 mm (28 in.)	1 m (39.3 in.)
9 m (29.5 ft)	—	—	—
—	—	—	—
1.2 m (3.9 ft) adj.	87 mm (3.44 in.)	150 mm (5.9 in.)	70 mm (2.75 in.)
No	—	—	—
AC/DC, DC	—	—	—
94	102	100	104

Reflectors Page 136
 Accessories Page 137
 Beam Patterns Pages 141–142
 Dimensions Pages 142–145
 Application Information Pages 20–27, 150–160

Photoelectric Sensors

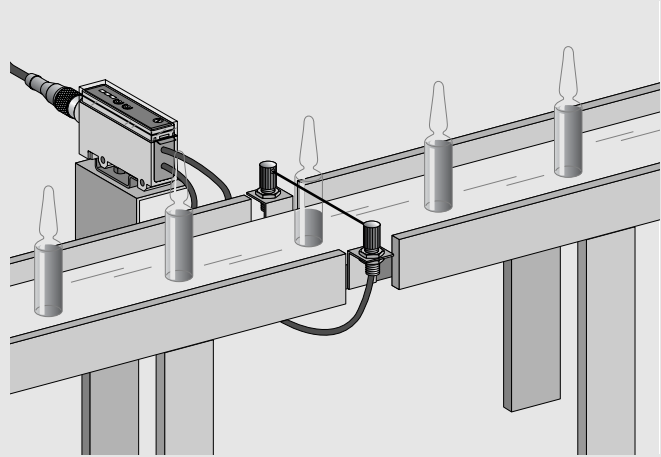
Application Examples

01: Monitoring the flow of bottles



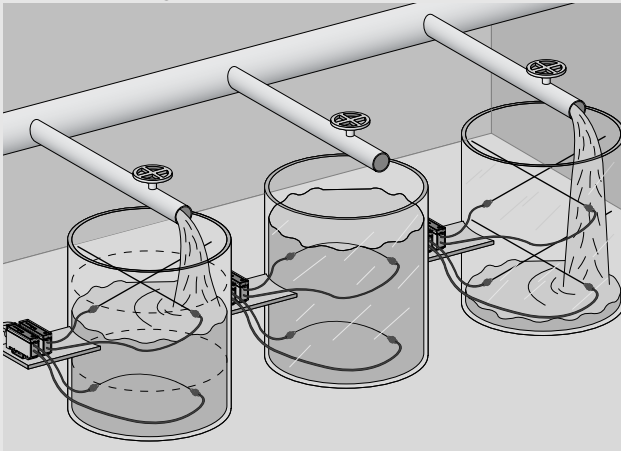
XUB9**WL2 or XUB0**SWL2

02: Verifying liquid presence in a vial



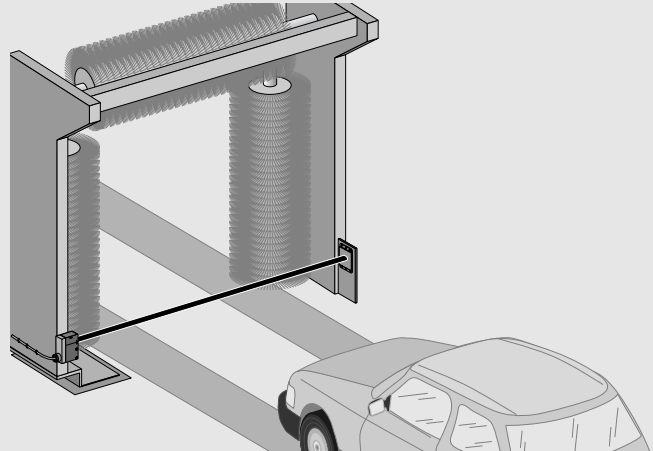
XUDA**SMM8 + XUFN12301 + XUFZ02

03: Monitoring the water level in a container



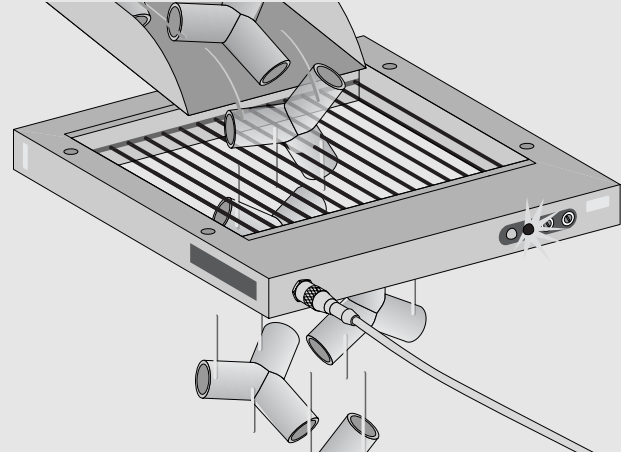
XUDA**SML2 + XUFN12301

04: Car washes



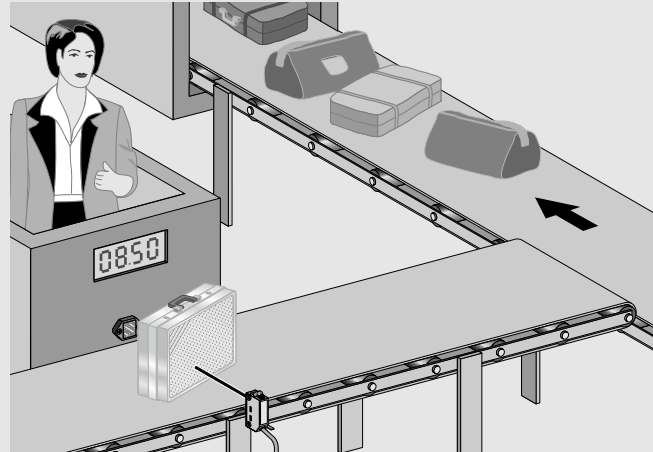
XUX0ARCTT16 or XUX9ARCNT16

05: Detecting small falling objects



XUVF**0M12

06: Detecting reflective objects



XUM0A*SAL2 or XUM9A**NL2

Photoelectric Sensors Application Examples

07: Monitoring the height of lipsticks prior to capping

XUB0•SML2R + XUB0•KSNL2T or XUB2•NL2• + XUB2•KSNL2T

08: Monitoring the flow of pallets carrying bottled water

XUX0AKSAT16 or XUX1A•NT16

09: Monitoring the flow of cans

XUX0AKSAT16 or XUX1A•NT16

10: Monitoring the position of cheese

XUK0AKSAL2 or XUK5A•NL2

11: Verifying the correct seating of a screw

XUDA•SML2 + XUFN35301

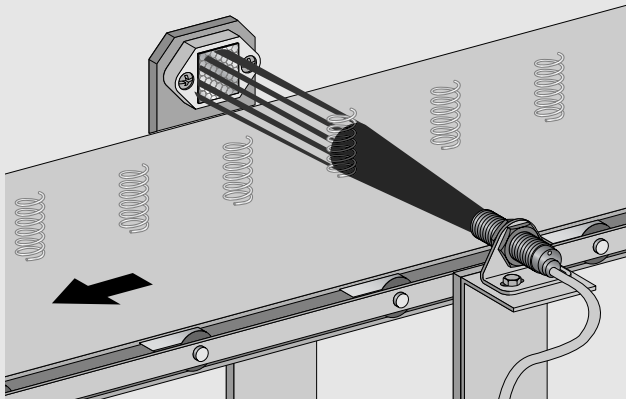
12: Monitoring the flow of objects exiting vibrating bowl

XUDA•SML2 + XUFN35301

Photoelectric Sensors

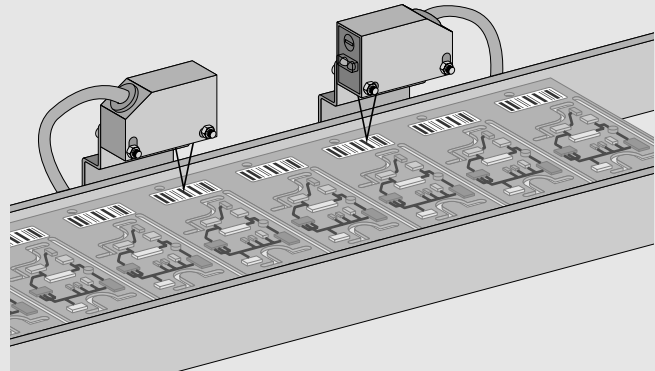
Application Examples

13: Detecting springs (considered a transparent material)



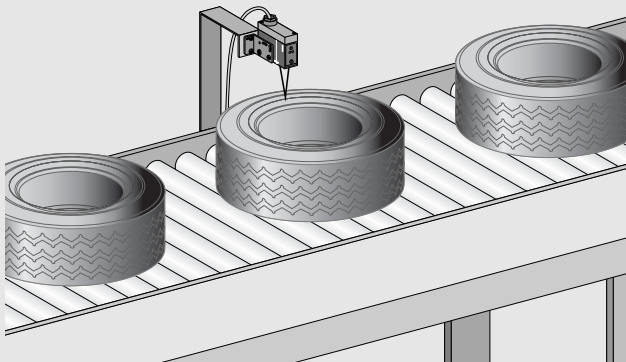
XUB•01353

14: Monitoring the flow of printed circuit boards



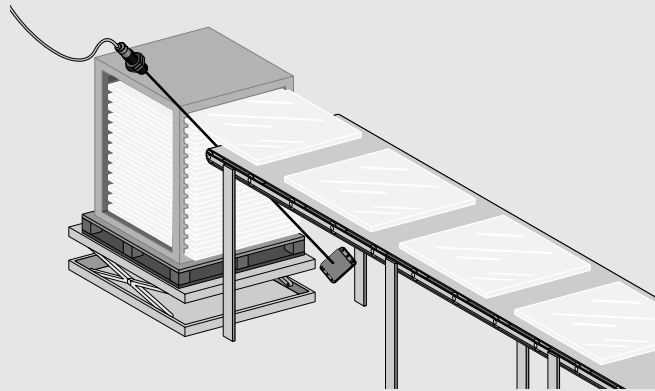
XUM•15353•

15: Detecting dark colored objects on a conveyor



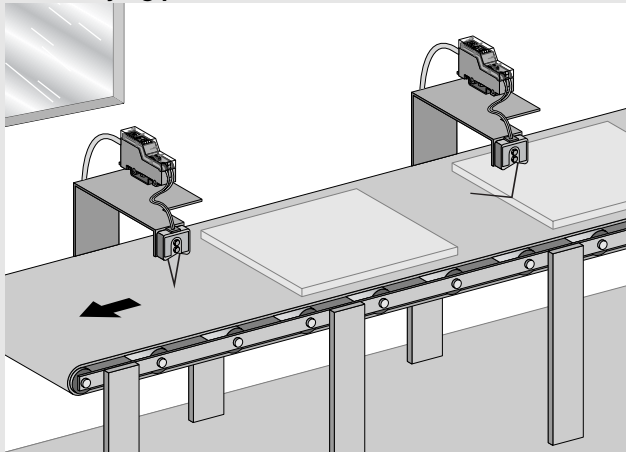
XUX0AKSAT16 or XUX5A••NT16

16: Monitoring the alignment of glass panes



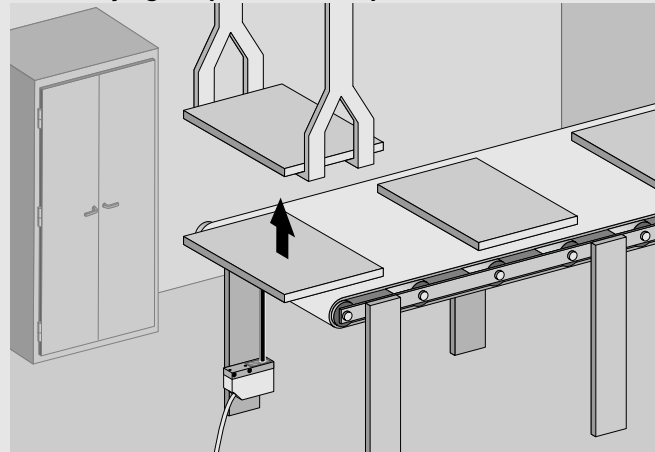
XUB•01353

17: Verifying plate feed



XUV•003530 + XUVN02428

18: Verifying the presence of a plate



XUK0AKSAL2 or XUK5A••NL2

Photoelectric Sensors

Application Examples

19: Indexing the height of a table

XUJK803538 (analog)

20: Detecting overlapping plates

XUK0AKSAL2 or XUK5A••NL2

21: Indexing position of robot arms

XUX0AKSAT16 or XUX5A••NT16

22: Counting televisions

XUK0AKSAL2 or XUK5A••NL2

23: Verifying the presence of a plastic cap

XUB0••SNM12 or XUB5••NM12 + XUB0••SWL2 or XUB9••WL2

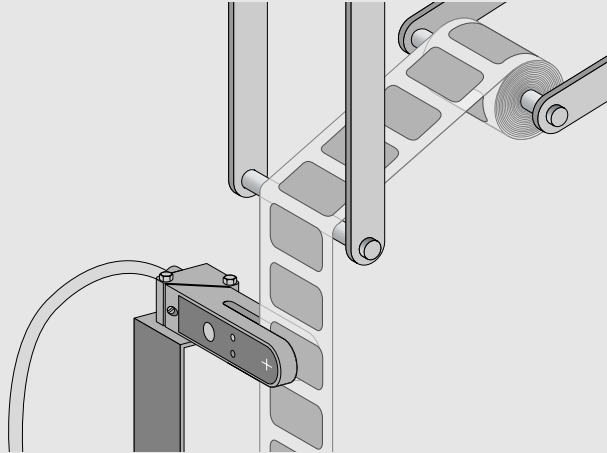
24: Detecting plastic film

XUB•01353

Photoelectric Sensors

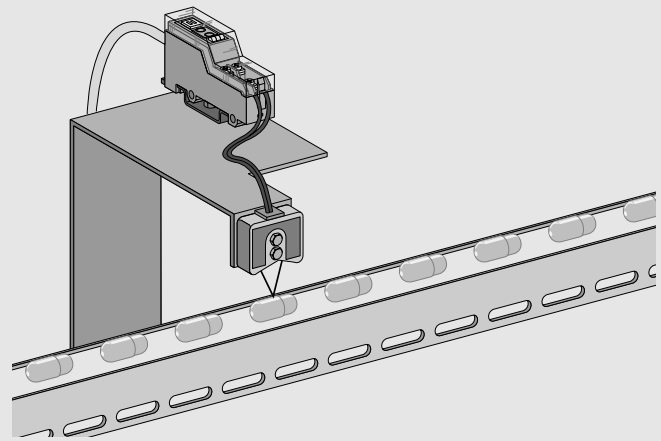
Application Examples

25: Detecting a label on a transparent background



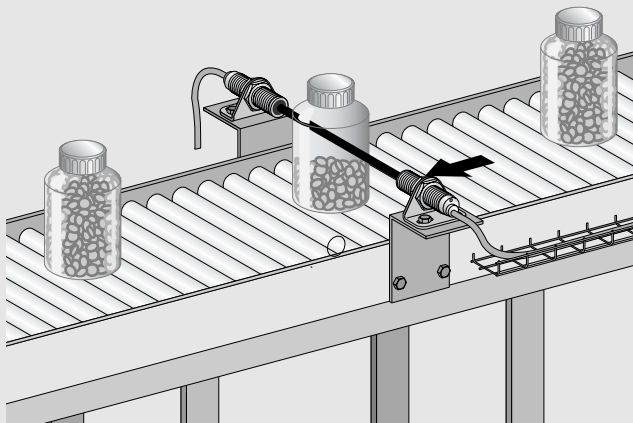
XUVK0252

26: Counting tablets



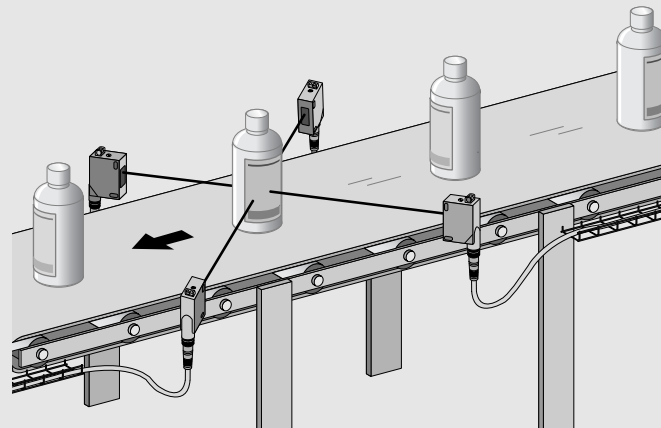
XUV-003530

27: Verifying the presence of tablets in a bottle



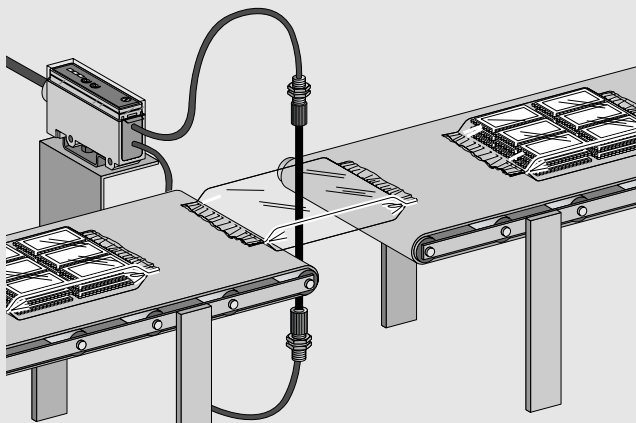
XUB0**SNL2 + XUB0*KSNL2T or XUB2**NL2R + XUB2*KSNL2T

28: Verifying the presence of a label



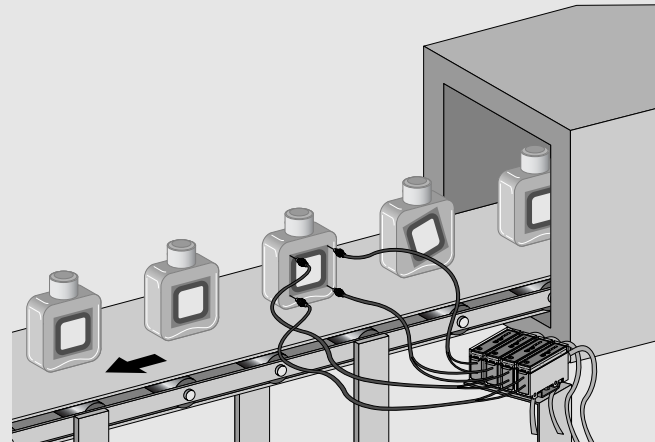
XUM0A*SAM8 + XUM0AKSAM8T or XUM2A**NM8R + XUM2AKSNM8T

29: Verifying presence of cakes in transparent packaging



XUDA**SML2 + XUFN12301 + XUFZ01

30: Detecting incorrect positioning of a label

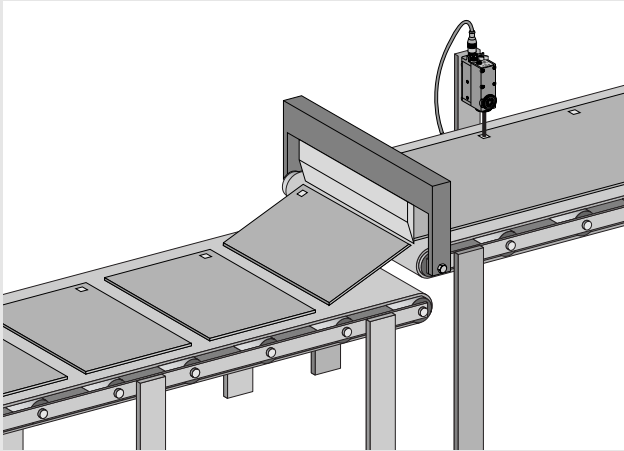


XUDA**SML2 + XUFN05321

Photoelectric Sensors

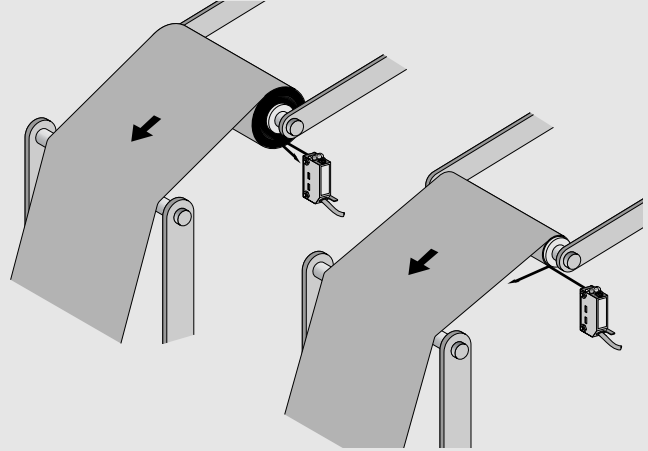
Application Examples

31: Reading reference marks for trimming



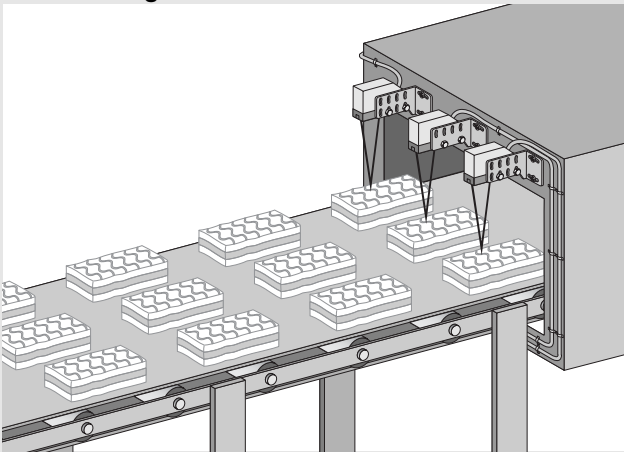
XURK0955D

32: Detecting the end of a roll



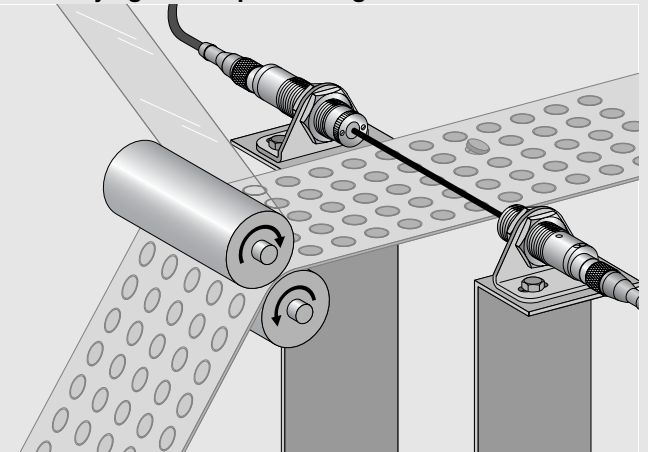
XUM0A•SAL2 or XUM5A•NL2

33: Detecting cakes



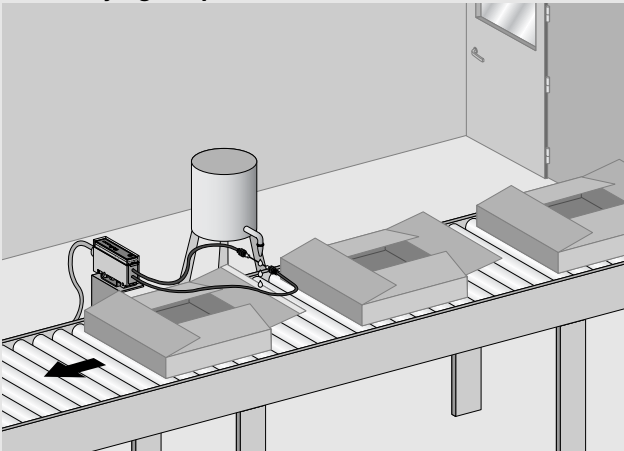
XUM0A•SAL2 or XUM5A•NL2

34: Verifying correct positioning of labels



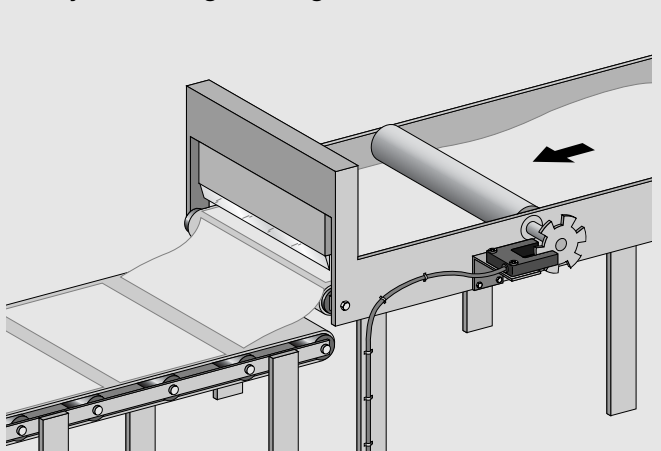
XU2P18•P340DL

35: Verifying the presence of adhesive



XUDA•SML2 + XUFN35301

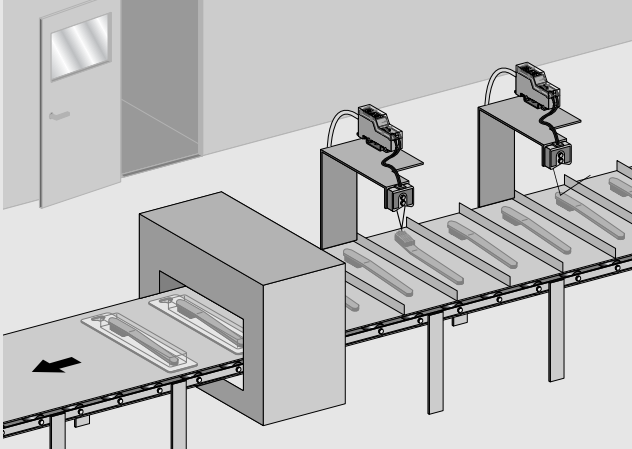
36: Synchronizing a cutting stroke



XUVH0312

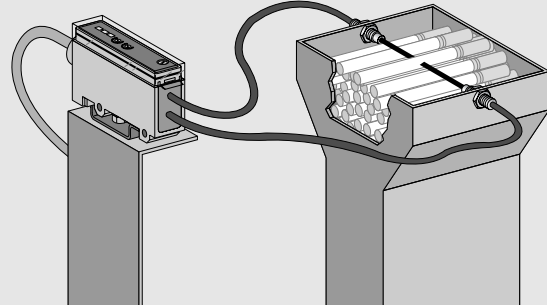
Photoelectric Sensors Application Examples

37: Monitoring the position of tooth brushes



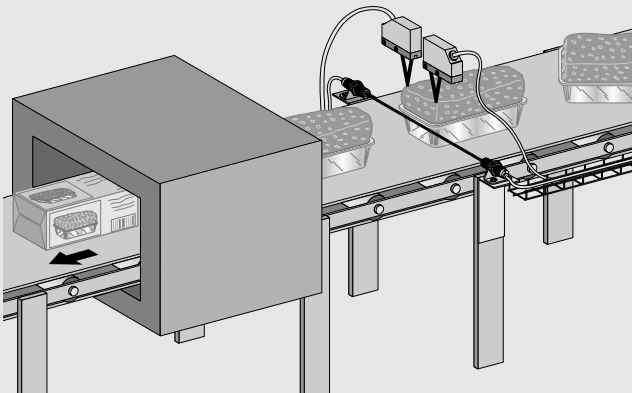
XUV•003530

38: Monitoring the stock level in a hopper



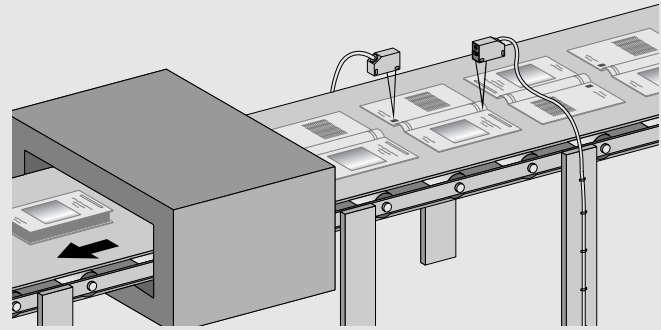
XUDA•SML2

39: Monitoring a cake position prior to packaging



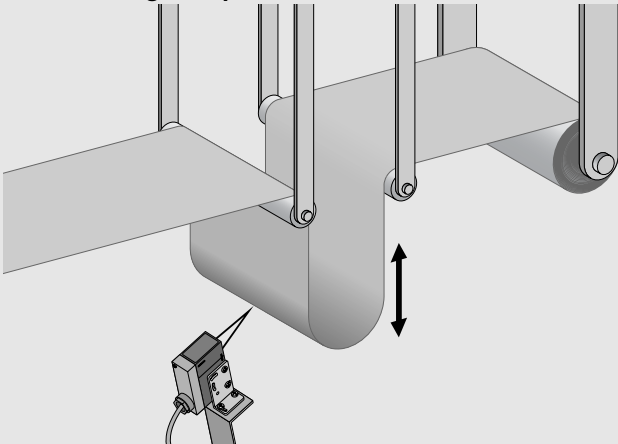
XUM0A•SAL2 or XUM5A•NL2 (miniature) + XUB•SNL2 + XUB0•KSNL2T or XUB2•NL2R + XUB2•KSNL2T (tubulars)

40: Monitoring the positioning of a book cover



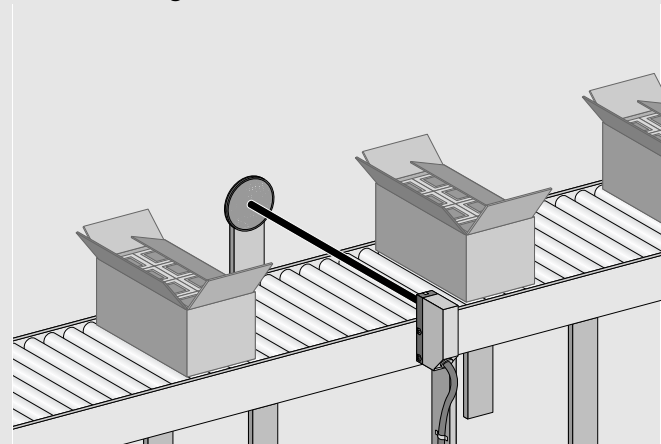
XUM•15353R (color mark reader)

41: Detecting a loop



XUJK803538 (analog)

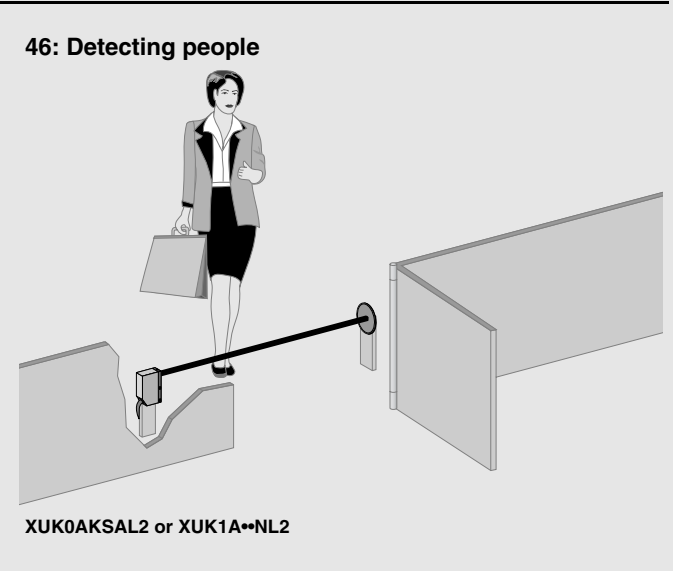
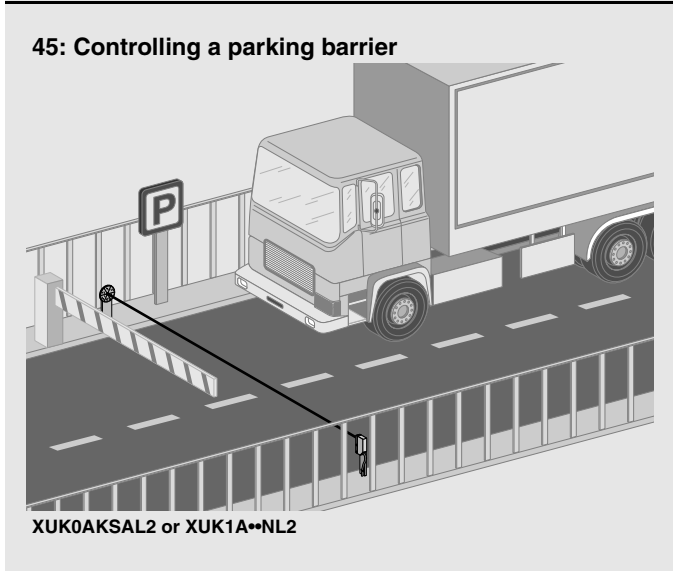
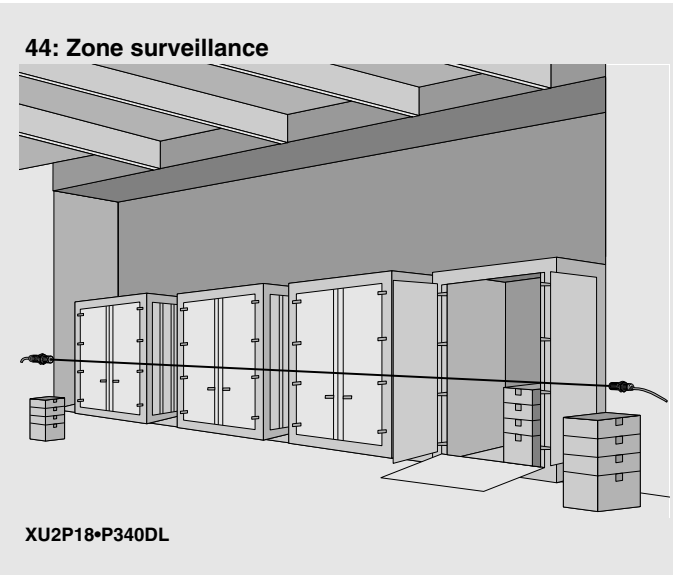
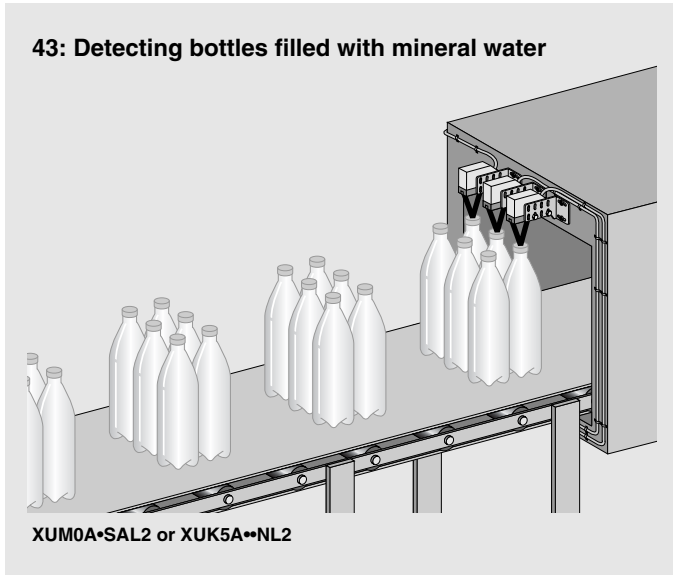
42: Monitoring the flow of cartons



XUK0AKSAL2 or XUK1A•NL2

Photoelectric Sensors

Application Examples



Photoelectric Sensors

Interpretation of Catalog Numbers

	X	U	X	O	A	K	S	A	T	1	6	
BODY STYLE																
8 mm tubular			A													
18 mm tubular			B													
40 x 40 mm square			C													
Amplifier			D													
Rectangular compact			E													
Fiber optic			F													
Compact rectangular			J													
Rectangular subcompact 50 x 50 x 18 mm			K													
Subcompact rectangular			L													
Rectangular miniature			M													
Rectangular compact color			R													
Fork and frame sensors			V													
Rectangular output PE			X													
Accessories			Z													
FORMAT OR MODE																
Multi-Mode				0												
Retroreflective				1												
Thru-beam				2												
Fixed proximity long range				3												
Fixed proximity short range				4												
Adjustable proximity long range				5												
Adjustable proximity short range				6												
Background suppression				8												
Polarized retroreflective				9												
Fiber amplifier				A												
Color detection				C												
Glass fiber				G												
Separate head				H												
Laser				L												
Plastic fibers				N												
Color contrast				R												
Safety				S												
Transparent detection				T												
Amplifier heads				V												
Accessories				Z												
FAMILY TYPE OR MATERIAL																
Osiris® applications (versions)					1-9											
Plastic					A											
Metal					B											
Stainless Steel					S											
OUTPUT																
DC 3-wire PNP									P							
DC 3-wire NPN									N							
DC 3-wire PNP/NPN									K							
DC 2-wire									D							
DC 2-wire automobile									C							
DC analog output									A							
AC 2-wire									F							
AC/DC 2-wire									M							
AC/DC 2-wire SCP									S							
AC/DC relay									R							
BUS									B							
FUNCTION																
Analog 0-10 mA										1						
Analog 4-20 mA										2						
N.O.										A						
N.C.										B						
N.O. + N.C.										C						
Programmable/wiring										P						
Programmable										S						
ADDITIONAL FUNCTIONS																
No additional functions															N	
Time delay															T	
Anti-interference															I	
Teach															M	
Alarm output															A	
Side sensing															W	
CONNECTION																
M8 x 1 (S)										M	8					
M12 x 1 (D)										M	1	2				
7/8 16UN (A)										U	7	8				
1/2 20 UNF (K)										U	2	0				
Cable, 0.1 m (3.9 in.)										L	0	1				
Cable, 2 m (6.6 ft)										L	2					
Cable, 5 m (16.4 ft)										L	5					
Cable, 10 m (32.8 ft)										L	1	0				
M12 pigtail 0.1 m (3.9 in.)										L	0	1	M	1	2	
Cable entry metric 16										T	1	6				
OPTIONAL																
Emitter																T
Receiver																R

Photoelectric Sensors

Interpretation of Catalog Numbers

Classic XU 18 mm Tubular

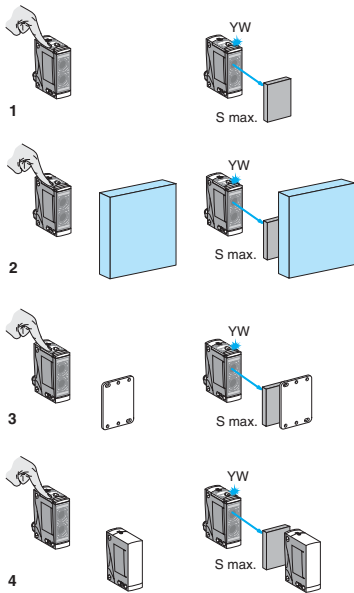
Example	X	U	2	M	1	8	M	A	2	3	•	D
Photoelectric												
MODE OF SENSING												
Retroreflective			1									
Thru-beam			2									
Proximity diffuse			5									
Proximity diffuse with background suppression			8									
Polarized retroreflective			9									
ENCLOSURE TYPE												
Plastic with sensitivity adjustment				B								
Metal with sensitivity adjustment				M								
Metal				N								
Plastic				P								
DIAMETER												
18 mm diameter					1	8						
OUTPUT												
Analog							A					
2-wire AC/DC							M					
3-wire DC, NPN							N					
3-wire DC, PNP							P					
Ultraviolet							U					
OPERATION MODE												
Dark operate								A				
Light operate								B				
Light and dark operate								P				
WIRING												
2-Wire									2			
3-Wire									3			
AC/DC without short circuit protection										3		
DC with short circuit protection										4		
MISCELLANEOUS												
DC micro-style connector												D
Laser Sensor with micro-style connector												DL
AC/DC micro-style connector												K
Cable, 5 m												L5
Cable, 10 m												L10
Separate thru-beam receiver												R
Separate thru-beam emitter												T
90° side sensing												W

NOTE: Use these tables only for interpreting the catalog number. Some combinations are not available. Consult your local field office.

Photoelectric Sensors

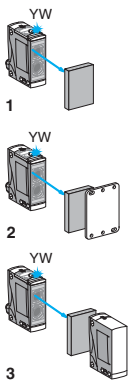
Osiconcept™ Multi-Mode™ Technology

Overview



Principle

- A single product that automatically adapts to every use
Telemecanique® brand offers this major innovation: Osiconcept technology—Offering Simplicity through Innovation.
- With Osiconcept technology, simply clicking on the teach button automatically configures the product for optimal use based on the application.
 1. Diffuse proximity sensing with no accessories
 2. Diffuse proximity sensing with background suppression, with no accessories
 3. Polarized retroreflexive sensing with a reflector accessory
 4. Thru-beam sensing with thru-beam accessory
- In addition, Osiconcept technology offers:
 - the maximum range for each environment
 - a 90% reduction in the number of separate products needed
- The first sensor of its kind in the world for enhancing productivity
- A complete offering that resolves the most common sensing problems:
 - simplifying your options
 - simplifying your product inventories
 - simplifying installation
 - simplifying maintenance



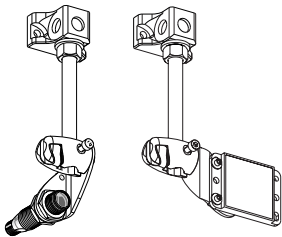
Automatic Output Activation when the Object is Present

- All Osiconcept photoelectric sensors boast automatic activation of the output signal. When an object is present, the output is activated—regardless of the sensing mode used (with or without an accessory). See the figure at left.
 1. Output activated
 2. Output activated
 3. Output activated

NOTE: Reverse operation is available simply by pressing the teach button.

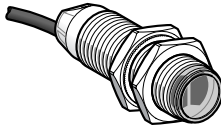
Installation

- The 3-D attachment kits provide quick installation or adjustment of Osiconcept photoelectric sensors on 3 axes.
 - Can also be used to install reflectors
 - Includes a set of brackets, screws, and covers that can be used to install all new enclosures in the Osiris® line of Osiconcept photoelectric sensors

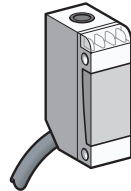
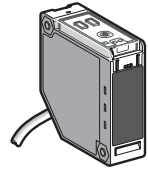
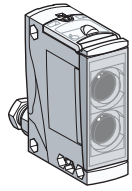


Photoelectric Sensors
Osiconcept™ Multi-Mode™ Technology
Overview

Tubular

Dimensions	18 mm (0.71 in.)
	
Applications	Machine Building, Packaging, Counting, Conveyor
Range, m (ft)	
with emitter accessory	15 (49.2)
with reflector accessory	2 (6.6)
diffuse without accessory	0.30 (1.0)
Diffuse with background suppression, without accessory	0.12 (0.4)
Body style	XUB
Page	32

Rectangular

Dimensions—mm (in.)	12 x 34 x 20 (0.47 x 1.3 x 0.78)	18 x 50 x 50 (0.7 x 1.9 x 1.9)	30 x 114 x 87.5 (1.2 x 4.5 x 3.4)
			
Applications	Packaging, Counting, Access Control, Conveyor		
Range, m (ft)			
thru-beam with emitter accessory	8 (26.2)	30 (98.4)	40 (130)
with reflector accessory	2 (6.6)	4 (13)	11 (36.1)
diffuse without accessory	0.40 (1.3)	0.80 (2.6)	2.1 (6.9)
Diffuse with background suppression, without accessory	0.10 (0.3)	0.28 (0.9)	1.3 (4.3)
Body style	XUM	XUK	XUX
Pages	48	52	56

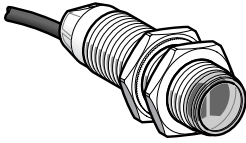
A complete offer structured to the specific needs of the market today:

- Multi-Mode™ Sensors—Products for multiple functions
- General Sensors—Product with essential functions for minimum cost
- Application Specific—Products designed to perform the most difficult applications to the customer's requirements

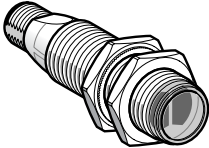
Osiconcept™ Photoelectric Sensors

XUB 18 mm Tubular

Plastic, Multi-Mode™, Front Sensing, DC



XUB0...NL2



XUB0...NM12

Features

- Selectable sensing mode
 - Diffuse
 - Diffuse with background suppression
 - Polarized retroreflective ■
 - Thru-beam *
- Light (N.C.) / Dark (N.O.) selectable
- Self-teaching feature enables setup with the press of a button
- Multi-Mode sensor allows stock reduction
- Plastic housing

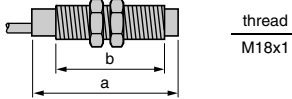
Output Mode	Circuit Type	Voltage Range	Connection Type □	Load Current Maximum	Operating Frequency Maximum	Catalog Number
N.C. / N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUB0APSNL2
N.C. / N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUB0APSNM12
N.C. / N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUB0ANSNL2
N.C. / N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUB0ANSNM12

Accessories (for additional accessories, see pages 134–139)

Description	Connection Type	Catalog Number
Reflector	—	XUZC50
Transmitter	2 m (6.6 ft) cable	XUB0AKSNL2T
	4-pin micro-style	XUB0AKSNM12T

- * Transmitter required for Multi-Mode receiver to operate in thru-beam mode
- Reflector required for Multi-Mode receiver to operate in polarized retroreflective mode
- For a 5 m (16.4 ft) cable length, add suffix L5.

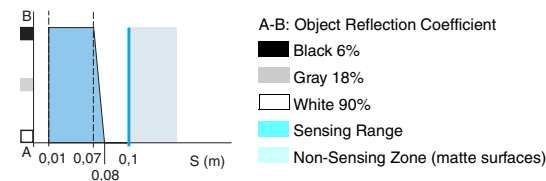
Dimensions



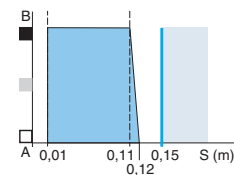
	Cable		Connector	
	a	b	a	b
∅ 18 Front Sensing	2.5 (64)	1.7 (44)	3.1 (78)	1.7 (44)
∅ 18 XUB0...T	2.4 (62)	—	3.0 (76)	—
in. (mm)				

Variation of Usable Sensing Distance

Diffuse System with Adjustable Background Suppression
Learning at Minimum



Learning at Maximum



Excess Gain

An excess gain of 2 has been achieved at the nominal sensing distance (S_n) of all sensing modes.

Osiconcept™ Photoelectric Sensors

XUB 18 mm Tubular

Plastic, Multi-Mode™, Front Sensing, DC

Wiring



Specifications

Mechanical

For the usable sensing range, see the detection curves.

Sensing Distance (Sn) (excess gain = 2)	Diffuse Background Suppression	12 cm (4.72 in.)
	Diffuse Standard	30 cm (11.81 in.)
Temperature Range	Polarized Retroreflective	2 m (6.6 ft)
	Thru-Beam	15 m (49.2 ft)
Enclosure Rating	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Material	NEMA Type	4X (indoor), 12
	IEC	IP67 Double Insulated
Tightening Torque, Maximum	Case	PBT
	Lens	PMMA
	Cable	PVR
Vibration Resistance	Mounting Nuts	5 N•m (44.4 lb-in)
	Connector	2 N•m (17.7 lb-in)
Shock Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10–55 Hz)
LED Indicator	(IEC 60068-2-27)	30 g, 11 ms duration
	Output	Yellow
	Signal Instability	Red
Connection	Power and Teach	Green
	Cable	4.2 mm (0.17 in.) O.D. 3 conductor 0.34 mm ² (22 AWG)
	Connector	4-pin micro-style DC (M12)

Electrical

Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	35 mA (20 mA–XUB0***T)
Load Current, Maximum	100 mA
Operating Frequency, Maximum	250 Hz
On Delay, Maximum	2 ms
Off Delay, Maximum	2 ms
Power-up Delay, Maximum	200 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes

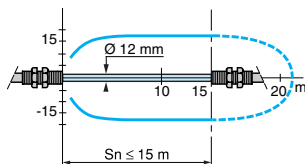


Accessories

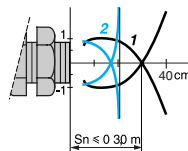
Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp style mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003

Detection Curves

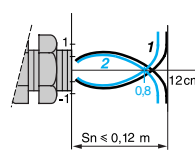
Thru-Beam with Thru-Beam Accessory



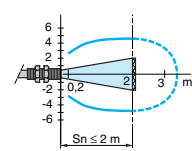
Diffuse without Accessory



Diffuse without Accessory with Background Suppression



Polarized Retroreflective with Reflector Accessory



Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths... Page 484.

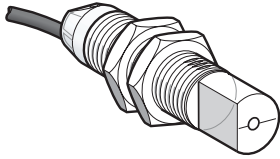
Object: 100 x 100 mm (3.9 x 3.9 in.)
1: White 90%, 2: Gray 18%

With Reflector XUZC50

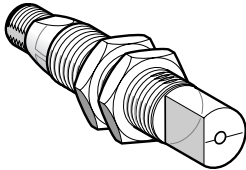
Osiconcept™ Photoelectric Sensors

XUB 18 mm Tubular

Plastic, Multi-Mode™, 90° Side Sensing, DC



XUB0***WL2



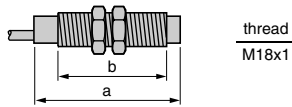
XUB0****WM12

Features

- Selectable sensing mode
 - Diffuse
 - Diffuse with background suppression
 - Polarized retroreflective ■
 - Thru-beam *
- Light (N.C.)/Dark (N.O.) selectable
- Self-teaching feature enables setup with the press of a button
- Multi-Mode sensor allows stock reduction
- Plastic housing

Output Mode	Circuit Type	Voltage Range	Connection Type □	Load Current Maximum	Operating Frequency Maximum	Catalog Number
N.C. / N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUB0APSWL2
N.C. / N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUB0APSWM12
N.C. / N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUB0ANSWL2
N.C. / N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUB0ANSWM12

Dimensions



	Cable		Connector	
	a	b	a	b
∅ 18 90° Side Sensing	3.1 (78)	1.7 (44)	3.6 (92)	1.7 (44)
in. (mm)				

Accessories

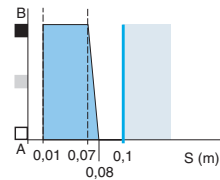
Description	Connection Type	Catalog Number
Reflector	—	XUZC50
Transmitter	2 m (6.6 ft) cable	XUB0AKSWL2T
	4-pin micro-style	XUB0AKSWM12T

- * Transmitter required for Multi-Mode receiver to operate in thru-beam mode
- Reflector required for Multi-Mode receiver to operate in polarized retroreflective mode
- For a 5 m (16.4 ft) cable length, add suffix L5.

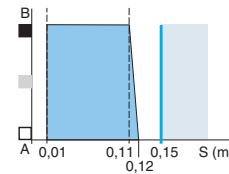
Variation of Usable Sensing Distance

Diffuse System with Adjustable Background Suppression

Learning at Minimum



Learning at Maximum



A-B: Object Reflection Coefficient

- Black 6%
- Gray 18%
- White 90%

- Sensing Range
- Non-Sensing Zone (matte surfaces)

Excess Gain

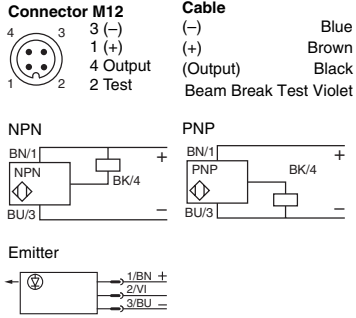
An excess gain of 2 has been achieved at the nominal sensing distance (Sn) of all sensing modes.

Osiconcept™ Photoelectric Sensors

XUB 18 mm Tubular

Plastic, Multi-Mode™, 90° Side Sensing, DC

Wiring



Specifications

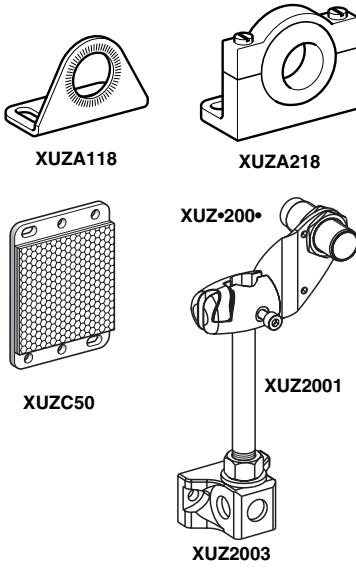
Mechanical

For the usable sensing range, see the detection curves.

Sensing Distance (Sn) (excess gain—2)	Diffuse Background Suppression	12 cm (4.72 in.)
	Diffuse Standard	20 cm (7.87 in.)
	Polarized Retroreflective	1.5 m (4.9 ft)
Temperature Range	Thru-Beam	10 m (32.8 ft)
	Operating	-13 to +131 °F (-25 to +55 °C)
Enclosure Rating	Storage	-40 to +158 °F (-40 to +70 °C)
	NEMA Type	4X (indoor), 12
Enclosure Material	IEC	IP67 Double Insulated
	Case	PBT
Tightening Torque, Maximum	Lens	PMMA
	Connector	PVR
	Mounting Nuts	5 N•m (44.4 lb-in)
Vibration Resistance	Connector	2 N•m (17.7 lb-in)
	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, duration 10 ms
LED Indicator	Output	Yellow
	Signal Instability	Red
	Power and Teach	Green
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor 0.34 mm ² (22 AWG)
	Connector	4-pin micro-style DC (M12)

Electrical

Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	35 mA (20 mA–XUB0***T)
Load Current, Maximum	100 mA
Operating Frequency, Maximum	250 Hz
On Delay, Maximum	2 ms
Off Delay, Maximum	2 ms
Power-up Delay, Maximum	200 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes

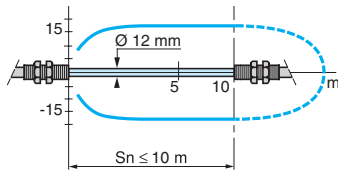


Accessories (for additional accessories, see pages 134–139)

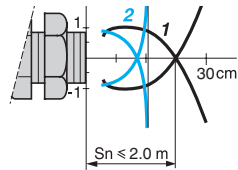
Description	Catalog Number
Reflector, 50x50 mm	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp style mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003

Detection Curves

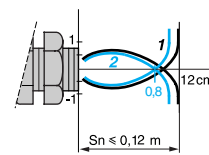
Thru-Beam with Thru-Beam Accessory



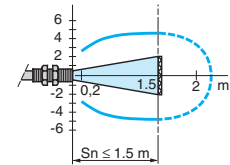
Diffuse without Accessory



Diffuse without Accessory with Background Suppression



Polarized Retroreflective with Reflector Accessory



Connector Cables (M12 or D suffix)

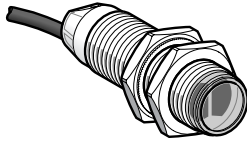
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

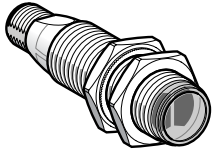
Osiconcept™ Photoelectric Sensors

XUB 18 mm Tubular

Metal, Multi-Mode™, Front Sensing, DC



XUB0****ML2



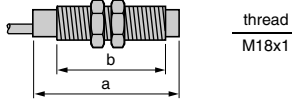
XUB0****NM12

Features

- Selectable sensing mode
 - Diffuse
 - Diffuse with background suppression
 - Polarized retroreflective ■
 - Thru-beam *
- Selectable N.C./N.O. output mode
- Self-teaching feature enables setup with the press of a button
- Multi-Mode sensor allows stock reduction
- Metal housing

Output Mode	Circuit Type	Voltage Range	Connection Type □	Load Current Maximum	Operating Frequency Maximum	Catalog Number
N.C. / N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUB0BPSNL2
N.C. / N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUB0BPSNM12
N.C. / N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUB0BNSNL2
N.C. / N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUB0BNSNM12

Dimensions



	Cable		Connector	
	a	b	a	b
∅ 18 Front Sensing	2.5 (64)	1.7 (44)	3.1 (78)	1.7 (44)
∅ 18 XUB0***T	2.4 (62)	—	3.0 (76)	—

in. (mm)

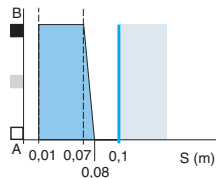
Accessories

Description	Connection Type	Catalog Number
Reflector	—	XUZC50
Transmitter	2 m (6.6 ft) cable	XUB0BKSNL2T
	4-pin micro-style	XUB0BKSNMT12T

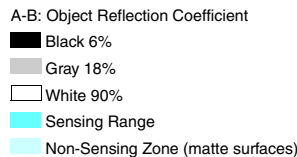
- * Transmitter required for Multi-Mode receiver to operate in thru-beam mode
- Reflector required for Multi-Mode receiver to operate in polarized retroreflective mode
- For a 5 m (16.4 ft) cable length, add suffix L5.

Variation of Usable Sensing Distance

Diffuse System with Adjustable Background Suppression
Learning at Minimum



Learning at Maximum



Excess Gain

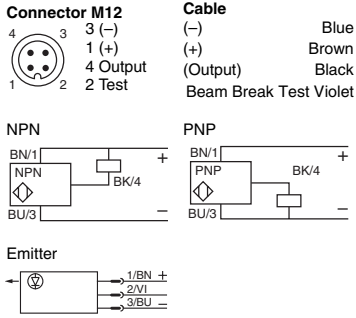
An excess gain of 2 has been achieved at the nominal sensing distance (Sn) of all sensing modes.

Osiconcept™ Photoelectric Sensors

XUB 18 mm Tubular

Metal, Multi-Mode™, Front Sensing, DC

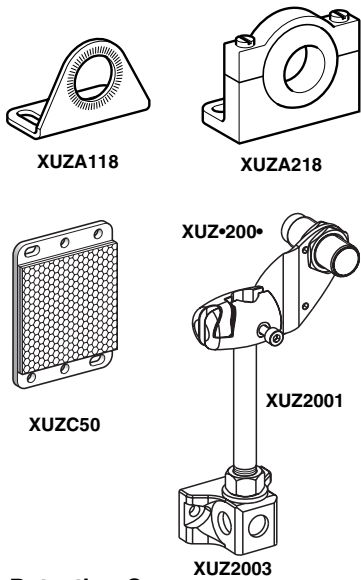
Wiring



Specifications

Mechanical		
For the usable sensing range, see the detection curves.		
Sensing Distance (Sn) (Excess Gain = 2)	Diffuse with Background Suppression	12 cm (4.72 in.)
	Standard Diffuse	30 cm (11.81 in.)
	Polarized Retroreflective	2 m (6.6 ft)
	Thru-Beam	15 m (49.2 ft)
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4X, 12
	IEC	IP67
Enclosure Material	Case	Nickel-plated brass
	Lens	PMMA
	Cable	PVR
Tightening Torque, Maximum	Mounting Nuts	15 N•m (133.3 lb-in)
	Connector	2 N•m (17.7 lb-in)
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
	Signal Instability	Red
	Power and Teach	Green
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor 0.34 mm ² (22 AWG)
	Connector	4-pin micro-style DC (M12)

Electrical	
Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	35 mA (20 mA–XUB0•••T)
Load Current, Maximum	100 mA
Operating Frequency, Maximum	250 Hz
On Delay, Maximum	2 ms
Off Delay, Maximum	2 ms
Power-up Delay, Maximum	200 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes
Agency Listings	UL SP CE

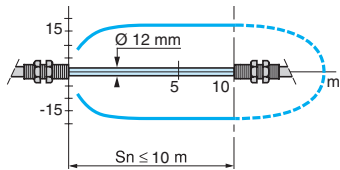


Accessories (for additional accessories, see pages 134–139)

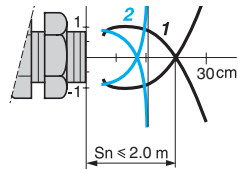
Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp style mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003

Detection Curves

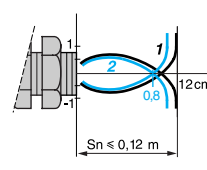
Thru-Beam with Thru-Beam Accessory



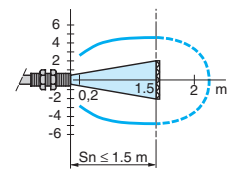
Diffuse without Accessory



Diffuse without Accessory with Background Suppression



Polarized Retroreflective with Reflector Accessory



Connector Cables (M12 or D suffix)

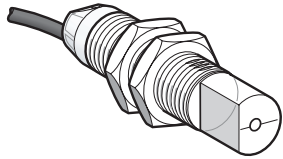
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

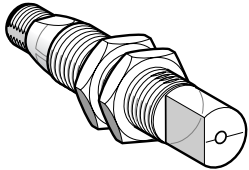
Osiconcept™ Photoelectric Sensors

XUB 18 mm Tubular

Metal, Multi-Mode™ 90° Side Sensing, DC

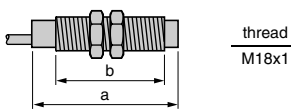


XUB00***WL2



XUB0***WM12

Dimensions



	Cable		Connector	
	a	b	a	b
Ø 18	3.1	1.7	3.6	1.7
90°	(78)	(44)	(92)	(44)
Side Sensing				
in. (mm)				

Features

- Selectable sensing mode
 - Diffuse
 - Diffuse with background suppression
 - Polarized retroreflective ■
 - Thru-beam *
- Selectable N.C. / N.O. output mode
- Self-teaching feature enables setup with the press of a button
- Multi-Mode sensor allows stock reduction
- Metal housing

Output Mode	Circuit Type	Voltage Range	Connection Type □	Load Current Maximum	Operating Frequency Maximum	Catalog Number
N.C. / N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUB0BPSWL2
N.C. / N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUB0BPSWM12
N.C. / N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUB0BNSWL2
N.C. / N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUB0BNSWM12

Accessories

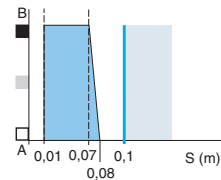
Description	Connection Type	Catalog Number
Reflector	—	XUZC50
Transmitter	2 m (6.6 ft) cable	XUB0BKSWL2T
	4-pin micro-style	XUB0BKSWMT12T

- * Transmitter required for Multi-Mode receiver to operate in thru-beam mode
- Reflector required for Multi-Mode receiver to operate in polarized retroreflective mode
- For a 5 m (16.4 ft) cable length, add suffix L5. For a 10 m (32.8 ft) cable length, add suffix L10.

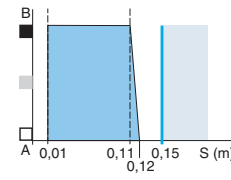
Variation of Usable Sensing Distance

Diffuse System with Adjustable Background Suppression

Learning at Minimum



Learning at Maximum



A-B: Object Reflection Coefficient

- Black 6%
- Gray 18%
- White 90%

■ Sensing Range

■ Non-Sensing Zone (matte surfaces)

Excess Gain

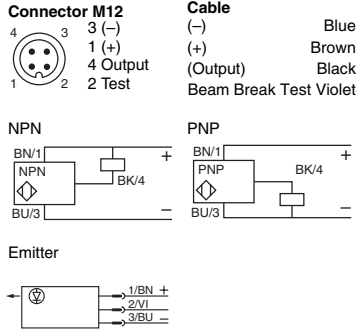
An excess gain of 2 has been achieved at the nominal sensing distance (S_n) of all sensing modes.

Osiconcept™ Photoelectric Sensors

XUB 18 mm Tubular

Metal, Multi-Mode™, 90° Side Sensing, DC

Wiring



Specifications

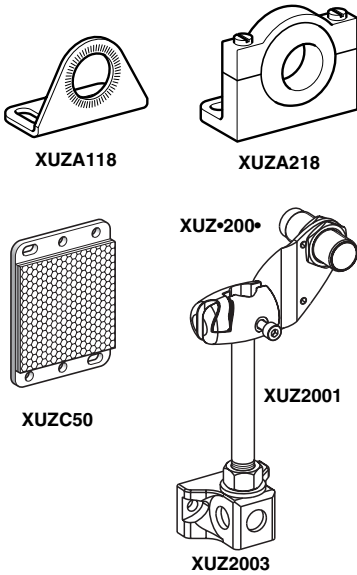
Mechanical

For the usable sensing range, see the detection curves.

Sensing Distance (Sn) (Excess Gain = 2)	Diffuse Background Suppression	12 cm (4.72 in.)
	Standard Diffuse	20 cm (7.87 in.)
	Polarized Retroreflective	1.5 m (4.9 ft)
	Thru-Beam	10 m (32.8 ft)
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4X, 12
	IEC	IP67
Enclosure Material	Case	Nickel-plated brass
	Lens	PMMA
	Cable	PVR
Tightening Torque, Maximum	Mounting Nuts	15 N•m (133.3 lb-in)
	Connector	2 N•m (17.7 lb-in)
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
	Signal Instability	Red
	Power and Teach	Green
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor 0.34 mm ² (22 AWG)
	Connector	4-pin micro-style DC (M12)

Electrical

Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	35 mA
Load Current, Maximum	100 mA
Operating Frequency, Maximum	250 Hz
On Delay, Maximum	2 ms
Off Delay, Maximum	2 ms
Power-up Delay, Maximum	200 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes

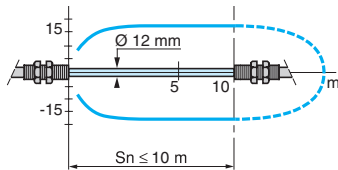


Accessories

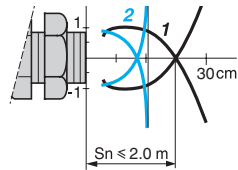
Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90 ° metal mounting bracket	XUZA118
Plastic clamp style mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem, 75 mm (2.95 in.) usable length.	XUZ2001
3-D mounting base	XUZ2003

Detection Curves

Thru-Beam with Thru-Beam Accessory

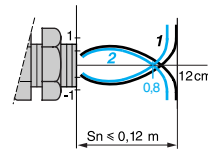


Diffuse without Accessory

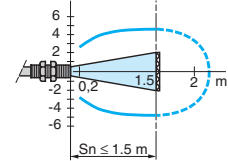


Object: 100 x 100 mm (3.9 x 3.9 in.)
1: White 90%, 2: Gray 18%

Diffuse without Accessory with Background Suppression



Polarized Retroreflective with Reflector Accessory



With Reflector XUZC50

Connector Cables (M12 or D suffix)

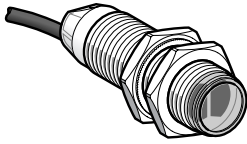
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths... Page 484

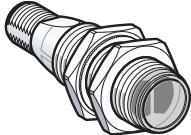
Photoelectric Sensors

XUB 18 mm Tubular

Plastic, Front Sensing, DC

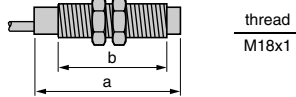


XUB•A•••••WL2



XUB•A••NM12

Dimensions



	Cable		Connector	
	a	b	a	b
∅ 18 Front Sensing	1.8 (46)	1.1 (28)	2.4 (60)	1.1 (28)
18 mm XUB5	2.5 (62)	1.7 (44)	3.0 (76)	1.7 (44)
XUB9	1.9 (48)	—	2.4 (62)	—

in. (mm)

Features

- Plastic housing
- Mounting nuts included
- UL Listed, CSA Certified
- CE Marked

Output Mode	Circuit Type	Voltage Range	Connection Type *	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam (receiver)—15 m (49.2 ft) Nominal Sensing Distance (emitter sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2APANL2R
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2APBNL2R
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2ANANL2R
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2ANBNL2R
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2APANM12R
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2APBNM12R
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2ANANM12R
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2ANBNM12R
Thru-Beam (emitter)						
—	—	12–24 Vdc	2 m (6.6 ft) cable	—	—	XUB2AKSNL2T
—	—	12–24 Vdc	4-pin micro-style	—	—	XUB2AKSNM12T
Retroreflective—4 m (13.1 ft) Nominal Sensing Distance (reflector sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1ANBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1ANBNM12
Polarized Retroreflective—2 m (6.6 ft) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9ANBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9ANBNM12
Fixed Proximity Diffuse—10 cm (4 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4ANBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4ANBNM12
Adjustable Proximity Diffuse—60 cm (23.6 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5ANBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5ANBNM12

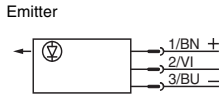
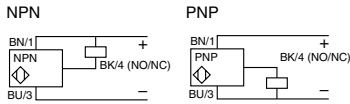
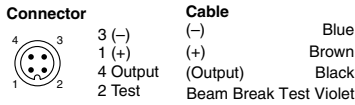
* For a 5 m (16.4 ft) cable length, add suffix L5.

Photoelectric Sensors

XUB 18 mm Tubular

Plastic, Front Sensing, DC

Wiring



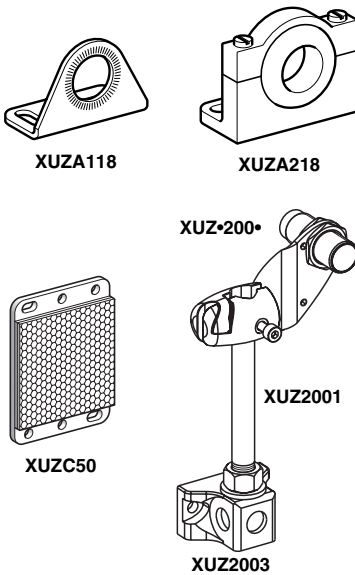
Excess Gain

An excess gain of 2 has been achieved at the nominal sensing distance (S_n) of all sensing modes.

Specifications

Mechanical		
For the usable sensing range, see the detection curves.		
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4X (indoor), 12
	IEC	IP67 Double Insulated
Enclosure Material	Case	PBT
	Lens	PMMA
	Cable	PVR
Tightening Torque, Maximum	Mounting Nuts	5 N•m (44.4 lb-in)
	Connector	2 N•m (17.7 lb-in)
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, duration 10 ms
LED Indicator	Output	Yellow
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor 0.34 mm ² (22 AWG)
	Connector	4-pin micro-style DC (M12)

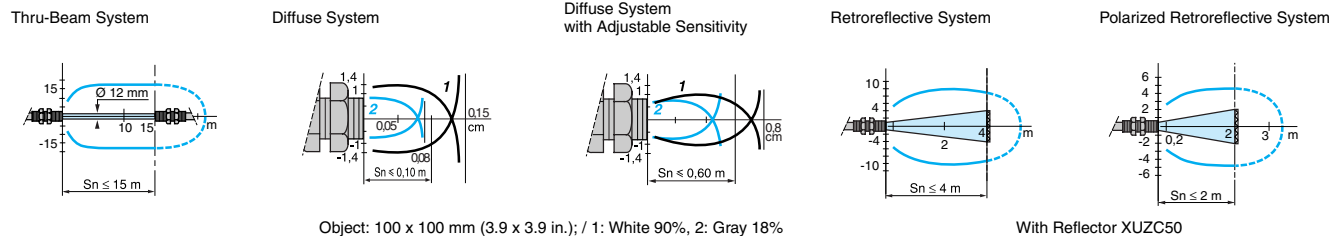
Electrical	
Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	35 mA
Load Current, Maximum	100 mA
Operating Frequency, Maximum	500 Hz
On Delay, Maximum	1 ms
Off Delay, Maximum	1 ms
Power-up Delay, Maximum	15 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes



Accessories

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZZ2003
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003
Plastic mounting nuts	XSZE218

Detection Curves



Connector Cables (M12 or D suffix)

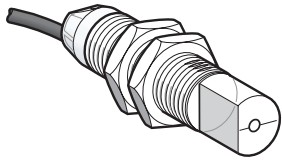
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths... Page 484

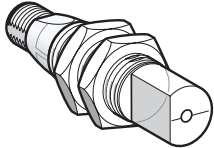
Photoelectric Sensors

XUB 18 mm Tubular

Plastic, 90° Side Sensing, DC

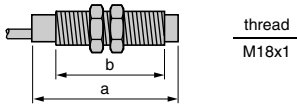


XUB•A••••WL2



XUB•A••WM12

Dimensions



	Cable		Connector	
	a	b	a	b
∅ 18 90° Side Sensing	2.4 (62)	1.1 (28)	3.0 (76)	1.1 (28)
18 mm XUB5	3.0 (78)	1.7 (44)	3.6 (92)	1.7 (44)
in. (mm)				

Features

- Plastic housing
- Mounting nuts included
- UL Listed, CSA Certified
- CE Marked

Output Mode	Circuit Type	Voltage Range	Connection Type *	Load Current Maximum	Operating Frequency	Catalog Number
Thru-Beam (receiver)—15 m (49.2 ft) Nominal Sensing Distance (emitter sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2APAWL2R
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2APBWL2R
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2ANAWL2R
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2ANBWL2R
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2APAWM12R
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2APBWM12R
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2ANAWM12R
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2ANBWM12R

Thru-Beam (emitter)						
—	—	12–24 Vdc	2 m (6.6 ft) cable	—	—	XUB2AKSWL2T
—	—	12–24 Vdc	4-pin micro-style	—	—	XUB2AKSWM12T

Retroreflective—4 m (13.1 ft) Nominal Sensing Distance (reflector sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1APAWL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1APBWL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1ANAWL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1ANBWL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1APAWM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1APBWM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1ANAWM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1ANBWM12

Polarized Retroreflective—2 m (6.6 ft) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9APAWL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9APBWL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9ANAWL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9ANBWL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9APAWM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9APBWM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9ANAWM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9ANBWM12

Fixed Proximity Diffuse—10 cm (4 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4APAWL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4APBWL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4ANAWL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4ANBWL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4APAWM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4APBWM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4ANAWM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4ANBWM12

Adjustable Proximity Diffuse—60 cm (23.6 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5APAWL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5APBWL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5ANAWL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5ANBWL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5APAWM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5APBWM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5ANAWM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5ANBWM12

* For a 5 m (16.4 ft) cable length, add suffix L5.

Excess Gain

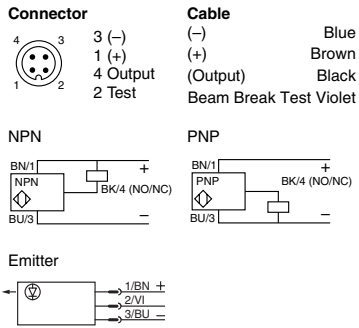
An excess gain of 2 has been achieved at the nominal sensing distance (Sn) of all sensing modes.

Photoelectric Sensors

XUB 18 mm Tubular

Plastic, 90° Side Sensing, DC

Wiring



Specifications

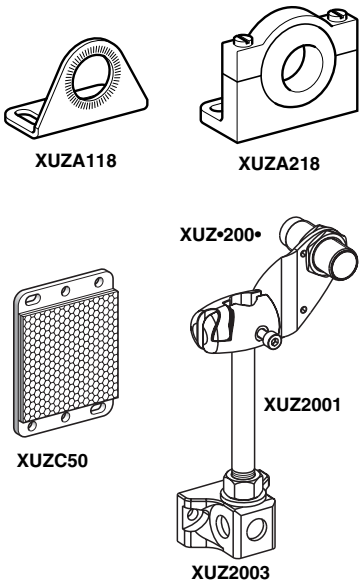
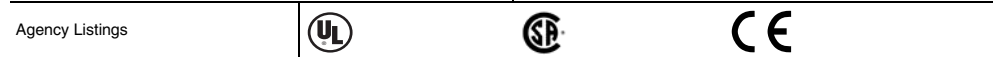
Mechanical

For the usable sensing range, see the detection curves.

Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4X (indoor), 12
	IEC	IP67 Double Insulated
Enclosure Material	Case	PBT
	Lens	PMMA
	Cable	PVR
Tightening Torque, Maximum	Mounting Nuts	5 N•m (44.4 lb-in)
	Connector	2 N•m (17.7 lb-in)
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, duration 10 ms
LED Indicator	Output	Yellow
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor 0.34 mm ² (22 AWG)
	Connector	4-pin micro-style DC (M12)

Electrical

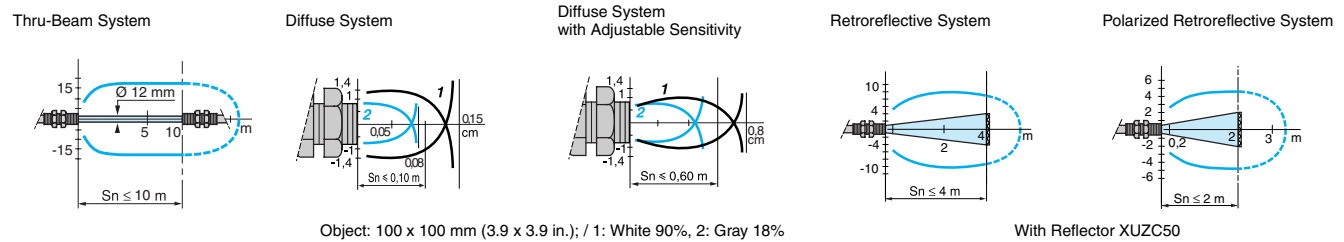
Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	35 mA
Load Current, Maximum	100 mA
Operating Frequency, Maximum	500 Hz
On Delay, Maximum	1 ms
Off Delay, Maximum	1 ms
Power-up Delay, Maximum	15 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes



Accessories

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003
Plastic mounting nuts	XSZE218

Detection Curves



Connector Cables (M12 or D suffix)

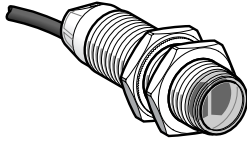
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths... Page 484

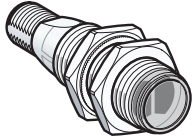
Photoelectric Sensors

XUB 18 mm Tubular

Metal, Front Sensing, DC

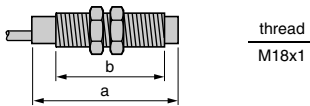


XUB•B•••••L2



XUB•B••NM12

Dimensions



	Cable		Connector	
	a	b	a	b
∅ 18 Front Sensing	1.8 (46)	1.1 (28)	2.4 (60)	1.1 (28)
18 mm XUB5	2.5 (62)	1.7 (44)	3.0 (76)	1.7 (44)
18 mm XUB9	1.9 (48)	—	2.4 (62)	—
in. (mm)				

Features

- Metal housing
- Mounting nuts included
- UL Listed, CSA Certified
- CE Marked

Output Mode	Circuit Type	Voltage Range	Connection Type *	Load Current Maximum	Operating Frequency	Catalog Number
Thru-Beam (receiver)—15 m (49.2 ft) Nominal Sensing Distance (emitter sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2BPANL2R
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2BPBNL2R
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2BNANL2R
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2BNBNL2R
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2BPANM12R
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2BPBNM12R
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2BNANM12R
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2BNBNM12R
Thru-Beam (emitter)						
—	—	12–24 Vdc	2 m (6.6 ft) cable	—	—	XUB2BKSNL2T
—	—	12–24 Vdc	4-pin micro-style	—	—	XUB2BKSNM12T
Retroreflective—4 m (13.1 ft) Nominal Sensing Distance (reflector sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1BPANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1BPBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1BNANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1BNBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1BPANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1BPBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1BNANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1BNBNM12
Polarized Retroreflective—2 m (6.6 ft) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9BPANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9BPBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9BNANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9BNBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9BPANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9BPBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9BNANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9BNBNM12
Fixed Proximity Diffuse—10 cm (4 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4BPANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4BPBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4BNANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4BNBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4BPANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4BPBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4BNANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4BNBNM12
Adjustable Proximity Diffuse—60 cm (23.6 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5BPANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5BPBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5BNANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5BNBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5BPANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5BPBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5BNANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5BNBNM12

* For a 5 m (16.4 ft) cable length, add suffix L5.

Excess Gain

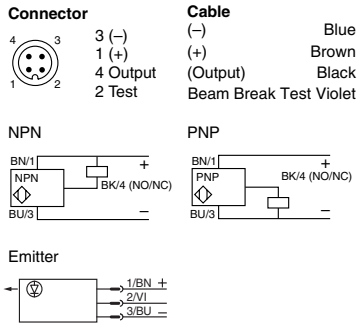
An excess gain of 2 has been achieved at the nominal sensing distance (Sn) of all sensing modes.

Photoelectric Sensors

XUB 18 mm Tubular

Metal, Front Sensing, DC

Wiring



Specifications

Mechanical

For the usable sensing range, see the detection curves.

Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4X, 12
	IEC	IP67 double insulated
Enclosure Material	Case	Nickel-plated brass
	Lens	PMMA
	Cable	PVR
Tightening Torque, Maximum	Mounting Nuts	15 N•m (133.3 lb-in)
	Connector	2 N•m (17.7 lb-in)
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor 0.34 mm ² (22 AWG)
	Connector	4-pin micro-style DC (M12)

Electrical

Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	35 mA
Load Current, Maximum	100 mA
Operating Frequency, Maximum	500 Hz
On Delay, Maximum	1 ms
Off Delay, Maximum	1 ms
Power-up Delay, Maximum	15 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes

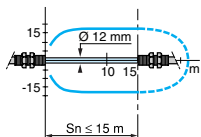
Agency Listings	UL	SP	CE
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Accessories

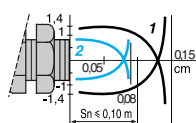
Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003
Metal mounting nuts	XSZE108

Detection Curves

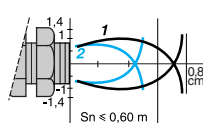
Thru-Beam System



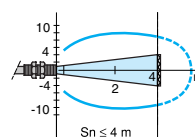
Diffuse System



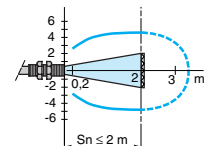
Diffuse System with Adjustable Sensitivity



Retroreflective System



Polarized Retroreflective System



Object: 100 x 100 mm (3.9 x 3.9 in.); / 1: White 90%, 2: Gray 18%

With Reflector XUZC50

Connector Cables (M12 or D suffix)

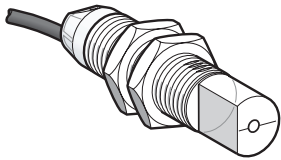
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

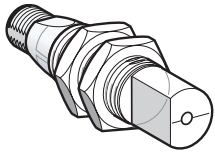
Photoelectric Sensors

XUB 18 mm Tubular

Metal, 90° Side Sensing, DC

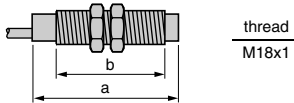


XUB•B••••WL2



XUB•B••WM12

Dimensions



	Cable		Connector	
	a	b	a	b
∅ 18 90° Side Sensing	2.4 (62)	1.1 (28)	3.0 (76)	1.1 (28)
18 mm XUB5	3.0 (78)	1.7 (44)	3.6 (92)	1.7 (44)
in. (mm)				

Features

- Metal housing
- Mounting nuts included
- UL Listed, CSA Certified
- CE Marked

Output Mode	Circuit Type	Voltage Range	Connection Type *	Load Current Maximum	Operating Frequency	Catalog Number
Thru-Beam (receiver)—15 m (49.2 ft) Nominal Sensing Distance (emitter sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2BPAWL2R
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2BPBWL2R
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2BNAWL2R
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB2BNBWL2R
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2BPAWM12R
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2BPBWM12R
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2BNAWM12R
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB2BNBWM12R
Thru-Beam (emitter)						
—	—	12–24 Vdc	2 m (6.6 ft) cable	—	—	XUB2BKSWL2T
—	—	12–24 Vdc	4-pin micro-style	—	—	XUB2BKSWM12T
Retroreflective—4 m (13.1 ft) Nominal Sensing Distance (reflector sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1BPAWL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1BPBWL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1BNAWL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB1BNBWL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1BPAWM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1BPBWM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1BNAWM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB1BNBWM12
Polarized Retroreflective—2 m (6.6 ft) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9BPAWL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9BPBWL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9BNAWL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB9BNBWL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9BPAWM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9BPBWM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9BNAWM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB9BNBWM12
Fixed Proximity Diffuse—10 cm (4 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4BPAWL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4BPBWL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4BNAWL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB4BNBWL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4BPAWM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4BPBWM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4BNAWM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB4BNBWM12
Adjustable Proximity Diffuse—60 cm (23.6 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5BPAWL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5BPBWL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5BNAWL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUB5BNBWL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5BPAWM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5BPBWM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5BNAWM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XUB5BNBWM12

* For a 5 m (16.4 ft) cable length, add suffix L5.

Excess Gain

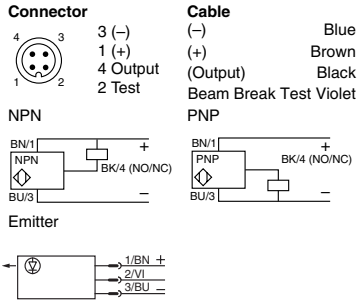
An excess gain of 2 has been achieved at the nominal sensing distance (Sn) of all sensing modes.

Photoelectric Sensors

XUB 18 mm Tubular

Metal, 90° Side Sensing, DC

Wiring



Specifications

Mechanical

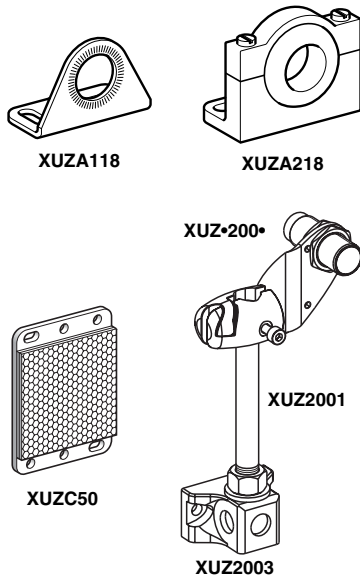
For the usable sensing range, see the detection curves.

Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4X, 12
	IEC	IP67 double insulated
Enclosure Material	Case	Nickel-plated brass
	Lens	PMMA
	Cable	PVR
Tightening Torque, Maximum	Mounting Nuts	15 N•m (133.3 lb-in)
	Connector	2 N•m (17.7 lb-in)
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor
	Connector	4-pin micro-style DC (M12)

Electrical

Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	35 mA
Load Current, Maximum	100 mA
Operating Frequency, Maximum	500 Hz
On Delay, Maximum	1 ms
Off Delay, Maximum	1 ms
Power-up Delay, Maximum	15 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes

Agency Listings

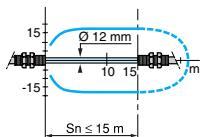


Accessories

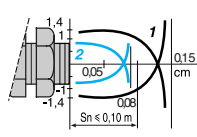
Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp style mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003
Metal mounting nuts	XSZE108

Detection Curves

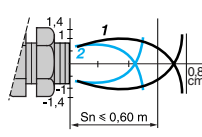
Thru-Beam System



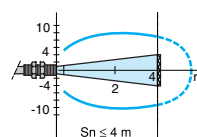
Diffuse System



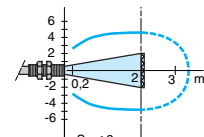
Diffuse System with Adjustable Sensitivity



Retroreflective System



Polarized Retroreflective System



Object: 100 x 100 mm (3.9 x 3.9 in.); / 1: White 90%, 2: Gray 18%

With Reflector XUZC50

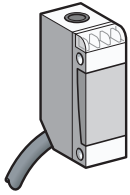
Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

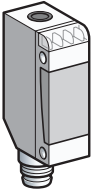
Additional cable options and lengths . . . Page 484

Osiconcept™ Photoelectric Sensors

XUM Miniature Rectangular Multi-Mode™, DC



XUM0A-L2



XUM0A-M8

Features

- Selectable sensing mode:
 - Diffuse
 - Diffuse with background suppression
 - Polarized retroreflective ■
 - Thru-beam *
- Selectable N.C. / N.O. output mode
- Self-teaching feature enables setup with the press of a button
- Multi-Mode sensor allows stock reduction
- Plastic housing

Output Mode	Circuit Type	Voltage Range	Connection Type □	Load Current Maximum	Operating Frequency Maximum	Catalog Number
N.C. / N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUM0APSA2
N.C. / N.O.	PNP	12–24 Vdc	M8 nano-style	100 mA	250 Hz	XUM0APSAM8
N.C. / N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUM0ANSA2
N.C. / N.O.	NPN	12–24 Vdc	M8 nano-style	100 mA	250 Hz	XUM0ANSAM8

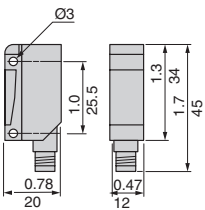
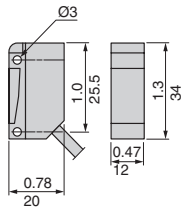
Accessories

Description	Connection Type	Catalog Number
Reflector	—	XUZZ50
Transmitter	2 m (6.6 ft) cable	XUM0AKSA2T
	M8 nano-connector	XUM0AKSAM8T

- * Transmitter required for Multi-Mode receiver to operate in thru-beam mode
- Reflector required for Multi-Mode receiver to operate in polarized retroreflective mode
- For a 5 m (16.4 ft) cable length, add suffix L5. For a 10 m (32.8 ft) cable length, add suffix L10.

Dimensions

XUM



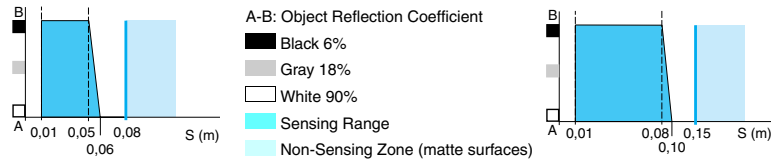
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Variation of Usable Sensing Distance

Diffuse System with Adjustable Background Suppression

Learning at Minimum

Learning at Maximum



Excess Gain

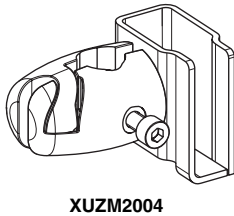
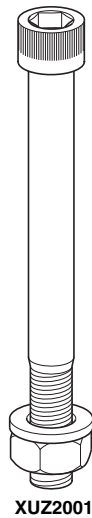
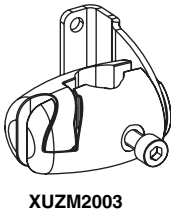
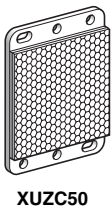
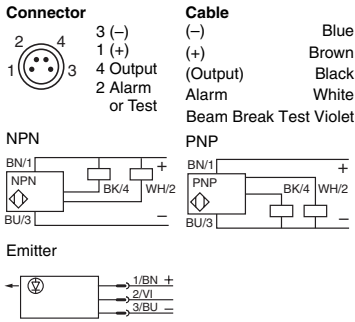
An excess gain of 2 has been achieved at the nominal sensing distance (S_n) of all sensing modes.

Osiconcept™ Photoelectric Sensors

XUM Miniature Rectangular

Multi-Mode™, DC

Wiring



Specifications

Mechanical

For the usable sensing range, see the detection curves.

Sensing Distance (Sn) (excess gain = 2)	Diffuse Background Suppression	10 cm (3.9 in.)
	Diffuse Standard	40 cm (15.7 in.)
	Polarized Retroreflective	3 m (9.8 ft)
	Thru-Beam	14 m (45.9 ft)
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	1, 3, 4, 6, 6P (cable version only), 12, 13
	IEC	IP67
Enclosure Material	Case	PBT
	Lens	PMMA
	Cable	PVR
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
	Power and Teach	Green
	Signal Instability	Red
Connection	Cable	4.2 mm (0.17 in.) O.D. 4 conductor
	Connector	4-pin nano-style M8

Electrical

Voltage Range	12–24 Vdc	
Voltage Limit (Including Ripple)	10–30 Vdc	
Voltage Drop (Across Switch), Closed State Maximum	1.5 V	
Current Consumption (No Load), Maximum	35 mA (20 mA–XUM0***T)	
Load Current, Maximum	100 mA	
Operating Frequency, Maximum	250 Hz	
On Delay, Maximum	2 ms	
Off Delay, Maximum	2 ms	
Power-up Delay, Maximum	100 ms	
Alarm Output	50 mA	
Wavelength	Polarized—red	660 nm
	Short Range Proximity	660 nm
	All others	880 nm
Protective Circuitry	Reverse Polarity Protection	Yes
	Overload Protection	Yes
	Short Circuit Protection-SCP	Yes
Agency Listings		

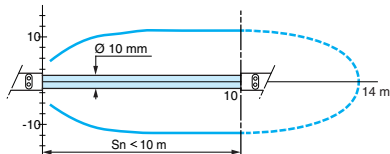
Accessories

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
3-D mounting bracket (stem not included) for XUM or Reflector	XUZM2003
3-D Protective mounting bracket (stem not included) for XUM	XUZM2004
M12 stem, 75 mm (2.95 in.) usable length	XUZZ001
3-D mounting base	XUZZ003
Metal mounting nuts	XSZE108

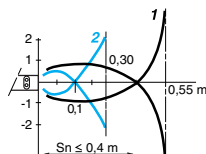
See page 139 for complete 3-D assembly.

Detection Curves

Thru-Beam with Thru-Beam Accessory

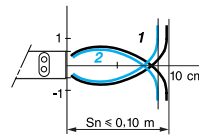


Diffuse without Accessory

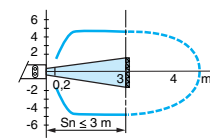


Object: 100 x 100 mm (3.9 x 3.9 in.)
1: White 90%, 2: Gray 18%

Diffuse without Accessory with Background Suppression



Polarized Retroreflective with Reflector Accessory



With Reflector XUZC50

Connector Cables (M8 or S suffix)

XSZCS141	Nano-style, 4-pin, 2 m, straight
XSZCS151	Nano-style, 4-pin, 2 m 90 °

Additional cable options and lengths . . . Page 484

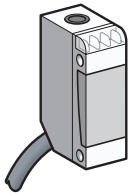
Photoelectric Sensors

XUM Miniature Rectangular DC

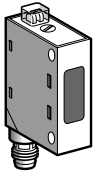
Optimum miniature rectangular photoelectric sensors designed for OEMs and industrial applications.

Features

- Small dimensions, designed to fit in those tight applications
- Quick connect versions
- Available in either N.C. or N.O. operation



XUM-A-L2



Output Mode	Circuit Type	Voltage Range	Connection Type *	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam (receiver)—8 m (26 ft) Nominal Sensing Distance (emitter sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	400 Hz	XUM2APANL2R
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	400 Hz	XUM2APBNL2R
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	400 Hz	XUM2ANANL2R
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	400 Hz	XUM2ANBNL2R
N.O.	PNP	12–24 Vdc	M8 nano-style	100 mA	400 Hz	XUM2APANM8R
N.C.	PNP	12–24 Vdc	M8 nano-style	100 mA	400 Hz	XUM2APBNM8R
N.O.	NPN	12–24 Vdc	M8 nano-style	100 mA	400 Hz	XUM2ANANM8R
N.C.	NPN	12–24 Vdc	M8 nano-style	100 mA	400 Hz	XUM2ANBNM8R

Thru-Beam (emitter)						
—	—	12–24 Vdc	2 m (6.6 ft) cable	—	—	XUM2AKSNL2T
—	—	12–24 Vdc	M8 nano-style	—	—	XUM2AKSNM8T

Retroreflective—4 m (13.1 ft) Nominal Sensing Distance (reflector sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM1APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM1APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM1ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM1ANBNL2
N.O.	PNP	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM1APANM8
N.C.	PNP	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM1APBNM8
N.O.	NPN	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM1ANANM8
N.C.	NPN	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM1ANBNM8

Polarized Retroreflective—2 m (6.6 ft) Nominal Sensing Distance (reflector sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM9APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM9APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM9ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM9ANBNL2
N.O.	PNP	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM9APANM8
N.C.	PNP	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM9APBNM8
N.O.	NPN	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM9ANANM8
N.C.	NPN	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM9ANBNM8

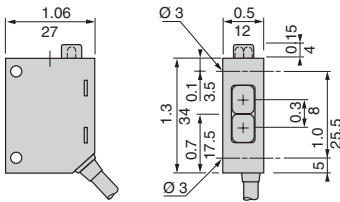
Adjustable Short Range Proximity Diffuse—10 cm (4 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM6APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM6APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM6ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM6ANBNL2
N.O.	PNP	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM6APANM8
N.C.	PNP	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM6APBNM8
N.O.	NPN	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM6ANANM8
N.C.	NPN	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM6ANBNM8

Adjustable Long Range Proximity Diffuse—40 cm (16 in.) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM5APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM5APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM5ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XUM5ANBNL2
N.O.	PNP	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM5APANM8
N.C.	PNP	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM5APBNM8
N.O.	NPN	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM5ANANM8
N.C.	NPN	12–24 Vdc	M8 nano-style	100 mA	500 Hz	XUM5ANBNM8

* For a 5 m (16.4 ft) cable length, add suffix L5.

Dimensions

XUM



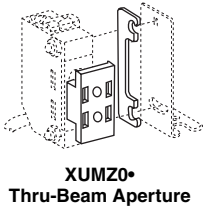
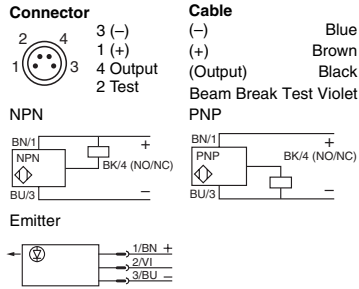
Dual Dimensions inches/mm

Photoelectric Sensors

XUM Miniature Rectangular

DC

Wiring



Specifications

Mechanical

For the usable sensing range, see the detection curves.

Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	1, 3, 4, 4X (indoor), 6, 6P (cable version only), 12, 13
	IEC	IP67
Enclosure Material	Case	PBT
	Lens	PMMA
	Cable	PVR
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60067-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
	Power	Green (XUM2••T)
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor
	Connector	4-pin nano-style DC (M8)

Electrical

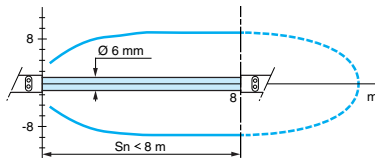
Voltage Range	12–24 Vdc	
Voltage Limit (Including Ripple)	10–30 Vdc	
Voltage Drop (Across Switch), Closed State Maximum	1.5 V	
Current Consumption (No Load), Maximum	35 mA	
Load Current, Maximum	100 mA	
Operating Frequency, Maximum	500 Hz (400 Hz Thru-Beam)	
On Delay, Maximum	1 ms	
Off Delay, Maximum	1 ms	
Power-up Delay, Maximum	30 ms	
Wavelength	Polarized—red	660 nm
	Short Range Proximity	660 nm
	All others	880 nm
Protective Circuitry	Overload Protection	Yes
	Short Circuit Protection	Yes
Agency Listings		

Accessories

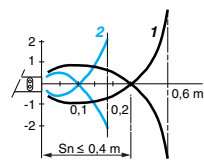
Description	Sensing Distance	Catalog Number
90° mounting bracket (cable version)	—	XUZA47
90° mounting bracket (connector version)	—	XUZA46
Thru-Beam aperture	0.5 mm diameter	4.5 cm (1.78 in.)
	1.0 mm diameter	4.5 cm (1.78 in.)
	2.0 mm diameter	4.5 cm (1.78 in.)

Detection Curves

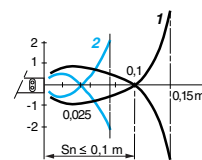
Thru-Beam System



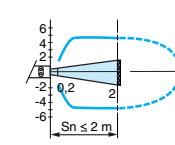
Diffuse Long Range



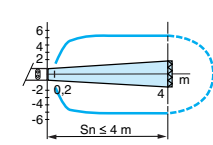
Diffuse Short Range



Polarized Retroreflective



Retroreflective



Object: 100 x 100 mm (3.9 x 3.9 in.), 1: White 90%, 2: Gray 18%

With Reflector XUZC50

With Reflector XUZC50

Excess Gain

An excess gain of 2 has been achieved at the nominal sensing distance (S_n) of all sensing modes.

Connector Cables (M8 or S suffix)

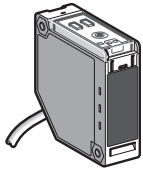
XSZCS141	Nano-style, 4-pin, 2 m, straight
XSZCS151	Nano-style, 4-pin, 2 m 90°

Additional cable options and lengths... Page 484

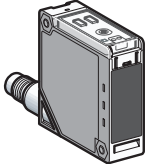
Osiconcept™ Photoelectric Sensors

XUK Subcompact Rectangular

Multi-Mode™, DC and AC/DC



XUK0AKSAL2



XUK0AKSAM12

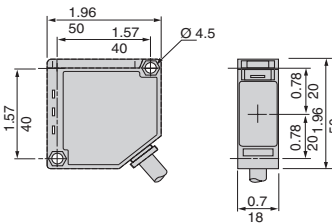
Features

- Selectable sensing mode
 - Diffuse
 - Diffuse with background suppression
 - Polarized retroreflective ■
 - Thru-beam *
- Selectable N.C. / N.O. output mode
- Self-teaching feature enables setup with the press of a button
- Multi-Mode sensor allows stock reduction
- Plastic housing

Output Mode	Circuit Type	Voltage Range	Connection Type □	Load Current Maximum	Operating Frequency Maximum	Catalog Number
N.C. / N.O.	PNP/NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK0AKSAL2
N.C. / N.O.	PNP/NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK0AKSAM12
N.C. / N.O.	AC/DC relay	20–240 Vac/Vdc	2 m (6.6 ft) cable	3 A	20 Hz	XUK0ARCTL2

Dimensions

XUK



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

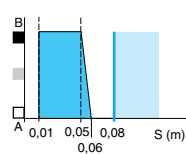
Accessories

Description	Connection Type	Catalog Number
Reflector	—	XUZC50
Transmitter	12–240 Vdc	2 m (6.6 ft) cable
	12–240 Vdc	4-pin micro-style
	24–240 Vac/Vdc	2 m (6.6 ft) cable

- * Transmitter required for Multi-Mode receiver to operate in thru-beam mode
- Reflector required for Multi-Mode receiver to operate in polarized retroreflective mode
- For a 10 m (32.8 ft) cable length, add suffix L10.

Variation of Usable Sensing Distance

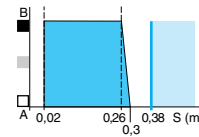
Diffuse System with Adjustable Background Suppression
Learning at Minimum



A-B: Object Reflection Coefficient

- Black 6%
- Gray 18%
- White 90%
- Sensing Range
- Non-Sensing Zone (matte surfaces)

Learning at Maximum



Excess Gain

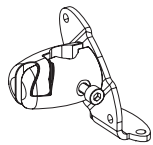
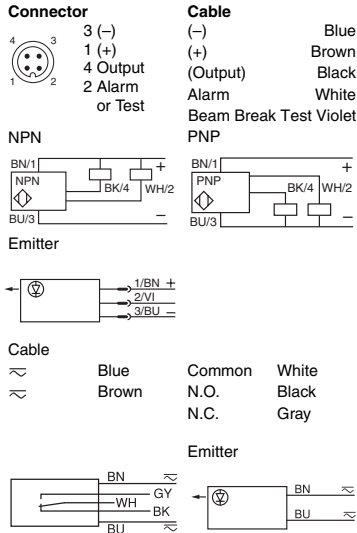
An excess gain of 2 has been achieved at the nominal sensing distance (S_n) of all sensing modes.

Osiconcept™ Photoelectric Sensors

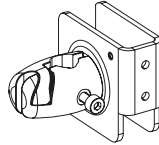
XUK Subcompact Rectangular

Multi-Mode™, DC and AC/DC

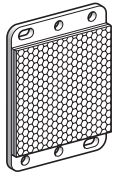
Wiring



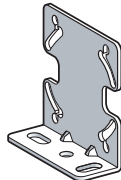
XUZK2003



XUZK2004



XUZC50



XUZA51

Specifications

Mechanical

For the usable sensing range, see the detection curves.

Sensing Distance (Sn) (excess gain = 2)	Diffuse Background Suppression	30 cm (11.81 in.)
	Diffuse Standard	1 m (3.3 ft)
	Polarized Retroreflective	4 m (13.1 ft)
	Thru-Beam	30 m (98.4 ft)
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4, 4X (indoor), 12, 13
	IEC	IP65
Enclosure Material	Case	PBT
	Lens	PMMA
	Cable	PVR
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
	Signal Instability	Red
	Power and Teach	Green
Connection	Cable	4.2 mm (0.17 in.) O.D. 4, 5 conductor
	Connector (DC version)	4-pin micro-style DC (M12)

	AC/DC	DC
	Voltage Range	24–240 Vac/Vdc
Voltage Limit (Including Ripple)	20–264 Vac/Vdc	10–30 Vdc
Voltage Drop (Across Switch), Closed State Maximum	2 V	2 V
Current Consumption (No Load), Maximum	3 W	10 mA
Load Current, Maximum	3 A	100 mA
Operating Frequency, Maximum	30 Hz	250 Hz
On Delay, Maximum	25 ms	20 ms
Off Delay, Maximum	25 ms	20 ms
Power-up Delay, Maximum	200 ms	300 ms
Protective Circuitry	Overload Protection	Yes
	Reverse Polarity Protection	—
	Short Circuit Protection	Yes

Agency Listings	UL	SF	CE
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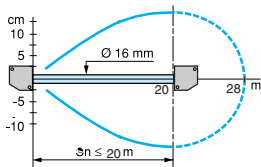
Accessories

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA51
3-D mounting bracket (stem not included)	XUZK2003
3-D protective mounting bracket (stem not included)	XUZK2004
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003

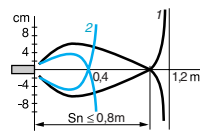
See page 139 for complete 3-D assembly.

Detection Curves

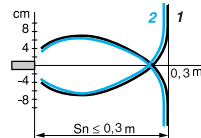
Thru-Beam with Thru-Beam Accessory



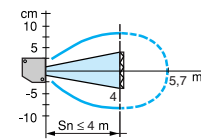
Diffuse without Accessory



Diffuse without Accessory with Background Suppression



Polarized Retroreflective with Reflector Accessory



Object: 100 x 100 mm (3.9 x 3.9 in.)
1: White 90%, 2: Gray 18%

With Reflector XUZC50

Connector Cables (M12 or D suffix)

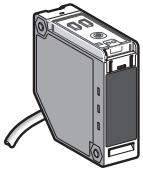
XSZCD101Y	Micro-style, 4-pin, 2 m, 90°
XSZCD111Y	Micro-style, 4-pin, 2 m, straight

Additional cable options and lengths . . . Page 484

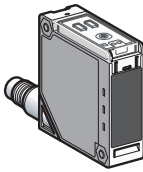
Photoelectric Sensors

XUK Subcompact Rectangular

DC and AC/DC

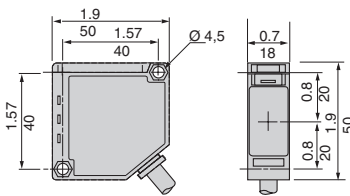


XUK•AL***2



XUK•A***M12

Dimensions



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

- Universal mounting and popular 50 mm x 50 mm housing size
- Optimum version, low cost, perfect for use by OEMs
- Hinged plastic cover locks to protect adjustments

Output Mode	Circuit Type	Voltage Range	Connection Type *	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam (receiver)—30 m (98 ft) Nominal Sensing Distance (emitter sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK2APANL2R
N.C.	PNP	12–240 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK2APBNL2R
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK2ANANL2R
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK2ANBNL2R
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK2APANM12R
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK2APBNM12R
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK2ANANM12R
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK2ANBNM12R
Thru-Beam (receiver)—20 m (66 ft) Nominal Sensing Distance (emitter sold separately)						
N.C. / N.O.	AC/DC relay	20–240 Vac/Vdc	2 m (6.6 ft) cable	3 A	20 Hz	XUK2ARCNL2R
Thru-Beam (emitter)						
—	—	12–24 Vdc	2 m (6.6 ft) cable	—	—	XUK2AKSNL2T
—	—	12–24 Vdc	4-pin micro-style	—	—	XUK2AKSNM12T
—	—	20–240 Vac/Vdc	2 m (6.6 ft) cable	—	—	XUK2ARCNL2T
Retroreflective—9 m (30 ft) Nominal Sensing Distance (reflectors sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK1APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK1APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK1ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK1ANBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK1APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK1APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK1ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK1ANBNM12
Retroreflective—7 m (22 ft) Nominal Sensing Distance (reflectors sold separately)						
N.C. / N.O.	AC/DC relay	20–240 Vac/Vdc	2 m (6.6 ft) cable	3 A	20 Hz	XUK1ARCNL2
Polarized Retroreflective—5 m (16 ft) Nominal Sensing Distance (reflectors sold separately)						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK9APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK9APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK9ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK9ANBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK9APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK9APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK9ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK9ANBNM12
Polarized Retroreflective—4 m (13 ft) Nominal Sensing Distance (reflectors sold separately)						
N.C. / N.O.	AC/DC relay	20–240 Vac/Vdc	2 m (6.6 ft) cable	3 A	20 Hz	XUK9ARCNL2
Proximity Diffuse—1 m (3.3 ft) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK5APANL2
N.C.	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK5APBNL2
N.O.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK5ANANL2
N.C.	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	250 Hz	XUK5ANBNL2
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK5APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK5APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK5ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUK5ANBNM12
Proximity Diffuse—1 m (3.3 ft) Nominal Sensing Distance						
N.C. / N.O.	AC/DC relay	20–340 Vac/Vdc	2 m (6.6 ft) cable	3 A	20 Hz	XUK5ARCNL2

* For a 10 m (32.8 ft) cable length, add suffix L10.

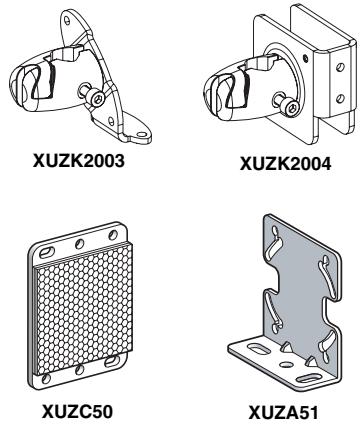
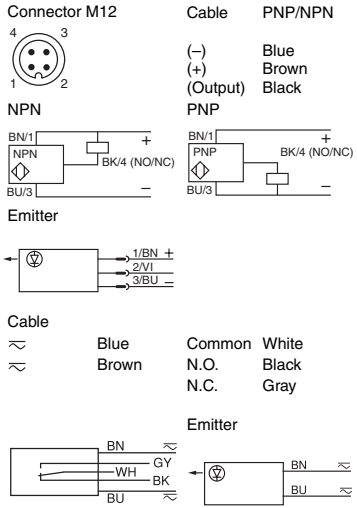
Excess Gain

An excess gain of 2 has been achieved at the nominal sensing distance (Sn) of all sensing modes.

Photoelectric Sensors

XUK Subcompact Rectangular

DC and AC/DC



Specifications

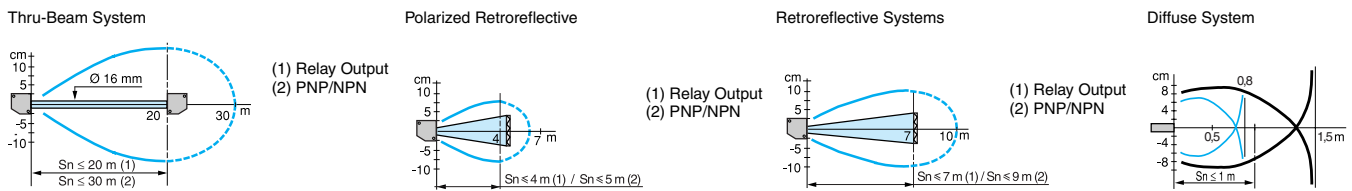
Mechanical			
For usable sensing range, see detection curves			
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)	
	Storage	-40 to +158 °F (-40 to +70 °C)	
Enclosure Rating	NEMA Type	4, 4X (indoor), 12, 13	
	IEC	IP65	
Enclosure Material	Case	PBT	
	Lens	PMMA	
	Cable	PVR	
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)	
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration	
LED Indicator	Output	Yellow	
	Stability	Red	
	Power	Green (XUK2***T)	
Connection	Cable	4.2 mm (0.17 in.) O.D. 3 conductor	
	Connector (DC version)	4-pin micro-style DC (M12)	
Electrical			
	AC/DC	DC	
Voltage Range	20–240 Vac/Vdc	12–24 Vdc	
Voltage Limit (Including Ripple)	20–264 Vac/Vdc	10–30 Vdc	
Voltage Drop (Across Switch), Closed State Maximum	1.5 V	1.5 V	
Current Consumption (No Load), Maximum	2 W	35 mA	
Load Current, Maximum	3 A	100 mA	
Operating Frequency, Maximum	20 Hz	250 Hz	
On Delay, Maximum	25 ms	2 ms	
Off Delay, Maximum	25 ms	2 ms	
Power-up Delay, Maximum	60 ms	15 ms	
Protective Circuitry	Overload Protection	Yes	Yes
	Reverse Polarity Protection	—	Yes
	Short Circuit Protection	—	Yes
Agency Listings			

Accessories

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA51
3-D mounting bracket (stem not included)	XUKZ2003
3-D protective mounting bracket (stem not included)	XUKZ2004
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003

See page 139 for complete 3-D assembly.

Detection Curves



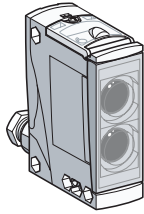
Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

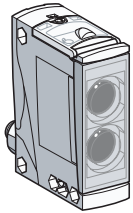
Additional cable options and lengths... Page 484

Osiconcept™ Photoelectric Sensors

XUX Compact Rectangular Multi-Mode™, DC and AC/DC



XUX0ARTT16



XUX0AKSAM12

Features

- Selectable sensing mode
 - Diffuse
 - Diffuse with background suppression
 - Polarized retroreflective ■
 - Thru-beam *
- Selectable N.C. / N.O. output mode
- Self-teaching feature enables setup with the press of a button
- Multi-Mode sensor allows stock reduction
- Plastic housing

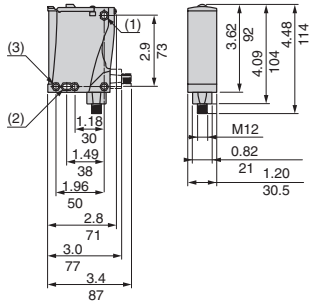
Output Mode	Circuit Type	Voltage Range	Connection Type	Load Current Maximum	Operating Frequency Maximum	Catalog Number
N.C. / N.O.	PNP/NPN	12–24 Vdc	PG 16 cable gland	100 mA	250 Hz	XUX0AKSAT16
N.C. / N.O.	PNP/NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX0AKSAM12
N.C. / N.O.	AC/DC relay	20–240 Vac/Vdc	PG 16 cable gland	3 A	25 Hz	XUX0ARCTT16

Accessories

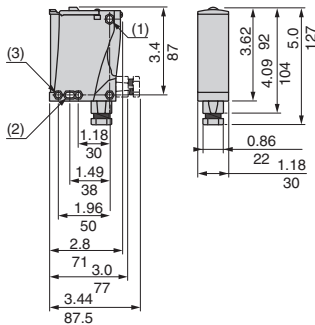
Description	Connection Type	Catalog Number
Reflector	—	XUZC50
Transmitter	12–240 Vdc	PG16 cable gland entry
	12–240 Vdc	4-pin micro-style
	24–240 Vac/Vdc	PG16 cable gland entry

- * Transmitter required for Multi-Mode receiver to operate in thru-beam mode
 - Reflector required for Multi-Mode receiver to operate in polarized retroreflective mode
- PG 16 cable gland is for cable size from 0.27 to 0.40 in. (7 to 10 mm) diameter.

Dimensions



XUX...M12



XUX...T16

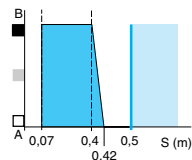
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Excess Gain

An excess gain of 2 has been achieved at the nominal sensing distance (S_n) of all sensing modes.

Variation of Usable Sensing Distance

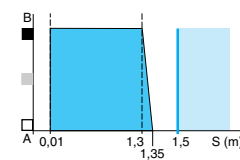
Diffuse System with Adjustable Background Suppression
Learning at Minimum



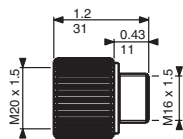
A-B: Object Reflection Coefficient

- Black 6%
- Gray 18%
- White 90%
- Sensing Range
- Non-Sensing Zone (matte surfaces)

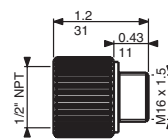
Learning at Maximum



XUXZ2001



XUXZ2002



Osiconcept™ Photoelectric Sensors

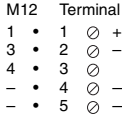
XUX Compact Rectangular Multi-Mode™, DC and AC/DC

Wiring

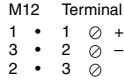
Connector M12



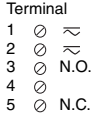
PNP/NPN



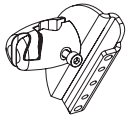
Emitter



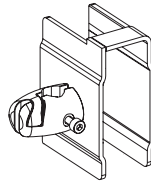
Output Terminal



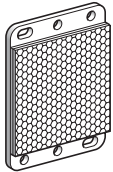
Emitter Terminal



XUXZ2003



XUXZ2004



XUZC50



XUZ2001

Specifications

Mechanical

For the usable sensing range, see the detection curves.

Sensing Distance (Sn) (excess gain = 2)	Diffuse Background Suppression	1.3 m (4.3 ft)
	Diffuse Standard	2 m (6.6 ft)
	Polarized Retroreflective	11 m (36.1 ft)
	Thru-Beam	40 m (131.2 ft)
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4, 4X (indoor), 12, 13
	IEC	IP67
Enclosure Material	Case	PBT
	Lens	PMMA
	Cable	PVR
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
	Signal Instability	Red
	Power and Teach	Green
Connection	Cable Gland	PG16
	Connector (DC version)	4-pin micro-style DC (M12)

	AC/DC	DC
	Voltage Range	24–240 Vac/Vdc
Voltage Limit (Including Ripple)	20–264 Vac/Vdc	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V	1.5 V
Current Consumption (No Load), Maximum	2 W	35 mA (20 mA—Transmitter)
Alarm Output	100 mA	
Load Current, Maximum	3 A	100 mA
Operating Frequency, Maximum	20 Hz	240 Hz
On Delay, Maximum	25 ms	2 ms
Off Delay, Maximum	25 ms	2 ms
Power-up Delay, Maximum	200 ms	200 ms
Protective Circuitry	Overload Protection	Yes
	Reverse Polarity Protection	—
	Short Circuit Protection	—
Agency Listings	E164869 UL CCN NRKH	CE

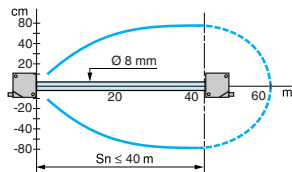
Accessories

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
3-D mounting bracket (stem not included)	XUXZ2003
3-D protective mounting bracket	XUXZ2004
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003
Adapter ISO 16 to 1/2 in. NPT	XUXZ2001
Adapter ISO 16 to ISO 20	XUXZ2002

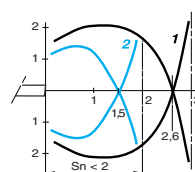
See page 139 for complete 3-D assembly.

Detection Curves

Thru-Beam with Thru-Beam Accessory

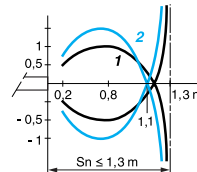


Diffuse without Accessory

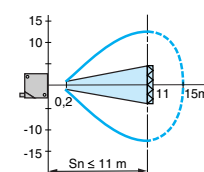


Object: 100 x 100 mm (3.9 x 3.9 in.)
1: White 90%, 2: Gray 18%

Diffuse without Accessory with Background Suppression



Polarized Retroreflective with Reflector Accessory



With Reflector XUZC50

Connector Cables (M12 or D suffix)

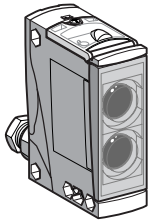
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths... Page 484

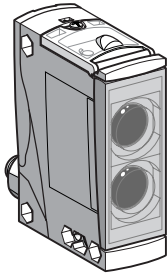
Photoelectric Sensors

XUX Compact Rectangular

DC and AC/DC

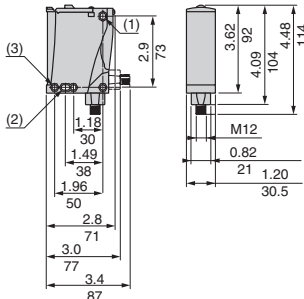


XUX•A•NT16

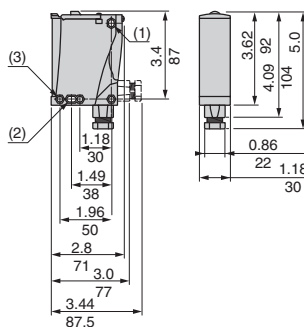


XUX•A•M12

Dimensions



XUX•A•M12



XUX•A•T16

Dual Dimensions inches/mm

Features

- Interchangeable mounting of competitive compact sensor body styles.
- Available with terminal block wiring or connector version.

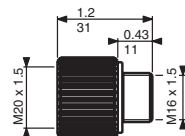
Output Mode	Circuit Type	Voltage Range	Connection Type	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam (receiver)—40 m (130 ft) Nominal Sensing Distance (emitter sold separately)						
N.O.	PNP	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX2APANT16R
N.C.	PNP	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX2APBNT16R
N.O.	NPN	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX2ANANT16R
N.C.	NPN	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX2ANBNT16R
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX2APANM12R
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX2APBNM12R
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX2ANANM12R
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX2ANBNM12R
N.O.	AC/DC relay	20–240 Vac/Vdc	PG16 cable entry	3 A	20 Hz	XUX2ARCNT16R
Thru-Beam (emitter)						
—	—	12–24 Vdc	PG16 cable entry	—	—	XUX2AKSNT16T
—	—	12–24 Vdc	4-pin micro-style	—	—	XUX2AKSNM12T
—	—	20–240 Vac/Vdc	PG16 cable entry	—	—	XUX0ARCNT16T
Retroreflective—14 m (45 ft) Nominal Sensing Distance (reflectors sold separately)						
N.O.	PNP	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX1APANT16
N.C.	PNP	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX1APBNT16
N.O.	NPN	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX1ANANT16
N.C.	NPN	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX1ANBNT16
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX1APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX1APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX1ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX1ANBNM12
N.C. / N.O.	AC/DC relay	20–240 Vac/Vdc	PG16 cable entry	3 A	20 Hz	XUX1ARCNT16
Polarized Retroreflective—10 m (36 ft) Nominal Sensing Distance (reflectors sold separately)						
N.O.	PNP	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX9APANT16
N.C.	PNP	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX9APBNT16
N.O.	NPN	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX9ANANT16
N.C.	NPN	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX9ANBNT16
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX9APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX9APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX9ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX9ANBNM12
N.C. / N.O.	AC/DC relay	20–240 Vac/Vdc	PG16 cable entry	3 A	20 Hz	XUX9ARCNT16
Proximity Diffuse—2.0 m (7 ft) Nominal Sensing Distance						
N.O.	PNP	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX5APANT16
N.C.	PNP	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX5APBNT16
N.O.	NPN	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX5ANANT16
N.C.	NPN	12–24 Vdc	PG16 cable entry	100 mA	250 Hz	XUX5ANBNT16
N.O.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX5APANM12
N.C.	PNP	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX5APBNM12
N.O.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX5ANANM12
N.C.	NPN	12–24 Vdc	4-pin micro-style	100 mA	250 Hz	XUX5ANBNM12
N.C. / N.O.	AC/DC relay	20–240 Vac/Vdc	PG16 cable entry	3 A	20 Hz	XUX5ARCNT16

PG 16 cable gland is for cable size from 0.27 to 0.40 in. (7 to 10 mm) diameter.

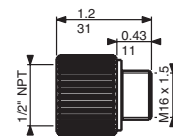
Excess Gain

An excess gain of 2 has been achieved at the nominal sensing distance (Sn) of all sensing modes.

XUZ2002



XUZ2001



Photoelectric Sensors

XUX Compact Rectangular

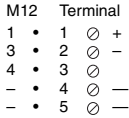
DC and AC/DC

Wiring

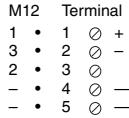
Connector M12



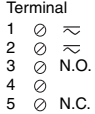
PNP/NPN



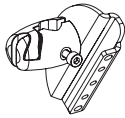
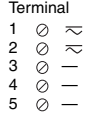
Emitter



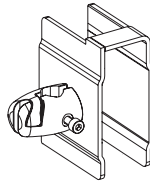
Output



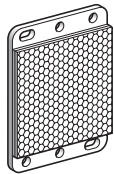
Emitter



XUXZ0303



XUXZ0404



XUZC50



XUZ2001

Specifications

Mechanical

For the usable sensing range, see the detection curves.

Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	1, 3, 4, 13
	IEC	IP67
Enclosure Material	Case	PBT
	Lens	PMMA
	Cable	PVR
Vibration Resistance	(IEC 60068-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, duration 10 ms
LED Indicator	Output	Yellow
	Power	Green
Connection	Cable gland	M16
	Connector (DC version)	4-pin micro-style DC (M12)

	AC/DC	DC
	Voltage Range	20–240 Vac/Vdc
Voltage Limit (Including Ripple)	20–264 Vac/Vdc	10–36 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V	1.5 V
Current Consumption (No Load), Maximum	2 W	35 mA
Load Current, Maximum	3 A	100 mA
Operating Frequency, Maximum	20 Hz	250 Hz
On Delay, Maximum	25 ms	2 ms
Off Delay, Maximum	25 ms	2 ms
Power-up Delay, Maximum	60 ms	15 ms
Protective Circuitry	Overload Protection	Yes
	Reverse Polarity Protection	—
	Short Circuit Protection	Yes
Agency Listings	UL E164869 CCN NRKH	CSA CE

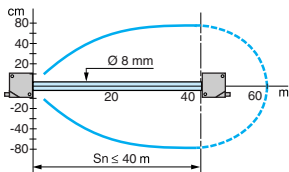
Accessories

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
3-D mounting bracket (stem not included)	XUXZ2003
3-D Protective mounting bracket (stem not included)	XUXZ2004
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D mounting base	XUZ2003
Adapter ISO 16 to 1/2 in. NPT	XUXZ2001
Adapter ISO 16 to ISO 20	XUXZ2002

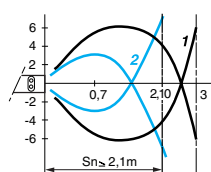
See page 139 for complete 3-D assembly.

Detection Curves

Thru-Beam System

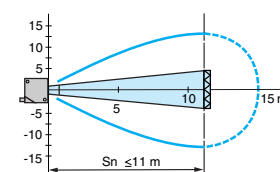


Diffuse System



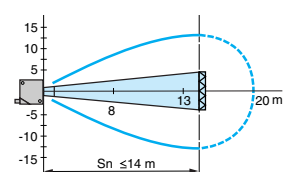
Object: 100 x 100 mm (3.9 x 3.9 in.),
1: White 90%, 2: Gray 18%

Polarized Retroreflective



With reflector XUZ C50

Retroreflective System



Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

Photoelectric Sensors

XUD Amplifiers, Self-Teach, DC

For XUFN Plastic and XUFS Glass Fiber Optics

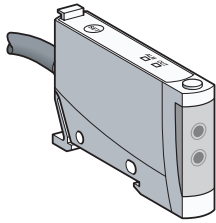
Features

XUDA1

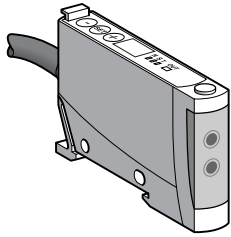
- Self-teach capability
- Selectable light (N.C.)/dark (N.O.)
- Nano-style connector available
- Fast response time
- Short circuit protection
- Reverse polarity protection

XUDA2

- Digital display for adjustment
- Self-teach capability (and fine adjustment)
- 40 ms time delay on beam break—selectable on/off
- Nano-style connector available
- Higher frequency selectable
- Short circuit protection
- Reverse polarity protection



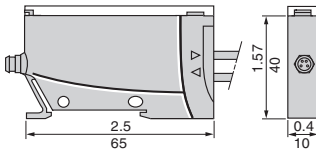
XUDA1



XUDA2

Dimensions

XUDA•



XUDA1



XUDA2



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency	Catalog Number
XUDA1—Amplifiers					
2 m (6.6 ft) cable					
PNP	N.C. / N.O.	12–24 Vdc	100 mA	1,000 Hz	XUDA1PSML2
NPN	N.C. / N.O.	12–24 Vdc	100 mA	1,000 Hz	XUDA1NSML2
M8 Nano-Connector					
PNP	N.C. / N.O.	12–24 Vdc	100 mA	1,000 Hz	XUDA1PSMM8
NPN	N.C. / N.O.	12–24 Vdc	100 mA	1,000 Hz	XUDA1NSMM8
XUDA2—Amplifiers					
2 m (6.6 ft) cable					
PNP	N.C. / N.O.	12–24 Vdc	100 mA	1,000 Hz or 5,000 Hz	XUDA2PSML2
NPN	N.C. / N.O.	12–24 Vdc	100 mA	1,000 Hz or 5,000 Hz	XUDA2NSML2
M8 Nano-Connector					
PNP	N.C. / N.O.	12–24 Vdc	100 mA	1,000 Hz or 5,000 Hz	XUDA2PSMM8
NPN	N.C. / N.O.	12–24 Vdc	100 mA	1,000 Hz or 5,000 Hz	XUDA2NSMM8

For XUFN and XUFS fiber optics see page 102–105.

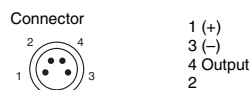
Photoelectric Sensors

XUD Amplifiers, Self-Teach, DC

For XUFN Plastic and XUFS Glass Fiber Optics

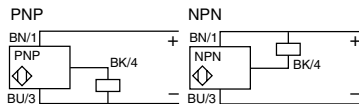
Wiring

XUDA1

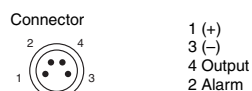


Cable

(+) Brown
(-) Blue
Output Black

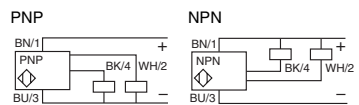


XUDA2






Cable

(+) Brown
(-) Blue
Output Black
Alarm White



Specifications

Mechanical	
Temperature Range	13 to 131 °F (-10 to 55 °C)
Sensing Distance (Sn)	Dependent on fiber optic (page 102)
Enclosure Rating	NEMA Type
	IEC
Vibration	7 g, amplitude ±0.5 mm (10–55 Hz)
Shock resistance	30 g, 11 ms duration
LED Indicator	Output
	Signal Instability
Signal Level Display	XUDA1 Red / XUDA2 Green
Connection	Cable version
	Connector version
Electrical	
Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–30 Vdc
Maximum Load Current	100 mA
Current Consumption (No Load)	50 mA
Alarm Output Current	50 mA (XUDA2)
Voltage Drop across Switch	1 V
On Delay	XUDA1–0.5 ms / XUDA2–0.1 ms
Off Delay	XUDA1–0.5 ms / XUDA2–0.1 ms
Power-up Delay	120 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes
Agency Listings	  

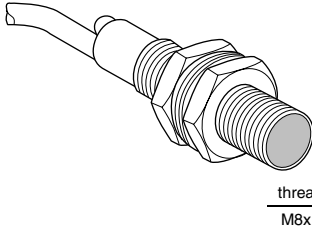
Connector Cables (M8 or S suffix)

XSZCS141	Nano-style, 4-pin, 2 m, straight
XSZCS151	Nano-style, 4-pin, 2 m 90°

Additional cable options and lengths . . . Page 484

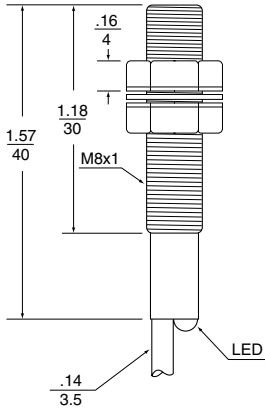
Photoelectric Sensors

XUA 8 mm Diameter Miniature Precision, DC

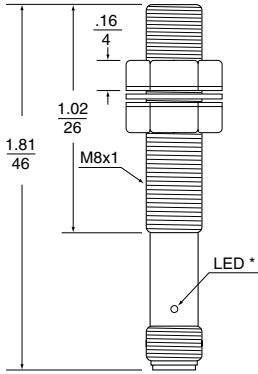


thread
M8x1

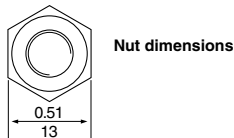
Dimensions



Nano-Style Connector



* One LED, visible from 4 quadrants



Nut dimensions

Features

- Ultra-short miniature body
- Very fast response time
- Rugged metal case
- Short circuit, overload, and reverse polarity protection
- CE Mark

Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam (Emitter-Receiver)—2 m (6.6 ft) Nominal Sensing Range*					
DC—2 m (6.6 ft) cable					
Emitter, 2-wire	—	12–24 V	—	—	XUAH0203
Receiver, 3-wire, PNP	N.C.	12–24 V	100 mA	2,000 Hz	XUAH0224
Receiver, 3-wire, PNP	N.O.	12–24 V	100 mA	2,000 Hz	XUAH0214
Receiver, 3-wire, NPN	N.C.	12–24 V	100 mA	2,000 Hz	XUAJ0224
Receiver, 3-wire, NPN	N.O.	12–24 V	100 mA	2,000 Hz	XUAJ0214
DC—Nano-style connector 8 mm (0.32 in.)^②					
Emitter, 2-wire	—	12–24 V	—	—	XUAH0203S
Receiver, 3-wire, PNP	N.C.	12–24 V	100 mA	2,000 Hz	XUAH0224S
Receiver, 3-wire, PNP	N.O.	12–24 V	100 mA	2,000 Hz	XUAH0214S
Receiver, 3-wire, NPN	N.C.	12–24 V	100 mA	2,000 Hz	XUAJ0224S
Receiver, 3-wire, NPN	N.O.	12–24 V	100 mA	2,000 Hz	XUAJ0214S
Proximity (Diffuse)—5 cm (1.9 in.) Nominal Sensing Range*^①					
DC—2 m (6.6 ft) cable					
3-wire, PNP	N.O.	12–24 V	100 mA	700 Hz	XUAH0515
3-wire, PNP	N.C.	12–24 V	100 mA	700 Hz	XUAH0525
3-wire, NPN	N.O.	12–24 V	100 mA	700 Hz	XUAJ0515
3-wire, NPN	N.C.	12–24 V	100 mA	700 Hz	XUAJ0525
DC—Nano-style connector 8 mm (0.32 in.)^②					
3-wire, PNP	N.O.	12–24 V	100 mA	700 Hz	XUAH0515S
3-wire, PNP	N.C.	12–24 V	100 mA	700 Hz	XUAH0525S
3-wire, NPN	N.O.	12–24 V	100 mA	700 Hz	XUAJ0515S
3-wire, NPN	N.C.	12–24 V	100 mA	700 Hz	XUAJ0525S

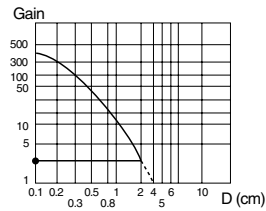
* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.

① With 90% Kodak White paper. 2 in x 2 in (5 cm x 5 cm)

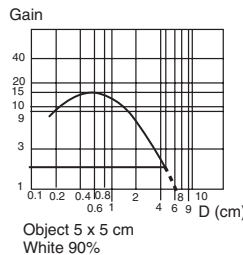
② See p. 484 for nano-connector cables.

Excess gain curves ambient temperature 25 °C (77 °F)

Thru-beam system

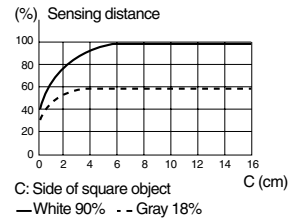


Diffuse system



Variation of sensing distance Sn

Diffuse system



C: Side of square object

— White 90% - - Gray 18%

Detection differential (H) when the object approaches from the front at the nominal distance: $H \leq 25\%$ of Sn

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors

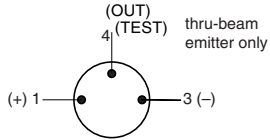
XUA 8 mm Diameter

Miniature Precision, DC

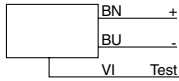
Wiring

Connector

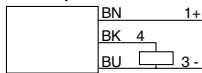
Sensor side



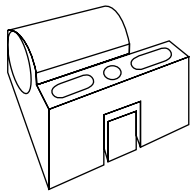
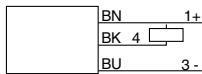
Emitter



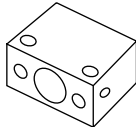
PNP output



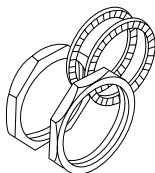
NPN output



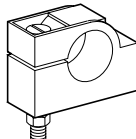
XSZB108



831608



XSZE108



XSAZ108

Connector Cables (M8 or S suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°

For additional cable options and lengths Page 484
Accessories Page 137

Specifications

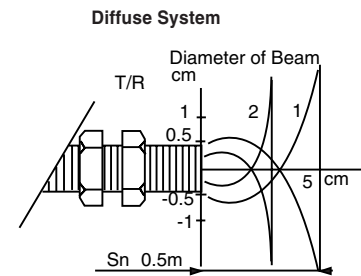
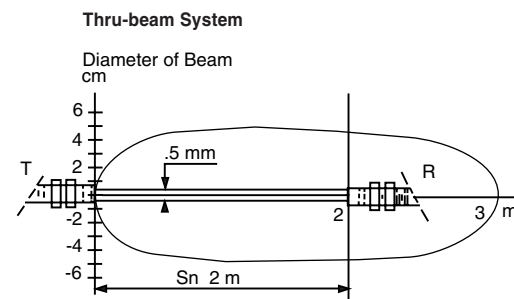
Mechanical		
For usable sensing range, see excess gain curve charts		
Temperature range	-13 to +131 °F (-25 to +55 °C)	
Enclosure rating	NEMA Type	4, 6, 6P, 12, 13
	CENELEC	IP67 conforming to IEC60529 (IP673 conforming to NF C 20-010)
Tightening torque (maximum)	Mounting torque 1.47 lb-in (2 N•m), Connector tightening torque 0.14 lb-in (0.3 N•m)	
Vibration	7 g, amplitude ±.75 mm (10–55 Hz)	
Shock resistance	30 g, 11 ms duration, conforming to IEC 60068-2-27	
Enclosure material	Case	Nickel-plated brass
	Lens	PMMA
Wiring	Cable: PVC, diameter 3.5 mm, wire AWG 26, 3 x 0.14 mm ²	
Electrical		
Voltage range	12–24 Vdc	
Voltage limit (including ripple)	10–30 Vdc	
Voltage drop (across switch), closed state (maximum)	1.8 V	
Maximum load current	100 mA	
Current consumption (no load) (maximum)	Emitter: 20 mA; receiver: 20 mA; diffuse: 25 mA	
Maximum operating frequency	Thru-beam: 2,000 Hz; Proximity (diffuse) 700 Hz	
On delay (maximum)	Thru-beam: 0.25 ms; Proximity (diffuse): 0.75 ms	
Off delay (maximum)	Thru-beam: 0.25 ms; Proximity (diffuse): 0.75 ms	
Power-up delay (maximum)	20 ms	
Physical Characteristics		
Ambient light immunity	3,000 Lux	
Emitter wave length:	Thru-beam	890 nm
	Proximity (diffuse)	940 nm
Protective circuitry	Short circuit protection	Yes
	Overload protection	Yes
	Reverse polarity protection	Yes
	Electrostatic discharges	DC 2-wire: IEC 61000-4-2, L3* (8 kV) DC 3-wire: IEC 61000-4-2, L2* (4 kV)
	Radio frequency immunity (RFI)	IEC 61000-4-3, L3* (10 V/m)
	Fast transients (motor start/stop interference)	IEC 61000-4-4, L3 (1 kV)
	Impulse voltages (lightning, etc.)	IEC 60947-5-2, L3 (2.5 kV)
Agency listings	UL E164869 CCN NRKH	

* L indicates level number

Accessories

Description	Catalog Number
Universal mounting bracket (Plastic)	XSZB108
Diecast zinc mounting bracket	831608
Plastic mounting bracket	XSAZ108
Metal mounting nuts	XSZE108

Sensing Pattern

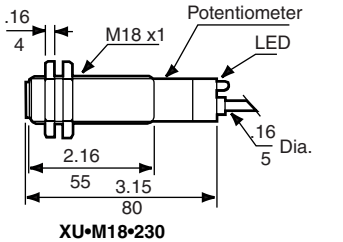
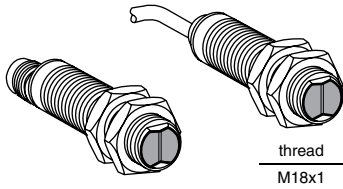


Object 5 x 5 cm
1 White 90% 2 Gray 18%

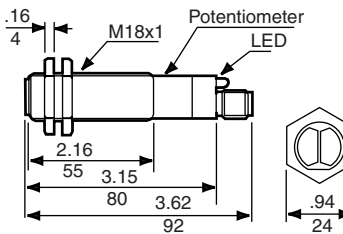
Photoelectric Sensors

Classic 18 mm Tubular

Metal Body, Front Sensing, AC/DC



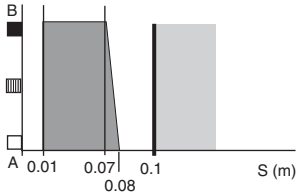
XU-M18-230



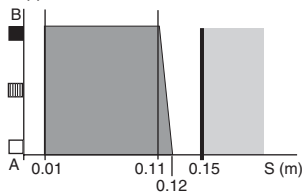
XU-M18-230K

Variation of usable sensing distance

Diffuse system with adjustable background suppression. Potentiometer at minimum.



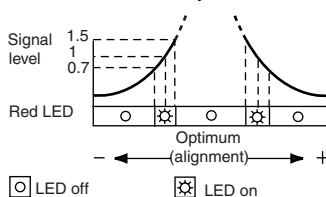
Diffuse system with adjustable background suppression. Potentiometer at maximum.



A-B : Object reflection coefficient
 ■ Black 6% ■ Sensing range
 ▨ Grey 18% ■ Non sensing range
 □ White 90% ■ (Matt surfaces)

Marginal Detection

Thru-beam and reflex systems



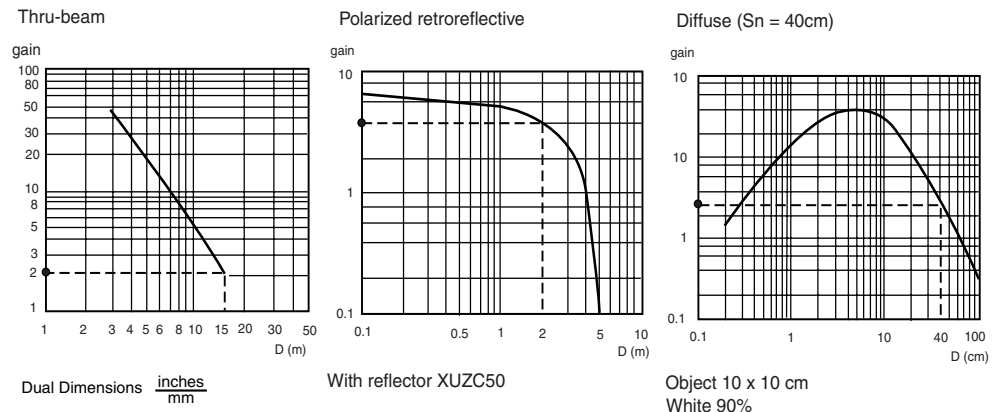
Features

- Nickel-plated brass housing
- Modulated LED output indication
- Sensing modes:
 - Thru-beam (emitter and receiver packaged together)
 - Retroreflective
 - Polarized retroreflective (XUZC50 reflector included in Retroreflective models)
 - Proximity diffuse
 - Proximity diffuse with background suppression
- Also available in side sensing style
- Standard 2 m (6.6 ft) cable
- Connector versions available
- Wide selection of mounting brackets available
- Self-locking mounting nuts included
- UL Listed, CSA Certified, CE Marked

Circuit Type	Output Mode	Voltage Range	Connection Type	Voltage Drop Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam System (Emitter-Receiver)—15 m (49.2 ft) Nominal Sensing Distance *							
2-wire	Dark	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU2M18MA230
2-wire	Dark	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU2M18MA230K
2-wire	Light	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU2M18MB230
2-wire	Light	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU2M18MB230K
Polarized Retroreflective—2 m (6.6 ft) Nominal Sensing Distance * (XUZC50 reflector included)							
2-wire	Dark	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU9M18MA230
2-wire	Dark	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU9M18MA230K
2-wire	Light	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU9M18MB230
2-wire	Light	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU9M18MB230K
Proximity Diffuse—40 cm (15.7 in.) Nominal Sensing Range *							
2-wire	Light	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU5M18MA230
2-wire	Light	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU5M18MA230K
2-wire	Dark	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU5M18MB230
2-wire	Dark	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU5M18MB230K
Proximity Diffuse with Background Suppression—12 cm (4.7 in.) Nominal Sensing Distance							
2-wire	Light	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU8M18MA230
2-wire	Light	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU8M18MA230K
2-wire	Dark	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU8M18MB230
2-wire	Dark	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU8M18MB230K

* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.
 ■ See p. 484 for matching connector cables

Excess Gain Curves ambient temperature 25 °C (77 °F)



Photoelectric Sensors

Classic 18 mm Tubular

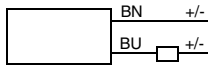
Metal Body, Front Sensing, AC/DC

Wiring

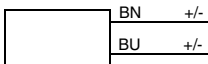
Connector
Thru-beam, reflex and diffuse



**2-wire
AC/DC Receiver**



**2-wire
AC/DC Emitter**



Specifications

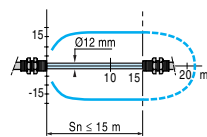
Mechanical		
For usable sensing range, see excess gain curve charts		
Temperature range	Operating Storage	-13 to 131 °F (-25 to 55 °C) -40 to 158 °F (-40 to 70 °C)
Enclosure rating	NEMA Type IEC	4X, 12 IP67 conforming to IEC 60529
Enclosure material	Case Lens Cable	Nickel-plated brass PMMA PvR
Maximum tightening torque	Mounting nuts Connector	5 N•m (44.4 lb-in) 2 N•m (17.7 lb-in)
Vibration resistance	(IEC 60068-2-6)	25 g, ±2 mm amplitude (10 Hz to 55 Hz)
Shock resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator type		360° ring LED shows output status
Connection AC/DC	Cable Connector	5 mm (0.2 in.) diameter cable, 2 x 0.34 mm ² (22 AWG) C.S.A. 3-pin micro-style AC/DC (M12 male)
Electrical		
Voltage range	AC/DC models	24–240 Vac/Vdc
Voltage limit (including ripple)	AC/DC models	20–264 Vac/Vdc
Voltage drop (across switch) closed state maximum	AC/DC models	6 V
Residual leakage current (open state)	AC/DC models	1.5 mA
Load current	AC/DC models	10–200 mA
Maximum operating frequency	AC/DC models	25 Hz
On delay, maximum	AC/DC Models	20 ms
Off delay, maximum	Retroreflective Proximity (diffuse) Thru-beam	20 ms 20 ms 20 ms
Power-up delay, maximum	AC/DC models	300 ms
Short circuit protection		No
Overload protection		No
Reverse polarity protection		No
Agency listings	E 164869 CCN NRKH	LR 44087 Class 3211 03

Accessories

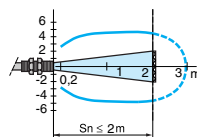
Description	Catalog Number
Swivel ball mounting bracket	XUZA218
Plastic mounting bracket	XSZB118
Metal 90° mounting bracket	9006PA18
Diecast zinc 90° mounting bracket (included)	XUZA118
Plastic mounting nuts	XSZE218
Stainless steel mounting nuts	XSZE318
90° mirror adapter for side sensing (Thru-beam only) Decreases sensing distance by 20% (0.80)	XUBZ02
90° mirror adapter for side sensing (All other models) Decreases sensing distance by 20% (0.80)	XUBZ01

Detection Curves

Thru-Beam System

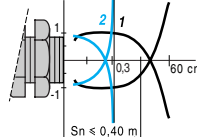


Polarized Reflex

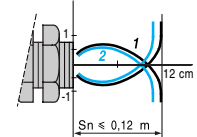


With reflector XUZ C50

Diffuse (Sn = 40 cm)



Diffuse Background Suppression (Sn = 10 cm)



Object: 100 x 100 mm (3.9 x 3.9 in.), 1: White 90%, 2: Gray 18%

Connector Cables (U20 or K suffix)

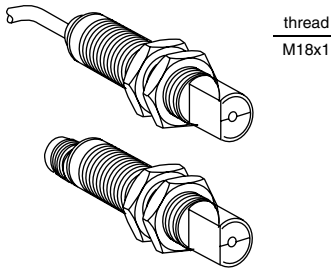
XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484
Accessories Page 82, 137
Reflectors Page 136

Photoelectric Sensors

Classic 18 mm Tubular

Metal Body, 90° Sensing, AC/DC

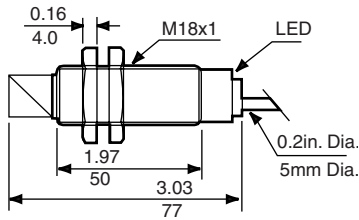


thread
M18x1

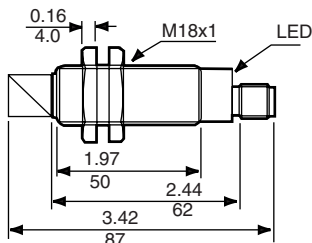
Features

- Nickel-plated brass housing
- Sensing modes:
 - Thru-beam (emitter and receiver packaged together)
 - Polarized retroreflective (XUZC50 reflector included in Retroreflective models)
 - Proximity diffuse
 - Proximity diffuse with background suppression
- Modulated LED output indication
- Standard 2 m cable
- Connector versions available
- Wide selection of mounting brackets available
- Self locking mounting nuts included
- Also available in side sensing style
- UL Listed, CSA Certified, CE marked

Dimensions



XU-M18-340W



XU-M18-340WD

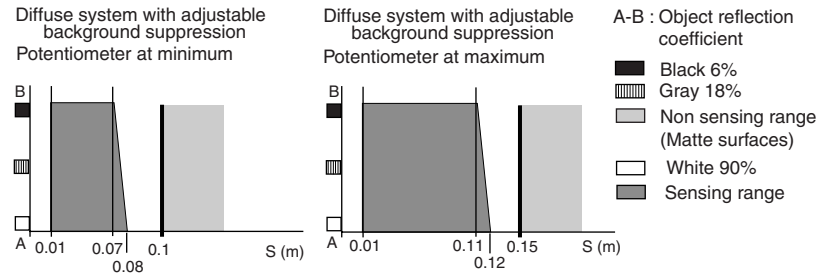


Dual Dimensions inches/mm

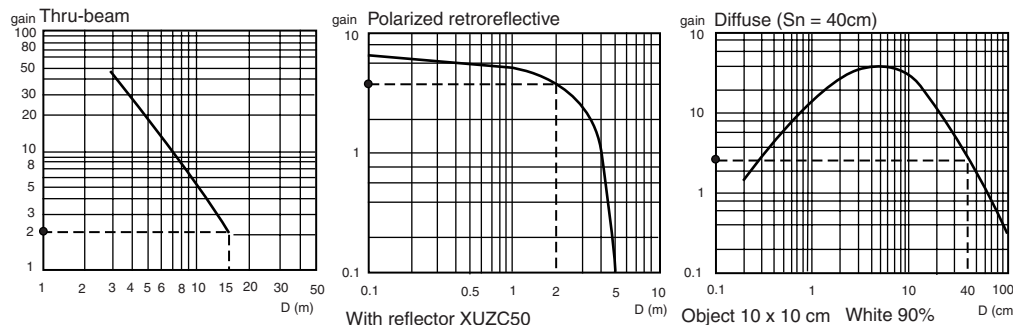
Circuit Type	Output Mode	Voltage Range	Connection Type	Voltage Drop, Maximum	Load Current Maximum	Operating Frequency, Maximum	Catalog Number
Thru-Beam System (Emitter-Receiver)—15 m (49.2 ft) Nominal Sensing Distance *							
2-wire	Dark	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU2M18MA230W
2-wire	Dark	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU2M18MA230WK
2-wire	Light	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU2M18MB230W
2-wire	Light	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU2M18MB230WK
Polarized Retroreflective—2 m (6.6 ft) Nominal Sensing Distance a (XUZC50 reflector included)							
2-wire	Dark	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU9M18MA230W
2-wire	Dark	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU9M18MA230WK
2-wire	Light	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU9M18MB230W
2-wire	Light	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU9M18MB230WK
Proximity Diffuse—40 cm (15.7 in.) Nominal Sensing Range *							
2-wire	Light	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU5M18MA230W
2-wire	Light	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU5M18MA230WK
2-wire	Dark	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU5M18MB230W
2-wire	Dark	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU5M18MB230WK
Proximity Diffuse with Background Suppression—12 cm (4.7 in.) Nominal Sensing Distance							
2-wire	Light	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU8M18MA230W
2-wire	Light	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU8M18MA230WK
2-wire	Dark	24–240 V	2 m (6.6 ft) cable	6 V	200 mA	25 Hz	XU8M18MB230W
2-wire	Dark	24–240 V	3-pin AC/DC micro-connector	6 V	200 mA	25 Hz	XU8M18MB230WK

* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.
 ■ See p. 484 for matching connector cables.

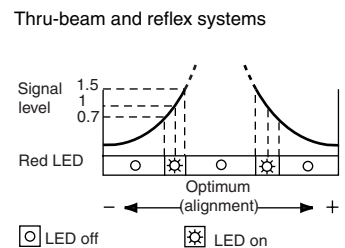
Variation of usable sensing distance



Excess Gain Curves ambient temperature 25 °C (77 °F)



Marginal Detection



Photoelectric Sensors

Classic 18 mm Tubular

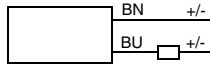
Metal Body, 90° Sensing, AC/DC

Wiring

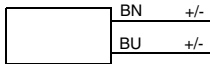
Connector
Thru-beam, reflex and diffuse



2-wire AC/DC Receiver



2-wire AC/DC Emitter



Specifications

Mechanical			
For usable sensing range, see excess gain curve charts			
Temperature Range	Operating Storage	-13 to 131 °F (-25 to 55 °C) -40 to 158 °F (-40 to 70 °C)	
Enclosure Rating	NEMA Type IEC	4X (indoor), 12 IP67 conforming to IEC 60529	
Enclosure Material	Case Lens Cable	Nickel-plated brass PMMA PvR	
Maximum Tightening Torque	Mounting Nuts Connector	5 N•m (44.4 lb-in) 2 N•m (17.7 lb-in)	
Vibration Resistance	(IEC 60068-2-6)	25 g, ±2 mm amplitude (10 Hz to 55 Hz)	
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration	
LED Indicator Type		360° ring LED shows output status	
Connection AC/DC AC/DC	Cable Connector	5 mm (0.2 in.) diameter cable, 2 x 0.34 mm ² (22 AWG) c.s.a. 3-pin micro-style AC/DC (M12 male)	
Electrical			
Voltage Range	AC/DC Models	24–240 Vac/Vdc	
Voltage Limit (Including Ripple)	AC/DC Models	20–264 Vac/Vdc	
Voltage Drop (Across Switch) Closed State Maximum	AC/DC Models	6 V	
Residual Leakage Current (Open State)	AC/DC Models	1.5 mA	
Load Current	AC/DC Models	10–200 mA 20 ≤ Vdc ≤ 58 IEC 60947-5-2 Utilization category DC-13 Vdc > 58 IEC 60947-5-2 Utilization category DC-12	
Operating Frequency, Maximum	AC/DC Models	25 Hz	
On Delay, Maximum	AC/DC Models	20 ms	
Off Delay, Maximum	Retroreflective Proximity (Diffuse) Thru-Beam	20 ms 20 ms 20 ms	
Power-up Delay, Maximum	AC/DC Models	300 ms	
Short Circuit Protection		No	
Overload Protection		No	
Reverse Polarity Protection		No	
Agency Listings	E 164869 CCN NRKH	LR 44087 Class 3211 03	

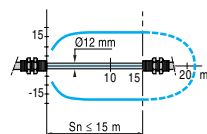
Accessories

Description	Catalog Number
Swivel Ball Mounting Bracket	XUZA218
Plastic Mounting Bracket	XSZB118
Metal 90° Mounting Bracket	9006PA18
Diecast Zinc 90° Mounting Bracket (included)	XUZA118
Plastic Mounting Nuts	XSZE218
Stainless Steel Mounting Nuts	XSZE318

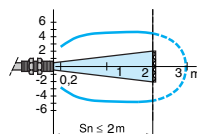
See page 82 for complete assembly.

Detection Curves

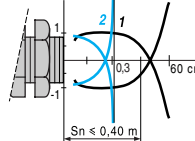
Thru-Beam System



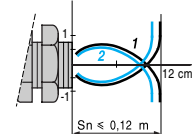
Polarized Reflex



Diffuse (Sn = 40 cm)



Diffuse Background Suppression (Sn = 10 cm)



With reflector XUZ C50

Object: 100 x 100 mm (3.9 x 3.9 in.), 1: White 90%, 2: Gray 18%

Connector Cables (U20 or K suffix)

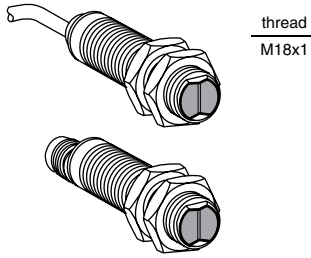
XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484.
Accessories Page 82, 137
Reflectors Page 136

Photoelectric Sensors

Classic 18 mm Tubular

Stainless Steel, Front Sensing, DC

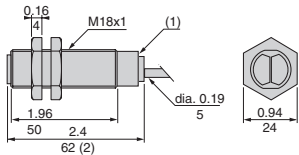


thread
M18x1

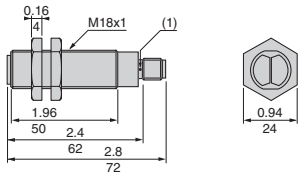
Features

- Stainless steel housing
- Food and beverage rated
- Mounting nuts included
- Short circuit (SCP) reverse polarity and overload protection
- UL Listed, CSA Certified, CE Marked

Dimensions—Front Sensing



XU•N18•341



XU•N18•341D

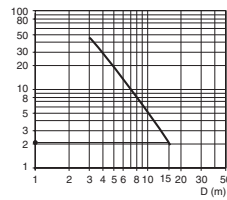
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Output Mode	Circuit Type	Voltage Range	Connection Type †	Load Current Maximum	Operating Frequency	Catalog Number
Thru-Beam (emitter and receiver)—15 m (49.2 ft) Nominal Sensing Distance						
Light/dark operate	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU2N18PP341
Light/dark operate	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU2N18NP341
Light/dark operate	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU2N18PP341D
Light/dark operate	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU2N18NP341D
Retroreflective—4 m (13.1 ft) Nominal Sensing Distance (reflector sold separately)						
Light/dark operate	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU1N18PP341
Light/dark operate	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU1N18NP341
Light/dark operate	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU1N18PP341D
Light/dark operate	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU1N18NP341D
Polarized Retroreflective—2 m (6.6 ft) Nominal Sensing Distance						
Light/dark operate	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU9N18PP341
Light/dark operate	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU9N18NP341
Light/dark operate	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU9N18PP341D
Light/dark operate	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU9N18NP341D
Proximity Diffuse—10 cm (4 in.) Nominal Sensing Distance						
Light/dark operate	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU5N18PP341
Light/dark operate	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU5N18NP341
Light/dark operate	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU5N18PP341D
Light/dark operate	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU5N18NP341D

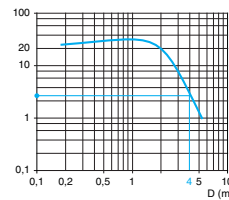
† For a 5 m (16.4 ft) cable length, add suffix L5.

Excess Gain Curves

Thru-Beam

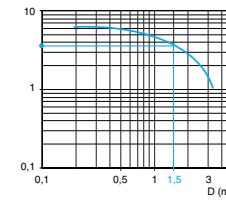


Retroreflective



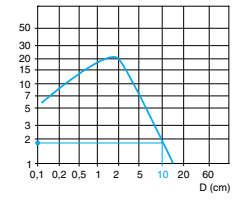
With Reflector XUZC50

Polarized Retroreflective



With Reflector XUZC50

Diffuse



Object 10 x 10 cm White 90%

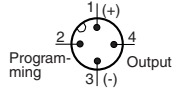
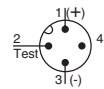
Photoelectric Sensors

Classic 18 mm Tubular

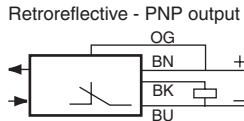
Stainless Steel, Front Sensing, DC

Wiring

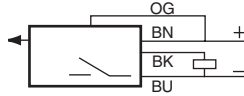
Connector



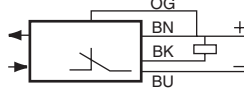
Light operate (no object present)



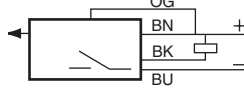
Diffuse - PNP output



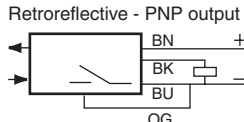
Retroreflective - NPN output



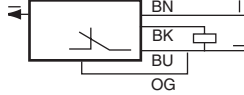
Diffuse - NPN output



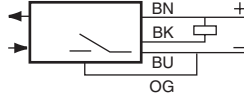
Dark operate (no object present)



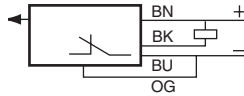
Diffuse - PNP output



Retroreflective - NPN output



Diffuse - NPN output



Specifications

Mechanical

For usable sensing range, see excess gain curve charts		
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4X (indoor), 12
	IEC	IP67 Double Insulated
Enclosure Material	Case	Stainless Steel
	Lens	PMMA
	Cable	PVR
Tightening Torque, Maximum	Mounting Nuts	15 N•m (133.3 lb-in)
	Connector	2 N•m (17.7 lb-in)
Vibration Resistance	(IEC 68868-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
Connection	Cable	5 mm (0.2 in.) O.D. 4 conductor 0.34 mm ² (22 AWG)
	Connector	4-pin micro-style DC (M12)

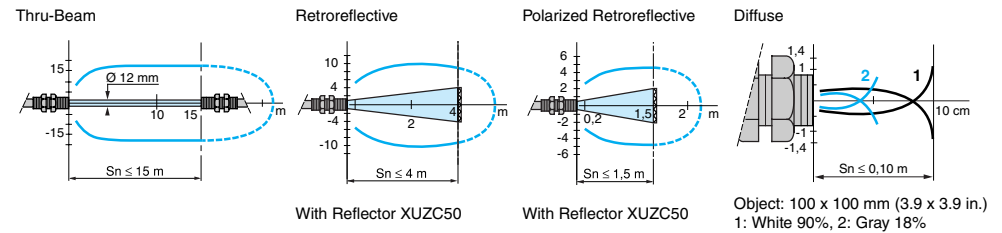
Electrical

Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–30 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	30 mA (reflex and diffuse), 50 mA (thru-beam)
Load Current, Maximum	100 mA
Operating Frequency, Maximum	500 Hz
On Delay, Maximum	1 ms
Off Delay, Maximum	1 ms
Power-up Delay, Maximum	15 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes
Agency Listings	UL CSA CE

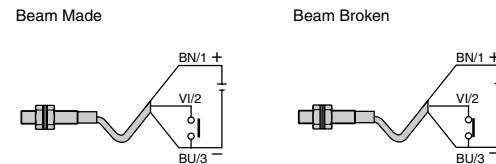
Accessories

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem	XUZ2001

Detection Curves



Beam Break Test (For thru-beam emitter only)



Connector Cables (M12 or D suffix)

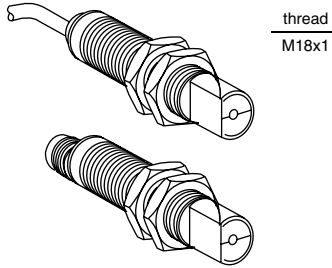
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Accessories Page 82, 137
Reflectors Page 136

Photoelectric Sensors

Classic 18 mm Tubular

Stainless Steel, 90° Sensing, DC

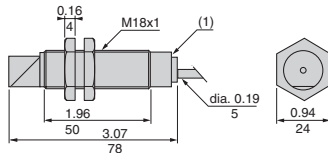


thread
M18x1

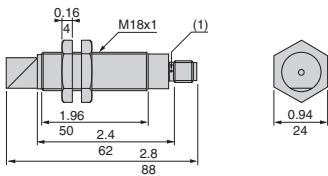
Features

- Stainless steel housing
- Food and beverage rated
- Mounting nuts included
- UL Listed, CSA Certified
- CE Marked

Dimensions Side Sensing



XU•N18•341W



XU•N18•341WD

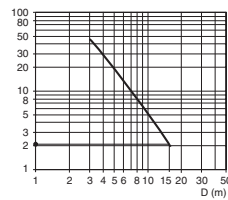
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Output Mode	Circuit Type	Voltage Range	Connection Type ♦	Load Current Maximum	Operating Frequency	Catalog Number
Thru-Beam (emitter and receiver)—15 m (49.2 ft) Nominal Sensing Distance						
Light/dark operate	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU2N18PP341W
Light/dark operate	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU2N18NP341W
Light/dark operate	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU2N18PP341WD
Light/dark operate	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU2N18NP341WD
Retroreflective—4 m (13.1 ft) Nominal Sensing Distance (reflector sold separately)						
Light/dark operate	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU1N18PP341W
Light/dark operate	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU1N18NP341W
Light/dark operate	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU1N18PP341WD
Light/dark operate	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU1N18NP341WD
Polarized Retroreflective —2 m (6.6 ft) Nominal Sensing Distance						
Light/dark operate	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU9N18PP341W
Light/dark operate	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU9N18NP341W
Light/dark operate	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU9N18PP341WD
Light/dark operate	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU9N18NP341WD
Proximity Diffuse—10 cm (4 in.) Nominal Sensing Distance						
Light/dark operate	PNP	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU5N18PP341W
Light/dark operate	NPN	12–24 Vdc	2 m (6.6 ft) cable	100 mA	500 Hz	XU5N18NP341W
Light/dark operate	PNP	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU5N18PP341WD
Light/dark operate	NPN	12–24 Vdc	4-pin micro-style	100 mA	500 Hz	XU5N18NP341WD

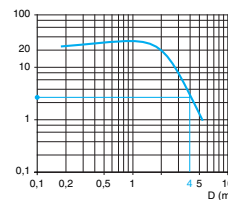
♦ For a 5 m (16.4 ft) cable length, add suffix L5.

Excess Gain Curves

Thru-Beam

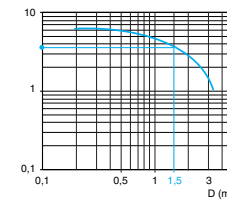


Retroreflective



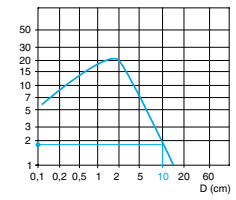
With Reflector XUC50

Polarized Retroreflective



With Reflector XUC50

Diffuse



Object 10 x 10 cm White 90%

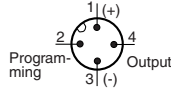
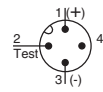
Photoelectric Sensors

Classic 18 mm Tubular

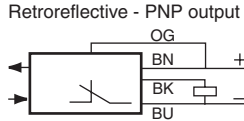
Stainless Steel, 90° Sensing, DC

Wiring

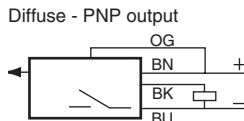
Connector



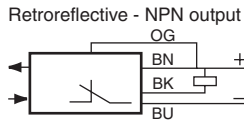
Light operate (no object present)



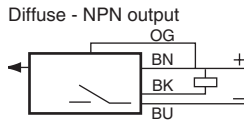
Retroreflective - PNP output



Diffuse - PNP output

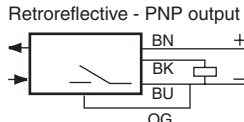


Retroreflective - NPN output

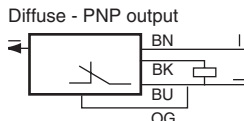


Diffuse - NPN output

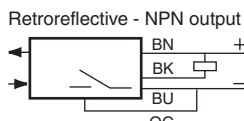
Dark operate (no object present)



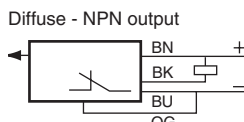
Retroreflective - PNP output



Diffuse - PNP output



Retroreflective - NPN output



Diffuse - NPN output

Specifications

Mechanical

For usable sensing range, see excess gain curve charts		
Temperature Range	Operating	-13 to +131 °F (-25 to +55 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure Rating	NEMA Type	4X (indoor), 12
	IEC	IP67 Double Insulated
Enclosure Material	Case	Stainless Steel
	Lens	PMMA
	Cable	PVR
Tightening Torque, Maximum	Mounting Nuts	15 N•m (133.3 lb-in)
	Connector	2 N•m (17.7 lb-in)
Vibration Resistance	(IEC600 68-2-6)	7 g, amplitude ±1.5 mm (10 Hz to 55 Hz)
Shock Resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED Indicator	Output	Yellow
Connection	Cable	5 mm (0.2 in.) O.D. 4 conductor 0.34 mm ² (AWG)
	Connector	4-pin micro-style DC (M12)

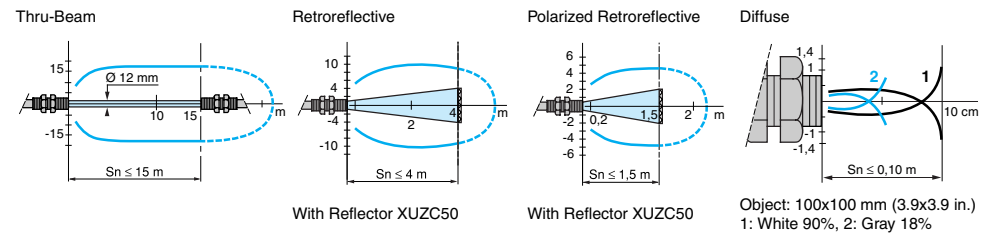
Electrical

Voltage Range	12–24 Vdc
Voltage Limit (Including Ripple)	10–30 Vdc
Voltage Drop (Across Switch), Closed State Maximum	1.5 V
Current Consumption (No Load), Maximum	30 mA (reflex and diffuse), 50 mA (thru-beam)
Load Current, Maximum	100 mA
Operating Frequency, Maximum	500 Hz
On Delay, Maximum	1 ms
Off Delay, Maximum	1 ms
Power-up Delay, Maximum	15 ms
Short Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes
Agency Listings	UL CSA CE

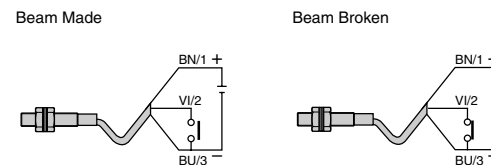
Accessories (for additional accessories, see pages 134–139)

Description	Catalog Number
Reflector, 50 x 50 mm (1.97 x 1.97 in.)	XUZC50
90° metal mounting bracket	XUZA118
Plastic clamp mounting bracket	XUZA218
3-D mounting bracket (stem not included)	XUZB2003
M12 stem	XUZ2001

Detection Curves



Beam Break Test (For thru-beam emitter only)



Connector Cables (M12 or D suffix)

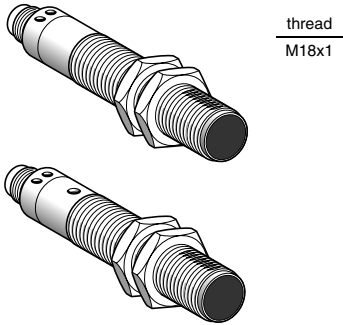
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Accessories Page 82, 137
 Reflectors Page 136

Photoelectric Sensors

Classic 18 mm Tubular

Metal Body, High Excess Gain, Thru Beam, DC

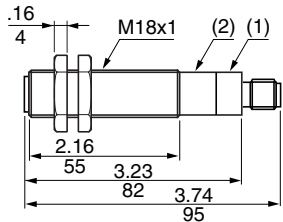


thread
M18x1

Features

- Very high excess gain of 250,000 at 10 cm with strength to burn through polluted environments such as in car washes or lumber milling applications
- Two distinct outputs: analog and digital with PNP output
- Analog can gauge density with sharp precision, as in hopper fill applications
- Digital output is ideal for detecting the presence of an object in nearly opaque packaging
- One catalog number for both emitter and receiver
- Four-pin micro-style connector standard

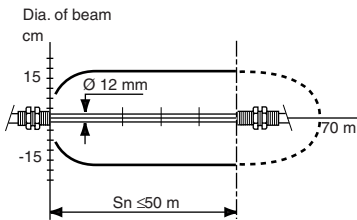
Dimensions



(1) LEDs
(2) Potentiometers
(Receiver Only)

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

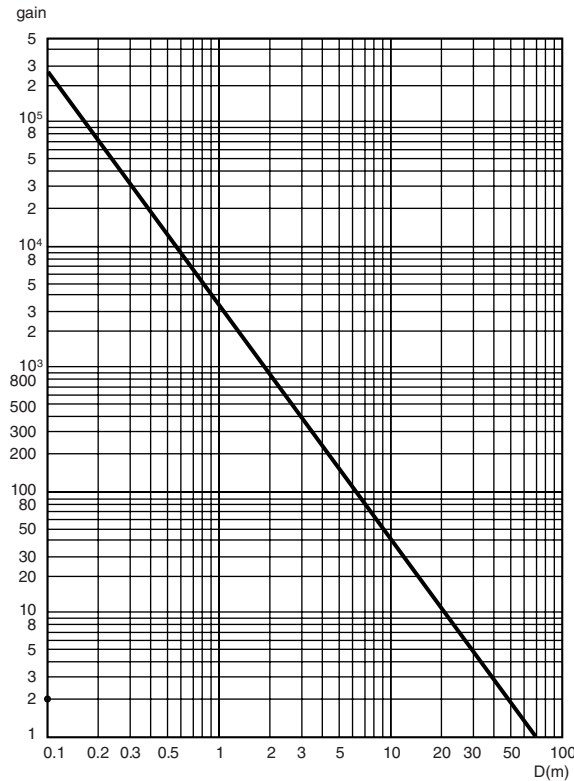
Beam Pattern



Output Mode	Circuit Type	Voltage Range	Connection Type	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam System (Emitter-Receiver)—50 m (164 ft) Nominal Sensing Range*						
Dark	PNP	12–24 Vdc	4-pin micro-style ■	100 mA	30 Hz	XU2M18AP20D

* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.
 ■ See p. 484 for matching connector cables.

Excess Gain Curves ambient temperature 25 °C (77 °F)

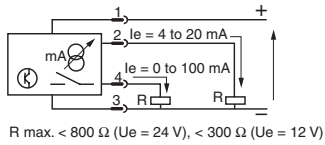


Photoelectric Sensors

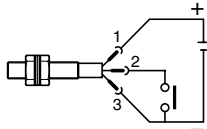
Classic 18 mm Tubular

Metal Body, High Excess Gain, Thru Beam, DC

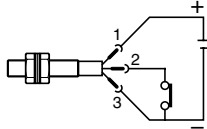
Wiring



Beam Break Test (Emitter Only)

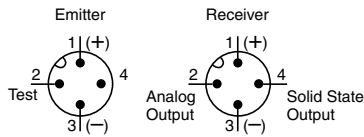


Beam Made



Beam Broken

Connector



Specifications

Mechanical

For usable sensing range, see excess gain curve chart

Temperature Range	Operation	-13 to 131 °F (-25 to 55 °C)
	Storage	-40 to 158 °F (-40 to 70 °C)
Enclosure Rating	NEMA Type	3, 4, 4X, 6, 12, 13
	IEC	IP67 conforming to IEC 60529
Vibration		7 g amplitude + 1.5 mm (10–55 Hz)
Shock Resistance		30 g for 11 ms conforming to 68-2-27
Tightening Torque	Mounting Nuts	15 N•m (133 lb-in)
	Connector	2 N•m (17.7 lb-in)
Repeatability (% of Sr)		3%
LED Indicator Type		One green power LED ■ One yellow output LED ■
Enclosure Material		Nickel-plated brass
Wiring		4-pin micro-style connector

Electrical

Voltage Limit (Including Ripple)		10–30 Vdc
Current Consumption (Maximum) (No Load)		55 mA (emitter and receiver)
Voltage Drop (Maximum)		1.5 V
Analog Output Range		4–20 mA
Current Drift Due to Temperature	At -13 to 131 °F (-25 to 55 °C)	10%
	At 32 to 104 °F (0 to 40 °C)	5%
Current Drift Due to Alignment		3%
Power-up Delay (Maximum)		50 ms
On Delay (Maximum)		15 ms
Off Delay (Maximum)		15 ms
LED Operation	Discrete (on/off) Output	Green LED is illuminated ■
	Analog Output	Yellow LED is illuminated ■
Protective Circuitry	Short Circuit Protection	Yes
	Overload Protection	Yes
	Reverse Polarity Protection	Yes
	Agency Listings	UL E 164869 CCN NRKH

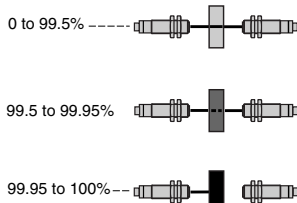
■ See description of LED operation below.

Operation of LEDs in the Analog mode

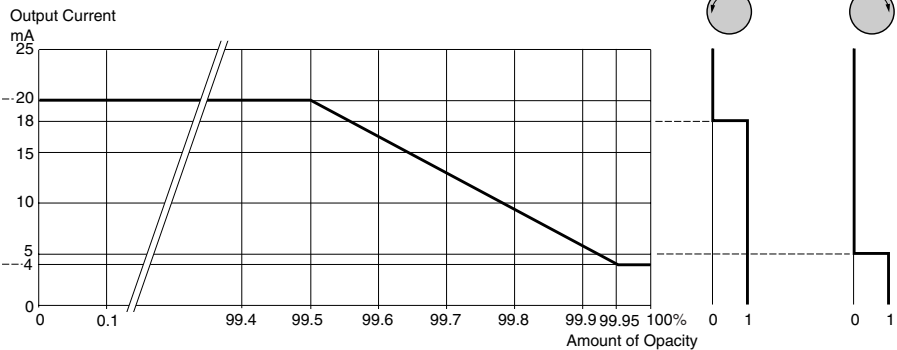
When sensing a slightly opaque target at 20 mA, LED is illuminated at its maximum strength. When sensing a target that is completely opaque at 4 mA, LED is illuminated at its minimum strength.

Type of Target: Opaque

Amount



Analog Output Curve



Example

Detecting sheets of white paper weighing 80 g (2.8 oz) with emitter and receiver 10 cm apart

Number of sheets	1	11	27	31
Analog output current (mA)	17.3	12	6	5

Connector Cables (M12 or D suffix)

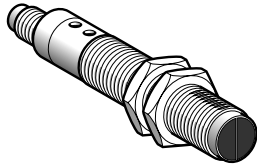
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484
Accessories Page 82, 137

Photoelectric Sensors

Classic 18 mm Tubular

Metal Body, Analog Output, Proximity Diffuse, DC

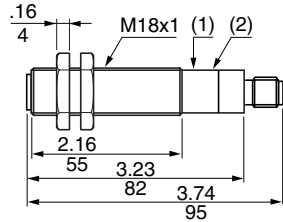


thread
M18x1

Features

- 4 to 20 mA output that adjusts as target characteristics change
- Analog technology in popular 18 mm diameter body style
- Rugged metal enclosure with micro-style connector
- Potentiometer adjusts sensor's sensitivity and reduces the color effects of the target
- Self locking mounting nuts included

Dimensions



(1) Potentiometer
(2) Green LED



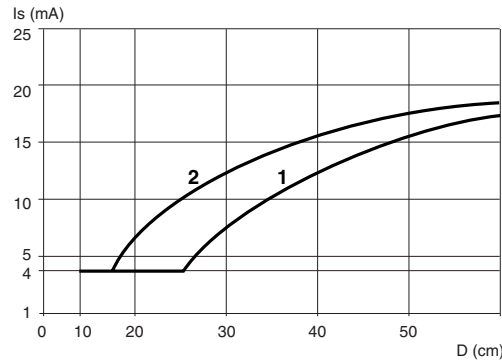
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Output Mode	Circuit Type	Voltage Range	Connection Type	Operating Frequency Maximum	Catalog Number
Proximity Diffuse 50 to 400 mm (2 to 15.7 in.) Nominal Sensing Range					
Light	Analog	12–24 Vdc	4-pin micro-style ■	20 Hz @ 10 mA	XU5M18AB20D

■ See p. 484 for matching connector cables.

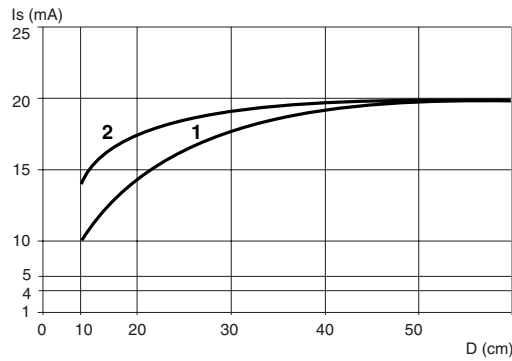
Output Signal (relative to distance/color)

Potentiometer at Maximum



Target Color
1 White 90%
2 Gray 15%

Potentiometer at Minimum



Target Color
1 White 90%
2 Gray 15%

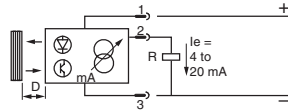
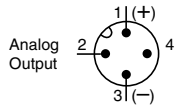
Photoelectric Sensors

Classic 18 mm Tubular

Metal Body, Analog Output, Proximity Diffuse, DC

Wiring

Connector



Specifications

Mechanical		
Temperature Range	Operation	-13 to 131 °F (-25 to 55 °C)
	Storage	-40 to 158 °F (-40 to 70 °C)
Enclosure Rating	NEMA Type	3, 4, 4X (Indoor), 6, 12, 13
	IEC	IP67 per IEC 56029, IP671 per NFC 20-010
Vibration		7 g amplitude + 1.5 mm (10–55 Hz)
Shock Resistance		30 g for 11 ms conforming to 68-2-27
Tightening Torque	Mounting Nuts	15 N•m (133 lb-in)
	Connector	2 N•m (17.7 lb-in)
Repeatability (% of Sr)		3%
LED Indicator Type		One green LED showing output
Enclosure Material		Nickel-plated brass (window is PMAA)
Wiring		4-pin micro-style connector ■
Electrical		
Voltage Range		12–24 Vdc
Voltage Limit (Including Ripple)		10–30 Vdc
Current Consumption (Maximum) (No Load)		30 mA
Output Range		4–20 mA
Maximum Output Current Drift	At -13 to 131 °F (-25 to 55 °C)	10%
	At 32 to 104 °F (0 to 40 °C)	5%
Power-up Delay (Maximum)		50 ms
Light Emission		Infrared
LED Intensity	At 20 mA	LED burns brightly (at maximum)
	At 4 mA	LED burns dimly (at minimum)
Protective Circuitry	Short Circuit Protection	Yes
	Overload Protection	Yes
	Reverse Polarity Protection	Yes
Agency Listings	E 164869 CCN NRKH LR 44087 Class 3211 03	

■ See p. 484 for matching connector cables.

Connector Cables (M12 or D suffix)

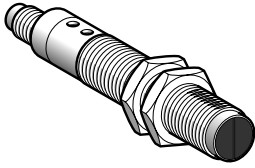
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484
Accessories Page 82, 137

Photoelectric Sensors

Classic 18 mm Tubular

Metal Body, Ultraviolet (UV), DC



thread
M18x1

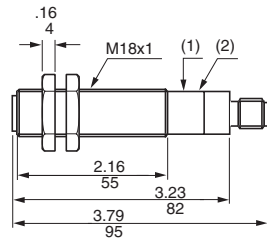
Features

- Detection of ultraviolet marks and products containing UV bluing agents, as used for packaging identification and quality assurance
- Either Mark Reader or standard Diffuse sensing modes
- Sensitivity adjustment by 20-turn potentiometer
- 20 ms Off Delay built-in timing feature
- Popular 18 mm tubular body style in rugged metal enclosure with a 4-pin micro-style connection

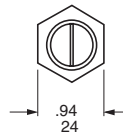
Circuit Type	Output Mode	Voltage Range	Connection Type	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Diffuse—20 mm (0.79 in.) Nominal Sensing Range*—Micro-Connector						
PNP	Light	12–24 Vdc	4-pin micro-style	100 mA	1,000 Hz	XU5M18U1D

* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal

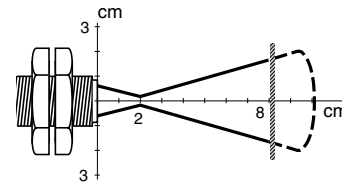
Dimensions



1. Potentiometer
2. Green LED



Detection Curve



Target 5 x 5 cm, white 90%
Spot size at 20 mm
Oval Dia. 3 x 1 mm

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

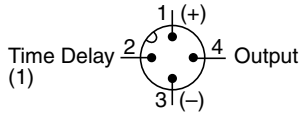
Photoelectric Sensors

Classic 18 mm Tubular

Metal Body, Ultraviolet (UV), DC

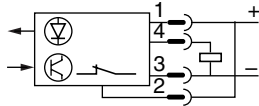
Wiring

Connector

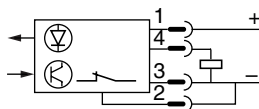


Off delay:

For no delay, connect contact 2 to (+)
For 20 ms delay, connect contact 2 to (-)



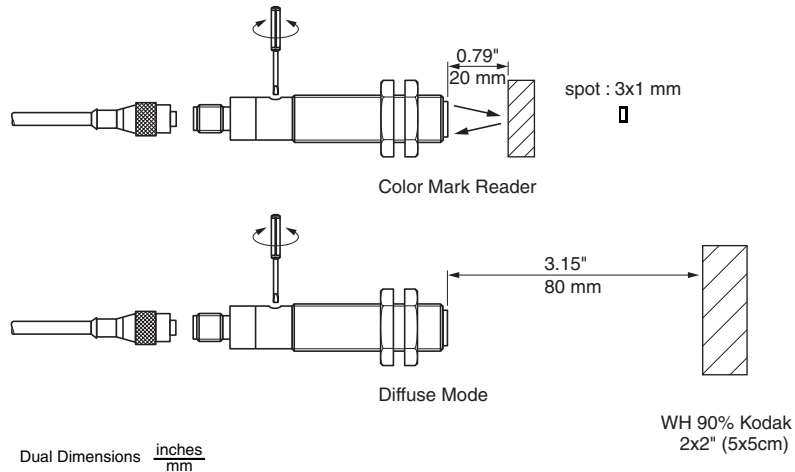
Without time delay



With time delay (20 ms)

Specifications

Mechanical			
Nominal sensing range	20 mm when reading UV mark 0 to 80 mm as standard diffuse		
UV spot dimensions	0.12 x 0.04 in. (3 x 1 mm) diameter		
Temperature range	Operation	-13 to 131 °F (-25 to 55 °C)	
	Storage	-40 to 158 °F (-40 to 70 °C)	
Enclosure rating	IEC	IP67 conforming to IEC 60529	
Tightening torque	15 N•m (11 lb-in)		
Vibration	7 g amplitude + 0.6 mm (10–55 Hz)		
Shock resistance	30 g for 11 ms conforming to IEC 60068-2-27		
LED indicator type	Red—output		
Enclosure material	Nickel-plated brass (window is PMAA)		
Sensitivity adjustment	20 turn potentiometer		
Connection	M12, 4-pin connector		
Light emission	Ultraviolet		
Electrical			
Voltage range	DC models		
Voltage range	12–24 V (with SCP)		
Voltage limit (including limit)	10–30 Vdc		
Operating frequency	1,000 Hz		
Current consumption (maximum) (no load)	20 mA		
Voltage drop (maximum)	1.5 V PNP		
Power-up delay (maximum)	100 ms		
On delay (maximum)	500 µs		
Off delay (maximum)	500 µs		
Timing function	20 ms off delay selectable by wiring		
Agency listings	E 164869 CCN NRKH	LR 44087 Class 3211 03	



Connector Cables (M12 or D suffix)

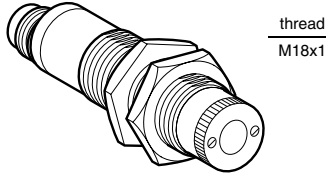
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484
Accessories Page 82, 137

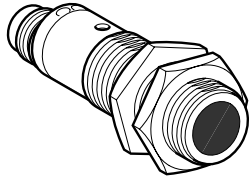
Photoelectric Sensors

Classic 18 mm Tubular

Plastic Body, Laser, Thru-Beam Mode, DC



thread
M18x1



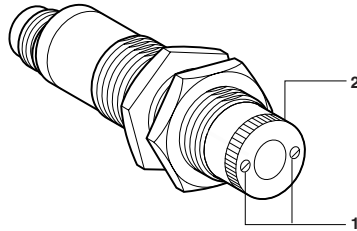
Features

- Extremely long sensing distance of 100 m (328.1 ft) in an 18 mm tubular body
- Detection of very small objects
- Adjustable beam (or focus point) down to 0.5 mm (0.02 in.)
- System checking and marginal detection LEDs
- Reserve Mode option increases beam strength for visible alignment during setup
- Mounting nuts and adjustment screwdriver included
- Micro-style connector standard ■

Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam Emitter-Receiver—100 m (328.1 ft) Nominal Sensing Distance *					
PNP	Light/dark	12–24 Vdc	100 mA	500 Hz	XU2P18PP340DL
NPN	Light/dark	12–24 Vdc	100 mA	500 Hz	XU2P18NP340DL

* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.
 ■ See p. 484 for matching connector cables

Adjustments



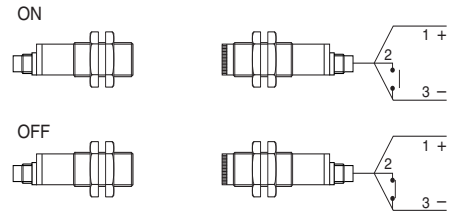
The adjustment of the focusing point enables the detection of targets down to a size of 0.5 mm.

To adjust the focusing point, loosen the mounting screws (1) and rotate the serrated sleeve (2) located on the face of the sensor.

Re-tighten mounting screws.

Note: Saddle clamp XUZA218 incorporating a ball joint (see page 82) is particularly suited for mounting the sensor and adjusting the beam alignment when the sensing range is several tens of meters.

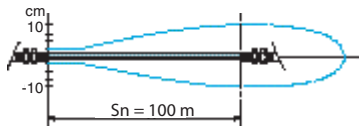
Beam break test



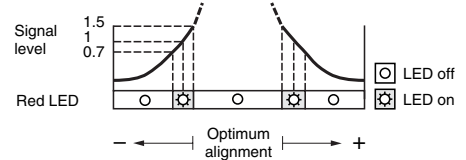
XU2P18•P340DLR

XU2P18KP340DLT

Detection curve (set to infinity)



Verification of correct operation



Operating precaution

⚠ CAUTION

LASER RADIATION

Do not stare into the beam.

Failure to follow this instruction can result in injury.

CLASS II LASER PRODUCT

This product complies with CFR 1040.1

Photoelectric Sensors

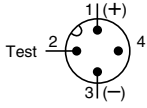
Classic 18 mm Tubular

Plastic Body, Laser, Thru-Beam Mode, DC

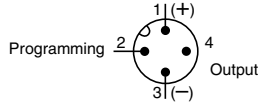
Wiring

Connector

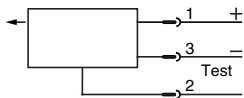
Emitter



Receiver

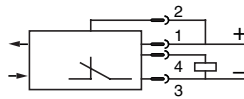


Emitter

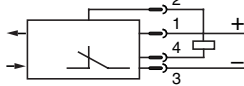


Light mode (no object present)

Receiver
PNP output

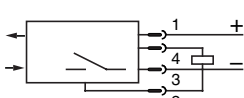


NPN output

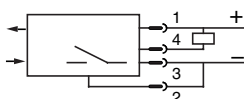


Dark mode (no object present)

Receiver
PNP output



NPN output



Specifications

Mechanical

For usable sensing range, see excess gain curve charts

Temperature range	Operation	14 to +113 °F (-10 to +45 °C)
	Storage	-40 to +158 °F (-40 to +70 °C)
Enclosure rating	IEC	IP67 conforming to IEC 60529
Tightening torque (maximum)		4 N•m (35.5 lb-in)
Vibration		7 g, amplitude ±1.5 mm, 10–55 Hz conforming to IEC 60068-2-6
Shock resistance		50 g for 11 ms conforming to 68-2-27
Enclosure material	Case	PC/ABS
	Lens	PMMA
Wiring		Micro-style connector

Electrical

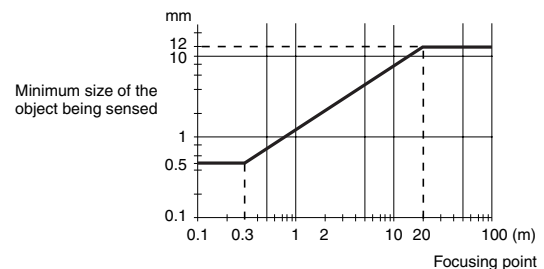
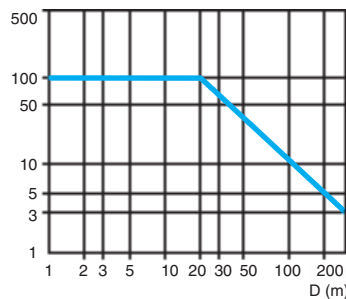
Voltage range	12–24 Vdc
Voltage limit (including ripple)	10–30 Vdc
Voltage drop (across switch), closed state	1.5 V
Maximum load current	100 mA
Current consumption (maximum) (no load)	50 mA (emitter and receiver)
Maximum operating frequency	500 Hz
On delay (maximum)	1 ms
Off delay (maximum)	1 ms
Power-up delay (maximum)	15 ms

Physical Characteristics

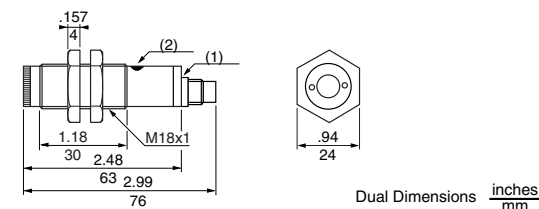
Emitter wave length	Red laser	630 nm
Transmission power (maximum)		1 mW, class 2 conforming to IEC 60825-1 and CFR 1040.1
Protective circuitry	Short circuit protection	yes
	Overload protection	yes
	Reverse polarity protection	yes

Agency listings	UL	SP	CE
-----------------	----	----	----

Excess gain curve ambient temperature 25 °C (77 °F)



Dimensions



- (1) LED
- (2) Adjustment potentiometer (receiver only)

Connector Cables (M12 or D suffix)

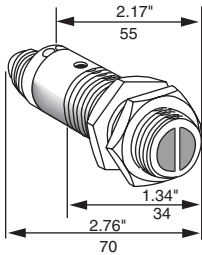
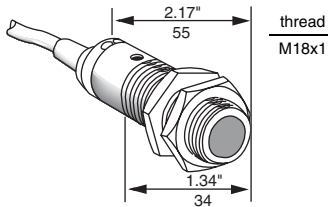
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484
Accessories Page 82, 137

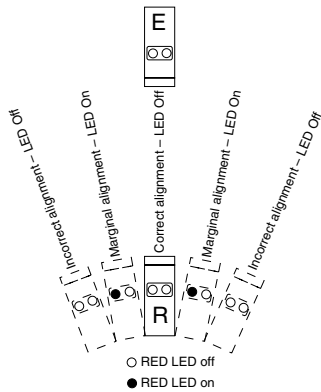
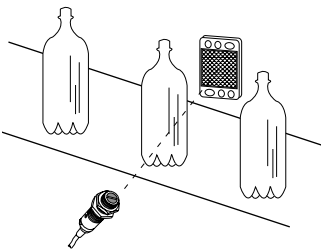
Photoelectric Sensors

XUB Plus 18 mm Short Body

Transparent Material Detection, DC



Dual Dimensions inches/mm



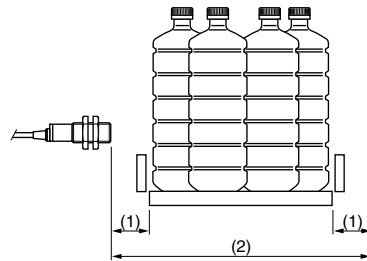
Features

- Ultra-short body
- Adjustable sensitivity
- Light/dark selectable
- Short circuit and overload protection
- Advanced features: 360° multi-functional LED indicator: output On, marginal detection indicator and short circuit indicator, and transparent object detection in retroreflective mode

Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Retroreflective—80 cm (31.5 in.) Nominal Sensing Range ■—2 m (6.6 ft) cable (Reflector sold separately)					
3-wire, PNP	Light/dark	12–24 V	100 mA	500 Hz	XUBH01353
3-wire, NPN	Light/dark	12–24 V	100 mA	500 Hz	XUBJ01353
Retroreflective—80 cm (31.5 in.) Nominal Sensing Range—Micro-Connector ◆ (Reflector sold separately)					
3-wire, PNP	Light/dark	12–24 V	100 mA	500 Hz	XUBH01353D
3-wire, NPN	Light/dark	12–24 V	100 mA	500 Hz	XUBJ01353D

- When used with XUZC50 reflector. 24 in. (60 cm) sensing range when used with XUZC24 reflector.
- * Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.
- ◆ See p. 484 for matching connector cables

Recommended distances and application restraints



- (1) 5 cm minimum
- (2) Sensor-reflector distance (see table below)

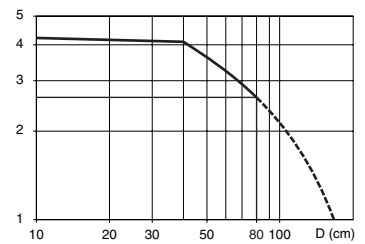
Recommended approach direction

(lens on horizontal plane, horizontal passage of target)



Excess gain curve

ambient temperature 25 °C (77 °F)



With reflector XUZC50

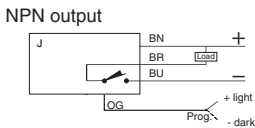
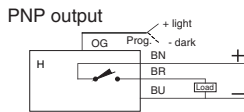
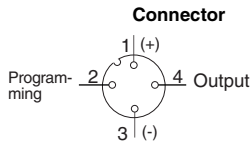
Material	Reflector	Sensor-reflector distance (2)				
		0	20 cm (7.9 in.)	40 cm (15.7 in.)	60 cm	80 cm
Tinted glass	XUZC50	—	—	—	—	—
	XUZC24	—	—	—	—	—
PVC bottles	XUZC50	—	—	—	—	—
	XUZC24	—	—	—	—	—
Clear glass	XUZC50	—	—	—	—	—
	XUZC24	—	—	—	—	—
PET bottles	XUZC50	—	—	—	—	—
	XUZC24	—	—	—	—	—
PE film	XUZC50	—	—	—	—	—
	XUZC24	—	—	—	—	—

Photoelectric Sensors

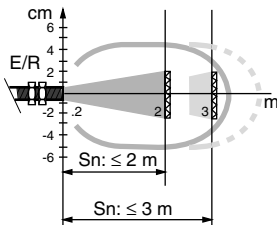
XUB Plus 18 mm Short Body

Transparent Material Detection, DC

Wiring

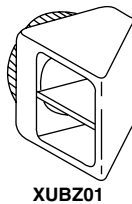
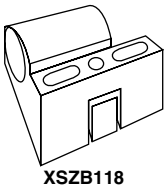
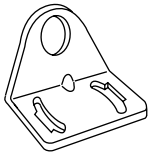


Beam Pattern



With reflector XUZC50

- Polarized reflex
- Reflex



Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484
 Accessories Page 82, 137
 Reflectors Page 136

Specifications

Mechanical		
For usable sensing range, see excess gain curve charts		
Temperature range	-13 to +131 °F (-25 to +55 °C)	
Enclosure rating	IEC IP67 (IEC 60529)	
Enclosure material	Case PC/ABS, Lens PMMA	
Tightening torque (maximum)	5 N•m (44 lb-in)	
Vibration resistance	7 g, amplitude ±1.5 mm (10–55 Hz)	
Shock resistance	50 g, for 11 ms	
Cable	PvR, 0.16 in. dia. (4 mm ²)	
Conductors	24 AWG (0.222 mm ²)	
Electrical		
Voltage range	12–24 Vdc	
Voltage limit (including ripple)	10–30 Vdc	
Voltage drop (across switch), closed state	1.5 V	
Maximum load current	100 mA	
Current consumption (no load)	35 mA Retroreflective	
Maximum operating frequency	500 Hz	
On delay (maximum)	1 ms (1.5 ms thru-beam)	
Off delay (maximum)	1 ms (1.5 ms thru-beam)	
Power-up delay (maximum)	30 ms	
Short circuit protection	Yes	
Overload protection	Yes	
Protective circuitry	Radio frequency immunity (RFI)	IEC 61000-4-3, L3* (10 V/M)
	Electrostatic discharges	DC 2-wire: IEC 61000-4-2, L3* (8 kV) DC 3-wire: IEC 61000-4-2, L2* (4 kV)
	Fast transients (motor start/stop interference)	IEC 61000-4-4, L3* (1 kV)
	Impulse voltages (lightning, etc.)	IEC 60947-5-2, L3* (2.5 kV)
Agency listings	E 164353 CCN NKCR2 LR 44087 Class 3211 03 	

Physical Characteristics

Ambient light immunity	10,000 Lux
Emitter wave length: Retroreflective	880 nm Pulsed Infrared LED

* L indicates level number.

Options

Description	Suffix
Extended cable length, 5 m (16.4 ft) cable	L05
Extended cable length, 10 m (32.8 ft) cable	L10

Accessories

Description	Catalog Number
Metal mounting bracket	9006PA18
Plastic universal mounting bracket	XSZB118
90° mirror adapter for side sensing (All other models) Decrease sensing distance by 20% (0.80)	XUBZ01

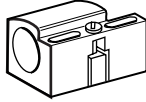
Photoelectric Sensors

Classic 18 mm Tubular

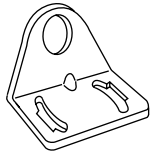
Accessories—Replacement



XUZA218



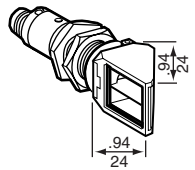
XSZB118



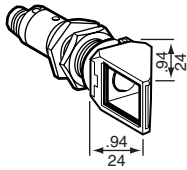
9006PA18



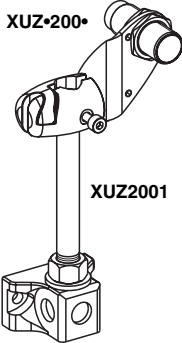
XUZA118



XUBZ01



XUBZ02



XUZ2001

XUZ2003

Accessories

Description	Catalog Number
Plastic swivel ball mounting bracket (18 mm)	XUZA218
Plastic mounting bracket	XSZB118
Metal 90° mounting bracket	9006PA18
Diecast zinc 90° mounting bracket	XUZA118
Plastic mounting nuts	XSZE218
Stainless steel mounting nuts	XSZE318
90° mirror adapter for side sensing (Thru-beam only) Decreases sensing distance by 20% (0.80)	Classic type only XUBZ02
90° mirror adapter for side sensing (All other models) Decreases sensing distance by 20% (0.80)	Classic type only XUBZ01
3-D Mounting base	XUZ2003
M12 stem, 75 mm (2.95 in.) usable length	XUZ2001
3-D Mounting bracket (stem not included)	XUZB2003

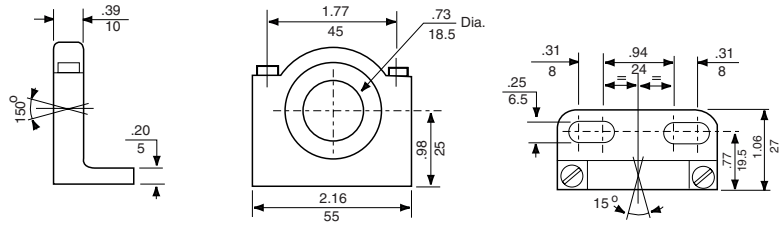
Thru-Beam Emitter and Receiver Replacements

Description	Catalog Number for Replacement of Emitter/Receiver Pair	Catalog Number for Emitter or Receiver Only
Classic Metal AC/DC, Dark Operate	XU2M18MA230	Emitter Only XU2M18MC230T Receiver Only XU2M18MA230R
Classic Metal AC/DC, Light Operate	XU2M18MB230	Emitter Only XU2M18MC230T Receiver Only XU2M18MB230R
Classic Metal AC/DC Dark Operate, Micro-Connector	XU2M18MA230K	Emitter Only XU2M18MC230KT Receiver Only XU2M18MA230KR
Classic Metal AC/DC Light Operate, Micro-Connector	XU2M18MB230K	Emitter Only XU2M18MC230KT Receiver Only XU2M18MB230KR
Classic Metal AC/DC Dark Operate, 5 m (16.4 ft) Cable	XU2M18MA230L5	Emitter Only XU2M18MC230L5T Receiver Only XU2M18MA230L5R
Classic Metal AC/DC Light Operate, 5 m (16.4 ft) Cable	XU2M18MB230L5	Emitter Only XU2M18MC230L5T Receiver Only XU2M18MB230L5R
Classic Metal DC, NPN Light/Dark Operate	XU2M18NP340	Emitter Only XU2M18KP340T Receiver Only XU2M18NP340R
Classic Metal DC, NPN Light/Dark Operate, Micro-Connector	XU2M18NP340D	Emitter Only XU2M18KP340DT Receiver Only XU2M18NP340DR
Classic Metal DC, NPN Light/Dark Operate, 5 m (16.4 ft) Cable with Connector	XU2M18NP340L5	Emitter Only XU2M18KP340L5T Receiver Only XU2M18NP340L5R
Classic Metal DC, PNP Light/Dark Operate	XU2M18PP340	Emitter Only XU2M18KP340T Receiver Only XU2M18PP340R
Classic Metal DC, PNP Light/Dark Operate, Micro-Connector	XU2M18PP340D	Emitter Only XU2M18KP340DT Receiver Only XU2M18PP340DR
Classic Metal DC, PNP Light/Dark Operate, 5 m (16.4 ft) Cable with Connector	XU2M18PP340L5	Emitter Only XU2M18KP340L5T Receiver Only XU2M18PP340L5R
Classic Plastic DC, NPN Light/Dark Operate	XU2B18NP340	Emitter Only XU2B18KP340T Receiver Only XU2B18NP340R
Classic Plastic DC, NPN Light/Dark Operate, Micro-Connector	XU2B18NP340D	Emitter Only XU2B18KP340DT Receiver Only XU2B18NP340DR
Classic Plastic DC, PNP Light/Dark Operate	XU2B18PP340	Emitter Only XU2B18KP340T Receiver Only XU2B18PP340R
Classic Plastic DC, PNP Light/Dark Operate, Micro-Connector	XU2B18PP340D	Emitter Only XU2B18KP340DT Receiver Only XU2B19PP340DR
Laser Light/Dark Operate, NPN	XU2P18NP340DL	Emitter Only XU2P18KP340DLT Receiver Only XU2P18NP340DLR
Laser Light/Dark Operate, PNP	XU2P18PP340DL	Emitter Only XU2P18KP340DLT Receiver Only XU2P18PP340DLR

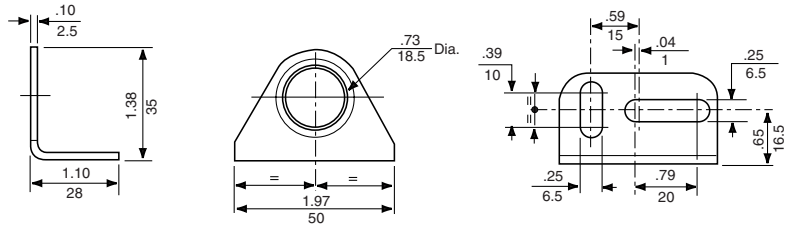
Photoelectric Sensors Classic 18 mm Tubular Accessories—Dimensions

Dimensions

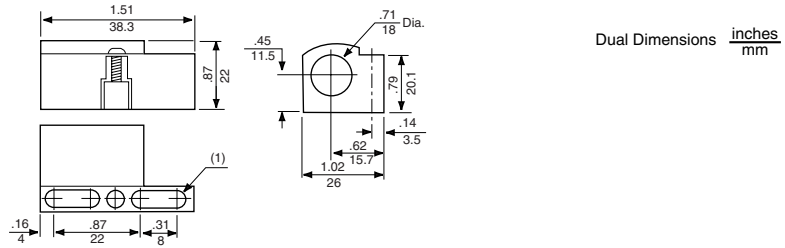
XUZA218



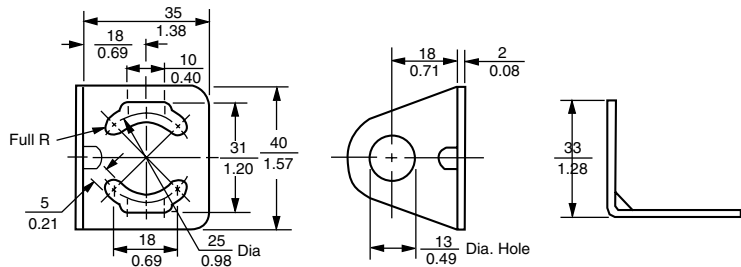
XUZA118



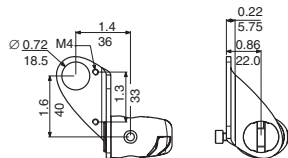
XSZB118



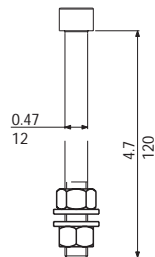
9006PA18



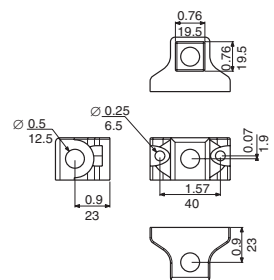
XUZB2003



XUZ2001



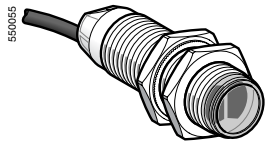
XUZ2003



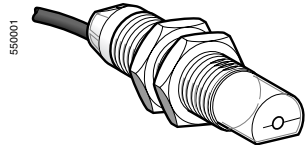
Photoelectric Sensors

Osiris® Food and Beverage Processing, Stainless Steel

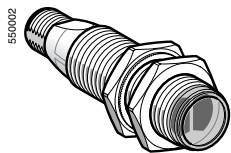
18 mm, Programmable, Three-Wire DC, Solid-State Output



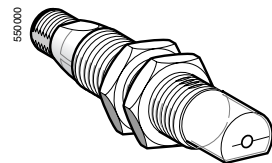
XUB0***NL2



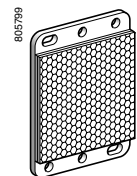
XUB0***WL2



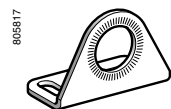
XUB0***NM12



XUB0***WM12



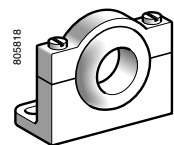
XUZC50



XUZA118



XUZB2005



XUZA218

Ø 18 stainless steel

Pre-cabled (2)

Sensing distance (Sn) (3)
m (ft)

Sensing distance (Sn) (3) m (ft)	Function	Output	Line of sight	Catalog number	Weight kg (lb)
0–15 (0–49.2) depending on whether accessories are used	NO or NC, using Osiconcept programming	PNP	Along case axis	XUB0SPSNL2	0.105 (0.231)
			90° to case axis	XUB0SPSWL2 (5)	0.110 (0.243)
		NPN	Along case axis	XUB0SNSNL2	0.105 (0.231)
			90° to case axis	XUB0SNSWL2 (5)	0.110 (0.243)

M12 connector

0–15 (0–49.2) depending on whether accessories are used	NO or NC, using Osiconcept programming	PNP	Along case axis	XUB0SPSNM12	0.055 (0.121)
			90° to case axis	XUB0SPSWM12 (5)	0.060 (0.132)
		NPN	Along case axis	XUB0SNSNM12	0.055 (0.121)
			90° to case axis	XUB0SNSWM12 (5)	0.060 (0.132)

Accessories

Description	Connection	Line of sight	Catalog number	Weight kg (lb)
Thru-beam accessories (transmitter)	Pre-cabled (2)	Along case axis	XUB0SKSNL2T	0.105 (0.231)
		90° to case axis	XUB0SKSWL2T (5)	0.110 (0.243)
	M12 connector	Along case axis	XUB0SKSNM12T	0.055 (0.121)
		90° to case axis	XUB0SKSWM12T (5)	0.060 (0.132)
Reflector 50 x 50 mm (1.97 x 1.97 in.)	—	—	XUZC50	0.020 (0.044)

Mounting accessories (4)

Description	Catalog number	Weight kg (lb)
Stainless steel mounting bracket	XUZA118	0.045 (0.099)
Plastic mounting bracket with adjustable ball-joint	XUZA218	0.035 (0.077)
Plastic mounting clamp, 24.1 mm (0.95 in.) centers with locking screw	XUZB2005	0.007 (0.015)

- For further information on **Osiconcept**, see page 7.
- For a 5 m (16.4 ft) cable, replace L2 with L5. Example: XUB0SPSNL2 becomes XUB0SPSNL5.
- For further information, see page 85.
- For further information, see page 139.
- For line of sight 90° to case axis versions, see sensing distances on page 85.


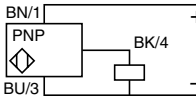
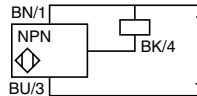
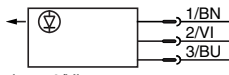
Photoelectric Sensors

Osiris® Food and Beverage Processing, Stainless Steel

18 mm, Programmable, Three-Wire DC, Solid-State Output

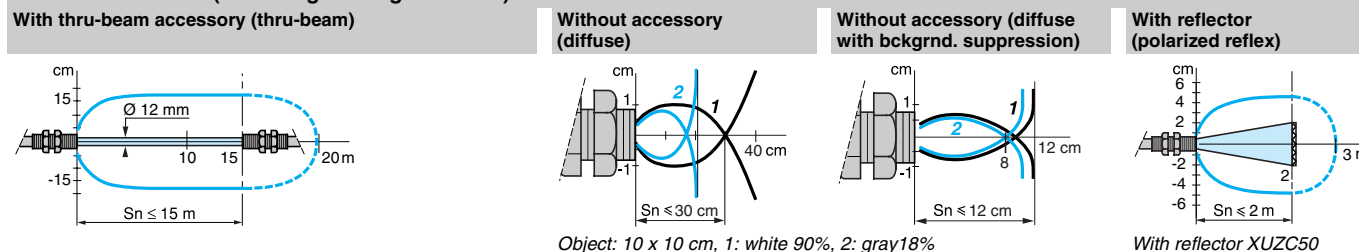
Specifications		XUB0***M12, XUB0***M12T	XUB0***L2, XUB0***L2T
Sensor type		XUB0***M12, XUB0***M12T	
Product certifications		UL, CSA, cE	
Connection	Connector	M12	—
	Pre-cabled	—	Length: 2 m (6.6 ft)
Sensing distance nominal Sn / maximum nominal Sn: excess gain = 2 maximum: excess gain = 1		Line of sight along case axis	Line of sight 90° to case axis
	m (ft)	0.12 / 0.12 (0.39 / 0.39)	0.11 / 0.11 (0.36 / 0.36)
	m (ft)	0.3 / 0.4 (1.0 / 1.3)	0.2 / 0.3 (0.7 / 1.0)
	m (ft)	2 / 3 (6.6 / 9.8)	1.5 / 2 (4.9 / 6.6)
Type of transmission		Infrared, except for polarized reflex (red)	
Degree of protection		IP 65, IP 67 conforming to IEC 60529; IP69 K to DIN 40050; double insulation □	
Storage temperature		°C -40 to +70	
Operating temperature		°C -25 to +55	
Materials		Case: stainless steel, grade 304CU; Lens: PMMA; Cable: PvR	
Vibration resistance		Conforming to IEC 60068-2-6 7 gn, amplitude ± 1.5 mm (10–55 Hz)	
Shock resistance		Conforming to IEC 60068-2-27 30 gn, duration 11 ms	
Indicator lights	Output state	Yellow LED (transmission present for XUB0***T)	
	Supply on	Green LED	
	Stability	Red LED (except for XUB0***T)	
Rated supply voltage		V _{DC} 12–24 with protection against reverse polarity	
Voltage limits (including ripple)		V _{DC} 10–36	
Current consumption, no-load		mA 35 (20 for XUB0***T)	
Switching capacity		mA ≤ 100 with overload and short-circuit protection	
Voltage drop, closed state		V 1.5	
Maximum switching frequency		Hz 250	
Delays	First-up	ms < 200	
	Response	ms < 2	
	Recovery	ms < 2	

Connections

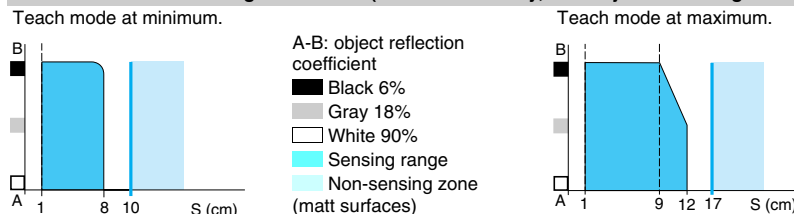
M12 connector  <p>3 (-) 1 (+) 4 OUT/Output 2 Beam break input (2)</p>	Pre-cabled (-) BU(Blue) (+) BN(Brown) OUT/Output BK (Black) Beam break input (2) VI (Violet)	PNP 	NPN 	Thru-beam accessory  <p>Input 2/VI: - not connected: beam made - connected to -: beam broken</p>
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For more connection information, refer to the Cabling section beginning on page 625.

Detection curves (line of sight along case axis)



Variation of usable sensing distance Su (without accessory, with adjustable background suppression)



Dimensions

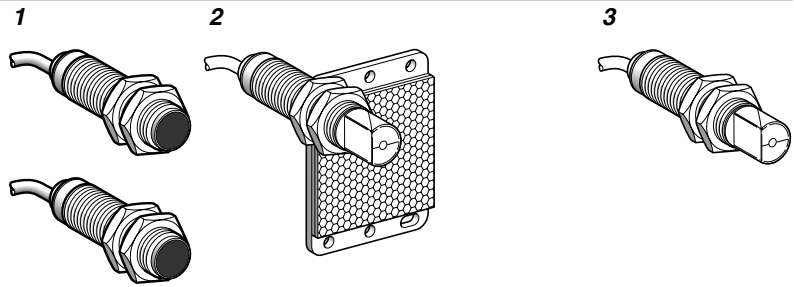
XUB	Ø 18	Pre-cabled (mm)		Plug-in connector (mm)	
		a	b	a	b
	Line of sight along case axis	64 (3)	44	78 (2)	44
	Line of sight 90° to case axis	78	44	92	44

Photoelectric Sensors

Osiris® Food and Beverage Processing, Stainless Steel

M18x1 DC Solid-State Output

18 mm



System		Thru-beam 1	Reflex 2	Polarized reflex 2	Diffuse 3
Type of transmission		Infrared	Infrared	Red	Infrared
Sensing distance	Nominal, Sn (excess gain = 2)	15 m	4 m	2 m	0.10 m
	Maximum (excess gain = 1)	20 m	5.5 m (with 50 x 50 mm reflector)	3 m (with 50 x 50 mm reflector)	0.15 m
Catalog numbers of pre-cabled versions (1)		(2)	(3)	(3)	
3-wire, PNP NO or NC programmable	Line of sight along case axis	XU2N18PP341	XU1N18PP341	XU9N18PP341	XU5N18PP341
	Line of sight 90° to case axis	XU2N18PP341W	XU1N18PP341W	XU9N18PP341W	XU5N18PP341W
3-wire, NPN NO or NC programmable	Line of sight along case axis	XU2N18NP341	XU1N18NP341	XU9N18NP341	XU5N18NP341
	Line of sight 90° to case axis	XU2N18NP341W	XU1N18NP341W	XU9N18NP341W	XU5N18NP341W
Weight (kg)		0.270 (0.595)	0.155 (0.342)	0.155 (0.342)	0.135 (0.298)
Catalog numbers of plug-in connector versions		(2)	(3)	(3)	
3-wire, PNP NO or NC programmable	Line of sight along case axis	XU2N18PP341D	XU1N18PP341D	XU9N18PP341D	XU5N18PP341D
	Line of sight 90° to case axis	XU2N18PP341WD	XU1N18PP341WD	XU9N18PP341WD	XU5N18PP341WD
3-wire, NPN NO or NC programmable	Line of sight along case axis	XU2N18NP341D	XU1N18NP341D	XU9N18NP341D	XU5N18NP341D
	Line of sight 90° to case axis	XU2N18NP341WD	XU1N18NP341WD	XU9N18NP341WD	XU5N18NP341WD
Weight (kg)		0.130 (0.287)	0.085 (0.187)	0.085 (0.187)	0.065 (0.143)

- Sensors available with 5 m (16.4 ft) cable: To order, add the suffix **L5** to the reference selected from above.
Example: sensor **XU1N18PP341** with 5 m cable becomes **XU1N18PP341L5**.
- Catalog number for both transmitter and receiver for thru-beam system sensors.
- 50 x 50 mm reflector included with reflex system sensors.

Catalog numbers of mounting accessories

Description	Catalog number	Weight kg (lb)
Stainless steel mounting bracket	XUZA118	0.045 (0.099)
Plastic mounting bracket	XUZA218	0.035 (0.077)
Set of 2 stainless steel nuts	XSZE318	0.020 (0.044)
Set of 2 plastic nuts	XSZE218	0.004 (0.009)

Accessories:
page 84

Photoelectric Sensors

Osiris® Food and Beverage Processing, Stainless Steel

M18x1 DC Solid-State Output

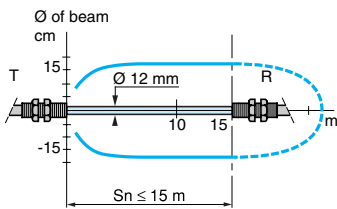
Specifications	
Product certifications	CE, UL, CSA
Ambient air temperature	Operation: -25 to +55 °C. Storage: -40 to +70 °C
Vibration resistance	Conforming to IEC 60068-2-6 25 gn, amplitude ± 1.5 mm (10–55 Hz)
Shock resistance	Conforming to IEC 60068-2-27 30 gn, duration 11 ms
Degree of protection	Conforming to IEC 60529 IP 67
Connection	Pre-cabled Pre-cabled, diameter 4.2 mm, length 2 m (3), wire c.s.a.: 4 x 0.34 mm ²
	Connector M12 male connector, 4-pin (for suitable female connectors, including pre-wired versions, see the Cabling section beginning on page 625)
Materials	Case Food and beverage processing stainless steel, grade 304 Cu
	Lenses PMMA
	Cable PvR
Rated supply voltage	12–24 V _{DC} with protection against reverse polarity
Voltage limits	10–30 V _{DC} (including ripple)
Switching capacity (sealed)	≤ 100 mA with overload and short-circuit protection
Voltage drop, closed state	≤ 1.5 V
Current consumption, no-load	≤ 30 mA (reflex and diffuse), ≤ 50 mA (thru-beam)
Maximum switching frequency	500 Hz
Delays	First-up ≤ 15 ms
	Response ≤ 1 ms
	Recovery ≤ 1 ms
Indicator lights	Supply on Green LED, on transmitter only
	Output state Yellow LED, on receiver only

1. Sensors available with 5 m (16.4 ft) cable: To order, add the suffix L5 to the reference selected from above.
Example: sensor XU1N18PP341 with 5 m cable becomes XU1N18PP341L5.

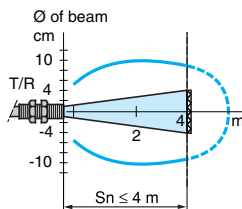
Curves

Detection curves

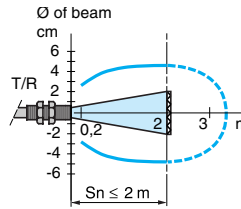
Thru-beam system



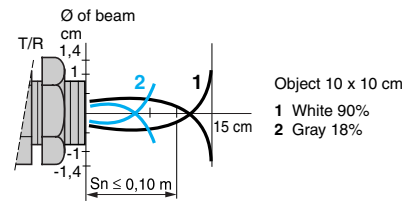
Reflex system with reflector XUZC50



Polarized reflex system with reflector XUZC50

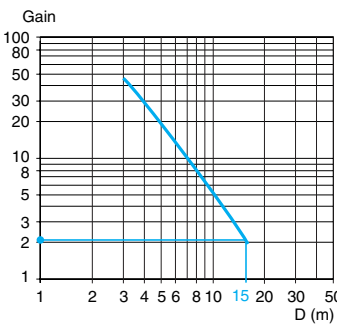


Diffuse system

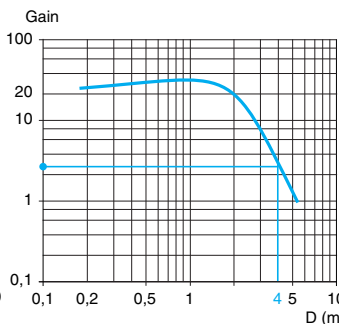


Excess gain curves (ambient temperature: + 25 °C)

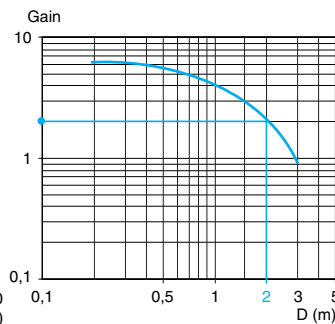
Thru-beam system



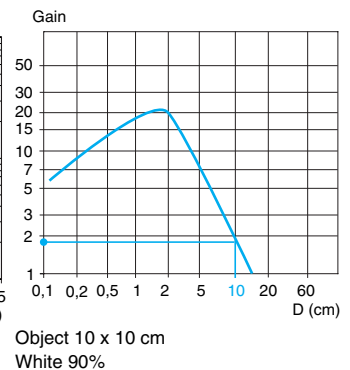
Reflex system with reflector XUZC50



Polarized reflex system with reflector XUZC50



Diffuse system



Accessories:
page 84

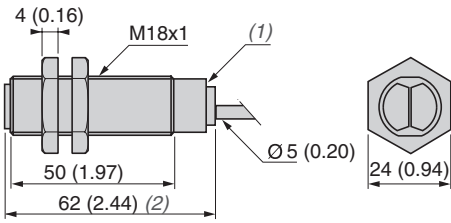
Photoelectric Sensors

Osiris® Food and Beverage Processing, Stainless Steel

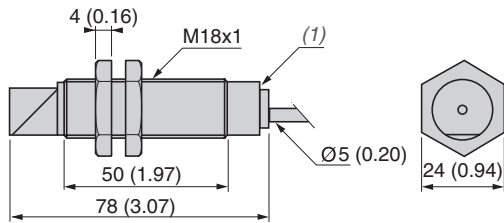
M18x1 DC Solid-State Output

Dimensions

XU•N18••341

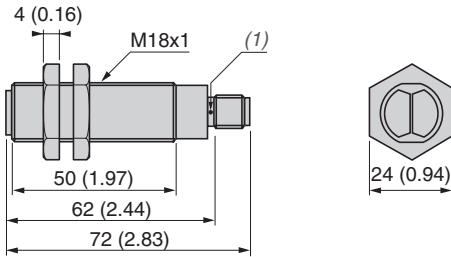


XU•N18••341W

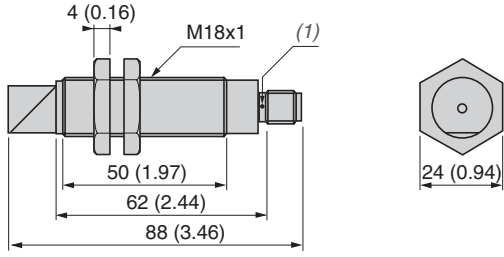


Dimensions: mm (in.)

XU•N18••341D



XU•N18••341WD



- 1. LED
 - 2. 64 for XU9N18••341
- Mounting nut tightening torque: < 15 N•m
 Connector tightening torque: 2 N•m

Accessories:
page 84

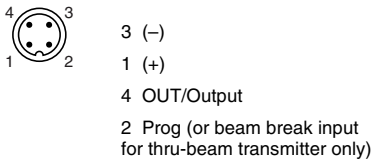
Photoelectric Sensors

Osiris® Food and Beverage Processing, Stainless Steel

M18x1 DC Solid-State Output

Connections

M12 connector scheme

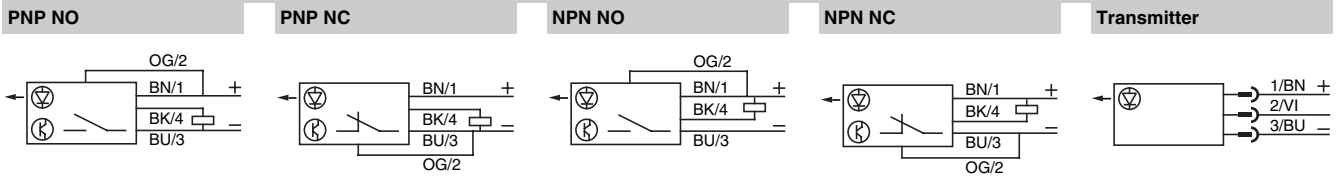


Cable connections

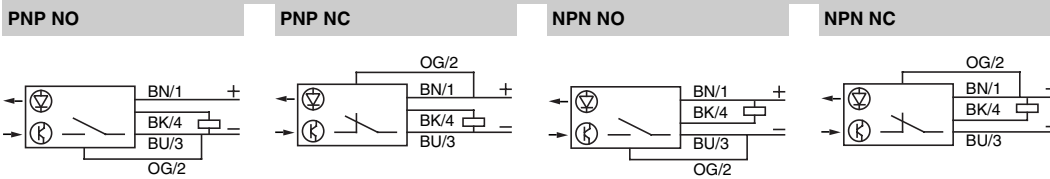
- (-) BU (Blue)
- (+) BN (Brown)
- (OUT/Output) BK (Black)
- (Prog) OG (Orange)
- (Beam break input) VI (Violet) on thru-beam transmitter only

For more connection information, refer to the Cabling section beginning on page 625.

Wiring diagrams—diffuse

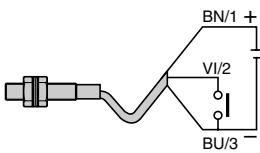


Wiring diagrams—reflex and thru-beam

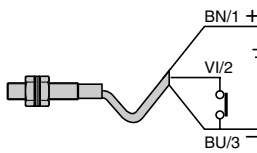


Beam break input on thru-beam transmitter only

Beam made



Beam broken

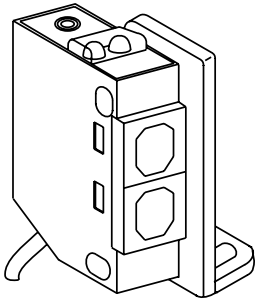


Accessories:
page 84

Photoelectric Sensors

XUM Miniature, Classic

High Performance, DC



High performance, self contained, medium range, miniature photoelectric sensors for industrial applications.

Features

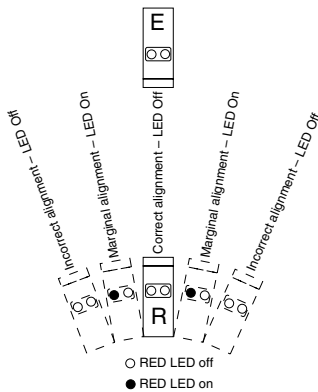
- Very small dimensions: 1.4 x 0.87 x 0.39 in. (35.5 x 22 x 9.9 mm) fixed.
- Marginal detection signal (MDS) provided for alarm output and alignment help.
- Test input—system checking
- Light/dark selectable
- Short range proximity mode for background avoidance
- Color mark detection. Green and red light for difficult contrast sensing
- Two LED alignment system
- Mounting bracket included.

For options, see page 91.

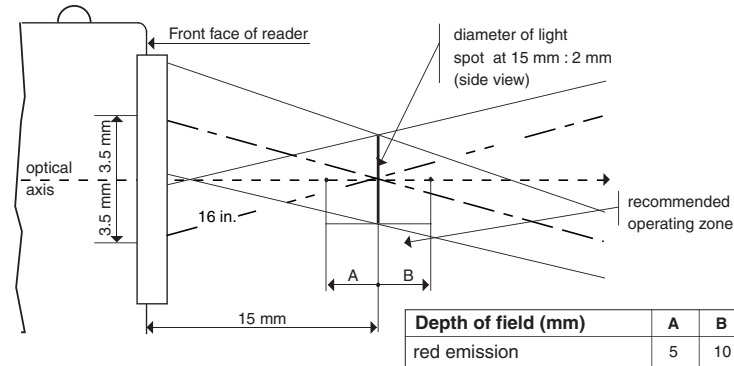
Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Convergent Beam [▲]—Sensing Range 15 mm (0.6 in.) [*]					
Red light					
PNP 3-wire	Light /dark	12–24 V	100 mA	500 Hz	XUMH15353R
NPN 3-wire	Light /dark	12–24 V	100 mA	500 Hz	XUMJ15353R

[▲] XUM Color mark sensor, red and green light, see p. 114.

^{*} Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.



Marginal Alignment Indication

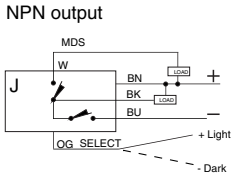
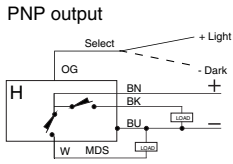


Photoelectric Sensors

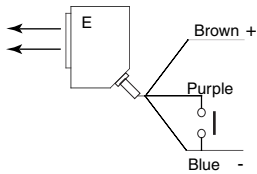
XUM Miniature, Classic

High Performance, DC

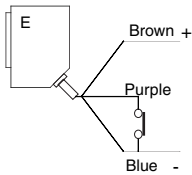
Wiring



Beam break test (purple wire)



Beam present



Beam broken

Specifications

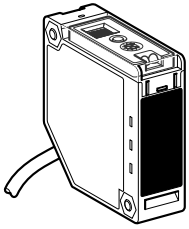
Mechanical	
For usable sensing range, see excess gain curve charts	
Temperature range	-13 to 131 °F (-25 to 55 °C)
Enclosure rating	NEMA Type
	IEC
Enclosure material	Housing: ABS/PC; Lens: PMMA, PC; Cable: PVC
Vibration resistance	7 g amplitude ±1.5 mm, 10–55 Hz
Shock resistance	50 g at 3 axes, 3 times
Wiring	6 ft cable, 0.18 in. (4.5 mm) dia., 3 x #24 AWG
Electrical	
Voltage limit (including ripple)	10–30 Vdc
Load current, maximum	100 mA, protected against overload and short circuit
Voltage drop, closed state	1.5 V
Current consumption (no load)	receiver: 30 mA; emitter: 20 mA; reflex (diffuse): 35 mA
Test output current, maximum	50 mA
Test input voltage, maximum	1.5 V @ 1 mA maximum
Switching frequency, maximum	500 Hz
Power-up delay, maximum	1 ms
On/Off delay, maximum	1 ms
Wavelength	Polarized
	Convergent (red)
	All others
Ambient light immunity	10,000 LUX
Protective circuitry	Radio frequency immunity (RFI)
	Electrostatic discharges
	Fast transients (motor start/stop interference)
	Impulse voltages (lightning, etc.)
Agency listings	E 164869 CCN NRKH LR 44087 Class 3211 03

* L indicates level number.

Photoelectric Sensors

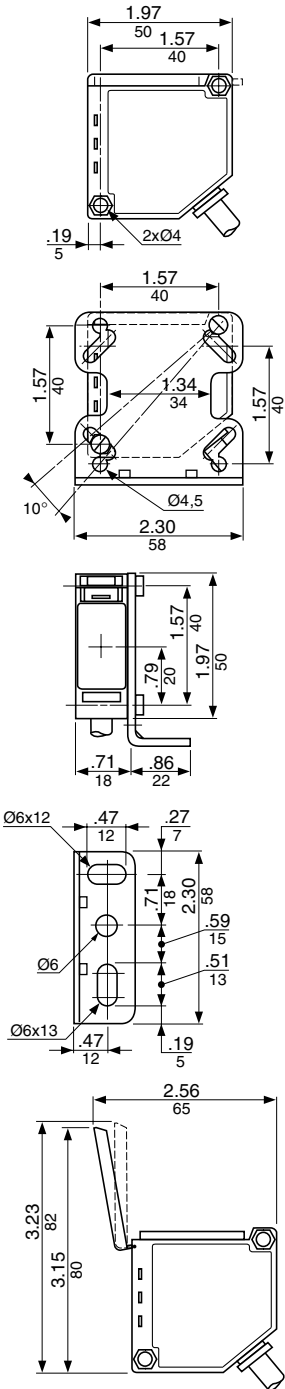
XUK Subcompact, Classic

DC



Features

- Increasingly popular rectangular body style perfect for mounting flat against machine wall
- Versatility incorporated in every mode of detection
- Universal features simplify retrofit
- 10 s, three-mode programmable time delay
- High gain reserve produces superior sensing distances
- Smallest multi voltage time-delay photo available
- Mounting bracket included (adapts to competitive models)
- Hinged, locking plastic cover protects adjustments



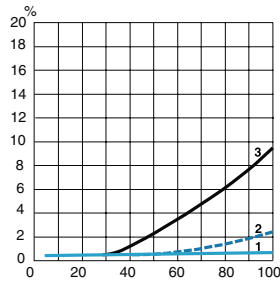
Circuit Type	Output Type	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Proximity Diffuse—1 m (3.3 ft) Nominal Sensing Distance—Adjustable High Precision					
Cable style—2 m (6.6 ft) length ■					
PNP/NPN	Light/dark	12–24 V	100 mA	250 Hz	XUK8AKSNL2
Micro-style connector					
PNP/NPN	Light/dark	12–24 V	100 mA	250 Hz	XUK8AKSNM12

■ For 10 m (32.8 ft) cable, change L2 suffix to L10.

* Excess gain one—in nominal ambient conditions maximum usable sensing distance is 75% of normal

Excess gain curve

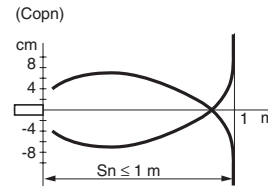
Adjustable Proximity Diffuse



1 White 90% 3 Black 6%
2 Gray 18%

Detection Curve

Proximity Diffuse



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

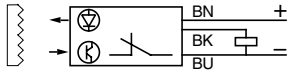
Photoelectric Sensors XUK Subcompact, Classic DC

Wiring

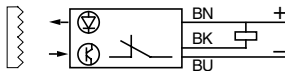
Connector



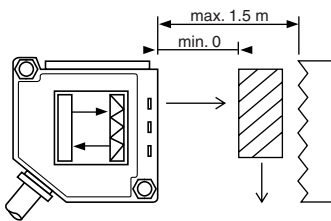
PNP Yellow on



NPN Yellow on



Recommended mounting distances



Specifications

Mechanical			
For usable sensing range, see excess gain curve charts			
Temperature range	Operation	-13 to 131 °F (-25 to 55 °C)	
	Storage	-30 to 158 °F (-30 to 70 °C)	
Enclosure rating	NEMA Type	4, 4X (indoor), 12, 13	
	IEC	IP65 conforming to IEC 60529	
Vibration	7 g amplitude (10–55 Hz) Conforming to IEC 60068-2-6		
Shock resistance	10 g for 11 ms conforming to 68-2-27		
Wiring	22 AWG (0.34 mm ²)		
Tightening torque (maximum)	5 N•m (44.4 lb-in)		
Enclosure material	Case	PC/ABS	
	Lens	PMMA	
	Cable	PvR	
Electrical			
		DC	
Voltage limit (including ripple)	10–30 Vdc		
Voltage drop (across switch, closed state)	1.5 V		
Current consumption (maximum) (no load)	35 mA with SCP		
Yellow Output LED	yes		
Red Stability LED	yes		
Power-up delay (maximum)	80 ms		
On delay (maximum)	0.5 ms		
Off delay (maximum)	0.5 ms		
Protective circuitry	Short Circuit Protection	—	
	Overload Protection	yes	
	Reverse polarity protection	—	
Agency listings	E164869 CCN NRKH	Pending	

Options

Description	Suffix
10 m (32.8 ft) length cable	L10

Connector Cables (M12 or D suffix)

XSZCD101Y Micro-style, 4-pin, 2 m, straight

XSZCD111Y Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

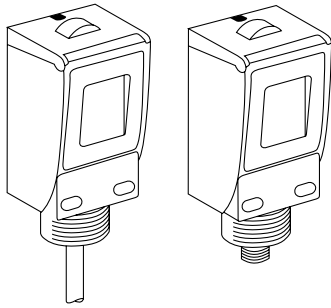
Accessories Page 137

Reflectors Page 136

Photoelectric Sensors

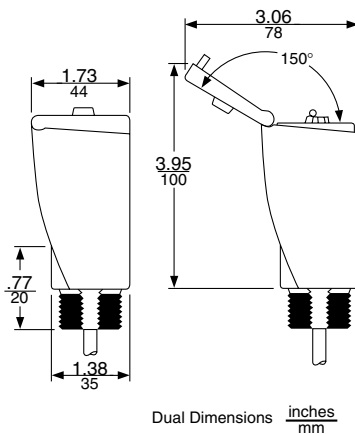
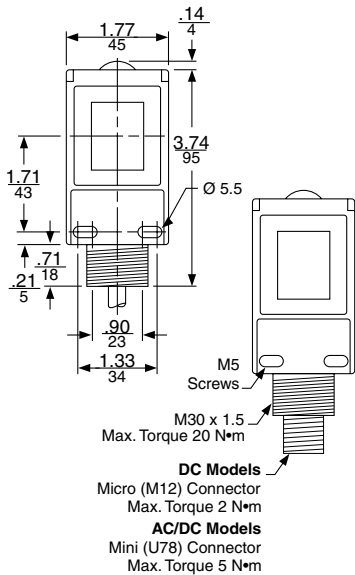
XUC Compact, Limit Switch Body Style

DC or AC/DC Timer



Features

- Sleek but rugged compact body with very long sensing distances
- Solid-state (NPN or PNP selectable) or Relay output (N.O./N.C.)
- Built-in 0–15 s timer option on AC/DC models
- Alarm output on DC versions
- Adjustable background suppression in Diffuse modes
- Oversized potentiometer for sensitivity adjustment
- Two 360° LED indicators (output and stability)
- Light/dark selectable
- Hinged transparent cover protects adjustments
- Cable or connector versions (see p. 484 for cables)
- 30 mm (1.18 in.) tubular base with mounting nuts
- UL rated for outdoor use, NEMA Type 4X



Circuit Type	Output Type	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
--------------	-------------	---------------	----------------------	-----------------------------	----------------

Thru-Beam (Emitter-Receiver)—60 m (196.8 ft) Nominal Sensing Distance □

Cable style—2 m (6.6 ft) length

AC/DC relay ♦	Light/dark	24–240	3 A	20 Hz	XUC2ARCTL2
PNP/NPN	Light/dark	12–24 V	100 mA	500 Hz	XUC2AKSAL2

Mini-style connector

AC/DC relay ♦	Light/dark	24–240	3 A	20 Hz	XUC2ARCTU78
---------------	------------	--------	-----	-------	-------------

Micro-style connector

PNP/NPN	Light/dark	12–24 V	100 mA	500 Hz	XUC2AKSAM12
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Polarized Retroreflective (XUZC50 reflector included) 9 m (29.5 ft) Nominal Sensing Distance □

Cable style—2 m (6.6 ft) length

AC/DC relay ♦	Light/dark	24–240	3 A	20 Hz	XUC9ARCTL2
PNP/NPN	Light/dark	12–24 V	100 mA	500 Hz	XUC9AKSAL2

Mini-style connector

AC/DC relay ♦	Light/dark	24–240	3 A	20 Hz	XUC9ARCTU78
---------------	------------	--------	-----	-------	-------------

Micro-style connector

PNP/NPN	Light/dark	12–24 V	100 mA	500 Hz	XUC9AKSAM12
---------	------------	---------	--------	--------	-------------

Proximity Diffuse with Adjustable Background Suppression 1.2 m (3.9 ft) Nominal Sensing Distance □

Cable style—2 m (6.6 ft) length

AC/DC relay ♦	Light/dark	24–240	3 A	20 Hz	XUC8ARCTL2
PNP/NPN	Light/dark	12–24 V	100 mA	500 Hz	XUC8AKSNL2

Mini-style connector

AC/DC relay ♦	Light/dark	24–240	3 A	20 Hz	XUC8ARCTU78
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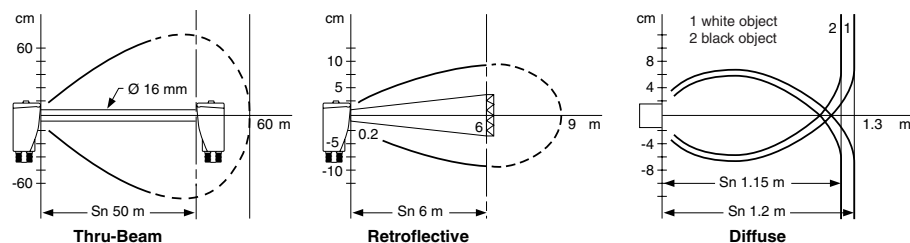
Micro-style connector

PNP/NPN	Light/dark	12–24 V	100 mA	500 Hz	XUC8AKSNM12
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♦ With 0–15 s timer option.

□ Excess gain one-in normal ambient conditions, maximum usable sensing distance is 75% of normal.

Beam Patterns



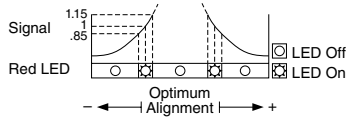
Accessories Page 137
Reflectors Page 136

Photoelectric Sensors

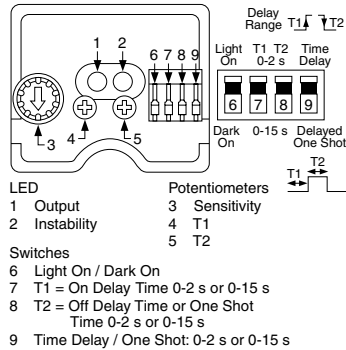
XUC Compact, Limit Switch Body Style

DC or AC/DC Timer

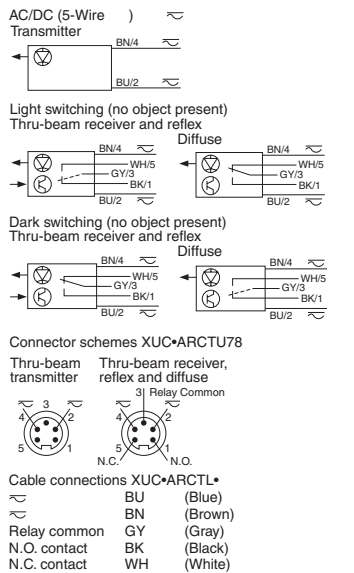
Verifying Correct Operation



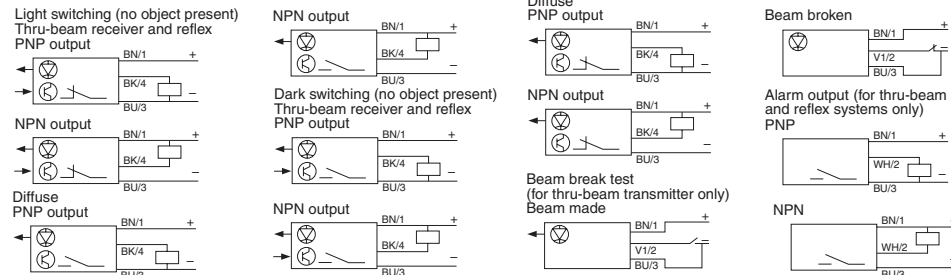
Programming AC/DC Model



Wiring



DC (3-Wire)



Connector Cables (M12 or D suffix; U78 or A suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Mini-style, 4-pin, 2 m, 90°
XSZCA1501Y	Mini-style, 5-pin, 2 m, straight
XSZCA9501Y	Mini-style, 5-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

Specifications

Mechanical		
For usable sensing range, see Excess Gain Curve Charts		
Temperature range	Operation	-13 to 131 °F (-25 to 55 °C)
Enclosure rating	Storage	-40 to 158 °F (-40 to 70 °C)
	NEMA Type	3, 4, 4X (outdoor use), 6, 6P, 12, 13
	IEC	IP67 conforming to IEC 60529
Vibration		7 g amplitude + 1.5 mm, 10–55 Hz
Shock resistance		30 g for 11 ms conforming to IEC 60068-2-27
Enclosure material	Case	PC/ABS
	Lens	PMMA
	Cable	PvR
Electrical		
Voltage limit (including ripple)	AC/DC	DC
Voltage drop (across switch, closed state)	20–264 Vac/Vdc	10–38 Vdc
Power current consumption (maximum) (no load)	—	1.5 V
Power-up delay (maximum)	2W	50 mA (thru-beam); 35 mA (others)
On delay (maximum)	60 ms	15 ms
Off delay (maximum)	25 ms	1 ms
Red LED: stability	25 ms	1 ms
Yellow LED: output	yes	no
	yes	yes
Agency listings	UL E164869 CCN NRKH	SP CE

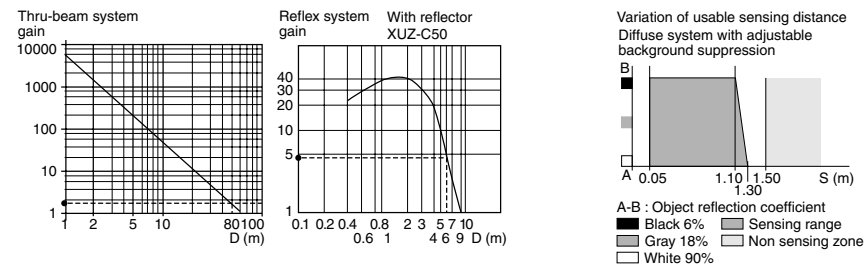
Options

Description	Suffix
5 m (16.4 ft) Cable	L5

Mounting Brackets

Description	Catalog Number
Swivel Ball Bracket (plastic)	XSZSB30
90° Bracket (steel)	9006PA30

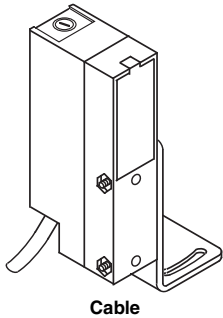
Excess gain curve ambient temperature 25 °C (77 °F)



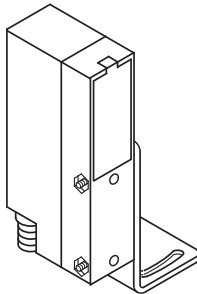
Photoelectric Sensors

XUL Subcompact

DC, AC/DC



Cable



Micro-style connector

Features

- Subcompact, medium-range, self-contained photoelectric sensors for industrial applications
- DC or AC/DC solid-state output, AC/DC relay output
- 2-wire solid-state AC/DC output provides substantially longer life than conventional relays, ideally suited for intensive material handling applications
- Economical
- Small size
- Flat lenses
- Side or front mounting
- LED visible from two directions (front, top)
- 45° cable entry for ease of wiring
- Cable or connector options available ^②
- 2-wire solid-state output saves wiring time
- Universal 24–240 Vac/Vdc power supply
- Double-insulated enclosure means no grounding is required
- Programmable light/dark (DC only)
- UL Listed

Type	Output mode	Voltage range		Load current maximum [•]	Operating frequency maximum	Catalog number
		AC max.	DC max.			
Thru beam—Nominal Sensing Range 10 m (32.8 ft) *						
AC/DC—2 m (6.6 ft) cable						
Emitter	—	20–264 V	20–60 V	—	—	XULM0600
Receiver, 5-wire, relay output	Light	20–264 V	20–60 V	2 A	20 Hz	XULM080314
DC—2 m (6.6 ft) cable						
Emitter, 2-wire	—	—	10–30 V	—	—	XULK0830
Receiver, 3-wire, PNP	Light/dark	—	10–30 V	200 mA	200 Hz	XULH083534
Receiver, 3-wire, NPN	Light/dark	—	10–30 V	200 mA	200 Hz	XULJ083534
Retroreflective—Nominal Sensing Range 8 m (25 ft) * (Reflector sold separately)						
AC/DC—2 m (6.6 ft) cable						
Solid-state output	Light	20–264 V	20–60 V	500 mA	20 Hz	XULA06021
Solid-state output	Dark	20–264 V	20–60 V	500 mA	20 Hz	XULA06011
5-wire, relay output	Light	20–264 V	20–60 V	2 A	20 Hz	XULM06031
DC—2 m (6.6 ft) cable						
3-wire PNP	Light/dark	—	10–30 V	200 mA	250 Hz	XULH06353
3-wire NPN	Light/dark	—	10–30 V	200 mA	250 Hz	XULJ06353
Polarized Retroreflective—Nominal Sensing Range 5 m (16.4 ft) * (Reflector sold separately)						
AC/DC—2 m (6.6 ft) cable						
Solid-state output	Light	20–264 V	20–60 V	500 mA	20 Hz	XULA040219
Solid-state output	Dark	20–264 V	20–60 V	500 mA	20 Hz	XULA040119
5-wire, relay output	Light	20–264 V	20–60 V	2 A	20 Hz	XULM040319
DC—2 m (6.6 ft) cable						
3-wire PNP	Light/dark	—	10–30 V	200 mA	200 Hz	XULH043539
3-wire NPN	Light/dark	—	10–30 V	200 mA	200 Hz	XULJ043539
Proximity Diffuse—Nominal Sensing Range 0.7 m (2.3 ft) *						
AC/DC—2 m (6.6 ft) cable						
Solid-state output	Light	20–264 V	20–60 V	500 mA	200 Hz	XULA700115
Solid-state output	Dark	20–264 V	20–60 V	500 mA	200 Hz	XULA700215
DC—2 m (6.6 ft) cable						
3-wire PNP	Light/dark	—	10–30 V	200 mA	200 Hz	XULH703535
3-wire NPN	Light/dark	—	10–30 V	200 mA	200 Hz	XULJ703535
Proximity Diffuse with Background Suppression—Sensing Range 0.3 m (0.15 ft) ^① *						
AC/DC—2 m (6.6 ft) cable						
5-wire, relay output	Light	20–264 V	20–60 V	2 A	20 Hz	XULM300318
DC—2 m (6.6 ft) cable						
3-wire PNP ^③	Light/dark	—	10–30 V	200 mA	200 Hz	XULH303538
3-wire NPN ^③	Light/dark	—	10–30 V	200 mA	200 Hz	XULJ303538
Proximity Diffuse with Adjustable Background Suppression—Sensing Range 0.5–0.15 m (1.6–0.5 ft) *						
DC—2 m (6.6 ft) cable						
3-wire PNP	Light/dark	—	12–24 Vdc	200 mA	200 Hz	XULH153538
3-wire NPN	Light/dark	—	12–24 Vdc	200 mA	200 Hz	XULJ153538

* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.

^① Fixed, no sensitivity adjustment.

^② See p. 484 for matching connector cables.

^③ Supplied with potentiometer to adjust range between 15 and 30 cm (5.9 and 11.8 in.).

• 20 < Vdc < 58 IEC 60947-5-2 Utilization category DC-13. Vdc > 58 IEC 60947-5-2 Utilization category DC-12.

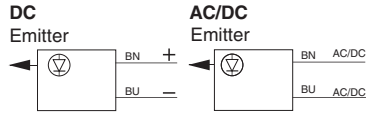
Photoelectric Sensors

XUL Subcompact

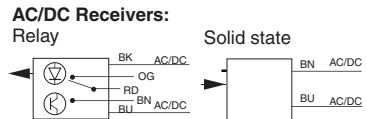
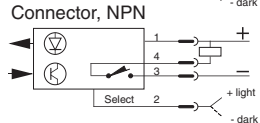
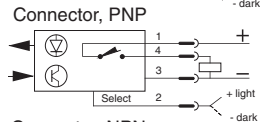
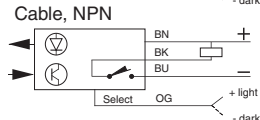
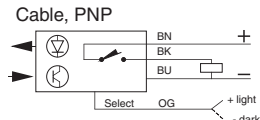
DC, AC/DC

Wiring

Connector



DC Receivers 3 wire



Specifications

Mechanical		
For usable sensing range, see excess gain curve charts		
Temperature range	-13 to 140 °F (-25 to 60 °C)	
Enclosure rating	NEMA Type	1, 3, 4, 6, 6P, 12, 13
	CENELEC	IP67 conforming to IEC 60529 and IP671 conforming to NFC 20-010
Enclosure materials	Housing: ABS/PC	Lens: PMMA Cable: PVC
Vibration resistance	7 g, mm amplitude, 10–55 Hz	
Shock resistance	20 g for 11 ms	
Wiring	2 m (6.6 ft) cable, 6 mm (0.2 in.) OD, 4 x 22 AWG or 2 x 22 AWG	
Electrical		
Voltage range	DC Models	Relay
Leakage current	1.7 mA	24–240 Vac/Vdc
Minimum load current	0 mA	24–240 Vac/Vdc
Power supply current (no load)	30 mA	24–240 Vac/Vdc
On delay maximum	4 ms	25 ms
Off delay maximum	4 ms	25 ms
Power-up delay maximum	15 ms	60 ms
Wavelength	880 nm	880 nm
Polarized	660 nm	660 nm
Protective circuitry	Radio frequency immunity (RFI)	IEC 61000-4-3, L3* (10 V/M)
	Electrostatic discharges	DC 2-wire: IEC 61000-4-2, L3* (8 kV)
		DC 3-wire: IEC 61000-4-2, L2* (4 kV)
	Fast transients (motor start/stop interference)	IEC 61000-4-4, L3* (1 kV)
Impulse voltages (lightning, etc.)	IEC 60947-5-2, L3* (2.5 kV)	
Agency listings	E164353 CCN NKCR	LR44087 Class 3211 03

* L indicates level number.

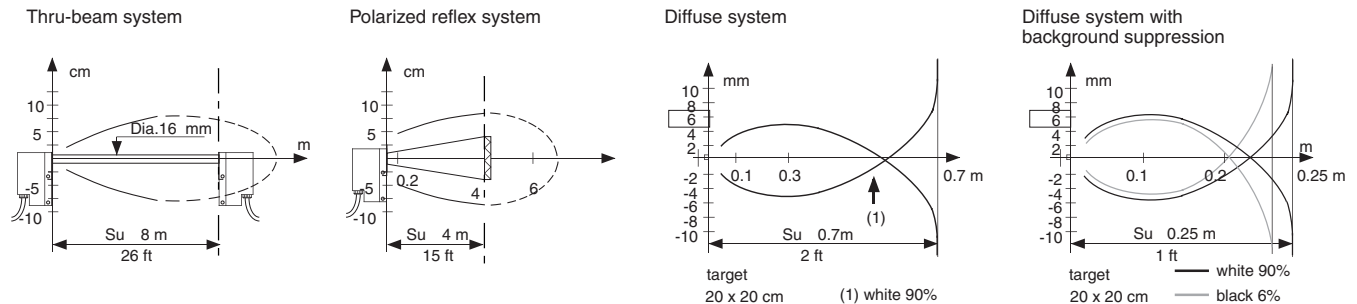
Options

Description	Suffix Adder
Micro-style DC receptacle (DC models only)	D
Micro-style AC/DC receptacle (AC/DC models only)	K
5 m (16.4 ft) cable	L05
10 m (32.8 ft) cable	L10
Example: XUL 08014L10	

Accessories

Description	Catalog Number
Mounting bracket (included)	XULZ41

Detection Curves



Connector Cables (M12 or D suffix; U20 or K suffix)

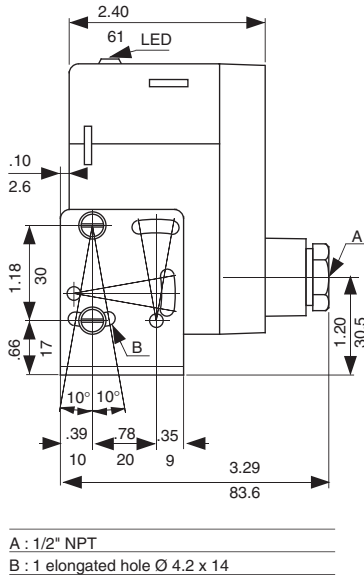
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCK101Y	Mini-style, 5-pin, 2 m, straight
XSZCK111Y	Mini-style, 5-pin, 2 m, 90°

Additional cable options and lengths... Page 484

Photoelectric Sensors

XUJ Analog with Background Suppression

Analog Output, DC

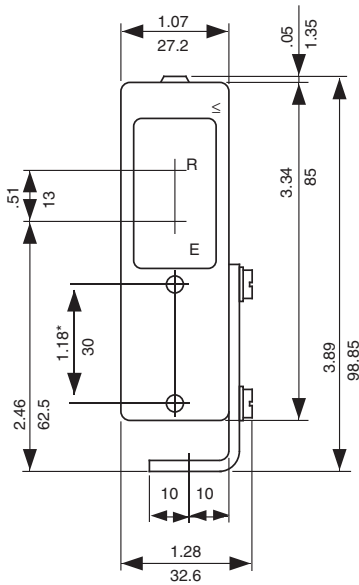


Features

- Distance indication independent of target color or texture
- Elimination of background influence
- Dual outputs 4–20 mA and 0–10 Vdc (selectable)
- Long range proximity (diffuse) with background suppression 20–80 cm (7.87–31.50 in.)
- FDA approved housing material—Ultem® plastic
- Rated for resistance to shock, vibration, and aggressive industrial environments (i.e. water, salts, oils, grease, alcohols and cleaning solutions)
- Seamless housing design
- LED indicator with an illumination level proportional to the output voltage
- Double-insulated enclosure means no grounding required
- UL Listed, CSA Certified, CE Marked

Applications:

- Bulk or liquid level control
- Thickness monitoring
- Winder speed control
- Position indication for feedback to drives and similar devices in web control applications
- Size sorting of objects such as fruit and vegetables



* Front mounting
(\varnothing 4 screws and inserts supplied)

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Circuit Type	Output Mode	Voltage Range	Current Output	Voltage Output	Catalog Number
Proximity (diffuse) with Background Suppression 20–80 cm (7.87–31.5 in.)					
Analog type	Light	20–30 Vdc	4–20 mA	0–10 V	XUJK803538

Osiconcept™ Photoelectric Sensors

XUJ Analog with Background Suppression

Analog Output, DC

Wiring

Connector



- 1 (-) Comm.
- 2
- 3 (+) 24 Vdc
- 4 Vs
- 5 Is
- 6 (-) Com.

NOTE: Terminals 1 and 6 are internally connected.

Specifications

Mechanical	
Temperature range	-13 to 140 °F (-25 to 60 °C)
Enclosure rating	NEMA Types
	IEC
Vibration	7 g, 1.5 mm amplitude, 10 Hz to 55 Hz
Shock resistance	30 g for 11 ms
Wiring—screw terminals	#16 AWG
Electrical	
Voltage limit (including ripple)	20–30 Vdc
Power supply current (no load)	40 mA
Operating frequency, maximum	50 Hz
Voltage output	0–10 Vdc
Current output	15 mA
Protective circuitry	Radio frequency immunity (RFI)
	Electrostatic discharges
	Fast transients (motor start/stop interference)
	Impulse voltages (lightning, etc.)
Agency listings	E164353 CCN NKCR LR44087 Class 3211 03

* L indicates level number.

Options

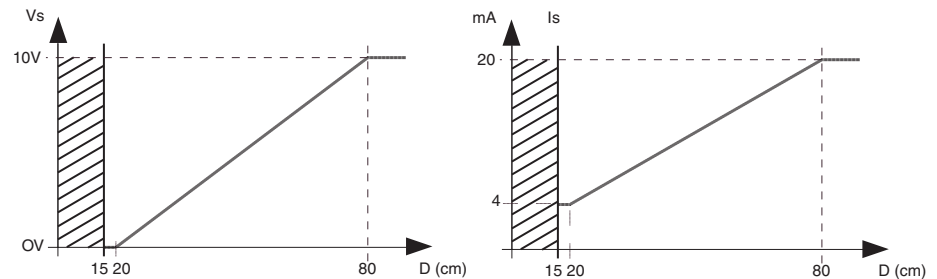
Description	Matching Connector Cables	Suffix Adder
Receptacle mini-style 5-pin	XSZCA1501Y	R5

Additional cable options and lengths, see p. 484.

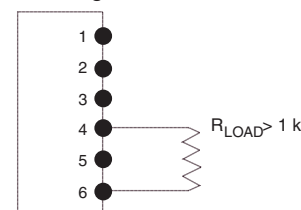
Accessories

Description	Catalog Number
Protective cover (top)	XUJZ01
Mounting bracket (included)	XUZA41

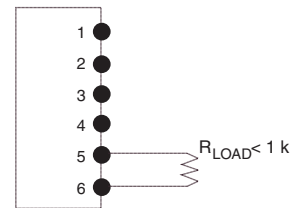
Output Across Load



Voltage output (Vs) according to distance



Current Output (Is) according to distance

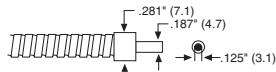


Dimensions Pages 142–145
 Reflectors Page 136
 Connectors Page 484

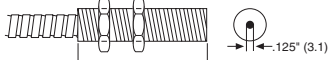
Photoelectric Sensors

Fiber Optics

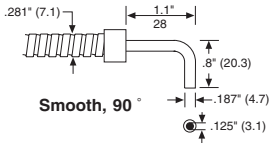
XUFA Glass Fiber Optics



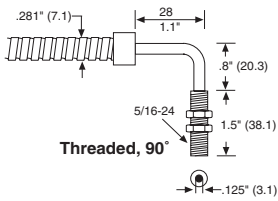
Smooth, straight



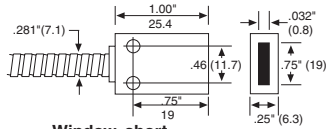
Threaded, straight



Smooth, 90°



Threaded, 90°



Window, short

The XUFA is one of the most versatile heavy-duty, glass-core fiber optic sensors in stainless steel sheeting available.

Features

- Coiled stainless steel sheathing withstands most aggressive environments while maintaining a high degree of flexibility
- Transmission of light through the fiber optics is not affected by water, gasoline, oil, sulfuric acid or other organic acids
- Most common sensing tips are standard (other tip configurations and cable lengths can be made to order—contact the factory)
- Very wide temperature range: -49 to 527 °F (-45 to 275 °C)
- Two scanning modes are recommended: thru-beam using a pair of cables (emitter-receiver)
- Proximity (diffuse) using a bifurcated cable with a triple sensing tip in which emitter and receiver fibers are mixed.

NOTE: If steps are taken to avoid the effects of proximity, the bifurcated cable can also be used in retroreflective scanning mode.

Tip	Nominal Sensing Distance * XUET	Length Maximum	Bundle Diameter	Catalog Number
Thru-beam (pair) (single emitter and receiver sold as a pair)				
Smooth, straight	11.8 in. (300 mm)	36 in. (914 mm)	0.125 in. (3.2 mm)	XUFA110213
Threaded, straight	11.8 in. (300 mm)	36 in. (914 mm)	0.125 in. (3.2 mm)	XUFA110113
Threaded, straight	11.8 in. (300 mm)	12 ft (3.66 m)	0.125 in. (3.2 mm)	XUFA1101112
Smooth, 90°	11.8 in. (300 mm)	36 in. (914 mm)	0.125 in. (3.2 mm)	XUFA110413
Threaded, 90°	11.8 in. (300 mm)	36 in. (914 mm)	0.125 in. (3.2 mm)	XUFA110313
Window, short	10 in. (255 mm)	36 in. (914 mm)	0.38 x 0.032 in. (9.65 x 0.80 mm)	XUFA110513
Proximity (bifurcated) (Y-shaped dual reflective type)				
Smooth, straight	4.33 in. (110 mm)	36 in. (914 mm)	0.125 in. (3.2 mm)	XUFA210213
Threaded, straight	5.51 in. (140 mm)	36 in. (914 mm)	0.125 in. (3.2 mm)	XUFA210113
Threaded, straight	4.53 in. (115 mm)	12 ft (3.66 m)	0.125 in. (3.2 mm)	XUFA2101112
Smooth, 90°	3.94 in. (100 mm)	36 in. (914 mm)	0.125 in. (3.2 mm)	XUFA210413
Threaded, 90°	4.72 in. (120 mm)	36 in. (914 mm)	0.125 in. (3.2 mm)	XUFA210313
Window, short	3.94 in. (100 mm)	36 in. (914 mm)	0.38 x 0.032 in. (9.65 x 0.80 mm)	XUFA210513

* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal.

Photoelectric Sensors

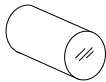
Fiber Optics

XUFA Glass Fiber Optics

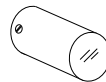
Wiring

Light mode: the output is energized when a target is not present (the proximity output is energized when a target is detected).

Dark mode: the output is energized when a target is present (the proximity output is energized when a target is not detected).





XUFAZ01



XUFAZ02

Amplifier Specifications

Mechanical	
Temperature range	-13 to 158 °F (-25 to 70 °C)
Enclosure rating (XUET)	NEMA Type
	IEC
Shock resistance	20 g for 11 ms
Vibration	7 g @ 0.6 mm amplitude
Cable	Screw terminals #16 AWG
Electrical	
Power supply current	45 mA
Voltage drop across switch	—
On delay	25 ms
Off delay	30 ms
Power-up delay	80 ms
Wavelength	880 nm
Agency listings	 E164343 CCN NKCR  LR60942 Class 4812 05

* L indicates level number.

Accessories

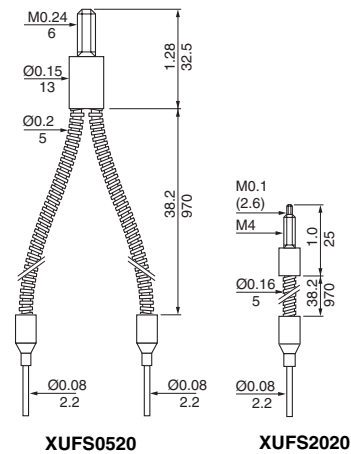
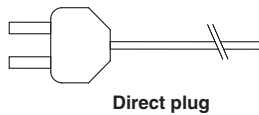
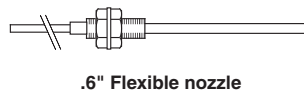
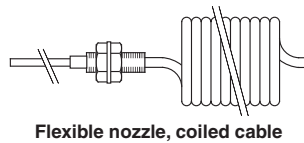
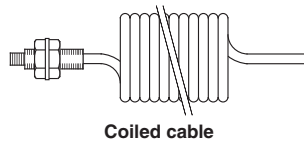
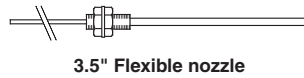
Description	Magnification factor (thru-beam) *	Catalog Number
Lenses (pair) for threaded tips	X10	XUFAZ01
Lenses (pair) for smooth tips	X10	XUFAZ02

* Will improve range approximately 3 to 5 times

Photoelectric Sensors

Fiber Optics

XUFN Plastic and XUFS Glass Fiber Optics



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features—XUFN

- The XUFN series of plastic core fiber optics provides flexibility in usage at an affordable price.
- Smooth plastic jacket (polyethylene) in straight or coiled versions, withstands most industrial environments including food processing and pharmaceuticals
- Straight cable standard
- Threaded and flexible nozzle tips
- Suitable for very small part detection
- Two scanning modes are recommended
- Thru-beam using a pair of cables (emitter-receiver); proximity diffuse using a bifurcated cable with a single sensing tip in which emitter and receiver fibers are mixed
- Standard separate emitter-receiver bundles or randomized receiver with an emitter core for very near detection are available.

NOTE: If steps are taken to avoid the effects of proximity, the bifurcated cable can also be used in retroreflective scanning mode.

Features—XUFS

- The XUFS series of glass core fiber optics provides ruggedness, higher temperature ratings and excellent withstanding in aggressive/chemical environments
- Coiled fiber cable for applications with significant movement between the amplifier and the sensing tip

Plastic Fiber Optics

Tip	Maximum Sensing distance, Sn *		Beam Diameter	Cable Diameter (OD)	Catalog Number
	Standard	w/XUFZ01 Lenses			
Thru-beam (pairs)—2 m (6.6 ft) long (single emitter and receiver sold as a pair)					
Straight cable					
Threaded*	9.84 in. (250 mm)	73.68 in. (1.87 m)	0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN12301
10 m (32.8 ft) Threaded*	4.43 in. (113 mm)	44.30 in. (1.13 m)	0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN12301L10
Threaded	2.46 in. (62 mm)	19.68 in. (0.5 m)	0.02 in. (0.5 mm)	0.04 in. (1 mm)	XUFN35301
3.5 in. Flexible nozzle	8.85 in. (225 mm)	—	0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN12311
3.5 in. Flexible nozzle	2.48 in. (63 mm)	—	0.02 in. (0.5 mm)	0.04 in. (1 mm)	XUFN35311
Coiled cable					
Threaded	7.30 in. (185 mm)	49.2 in. (1.2 m)	0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN10302
3.5 in. Flexible nozzle	7.30 in. (185 mm)	—	0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN10312
Proximity diffuse (bifurcated)—2 m (6.6 ft) long (Y-shaped dual reflective type)					
Straight cable					
Threaded ^① *	3.44 in. (87 mm)	—	2 x 0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN05321
10 m (32.8 ft) Threaded ^①	1.96 in. (50 mm)	—	2 x 0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN05321L10
Threaded ^②	3.44 in. (87 mm)	—	0.04 in. (1 mm) + 16 x 0.01 in. (0.265 mm)	0.09 in. (2.2 mm)	XUFN05323
Threaded ^①	0.89 in. (23 mm)	—	2 x 0.02 in. (0.5 mm)	0.04 in. (1 mm)	XUFN01321
Threaded ^②	1.47 in. (38 mm)	—	0.02 in. (0.5 mm) + 4 x 0.01 in. (0.25 mm)	0.04 in. (1 mm)	XUFN02323
3.5 in. Flexible nozzle	3.44 in. (87 mm)	—	2 x 0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN05331
3.5 in. Flexible nozzle	0.89 in. (23 mm)	—	2 x 0.02 in. (0.5 mm)	0.04 in. (1 mm)	XUFN01331
0.6 in. Flexible nozzle	0.30 in. (7.5 mm)	—	2 x 0.01 in. (0.265 mm)	0.04 in. (1 mm)	XUFN04331
Coiled cable					
Threaded	1.00 in. (25 mm)	—	2 x 0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN15322
3.5 in. Flexible nozzle	1.00 in. (25 mm)	—	2 x 0.04 in. (1 mm)	0.09 in. (2.2 mm)	XUFN15332
Direct plug					
3.5 in. Flexible nozzle	1.48 in. (37 mm)	—	0.02 in. (0.5 mm)+ 8 x 0.01 in. (0.265 mm)	0.06 in. (1.5 mm)	XUDZ01

^① Not recommended for very short sensing distances under 0.2 in. (5 mm) (coherent).

^② Recommended for very short sensing distances (randomized).

* Sensing distances change when used with ZUCN0016, ZUCN0017, and XUET1401266 amplifiers. Contact Schneider Electric for information and beam patterns.

Glass Fiber Optics—Threaded Tip 1 m (3 ft) long

Type	Maximum Sensing Distance, Sn *		Beam Diameter	Catalog Number
	Standard	w/ XUFZ01 Lenses		
Thru-beam (pair)	9.84 in. (250 mm)	98.4 in. (2.5 m)	1 x 0.04 in. (1 mm)	XUFS2020
Proximity diffuse (bifurcated)	3.44 in. (87 mm)	34.4 in. (870 mm)	2 x 0.04 in. (1 mm)	XUFS0520

* Nominal sensing distance. Recommended usable distance is x0.8 of the nominal sensing distance. This will cover variances in temperature, supply voltage and manufacturing tolerances.

Photoelectric Sensors

Fiber Optics

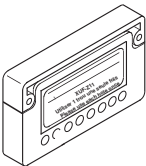
XUFN Plastic and XUFS Glass Fiber Optics



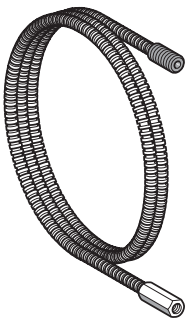
XUFZ02



XUFZ01



XUFZ11



XUFZ•10

Specifications

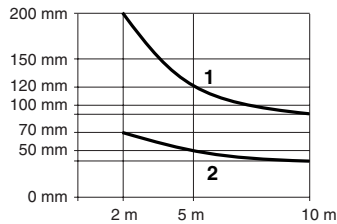
Fiber optic type		XUFN	XUFS
Temperature		-14 to 140 °F (-25 to 60 °C)	-40 to 356 °F (-40 to 180 °C)
Vibration		7 g, 1.5 mm amplitude	
Shock		30 g, for 11 ms	
Materials	core	PMMA	glass
	jacket	PE (polyethylene)	stainless steel
Minimum bend radius	0.04 in (1 mm) OD	0.39 in (10 mm)	—
	0.08 in (2.2 mm) OD	1.0 in (25 mm)	3.5 in (90 mm)

Accessories (for amplifiers, refer to page 60)

Description	Catalog Number
Lenses (pair) for standard threaded tips x10 Magnification *	XUFZ01
90° mirrors (pair) for standard threaded tips	XUFZ02
Fiber cable cutter (one is included with each fiber optic cable)	XUFZ11
4 mm stainless steel sheathing	XUFZ210
6 mm stainless steel sheathing	XUFZ310

* Will improve range approximately 3 to 5 times

Sensing range for length for cable



1 XUFN12301L10

2 XUFN05321L10

Photoelectric Sensors

Fiber Optics

XUFN Fiber Optic Cables for Specific Applications

Features

Suited for specific applications that were once difficult to tackle.

XUFN•L **L** for lens:

- Integrated focusing lens for precise spot-sensing
- Senses longer distances
- Convergent beam types sense to three different ranges

XUFN•P **P** for power:

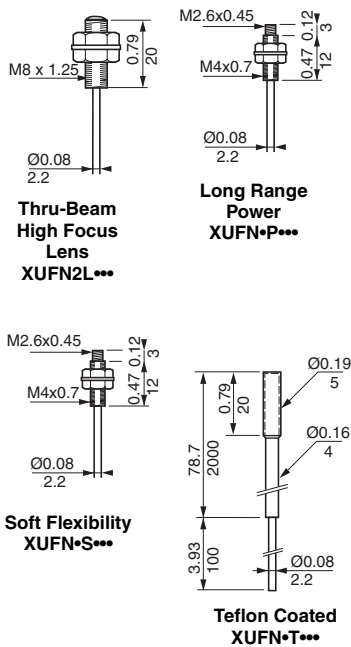
- Increases sensing distance by 40%
- Burns through pollutants for reliable detection

XUFN•S **S** for soft:

- Flexible enough for maneuvering tight corners
- Bend radius of 4 mm (0.16 in.)

XUFN•T **T** for Teflon®:

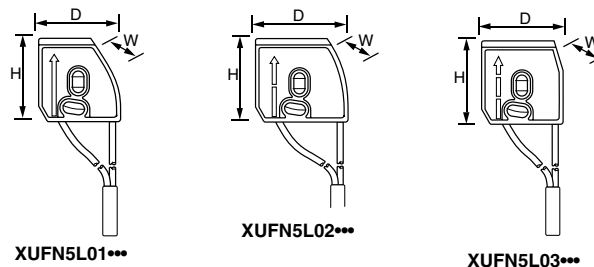
- Resists chemical aggressions
- Ideal for food and beverage, assembly and electronic, semiconductor



Sensing Mode	Cable Length	Beam Diameter	Sensing Distance	Dimensions H x W x D	Catalog Number
High Focus Lens					
Convergent	2 m (6.6 ft)	0.1 in (2.5 mm)	0.4 in (10 mm)	1.2 x 0.35 x 1.2 in (30 x 9 x 30 mm)	XUFN5L01L2
Convergent	2 m (6.6 ft)	0.2 in (5 mm)	0.8 in (20 mm)	1.22 x 0.47 x 1.33 in (31 x 12 x 34 mm)	XUFN5L02L2
Convergent	2 m (6.6 ft)	0.31 in (8 mm)	1.18 in (30 mm)	1.22 x 0.47 x 1.2 in (3 x 12 x 30 mm)	XUFN5L03L2
Thru-Beam	2 m (6.6 ft)	0.31 in (8 mm)	59 in (1.5 m)	see left	XUFN2L01L2
Thru-Beam	10 m (32.8 ft)	0.31 in (8 mm)	59 in (1.5 m)	see left	XUFN2L01L10
Long Range Power					
Thru-Beam	2 m (6.6 ft)	0.16 in (4 mm)	11.8 in (300 mm) ♦	see left	XUFN2P01L2
Thru-Beam	10 m (32.8 ft)	0.16 in (4 mm)	11.8 in (300 mm) ♦	see left	XUFN2P01L10
Diffuse	2 m (6.6 ft)	0.16 in (4 mm)	3.7 in (95 mm)	see left	XUFN5P01L2
Diffuse	10 m (32.8 ft)	0.16 in (4 mm)	3.7 in (95 mm)	see left	XUFN5N01L10
Soft Flexibility					
Thru-Beam	2 m (6.6 ft)	0.16 in (4 mm)	3.9 in (100 mm) ▲	see left	XUFN2S01L2
Thru-Beam	10 m (32.8 ft)	0.16 in (4 mm)	3.9 in (100 mm) ▲	see left	XUFN2S01L10
Diffuse	2 m (6.6 ft)	0.16 in (4 mm)	2.1 in (55 mm)	see left	XUFN5S01L2
Diffuse	2 m (6.6 ft)	0.16 in (4 mm)	2.1 in (55 mm)	see left	XUFN5S01L10
Teflon Coated					
Thru-Beam	2 m (6.6 ft)	0.16 in (4 mm)	3.9 in (100 mm)	see left	XUFN2T01L2
Diffuse	2 m (6.6 ft)	0.16 in (4 mm)	2.7 in (70 mm)	see left	XUFN5T01L2

♦ with XUFZ01, 2 m (78.74 in.)
 ▲ with XUFZ01, 750 mm (29.53 in.)

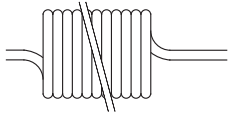
Convergent High Focus Lens



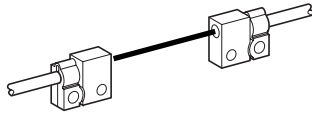
Photoelectric Sensors

Fiber Optics

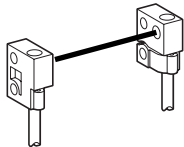
XUFN Fiber Optic Cables for Specific Applications



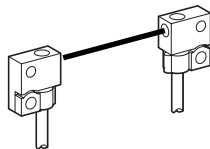
Unterminated cable



XUFZ13, XUFZ03



XUFZ14, XUFZ04



XUFZ15, XUFZ05

Unterminated Individual Cable

Length	Sensing Distance (Sn) @ 2 m (6.6 ft), Straight Cable Only *	Beam Diameter	Outside Diameter (OD)	Catalog Number
Straight cable				
10 m (32.8 ft)	250 mm (9.84 in.)	1 mm (0.04 in.)	2.2 mm (0.09 in.)	XUFZ910
20 m (65.6 ft)	250 mm (9.84 in.)	1 mm (0.04 in.)	2.2 mm (0.09 in.)	XUFZ920
10 m (32.8 ft)	375 mm (14.8 in.)	1.4 mm (0.06 in.)	2.2 mm (0.09 in.)	XUFZ911
20 m (65.6 ft)	375 mm (14.8 in.)	1.4 mm (0.06 in.)	2.2 mm (0.09 in.)	XUFZ921

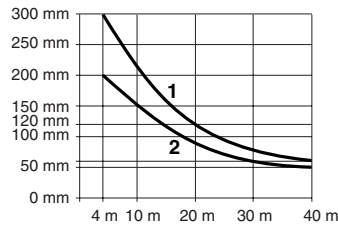
* Nominal sensing distance. Recommended usable distance is x0.8 of the nominal sensing distance. This will cover variances in temperature, supply voltage and manufacturing tolerances.

Separate Tips and Mounting Brackets (pair) for Unterminated Cables—Thru-Beam Mode

	Mounting	Sensing Distance *		Catalog Number
		1 mm (0.04 in.) diameter beam	1.4 mm (0.06 in.) diameter beam	
Non-Magnified	Axial	100 mm (3.94 in.)	150 mm (5.91 in.)	XUFZ13
	Frontal	70 mm (2.76 in.)	100 mm (3.94 in.)	XUFZ14
	Side	70 mm (2.76 in.)	100 mm (3.94 in.)	XUFZ15
Magnified	Axial	800 mm (31.50 in.)	600 mm (23.62 in.)	XUFZ03
	Frontal	600 mm (23.62 in.)	400 mm (15.75 in.)	XUFZ04
	Side	600 mm (23.62 in.)	400 mm (15.75 in.)	XUFZ05

* Distance is at 2 m (6.6 ft) cable length
 For other cable lengths:
 5 m (16.4 ft) cable—apply a reduction factor of 0.70 x Sn
 10 m (32.8 ft) cable—apply a reduction factor of 0.50 x Sn
 20 m (65.6 ft) cable—apply a reduction factor of 0.30 x Sn

Sensing range of cable length for unterminated cables

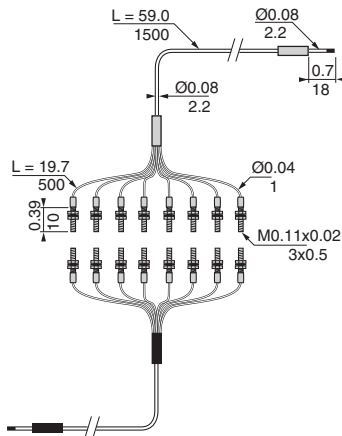


1 XUFZ911, 921
 2 XUFZ910, 920

Multiple Head Thru-Beam (pair), 2 m (6.6 ft) length

Tip	Sensing distance, Sn *		Beam Diameter	Outside Diameter (OD)	Catalog Number
	Standard (maximum)	w/XUFZ01 Lenses			
8 head, threaded	38 mm (1.48 in.)	—	16 x 0.265 mm (0.01 in.)	2.2 mm (0.09 in.)	XUFN02801

* Nominal sensing distance. Recommended usable distance is x0.8 of the nominal sensing distance. This allows for variances in temperature, supply voltage, and manufacturing tolerances.



XUFN02801

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors

XUV with Separate Optical Heads

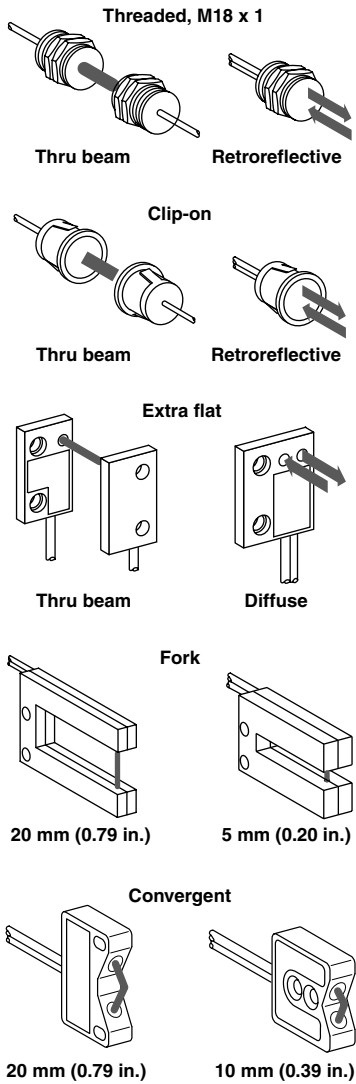
Optical Sensing Heads

The XUV series of separate optical sensing heads and amplifiers provides maximum flexibility in difficult applications.

Features

- Thru-beam, retroreflective, and proximity diffuse in several housing styles. Tubular: threaded or clip-on for easy replacement
- Extra flat for hard-to-access places, i.e. small conveyers
- Fork style for edge or mark detection
- Convergent for background suppression
- Visible red or green light for easy positioning and better contrast detection
- UL Listed ■
- CSA Certified

Optical Sensing Heads



Description	Nominal Sensing Distance *	Light	Beam Dia.	Type	Catalog Number
Thru-Beam					
Threaded (M18 x 1)	7.3 m (24 ft)	IR	11 mm (0.43 in.)	Emitter	XUVN06240
				Receiver	XUVN06244
Clip-on	7.3 m (24 ft)	IR	11 mm (0.43 in.)	Emitter	XUVN06250
				Receiver	XUVN06254
Extra flat	230 mm (9 in.)	IR	3 mm (0.118 in.)	Emitter	XUVN20210
				Receiver	XUVN20214
Fork					
	20 mm (0.79 in.)	Green	1 mm (0.04 in.)	—	XUVN0243G
		Red	1 mm (0.04 in.)	—	XUVN0243R
	5 mm (0.20 in.)	Green	1 mm (0.04 in.)	—	XUVN0143G
		Red	1 mm (0.04 in.)	—	XUVN0143R
Retroreflective					
Threaded (M18 x 1)	2.5 m (8 ft)	IR	11 mm (0.43 in.)	—	XUVN0244
Clip-on	2.5 m (8 ft)	IR	11 mm (0.43 in.)	—	XUVN0245
Proximity Diffuse					
Extra flat	63 mm (2.5 in.)	IR	3 mm (0.12 in.)	—	XUVN05415
Convergent	20 mm (0.79 in.)	Red	2 mm (0.08 in.)	—	XUVN02428
Convergent	10 mm (0.39 in.)	Red	1 mm (0.04 in.)	—	XUVN01428
Threaded (M18 x 1)	125 mm (5 in.)	IR	11 mm (0.43 in.)	—	XUVN10445

For amplifiers, see page 108.

* Excess gain one—in normal conditions, maximum usable sensing distance is 75% of normal.




■ The heads are not provided with the listing mark.

Photoelectric Sensors
XUV with Separate Optical Heads
Optical Sensing Heads

Mechanical Specifications—Thru-Beam Devices

	Threaded	Clip-on	Extra flat	Fork 20 mm (0.8 in.)	Fork 5 mm (0.2 in.)
Temperature range	Operation: -13 to +131 °F (-25 to +55 °C). Storage: -22 to +158 °F (-30 to +70 °C)				
Resistance to vibration	7 g amplitude ±0.06 in (1.5 mm), 10–55 Hz				
Resistance to shock	50 g at 3 axes, 3 times				
Degree of protection:					
NEMA Type	1, 4, 13		1, 5		1, 4, 6, 6P, 13
IEC	IP66		IP50		IP67
Connections	Cable 2.2 x 4 mm (0.08 x 0.16 in.) oval section Length: 6 m (19.7 ft) Cross section 0.3 mm ² (0.01 in. ²) Shielded (AWG 22)		Cable dia. 1.8 mm (0.07 in.) Length: 2 m (6.6 ft) Cross section 0.3 mm ² (0.01 in. ²) (AWG 22)		Cable dia. 1.8 mm (0.07 in.) Length: 2 m (6.6 ft) Cross section 0.3 mm ² (0.01 in. ²) (AWG 22)
Material	Case: ABS/PC; Cable: PVC				
Wavelength	880 nm	880 nm	880 nm	Green: 565 nm Red: 660 nm	Green: 565 nm Red: 660 nm

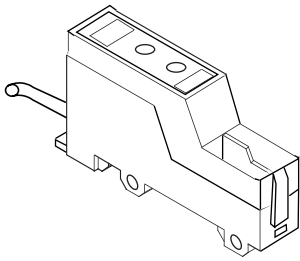
Mechanical Specifications

	Retroreflective		Diffuse		Convergent	
	Threaded	Clip-on	Extra flat	Threaded	20 mm (0.8 in.)	10 mm (0.4 in.)
Temperature range	Operation: -13 to +131 °F (-25 to +55 °C). Storage: -22 to +158 °F (-30 to +70 °C)					
Resistance to vibration	7 g amplitude ±0.6 in. (1.5 mm), 10–55 Hz					
Resistance to shock	50 g at 3 axes, 3 times					
Degree of protection:						
NEMA Type	1, 4, 13		1, 5	1, 4, 13	1, 5	
IEC	IP66		IP50	IP66	IP50	
Connections	Cable 2.2 x 4 mm (0.08 x 0.16 in.) oval section Length: 4 m (13.1 ft) Cross section 0.3 mm ² (0.01 in. ²) shielded (AWG 22)		Cable dia. 1.8 mm (0.07 in.) Length: 2 m (6.6 ft) Cross section 0.3 mm ² (0.01 in. ²) (AWG 22)		Cable dia. 1.8 mm (0.07 in.) Length 2 m (6.6 ft) Cross section 0.3 mm ² (0.01 in. ²) (AWG 22)	
Material	Case: ABS/PC; Cable: PVC					
Wavelength	880 nm		880 nm		660 nm	660 nm
Agency listings	 E164869 CCN NRKH		 LR44087 Class 3211 03			

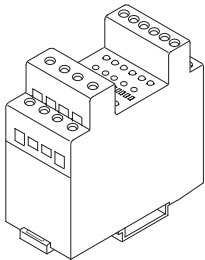
Photoelectric Sensors

XUV with Separate Optical Heads

Amplifiers, DC and AC



XUVH/J



XUVF

The XUV series of amplifiers designed for use with XUV optical sensing heads provide maximum flexibility in difficult applications. Features include:

- DIN rail mounting
- Light/dark programmable
- 3-LED alignment system
- 40 ms time delay programmable on beam break—selectable on/off

XUVH/J

- 2 potentiometers (coarse and fine)
- Marginal detection signal (MDS) output (alarm signals before sensor quits)
- System test input—turns off emitter; receiver follows suit if system is OK
- DC single channel, pre-wired
- Standard (1 ms) or fast (0.7 ms) response time (selectable)
- Gating (synchro) input for each channel (except XUVF)

XUVF

- AC
- Single and dual channel, relay output
- Screw terminals

DC Amplifiers

Output	Operating Frequency Maximum	Test Output	Synchro Input	Catalog Number
PNP	500 Hz/2,500 Hz	Yes	Yes	XUVH003530
NPN	500 Hz/2,500 Hz	Yes	Yes	XUVJ003530




AC Amplifiers

No. of Channels	Operating Frequency Maximum	Test Output	Synchro Input	Catalog Number
1	50 Hz	—	—	XUVF000510
2	50 Hz	—	Yes	XUVF000511

For optical heads, see page 106.

Photoelectric Sensors
XUV with Separate Optical Heads
Amplifiers, DC and AC

Operating and Electrical Specifications

		DC		AC	
		Standard	Fast	1 Channel	2 Channel
Temperature range		-13 to +131 °F (-25 to +55 °C)			
Enclosure rating	NEMA	Type 1, 5			
	IEC	IP50			
Vibration resistance		7 g amplitude ±0.06 in (1.5 mm), 10–55 Hz			
Shock resistance		30 g			
Wiring		Dia. 4.5 mm (0.18 in.), Length 2 m (6.6 ft) #22 AWG (0.2 mm ²)		Terminals 1–8: 16–20 AWG Terminals 9–29: 20–24 AWG	
Housing material		Plastic ABS Cable PVC		Plastic ABS Cable PVC	
Voltage range (maximum)		10–30 Vdc including ripple		90–264 Vac	
Output current (maximum)		100 mA		1 A (resistive load)	
Short-circuit/overload protection		Standard		—	
Relay output voltage (maximum)		—		250 Vac, 30 Vdc	
Power supply current (no load)		45 mA		30 mA	80 mA
Voltage drop (maximum)		1.5 V		—	
Operating frequency (maximum)		500 Hz	2,500 Hz	50 Hz	50 Hz
On/Off delay		1 ms	0.2 ms	10 ms	10 ms
Power-up delay		1 ms	0.2 ms	10 ms	10 ms
Pulse stretcher (monostable) delay		40 ms		40 ms	40 ms
Test input voltage (maximum)		1.5 V @ 1 mA		—	—
Test output current (maximum)		50 mA		—	—
Radio frequency immunity (RFI)		IEC 61000-4-3, L3* (10 V/m)			
Electrostatic discharge		IEC 61000-4-2, L2* (4 kV)		IEC 61000-4-2, L3* (8 kV)	
Fast transients (motor start/stop interference)		IEC 61000-4-4, L3* (1 kV)			
Impulse voltages (e.g., lightning)		IEC 60947-5-2, L3* (2.5 kV)			
Agency listings		 E164869 CCN NRKH		 LR44087 Class 3211 03	
					

* L indicates the level number.

Replacement Parts

Description	Catalog Number
Protective cover for DC amplifiers	XUVZ02

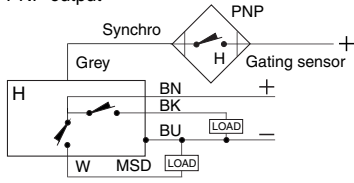
Photoelectric Sensors

XUV with Separate Optical Heads

Amplifiers, DC and AC

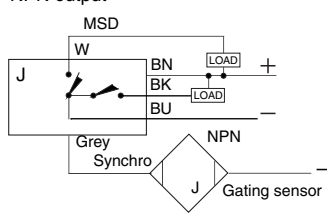
DC Amplifier XUVH

PNP output

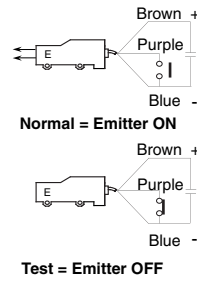


XUVJ

NPN output

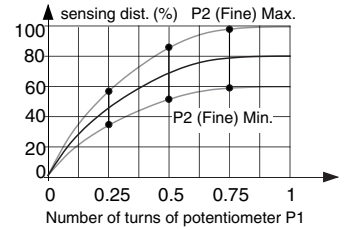


Test Input (Beam Break)

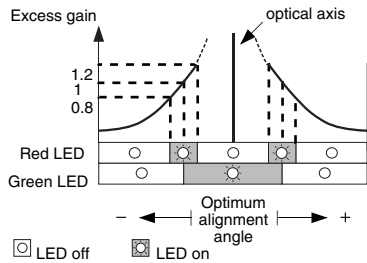


Variation of Sensing Distance

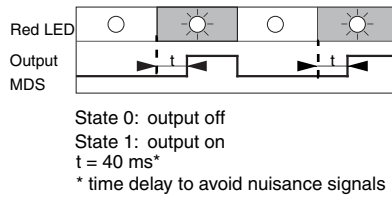
Depending on the sensitivity adjustment



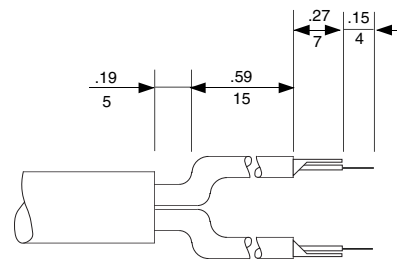
Marginal Detection LED



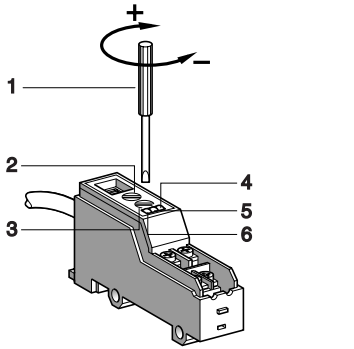
Marginal Detection Signal (MDS)



Optical Head Wire Stripping Dimensions

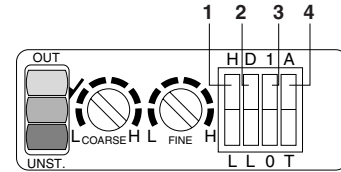


Sensitivity Adjustment



- 1 Plastic screwdriver (supplied)
- 2 Potentiometer P2 (fine adjustment)
- 3 Potentiometer P1 (coarse adjustment)
- 4 Red LED
- 5 Green LED
- 6 Yellow LED

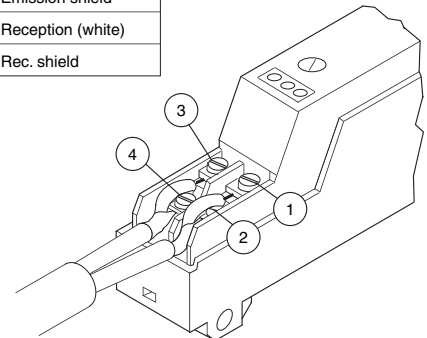
Switch Functions



- 1 Response time selector switch:
H = quick response time
L = standard response time
- 2 Light/dark switching selector switch:
D = dark switching
L = light switching
- 3 Time delay selector switch:
1 = On
0 = Off
- 4 White wire function selector switch:
A = Test output
T = Test input

Optical Head DC Wiring Diagram

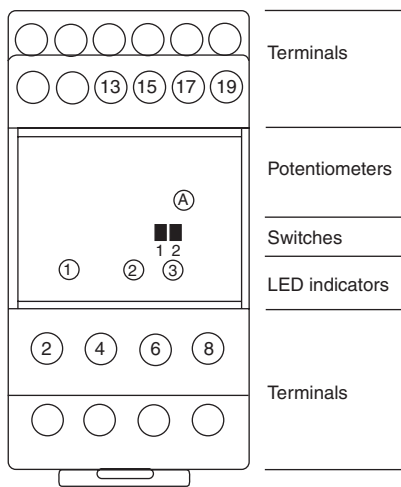
terminal	
①	Emission (red)
②	Emission shield
③	Reception (white)
④	Rec. shield



Photoelectric Sensors XUV with Separate Optical Heads Amplifiers, DC and AC

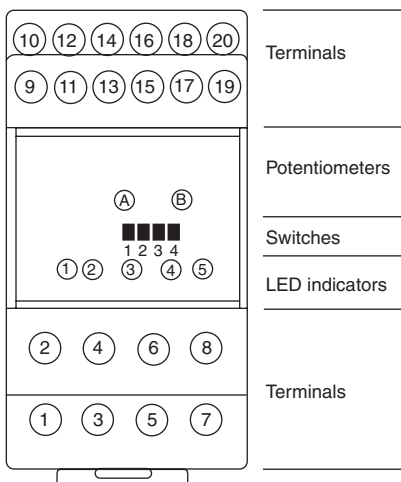
AC wiring diagrams

1 Channel Amplifier: XUVF000510



Terminals	
2	L1 supply
4	L2 supply
6-8	Relay output (1 contact)
13	Receiver (white wire)
15	Receiver (shielded cable)
17	Emitter shield
19	Emitter (red wire)
LED Indicators	
1	Power supply (green)
2	Unstable (red)
3	Output (yellow)
Potentiometers	
A	Sensitivity adjustment
Switches	
1	Light/dark
2	Monostable timer (pulse stretcher)

2 Channel Amplifier—Form C relay: XUVF000511

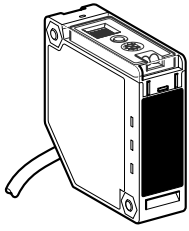


Terminals		Switches	
1	L1 supply	1	Time delay, channel 1
2	L2 supply	2	Light/dark, channel 1
3	N.C. output, channel 2	3	Time delay, channel 2
4	N.C. output, channel 1	4	Light/dark, channel 2
5	Common, channel 2	Potentiometers	
6	Common, channel 1	A	Sensitivity adjustment, channel 1
7	N.O. output, channel 2	B	Sensitivity adjustment, channel 2
8	N.O. output, channel 1	LED Indicators	
9	Output for synchro sensors 12 Vdc (-)	1	Green: Power supply
10	Output for synchro sensors 12 Vdc (+)	2	Red: Unstable, channel 1
11	Synchronization, channel 2, NPN	3	Yellow: Output, channel 1
12	Synchronization, channel 1, NPN	4	Red: Unstable, channel 2
13	Emitter, shielded, channel 1	5	Yellow: Output, channel 2
14	Receiver, channel 1 (white wire)		
15	Emitter, channel 1 (red wire)		
16	Receiver, shield, channel 1		
17	Emitter, shield, channel 2		
18	Receiver, channel 2 (white wire)		
19	Emitter, channel 2 (red wire)		
20	Receiver, shield, channel 2		

Photoelectric Sensors

XUK Subcompact

Transparent Detection with Timer—DC



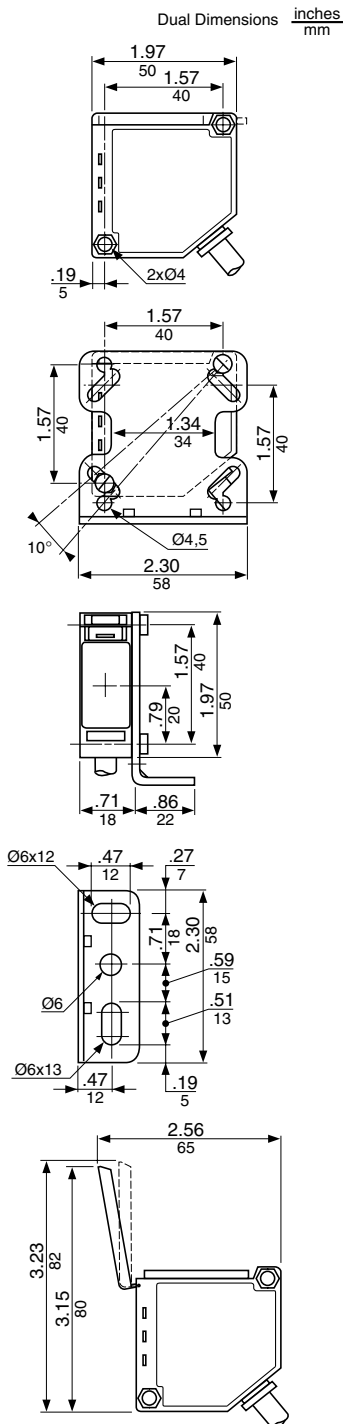
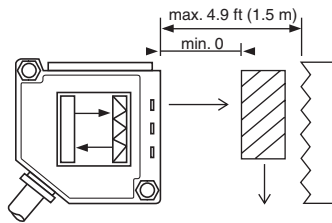
Features

- Detection of PVC, PET and glass targets at a high rate of speed
- Self-teaching feature enables setup with the press of a button
- Alarm output warns of marginal signal
- Time delay (perfect for avoiding jamming on bottling line) adjustment by potentiometer
- Cable or micro-connector style available

Circuit Type	Output Type	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Polarized Retroreflective—DC, 1.5 m (4.9 ft) Nominal Sensing Distance [▲]					
Cable style—2 m (6.6 ft) length					
PNP/NPN	Light/dark	12–24 Vdc	100 mA	1,500 Hz	XUKT1KSML2
Micro-style connector					
PNP/NPN	Light/dark	12–24 Vdc	100 mA	1,500 Hz	XUKT1KSMM12

[▲] 50 mA alarm output

Recommended mounting distances

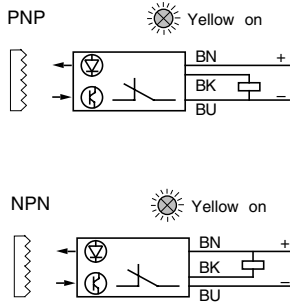


Photoelectric Sensors

XUK Subcompact

Transparent Detection with Timer—DC

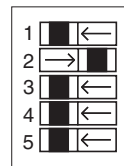
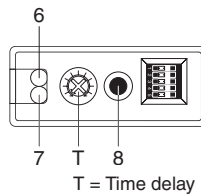
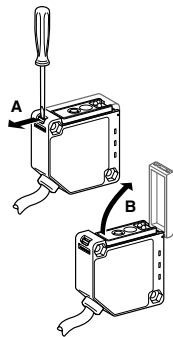
Wiring



Specifications

Mechanical		
Temperature Range	Operation	-13 to 131 °F (-25 to 55 °C)
	Storage	-40 to 158 °F (-40 to 70 °C)
Enclosure Rating	NEMA Type	3, 4, 4X, 6, 12, 13
	IEC	IP67 conforming to IEC 60529
Vibration		7 g amplitude ±0.6 in (1.5 mm), 10–55 Hz
Shock Resistance		30 g for 11 ms conforming to 68-2-27
Connection		6 mm dia. PVC cable with 0.34 mm wire
Tightening Torque (Maximum)		5 N•m (44.4 lb-in)
Enclosure Material	Case	PC/ABS
	Lens	PMMA
	Cable	PvR
Electrical		
Voltage Limit (Including Ripple)		10–30 V
Voltage Drop (Across Switch, Closed State)		2 V
Current Consumption (Maximum) (No Load)		35 mA
Yellow Output LED		Yes
Red Stability LED		Yes
Power-up Delay (Maximum)		80 ms
On Delay (Maximum)		0.3 ms
Off Delay (Maximum)		0.3 ms
Protective Circuitry	Short Circuit Protection	Yes
	Overload Protection	Yes
	Reverse Polarity Protection	Yes
Agency Listings		

Control Panel Access



Switches

1. Light/dark switching programming
2. Time delay activated or deactivated
3. Normal time delay or monostable
4. Normal time delay, on-delay or off-delay
5. PNP or NPN output

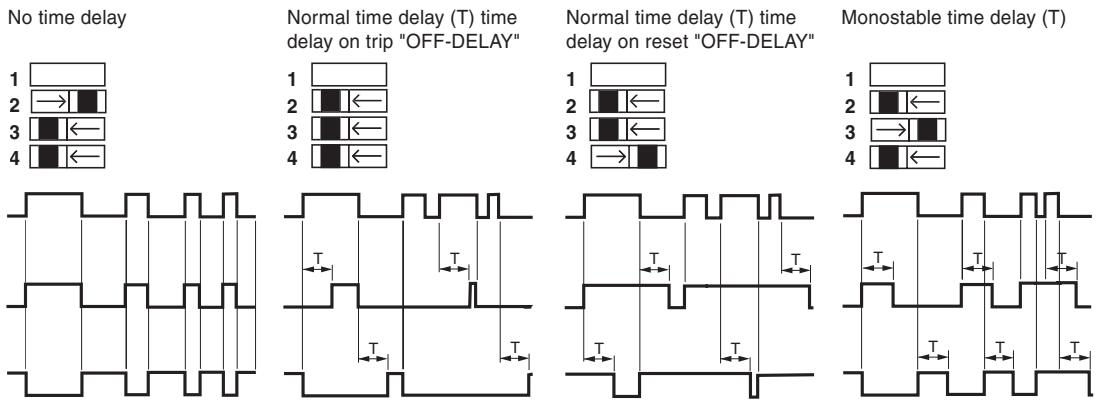
LEDs

6. Yellow LED: output and teach mode aid
7. Red LED: alignment aid and alarm indicator

Potentiometer and button

- Time delay adjustment
8. Self-teaching button (Set)

Time Delay



Switch Positions



Receiver state
Beam made
Beam broken

Light switching
1 Relay on
Relay off

Dark switching
1 Relay on
Relay off

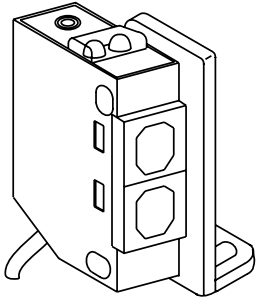
Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484
Reflectors Page 136

Photoelectric Sensors

XUM Miniature, Color Mark DC



High-performance, self-contained, medium-range, miniature photoelectric sensors for color mark detection.

Features

- Very small dimensions: 1.4 x 0.87 x 0.39 in. (35.5 x 22.1 x 9.9 mm)
- Marginal detection signal (MDS) provided for alarm output and alignment help
- Test input—system checking
- Light/dark selectable
- Green and red light for difficult contrast sensing
- 2 LED alignment system
- NEMA Types 4, 6, 6P ratings
- Mounting bracket included
- UL Listed, CSA Certified

Type	Output Mode	Voltage Range	Horizontal inclination of reader, maximum [▲]	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Color mark sensors—Sensing Range 15 mm (0.6 in.)						
Red light						
PNP 3-wire	Light/dark	12–24 Vdc	30°	100 mA	500 Hz	XUMH15353R
NPN 3-wire	Light/dark	12–24 Vdc	30°	100 mA	500 Hz	XUMJ15353R
Green light						
PNP 3-wire	Light/dark	12–24 Vdc	15°	100 mA	500 Hz	XUMH15353G
NPN 3-wire	Light/dark	12–24 Vdc	15°	100 mA	500 Hz	XUMJ15353G

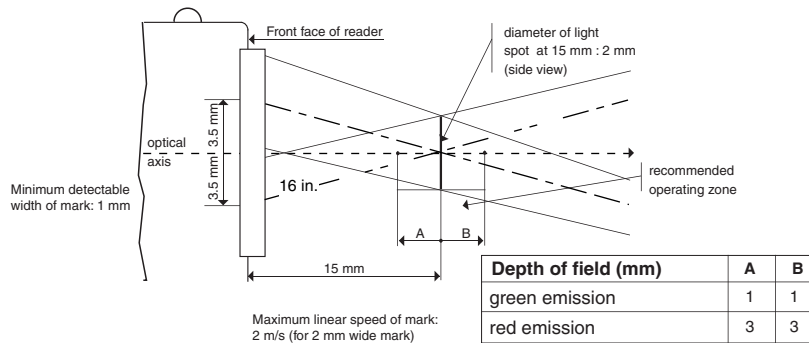
[▲] To eliminate stray reflection

XUM Color Mark Sensor Selection Chart

Color of object (surface background)	Mark Color						
	Black	Red	Orange	Yellow	Green	Blue	White
White	G, R	G	—	—	G, R	G, R	—
Blue	—	R	G, R	G, R	—	—	G, R
Green	—	R	G, R	G, R	—	—	G, R
Yellow	G, R	R	—	—	G, R	G, R	—
Orange	G, R	G	—	—	G, R	G, R	—
Red	R	—	R	G	R	R	R
Black	—	R	G, R	G, R	—	—	G, R

R = Red light G = Green light — = Marginal detection

NOTE: If both the Green and Red light meet the application requirements, **select the Red light**, which is more sensitive to contrasts.

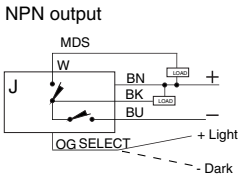
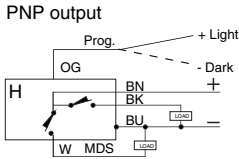


Photoelectric Sensors

XUM Miniature, Color Mark

DC

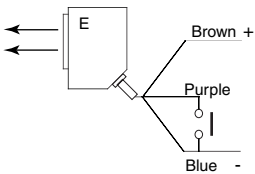
Wiring



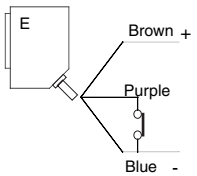
Beam break test

(purple wire)

Beam present



Beam broken



Specifications

Mechanical		
Temperature range		-13 to 131 °F (-25 to 55 °C)
Enclosure rating	NEMA Type	1, 3, 4, 6, 6P, 12, 13
	IEC	IP67 conforming to IEC 60529
Enclosure material		Housing: ABS/PC; Lens: PMMA, PC; Cable: PVC
Vibration resistance		7 g amplitude ±0.6 in (1.5 mm), 10–55 Hz
Shock resistance		50 g at 3 axes, 3 times
Wiring		2 m (6.6 ft) cable, 4.5 mm (0.18 in.) dia., 3 x 0.2 mm ² (24 AWG)
Electrical		
Voltage limits (including ripple)		10–30 Vdc
Load current maximum		100 mA
Voltage drop, closed state		1.5 V
Current consumption (no load)		35 mA
Test output current maximum		50 mA
Test input voltage maximum		1.5 V @ 1 mA maximum
Switching frequency maximum		500 Hz
Power-up delay maximum		1 ms
On/Off delay maximum		1 ms
Wavelength	Red color mark	660 nm
	Green color mark	565 nm
Ambient light immunity		10,000 LUX
Protective circuitry	Radio frequency immunity (RFI)	IEC 61000-4-3, Level 3 (10 V/M)
	Electrostatic discharges	DC 2-wire: IEC 61000-4-2, Level 3 (8 kV) DC 3-wire: IEC 61000-4-2, Level 2 (4 kV)
	Fast transients (motor start/stop interference)	IEC 61000-4-4, Level 3 (1 kV)
	Impulse voltages (lightning, etc.)	IEC 60947-5-2, Level 3 (2.5 kV)
Agency listings	E164869 CCN NRKH LR44087 Class 3211 03	

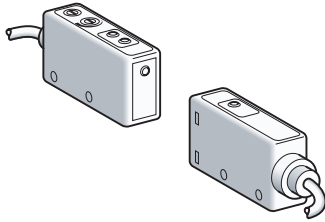
Accessories

Description	Sensing Distance	Catalog Number
Thru-beam aperture, one 0.5 mm (0.02 in.) and one 1 mm (0.04 in.)	1.78 in (4.5 cm)	XUMZ01
Thru-beam aperture, one 1.5 mm (0.06 in.) and one 2 mm (0.08 in.)	1.78 in (4.5 cm)	XUMZ03

Photoelectric Sensors

XUMW Liquid Detection

DC

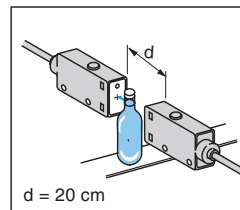
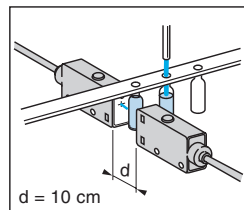


Features

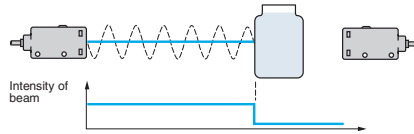
- Can reliably detect transparent or colored, water-based liquids
- Can detect liquid in thick containers
- Can control container filling

Circuit Type	Output Mode	Voltage Range	Connection Type	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam—200 mm (7.9 in.) Nominal Sensing Distance						
PNP/NPN	N.C. / N.O.	12–24 Vdc	2 m (6.6 ft) cable	100 mA	1,000 Hz	XUMW1KSNL2

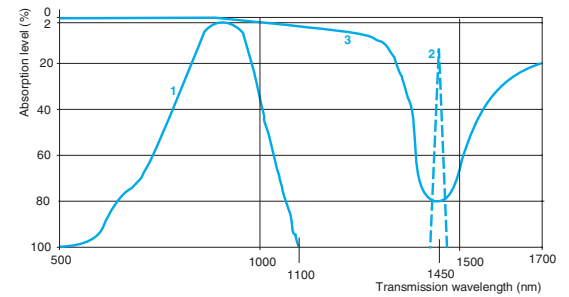
Application Examples



Principle of Detection

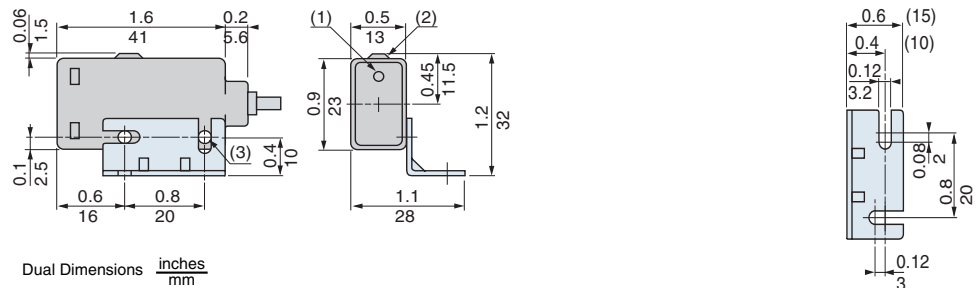


Light Emission Curve



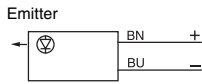
1. Transmission curve of a standard photoelectric sensor
2. Transmission curve of sensor XUMW1KSNL2
3. Curve of water absorption against incident beam wavelength

Dimensions

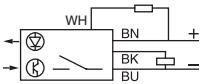


Photoelectric Sensors XUMW Liquid Detection DC

Wiring

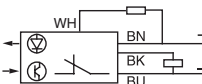


Black PNP Output
White NPN Output



N.O.
(no object present)

Black PNP Output
White NPN Output

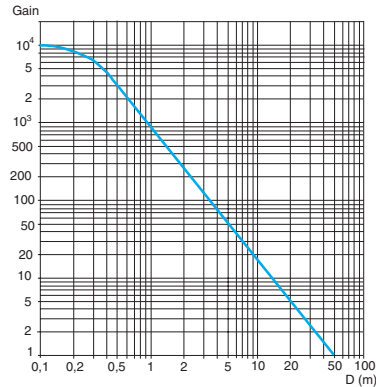


N.C.
(no object present)

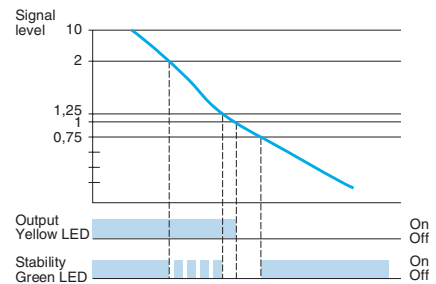
Specifications

Mechanical	
Nominal sensing range (Sn)	200 mm for optimum water-based liquid detection 10 m as standard thru-beam
Temperature range	Operation
	Storage
Enclosure rating	IP65 conforming to IEC60529
Vibration	25 g, ±2 mm amplitude (10–55 Hz)
Shock resistance	30 g for 11 ms conforming to IEC 60068-2-27
LED indicator	Output
	Signal stability
Enclosure material	Case
	Lens
Connection	2 m (6.6 ft) cable; 4 mm (0.16 in.) O.D.; 2, 3 conductor x 0.2 mm ² (24 AWG)
Light emission	Infrared (1450 nm)
Electrical	
Voltage range	12–24 Vdc
Voltage limit (including ripple)	10–30 Vdc
Operating frequency	1,000 Hz
Current consumption (no load)	45 mA
Voltage drop (maximum)	2 V
Power-up delay (maximum)	50 ms
On-delay (maximum)	0.5 ms
Off-delay (maximum)	0.5 ms
Agency listings	CE

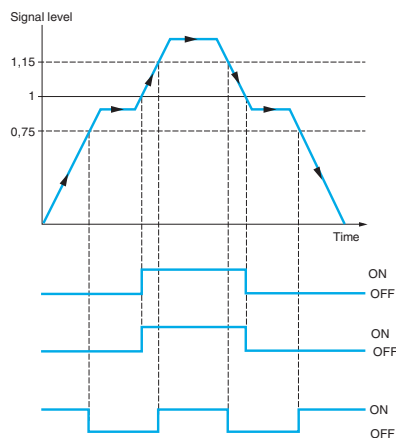
Excess Gain Curve



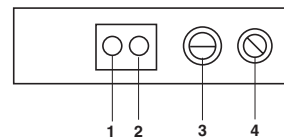
Stability Curve



Principle of Function



Functions

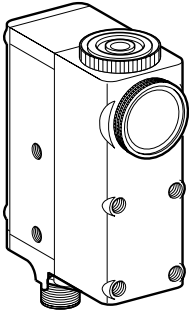


- LED
- 1 Yellow output LED
- 2 Green stability LED
- Potentiometer
- 3 Sensitivity adjustment switch
- 4 Light/dark switching programming

Photoelectric Sensors

XUR Rectangular Compact, Color

Color Mark Registration, DC



Features

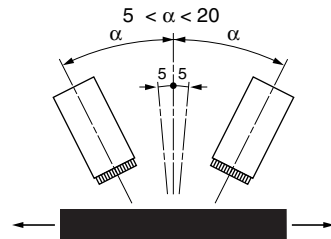
- 20 turn sensitivity/potentiometer
- Light/dark selectable
- Red or green lens option, selectable via adjustment screw
- Standard micro-style connector receptacle *
- 20 ms off delay, selectable by internal jumper
- Heavy-duty metal enclosure
- Front or side sensing option, modifiable by customer

Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Diffuse—9 mm (0.354 in.) Nominal Sensing Range [▲]					
PNP/NPN	Light/dark	12–24 Vdc	200 mA	10,000 Hz	XURK0955D

* See p. 484 for matching connector cables

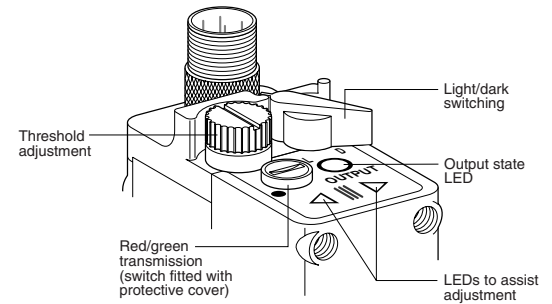
[▲] 7 mm (0.28 in.) with XURZ02 or 18 mm (0.71 in.) with XURZ01

Maximum vertical inclination

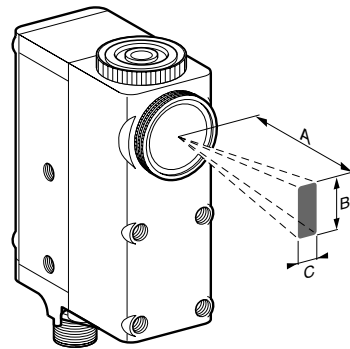


An angle of 5 to 10° from vertical is recommended for reflective or transparent surfaces.
Maximum vertical inclination: 20°

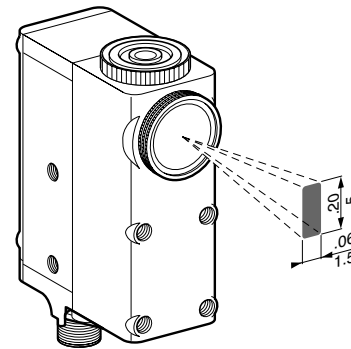
Programming features



Detection zone (in./mm)



Size of mark (in./mm)



Note: Maximum linear speed of mark is 10 m/s (for 1 mm wide mark)

	A		B		C	
	in.	mm	in.	mm	in.	mm
XURK	0.35	9	0.20	5	0.06	1.5
XURK + XURZ01	0.71	18	0.28	7	0.08	2.0
XURK + XURZ02	0.28	7	0.16	4	0.04	1.0

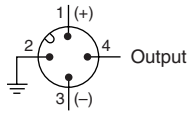
Photoelectric Sensors

XUR Rectangular Compact, Color

Color Mark Registration, DC

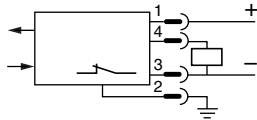
Wiring

Connector

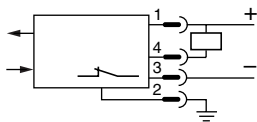


Light mode

PNP output

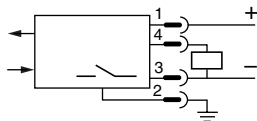


NPN output

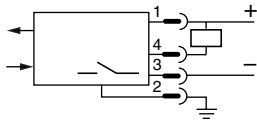


Dark mode

PNP output



NPN output



Specifications

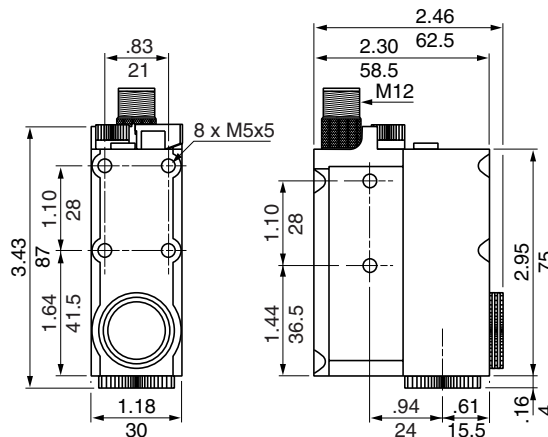
Mechanical		
Temperature range	Operation	14 to 131 °F (-10 to 55 °C)
	Storage	-4 to 158 °F (-20 to 70 °C)
Enclosure rating	IEC	IP67 conforming to IEC60529 and IP673, NCF 20-010
Vibration		7 g amplitude ±0.6 mm conforming to IEC 60068-2-6
Shock resistance		30 g for 11 ms, conforming to IEC 60068-2-7
Enclosure material	Case	ZAMAC
	Lens	Glass
Wiring		Micro-connector
Spot dimensions		1.5 x 5 mm (0.06 x 0.2 in.), min. detectable width 0.5 mm (0.02 in.)
Maximum linear speed of mark		10 ms (for 1 mm wide mark)
Maximum vertical inclination of reader		20°
Electrical		
Voltage range		12–24 Vdc
Voltage limit (including ripple)		10–30 Vdc
Voltage drop (across switch, closed state)	NPN	1.2 V
	PNP	2.2 V
Load current (maximum)		100 mA
Current consumption (maximum) (no load)		80 mA
Operating frequency (maximum)		1,000 Hz
Power-up delay (maximum)		100 ms
On delay (maximum)		50 ms
Off delay (maximum)		50 ms
Time delay		Off delay 20 ms
Physical Characteristics		
Emitter wave length	Red	635 nm
	Green	565 nm
Protective circuitry	Short circuit protection	yes
	Overload protection	yes
	Reverse polarity protection	yes



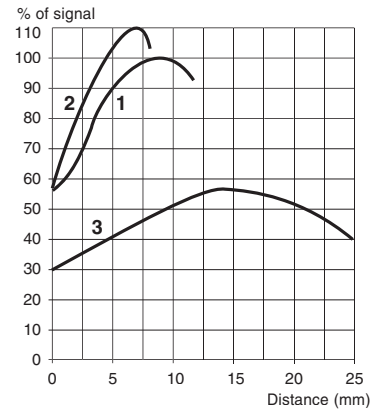
Accessories

Description	Catalog Number
Magnifying lens	XURZ01
Focusing lens	XURZ02

Dimensions



Detection curve



- 1 XURK ●●●●●●●●
- 2 XURK ●●●●●●●● + XURZ01
- 3 XURK ●●●●●●●● + XURZ02

Connector Cables (M12 or D suffix)

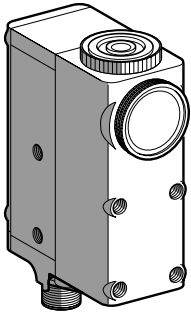
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

Photoelectric Sensors

XUR Rectangular Compact, Color

XURK1 Self-Teaching, Color Mark Registration, DC

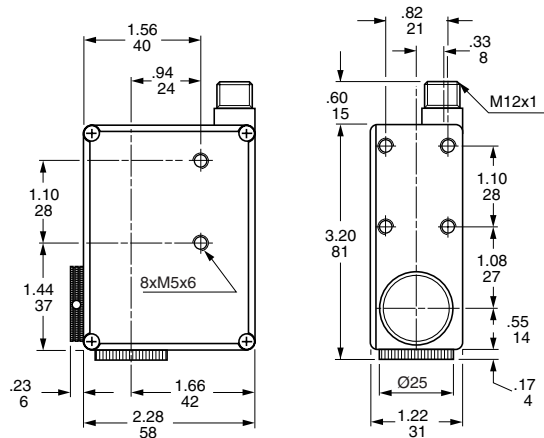


Features

- Self-teaching capability for memorization of target and precision repeatability
- 0 to 5.5 V analog output, depending on the illumination level of the mark
- Magnifying lenses increase sensing distance to 18 mm or focus to 7 mm
- Optional straight or 90° sensing setup
- 20 ms Off Delay built-in timing feature
- Automatic sensitivity adjustment by self-teaching
- Automatic light/dark switching, depending on order of teaching (mark or background)

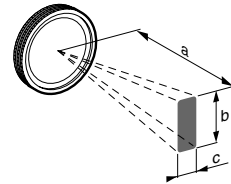
Circuit Type	Output Mode	Voltage Range	Voltage Drop Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Diffuse—9 mm (0.354 in.) Nominal Sensing Range*—Micro-Connector						
PNP/NPN or Analog	Light/dark	12–24 Vdc	2 V PNP, 2 V NPN	200 mA	10,000 Hz	XURK1KSMM12

* Excess gain one—in normal ambient conditions, maximum usable sensing distance is 75% of normal
 * 7 mm with XURZ02 and 18 mm with XURZ01 (see chart)



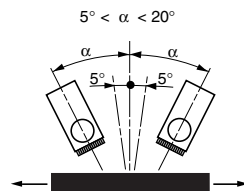
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Detection Zone and Mark Size (mm)



	a		b		c	
	in.	mm	in.	mm	in.	mm
XURK1KSMM12	.35	9	.20	5	.08	2
XURK1KSMM12 + XURZ01	.71	18	.28	7	.08	2
XURK1KSMM12 + XURZ02	.28	7	.16	4	.004	1

Vertical Plane



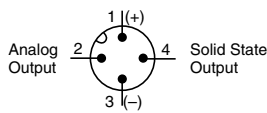
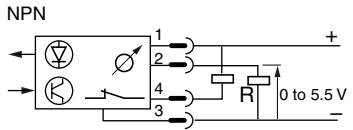
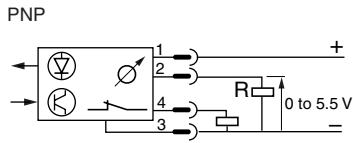
An angle of 5 to 10° from vertical is recommended for reflective or transparent surfaces. Max. vertical inclination: 20°

Photoelectric Sensors

XUR Rectangular Compact, Color

XURK1 Self-Teaching, Color Mark Registration, DC

Wiring



Specifications

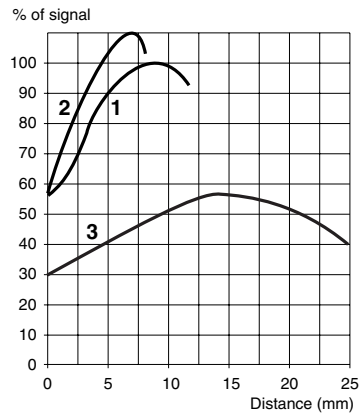
Mechanical	
Nominal sensing range	0.35 in. (9 mm) 0.28 in. (7 mm) with XURZ01, 0.71 in. (18 mm) with XURZ01
Spot dimension	1.5 x 5 mm (0.06 x 0.2 in.) diameter
Minimum detectable width of mark	0.5 mm (0.02 in.)
Maximum linear speed of mark	10 m/s (32.8 ft/s) for 1 mm (0.04 in.) mark
Temperature range	Operation: 14 to 131 °F (-10 to 55 °C) Storage: -4 to 158 °F (-20 to 70 °C)
Enclosure rating	IEC: IP67 conforming to IEC 60529
Vibration	7 g amplitude + 0.65 mm (10–55 Hz)
Shock resistance	30 g for 11 ms conforming to IEC 60068-2-27
LED indicator type	Red—output, green—learning mode
Enclosure material	Diecast zinc
Sensitivity adjustment	Automatic, through self-teach function
Connection	M12, 4-pin connector
Light emission	Red or green (automatic selection)
Electrical	
Voltage limits (including ripple)	10–0 Vdc
Rated supply voltage	12–24 V (with reverse polarity protection)
Operating frequency	10,000 Hz
Analog output	0–5.5 V (voltage proportional to light reflected by the object)
Current consumption (maximum) (no load)	80 mA
Power-up delay (maximum)	100 ms
On delay (maximum)	50 µs
Off delay (maximum)	50 µs
Timing	20 ms off delay



Accessories

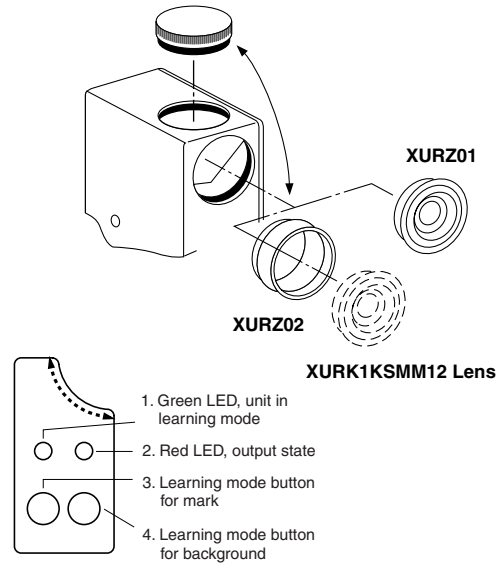
Description	Catalog Number
Mark magnification lens	XURZ01
Mark reduction lens	XURZ02

Excess Gain Curve



- 1 XURK1KSMM12
- 2 XURK1KSMM12 + XURZ01
- 3 XURK1KSMM12 + XURZ02

Optional Lenses for Focusing or Magnifying



Connector Cables (M12 or D suffix)

XSZCD101Y Micro-style, 4-pin, 2 m, straight

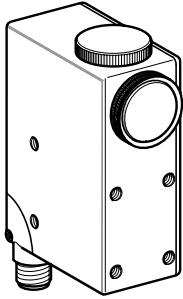
XSZCD111Y Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

Photoelectric Sensors

XUR Rectangular Compact, Color

XURU Ultraviolet (UV), Self-Teaching, DC

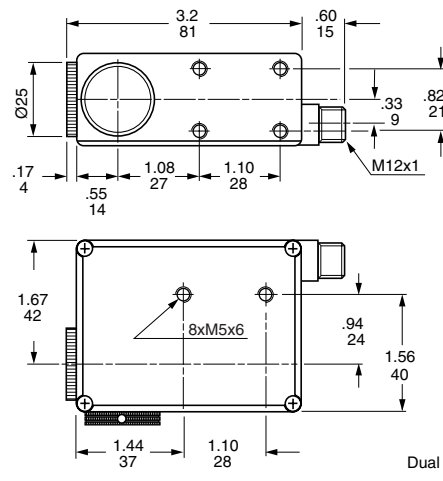


Features

- Detection of invisible marks, glues, varnishes, etc.
- Detection of ultraviolet marks and products containing UV bluing agents, as used for packaging identification and quality assurance.
- 0 to 7 V analog output, depending on the illumination level of UV mark
- Self-teaching capability for memorization of target and precision repeatability
- Optional magnifying lenses increase sensing distance to 18 mm (0.71 in.) or focus to 7 mm (0.28 in.)
- Mounting adjustable in 3 positions (straight or 90°)
- 20 ms Off Delay built-in timing feature
- Automatic sensitivity adjustment (self-teaching)
- Automatic light/dark switching, depending on order of teaching (mark or background)

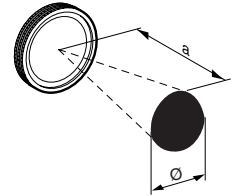
Circuit Type	Output Mode	Voltage Range	Voltage Drop Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Diffuse—9 mm (0.354 in.) Nominal Sensing Range*—Micro-Connector						
Discrete and analog outputs	Light operate	12–24 Vdc	2 V PNP 1 V NPN	200 mA	2,000 Hz	XURU1KSMM12

* 7 mm (0.28 in.) with XURZ02 and 18 mm (0.71 in.) with XURZ01 (see chart)



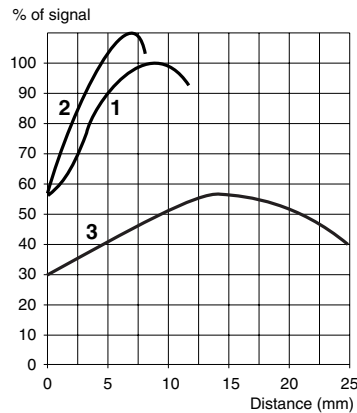
Dual Dimensions inches/mm

Detection zone and mark size (mm)



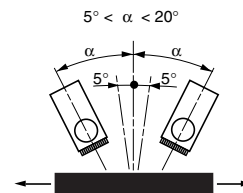
	a		Ø	
	in.	mm	in.	mm
XURU1KSMM12	.35	9	.20	5
XURU1KSMM12 + XURZ01	.71	18	.28	7
XURU1KSMM12 + XURZ02	.28	7	.12	3

Excess Gain Curve



- 1 XURU1KSMM12
- 2 XURU1KSMM12 + XURZ01
- 3 XURU1KSMM12 + XURZ02

Vertical Plane



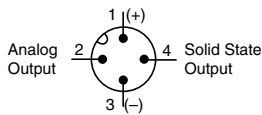
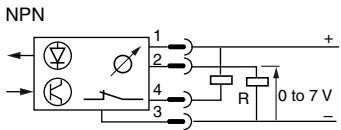
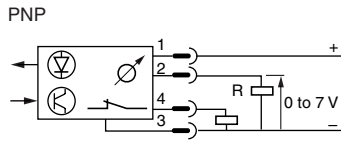
An angle of 5 to 10° from vertical is recommended for reflective or transparent surfaces. Max. vertical inclination: 20°

Photoelectric Sensors

XUR Rectangular Compact, Color

XURU Ultraviolet (UV), Self-Teaching, DC

Wiring



Specifications

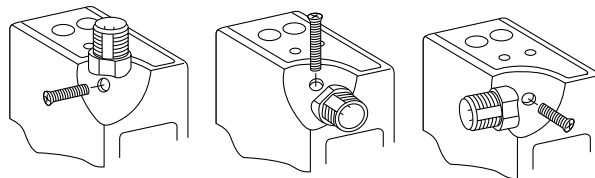
Mechanical		
Nominal sensing range		0.35 in. (9 mm) 0.28 in. (7 mm) with XURZ02; 0.71 in. (18 mm) with XURZ01
UV spot dimensions		0.20 (5 mm) diameter
Temperature range	Operation	14 to 131 °F (-10 to 55 °C)
	Storage	-4 to 158 °F (-20 to 70 °C)
Enclosure rating	NEMA Type	3, 4, 4X, 6, 6P, 12, 13
	IEC	IP67 conforming to IEC 60529
Vibration		7 g amplitude + 0.6 mm (10–55 Hz)
Shock resistance		30 g for 11 ms conforming to IEC 60068-2-27
LED indicator type		Red—output, green—learning mode
Enclosure material		Diecast zinc
Sensitivity adjustment		Automatic, through self-teach function
Connection		M12, 4-pin connector, with adjustable mounting plane
Light emission		Red or green (automatically selected) 370 nm
Electrical		DC models
Voltage range		10–30 Vdc
Rated supply voltage		12–24 V (reverse polarity protected)
Operating frequency		2,000 Hz
Current consumption (maximum) (no load)		80 mA
Power-up delay (maximum)		100 ms
On delay (maximum)		250 μs
Off delay (maximum)		250 μs
Timing		20 ms off delay selectable by internal switch
Analog output		0–7 V (voltage proportional to light reflected by the object)



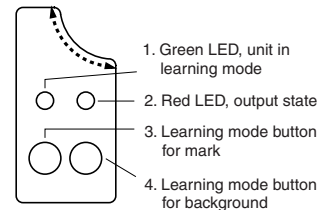
Accessories

Description	Catalog Number
Mark magnification lens	XURZ01
Mark reduction lens	XURZ02

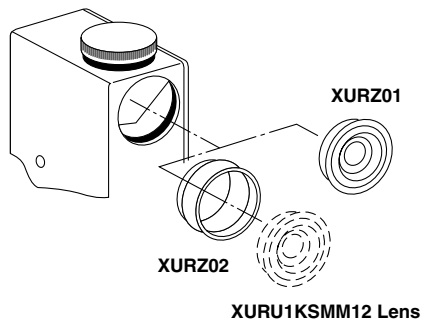
Selectable Mounting Orientation



Functions



Optional Lenses for Focusing or Magnifying



Connector Cables (M12 or D suffix)

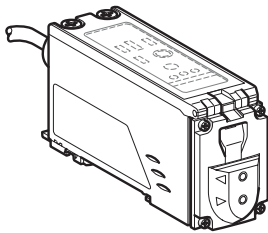
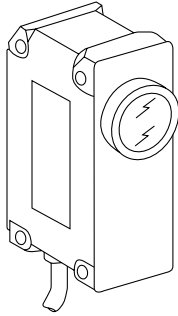
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

Photoelectric Sensors

XUR Rectangular Compact, Color

XURC Full Color and Fiber Optic Full Color



Features

- Ideal for applications such as sorting, label detection, and multi-color printing
- Self-teaching with adjustable sensitivity for comparing and matching similar colors
- Three channels with independent outputs
- Selectable response time
- Synchronization option available
- Selectable 40 ms time delay on beam break
- Adjustable sensing distance
- Withstands very high vibration
- Detects up to 8 mm diameter mark
- Easy-to-use programming panel under hinged, protective cover

Circuit Type	Output Type	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Diffuse—40 to 60 mm (1.57 to 2.36 in.) Nominal Sensing Range					
PNP	Light	12–24 Vdc	100 mA	1.2 kHz	XURC3PPML2
NPN	Light	12–24 Vdc	100 mA	1.2 kHz	XURC3NPML2
Fiber Optic—See Fiber Optic Cables for Sensing Distances					
PNP	Light	12–24 Vdc	100 mA	1.2 kHz	XURC4PPML2
NPN	Light	12–24 Vdc	100 mA	1.2 kHz	XURC4NPML2

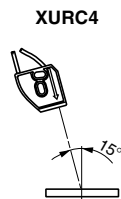
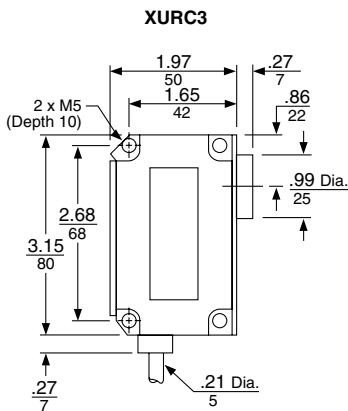
Recommended Fiber Optics

Sensing Type	System	Sensing Distance	Diameter of Spot	Catalog Number
Convergent	Diffuse	0.39 in. (10 mm)	0.1 in. (2.5 mm)	XUFN5L01L2
Convergent	Diffuse	0.79 in. (20 mm)	0.2 in. (5 mm)	XUFN5L02L2
Convergent	Diffuse	1.18 in. (30 mm)	0.32 in. (8 mm)	XUFN5L03L2
Standard	Diffuse	0.2 in. (5 mm)	—	XUFN05321
Standard	Diffuse	0.16 in. (4 mm)	—	XUFS05320
Standard	Thru-Beam	9.54 in. (250 mm)	—	XUFN12301 + XUFZ01
Standard	Thru-Beam	5.91 in. (150 mm)	—	XUFS2020 + XUFZ01

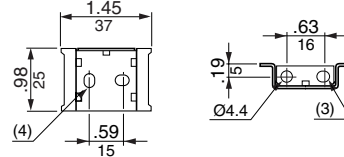
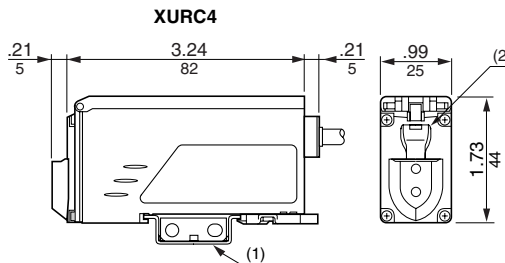
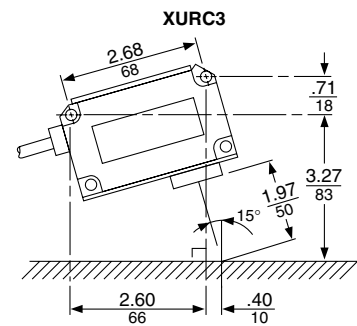
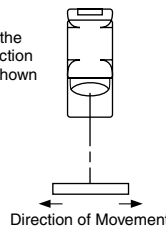
For additional plastic fiber optics, see p. 102.

Application Notes

Optimal installation is achieved when the sensor is approximately 15° tilted towards the object surface. One method for establishing an angle of 15° is shown in the illustration below. When the visible spot is positioned 10 mm forward of the vertical center-line to the uppermost mounting hole of the sensor, the face of the sensor is at an angle of 15° to the target object.



Since the detection is less affected by the changes in the sensing angle, moving direction of the object should be as shown in the figure to the right.



- (1) DIN Rail Mounting Accessory (Included)
- (2) Locking Latch for Fiber Optic Cables

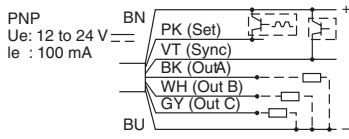
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors

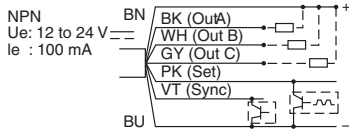
XUR Rectangular Compact, Color

XURC Full Color and Fiber Optic Full Color Sensors

Wiring



XURC-PPML2



XURC-NPML2

Wire Definitions

Sleeve Color	Title	Function
Brown	+V	Supply voltage, 12–24 V
Blue	0 V	Supply ground
Pink	SET	Set signal
Violet	EXT	External synchronous input
Black	OUT A	Control output A
White	OUT B	Control output B
Gray	OUT C	Control output C

Specifications

Mechanical			
Temperature Range	Operation	14 to 122 °F (-10 to 50 °C) ▲	
	Storage	-22 to 158 °F (-30 to -70 °C)	
Enclosure Rating	IEC	IP67 conforming to IEC 60529	
Vibration	Amplitude 0.75 mm, 10–55 Hz (2 hours/each of 3 axes)		
Shock Resistance	50 g (5 shocks/each of 3 axes)		
Maximum Operating Humidity	35 to 85% RH ▲		
Spot Diameter	at 40 mm (1.57 in.)	at 50 mm (1.97 in.)	at 60 mm (2.36 in.)
	4 mm (0.16 in.)	6 mm (0.24 in.)	8 mm (0.31 in.)
	Enclosure Material		
Enclosure Material	Case	Aluminum	
	Lens	Glass	
	Cover	Polyarylate	
Wiring	24 AWG (0.2 mm ²), Cable: vinyl rubber sleeve		
Electrical			
Voltage Range	12–24 Vdc		
Voltage Limit (Including Ripple)	10–30 Vdc		
Voltage Drop (Across Switch, Closed State)	1.5 V		
Load Current (Maximum)	100 mA		
Current Consumption (Maximum) (No Load)	150 mA		
Power-up Delay (Maximum)	100 ms		
Time Delay Programmable by Switch	40 ms on falling edge		
Programmable Response Time	Fast	Normal	Slow
	0.8 ms	1.5 ms	6 ms
	Physical Characteristics		
Ambient Light Immunity (Maximum)	Sunlight: 10,000 Lux; halogen light: 3,000 Lux		
Short Circuit Protection	Yes, each Independent channel		

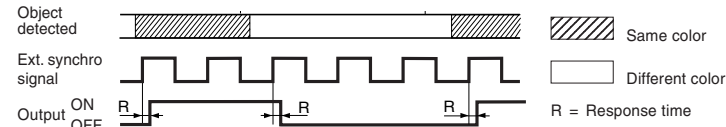


▲ Ice and condensation may impede performance.

Selection of Operating Mode

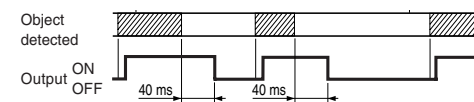
- Operating Status LED**
- Learning mode button, for memorizing reference colors**
- Reference color and operating mode selector**
Selection of reference colors (Set)
Selection of operating mode
Tolerance mode (positions 1–5)
5 positions allow selection of the tolerance level to be applied to the shading of the color to be detected.
Run mode (position S)
This mode enables sorting by color
- C or C + I selector**
Mode C
This mode is used to detect different colored objects.
Mode C or C + I
In this mode, the sensor is insensitive to varying surface finishes of the object to be detected.
- Synchronization mode selector**
Internal synchronization mode (INT)
In this mode, color detection is performed continually.
External synchronization mode (EXT)
In this mode, color detection is synchronized with an external signal.

External synchronization mode

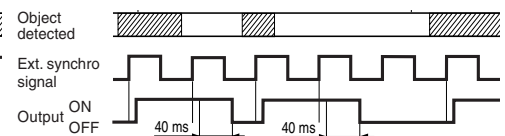


- Response time mode selector**
Fast mode (F), Normal mode (N), Slow mode (S)
- Output time delay selector (T-On/T-Off)**

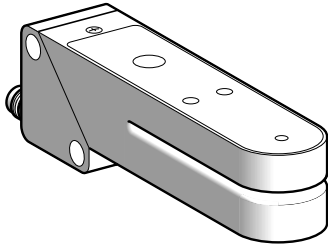
Output time delay, internal synchronization mode



Output time delay, external synchronization mode



Photoelectric Sensors
XUV Fork and Frame
Advanced Label Detection Fork, DC



Features

- Detects opaque colors on transparent background
- Self teaches to memorize label for accurate detection
- Adjustable from straight to 90° connection
- Two LEDs indicate three conditions: yellow—output; green—ready; red—error
- Standard nano-style connector
- Durable zinc alloy enclosure

Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru-Beam—2 mm (0.079 in.) Nominal Sensing Range—Infrared light emission					
PNP/NPN	Light/dark	12–24 Vdc	100 mA	10K Hz	XUVK0252S
Thru-Beam—2 mm (0.079 in.) Nominal Sensing Range—Visible red/green light emission					
PNP/NPN	Light/dark	12–24 Vdc	100 mA	10K Hz	XUVK0252VS

Function table

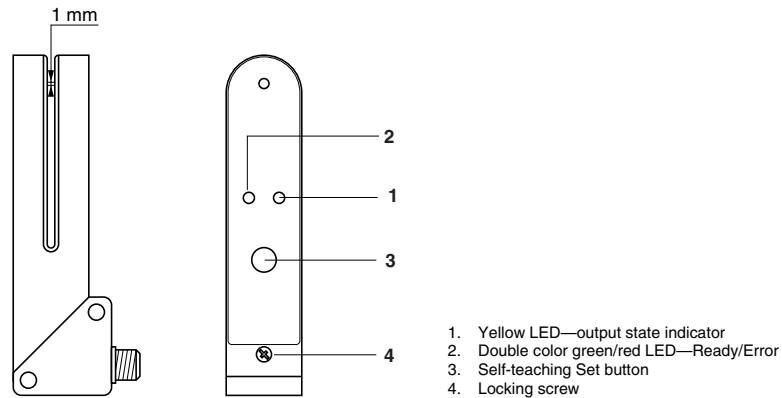
Output state (PNP or NPN) indicator (illuminated when sensor output is On)

Mode	Thru-beam system	
	Absence of label in the beam	Presence of label in the beam
Light switching		
Dark switching		

- 1 Applications: the infrared transmission beam sensor XUVK0252S is suitable for detecting all types of opaque legends; the red/green transmission beam sensor XUVK0252VS is suitable for detecting all types of opaque legends of different colors.
- 2 The sensor incorporates self-teaching setup: the light or dark switching function is selected when performing the first stage of the self-teaching setup procedure during sensor installation (see self-teaching setup procedure, below).

Self-teaching setup procedure

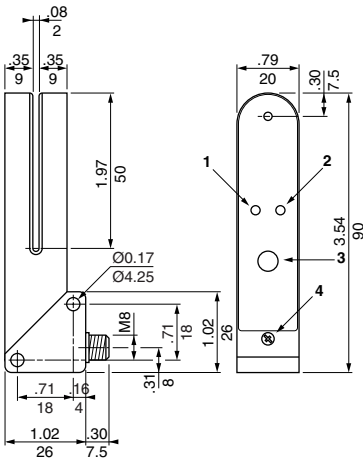
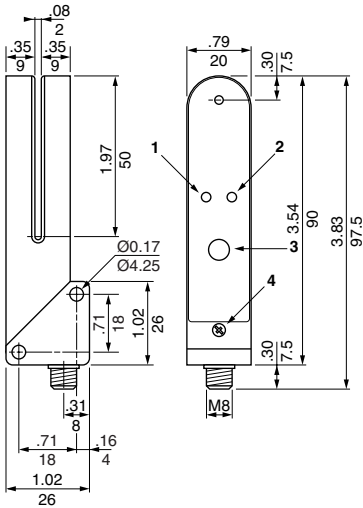
- Place the label to be detected in the beam of the optical fork. Press the Set button and hold it down until the green LED (2) goes out.
- When the green LED flashes, the sensor has learned the label. Place the item to which the label is affixed in the beam of the optical fork. Press the Set button and hold down until the green LED goes out.
- When the green LED illuminates as a steady light, the self-teaching setup procedure is completed and the sensor is ready for operation.



Photoelectric Sensors

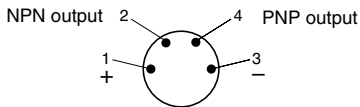
XUV Fork and Frame

Advanced Label Detection Fork, DC



1. Green/Red LED = Ready/Error
2. Yellow LED = Output
3. Set button
4. Locking screw

Connector



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Connector Cables (M8 or S suffix)

XSZCS141	Nano-style, 4-pin, 2 m, straight
XSZCS151	Nano-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

Specifications

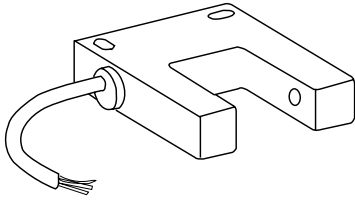
Mechanical		
Temperature range	Operation	32 to 131 °F (0 to 55 °C)
	Storage	-4 to 158 °F (-20 to 70 °C)
Enclosure rating	IEC	IP65 conforming to IEC 60068-2-27
Vibration		7 g amplitude + 1 mm, 10–42 Hz conforming to IEC 60068-2-6
Shock resistance		30 g for 11 mm conforming to IEC 60068-2-7
Enclosure material	Case	Zinc alloy
	Lens	Glass
Wiring		Female nano-connector
Electrical		
Voltage range		12–24 Vdc
Voltage limit (including ripple)		10–30 Vdc
Voltage drop (across switch, closed state)		1.5 V
Load current (maximum)		100 mA
Current consumption (maximum) (no load)		50 mA
Operating frequency (maximum)		10K Hz
Power-up delay (maximum)		30 ms
On delay (maximum)		100 μ
Off delay (maximum)		100 μ
Physical Characteristics		
Emitter wave length:	XUVK0252S	880 nm
	XUVK0252VS	635 nm
Protective circuitry	Short circuit protection	Yes
	Overload protection	Yes
	Reverse polarity protection	Yes



Photoelectric Sensors

XUV Fork and Frame

Self-Contained Fork Type (30 mm), Economy, DC



Features

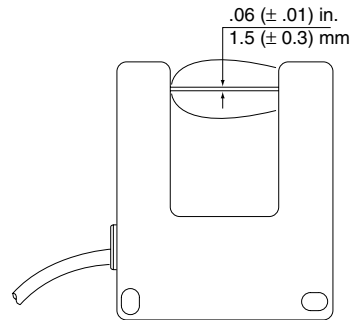
- Self-contained electronics eliminate the need for a separate amplifier
- Ideal for detecting small parts at fast speeds
- 360° LED output indicator
- ABS enclosure

Circuit Type	Output Mode	Voltage Range Maximum	Load Current Maximum	Operating Frequency Maximum	Connection	Catalog Number
Thru-Beam—30 mm (1.18 in.) Nominal Sensing Range						
PNP	Dark	19–38 Vdc	150 mA	1,000 Hz	2 m (6.6 ft) cable	XUVH0312
NPN	Dark	19–38 Vdc	150 mA	1,000 Hz	2 m (6.6 ft) cable	XUVJ0312

Function Table

	Function	Thru-Beam System	
		No object present in the beam	Object present in the beam
Output state (PNP) LED (illuminated when sensor output is On)	Dark Mode		

Detection Curve



Photoelectric Sensors

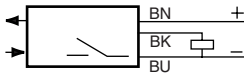
XUV Fork and Frame

Self-Contained Fork Type (30 mm), Economy, DC

Wiring

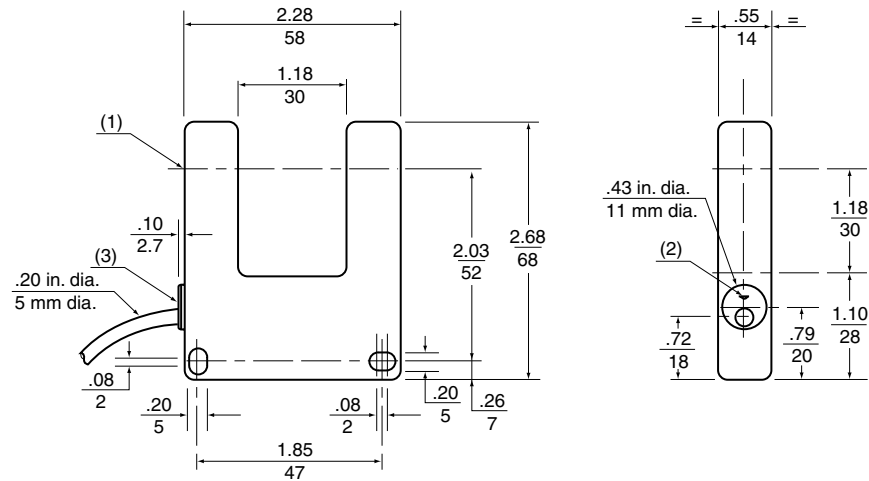
Dark mode (no object present)

PNP output



Specifications

Mechanical		
Temperature range	Operating	23 to 131 °F (-5 to 55 °C)
	Storage	-4 to 158 °F (-20 to 70 °C)
Enclosure rating	IEC	IP54 conforming to IEC 60529
Enclosure material	Case	PC/ABS
	Lens	PMMA
	Cable	PVC
Vibration resistance	(IEC 60068-2-6)	7 g, amplitude ±0 mm, 42–150 Hz
Shock resistance	(IEC 60068-2-27)	30 g, 11 ms duration
LED indicator type		360° ring LED shows output status
Connection	Cable	5 mm (0.2 in.) diameter cable, 3 x 0.5 mm ² (20 AWG)
Electrical		
Voltage limits (including ripple)		19–38 Vdc
Voltage drop (across switch) closed state maximum		1.5 V
Current consumption (no load) maximum		20 mA
Load current maximum		150 mA
Maximum operating frequency		1,000 Hz.
On delay, maximum		500 μs
Off delay, maximum		500 μs
Power-up delay, maximum		30 ms
Short circuit protection		Yes
Overload protection		Yes
Reverse polarity protection		Yes
Physical Characteristics		
Ambient light immunity		1,000 Lux.
Emitter wave length		880 nm



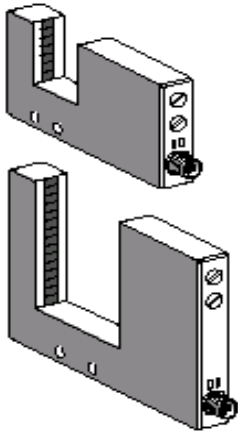
- (1) Optical Axis
- (2) LED
- (3) 360° Diffuser

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors

XUV Fork and Frame

XUVF Dynamic Fork Type, DC



XUVF sensors detect the dynamic flow of all types of objects (both metal and plastic, and of any color or shape)

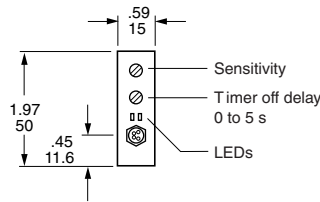
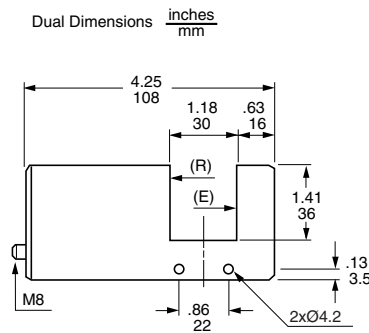
The fork body detects moving targets, for use in applications such as

- Parts ejection, as in air compression transfer of parts
- Counting of parts traveling down a chute
- Continuous feeding of thread, to detect breakage

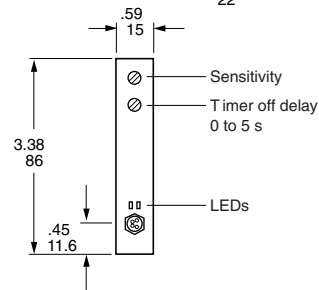
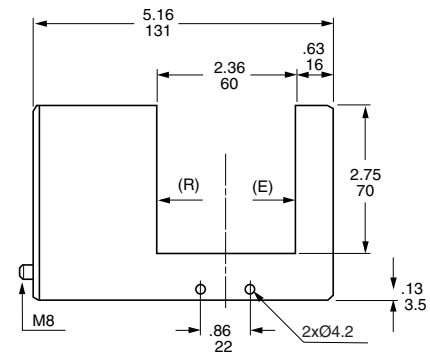
Features

- Detects targets falling at a minimum of 10 cm/s (3.9 in./s), maximum 15 m/s (49.2 ft/s)
- Off-delay (reset) timer function: 0 to 5 s
- Sensitivity and timing adjustment by separate potentiometers
- Green output LED and red alarm LED for clear indications
- Sturdy aluminum body and M8 (Nano) connector

Circuit Type	Output Type	Voltage Range Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru Beam—30 mm x 30 mm Fork—Minimum Target 2 mm—Nano-Style Connector					
PNP/NPN	Light/dark	18–30 Vdc	100 mA	500 Hz	XUVF30M8
Thru Beam—60 mm x 60 mm Fork—Minimum Target 2 mm—Nano-Style Connector					
PNP/NPN	Light/dark	18–30 Vdc	100 mA	500 Hz	XUVF60M8



XUVF30M8



E=Emitter
R=Receiver

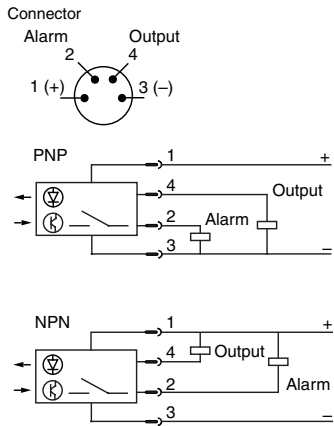
XUVF60M8

Photoelectric Sensors

XUV Fork and Frame

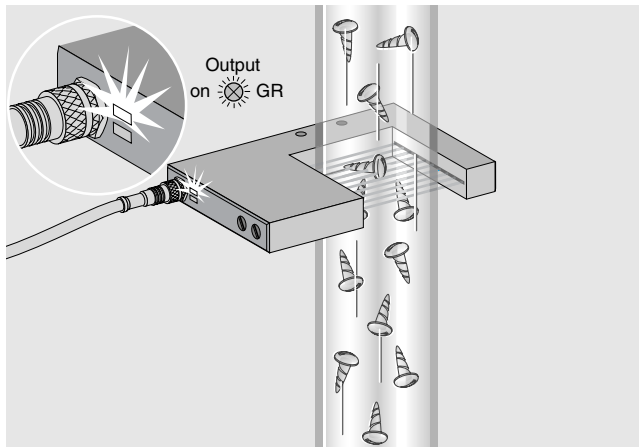
XUVF Dynamic Fork Type, DC

Wiring

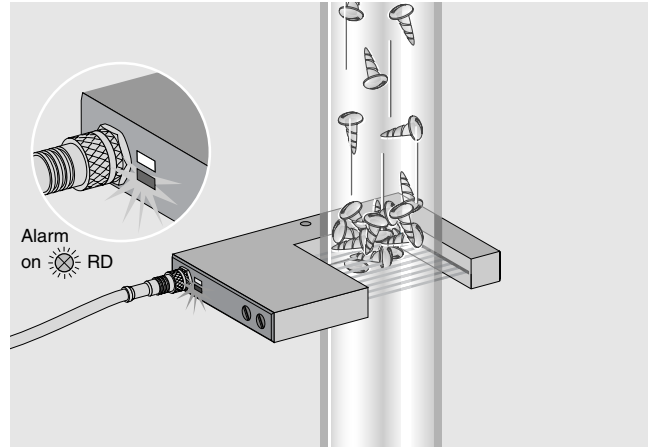


Specifications

Mechanical		
Temperature range	Operation	32 to 140 °F (0 to 60 °C)
	Storage	-4 to 176 °F (-20 to 80 °C)
Enclosure rating	IEC	IP65 conforming to IEC 60529
Vibration		25 g, ±2 mm amplitude (10–55 Hz)
Shock resistance		30 g for 11 ms conforming to IEC 60068-2-27
Enclosure material	Case	Aluminum
	Lenses	Polycarbonate
Connection		M8 (nano-style 4-pin DC) connector
Minimum target size		2 mm diameter
Emission type		Infrared
Ambient Immunity (maximum)		Sunlight: 4,000 lux
		Incandescent: 400 lux
Electrical		
Voltage limits (including ripple)		18–30 Vdc (reverse polarity protected)
Voltage drop (across switch, closed state)		2 V
Current consumption (maximum) (no load)		120 mA
Power-up delay (maximum)		100 ms
On delay (maximum)		1 ms
Off delay (maximum)		1 ms
Timing		Off-delay (reset): 0 to 5 s
Two LED indicators		Output, alarm, supply failure and short circuit
Minimum target speed		10 cm/s (0.33 ft/s) @ 2 mm (0.08 in.) dia.
Maximum target speed		15 cm/s (0.49 ft/s) @ 2 mm (0.08 in.) dia.



Detecting parts passing through fork: green LED indicates output.



If parts are lodged inside fork, red LED indicates alarm.

Connector Cables (M8 or S suffix)

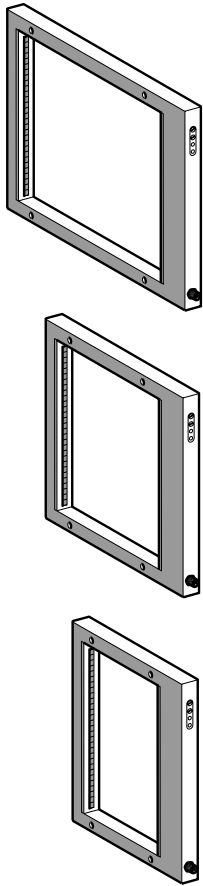
XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°

Additional cable options and lengths... Page 484

Photoelectric Sensors

XUV Fork and Frame

XUVF Dynamic Window Type, DC



XUVF sensors detect the dynamic flow of all types of objects (both metal and plastic, and of any color or shape).

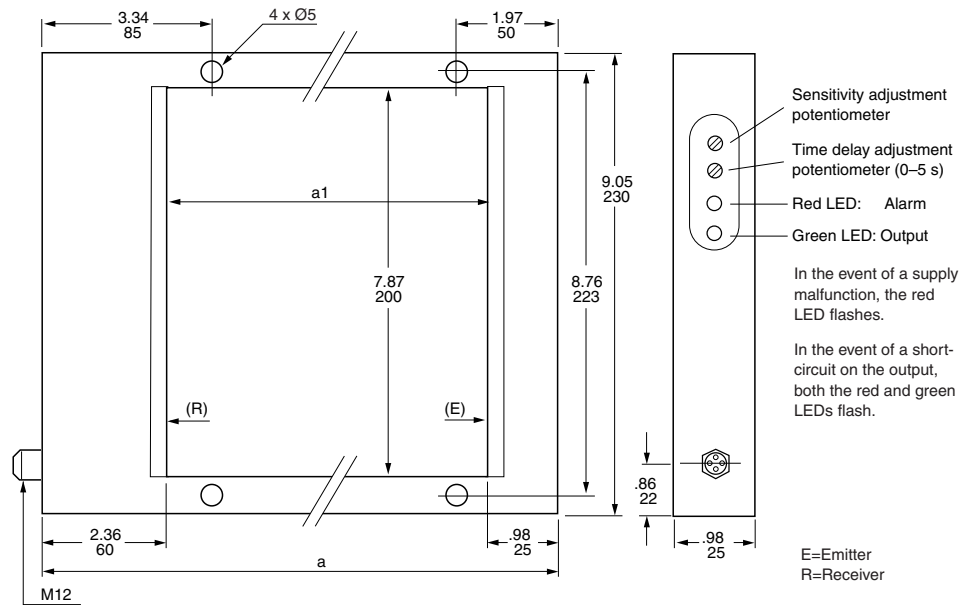
Window body detects moving targets for use in applications such as

- Parts ejection, as in air compression transfer of parts
- Counting of parts traveling down a chute
- Continuous feeding of thread, to detect breakage

Features

- Detects targets falling at a minimum of 10 cm/s (3.9 in./s), maximum 15 m/s (49.2 ft/s)
- Off-delay (reset) timer function: 0 to 5 s
- Sensitivity and timing adjustment by separate potentiometers
- Green output LED and red alarm LED for clear indications
- Sturdy aluminum body and M12 (Micro) connector

Circuit Type	Output Type	Voltage Range Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Thru Beam–200 mm x 120 mm Window–Minimum Target 4 mm–Micro-Connector					
PNP/NPN	Light/dark	18–30 Vdc	100 mA	500 Hz	XUVF120M12
Thru Beam–200 mm x 180 mm Window–Minimum Target 4 mm–Micro-Connector					
PNP/NPN	Light/dark	18–30 Vdc	100 mA	500 Hz	XUVF180M12
Thru Beam–200 mm x 250 mm Window–Minimum Target 4 mm–Micro-Connector					
PNP/NPN	Light/dark	18–30 Vdc	100 mA	500 Hz	XUVF250M12



Dimensions

	a		a1	
	in.	mm	in.	mm
XUVF120M12	8.07	205	4.72	120
XUVF180M12	10.43	265	7.09	180
XUVF250M12	13.19	335	9.84	250

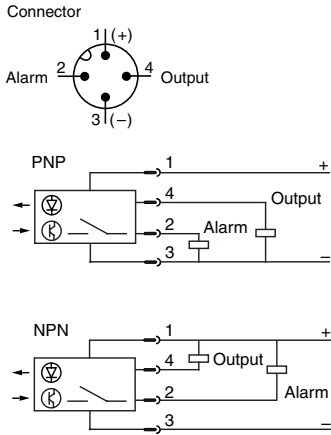
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors

XUV Fork and Frame

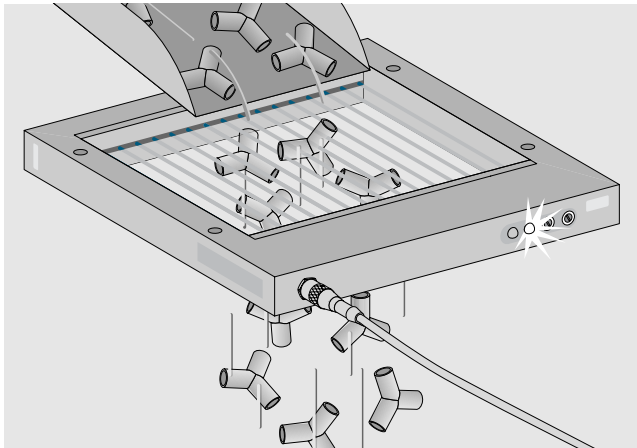
XUVF Dynamic Window Type, DC

Wiring

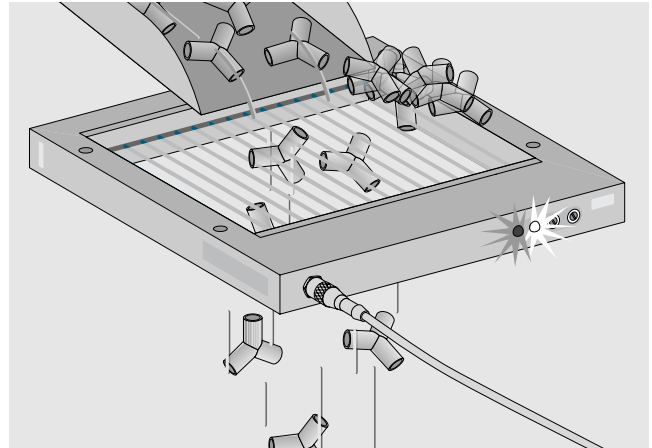


Specifications

Mechanical		
Temperature range	Operation	32 to 140 °F (0 to 60 °C)
	Storage	-4 to 176 °F (-20 to 80 °C)
Enclosure rating	IEC	IP65 conforming to IEC 60529
Vibration		25 g, ±2 mm amplitude (10–55 Hz)
Shock resistance		30 g for 11 ms conforming to IEC 60068-2-27
Enclosure material	Case	Aluminum
	Lenses	Polycarbonate
Connection		M12 micro-style 4-pin connector
Minimum target size		4 mm (0.16 in.) diameter
Emission type		Infrared
Ambient Immunity (maximum)		Sunlight: 4,000 lux
		Incandescent: 400 lux
Electrical		
Voltage limits (including ripple)		18–30 Vdc (reverse polarity protected)
Voltage drop (across switch, closed state)		2 V
Current consumption (maximum) (no load)		400 mA
Power-up delay (maximum)		100 ms
On delay (maximum)		1 ms
Off delay (maximum)		1 ms
Timing		Off-delay (reset): 0 to 5 s
LED indicators		Output, alarm, supply failure and short circuit
Minimum target speed		10 cm/s (3.9 in./s) @ 4 mm (0.16 in.) dia.
Maximum target speed		15 cm/s @ 4 mm (0.16 in.) dia.



Detecting parts passing through window: green LED indicates output.



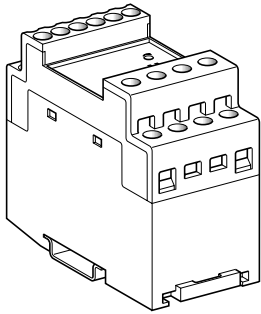
If parts are lodged inside window, red LED indicates alarm, but sensing operation is not affected.

Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . Page 484

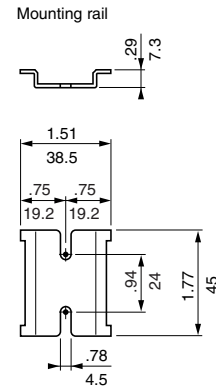
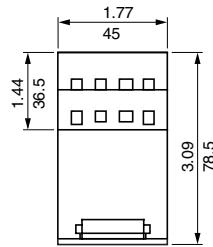
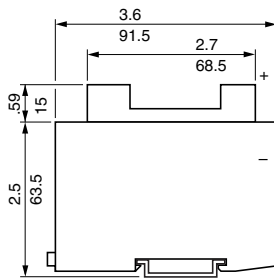
Photoelectric Sensors
XUZ Accessories
Power Supply/Converter, AC to DC



Features

- AC supply, DC output
- Two channel converter, for PNP Solid State
- Three LED indicators: Power, Output 1, Output 2
- N.O. and N.C. output per channel relay
- 40 ms time delay optional

Circuit Type	Output Mode	Voltage Range	Output Voltage Maximum	Operating Frequency Maximum Output	Catalog Number
AC, Relay Output	N.O. / N.C.	100–240 Vac	30 Vdc	50 Hz	XUZF02

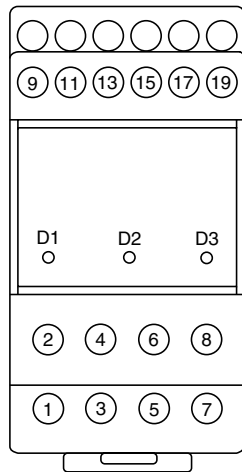


Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors
XUZ Accessories
Power Supply/Converter, AC to DC

Specifications

Mechanical		
Temperature range	Storage	-22 to 158 °F (-30 to 70 °C)
	Operation	14 to 131 °F (-10 to 55 °C)
Enclosure rating	IEC	IP20 conforming to IEC 60529
Vibration		7 g ±1.5 mm, 10–55 Hz
Shock resistance		10 g at 3 axes, 3 times
LED indicator type		Supply: green
		Output—channel 1: yellow
		Output—channel 2: yellow
Enclosure material		ABS
Electrical		
Voltage range		100–240 Vac
Voltage on relay output		264 Vac, 30 Vdc
Current consumption (maximum) (no load)		10 mA
Operating frequency (maximum)		50 Hz
Power-up delay (maximum)		20 ms
On delay (maximum)		.1 ms
Time delay		40 ms (fixed)
Relay load current		1 A



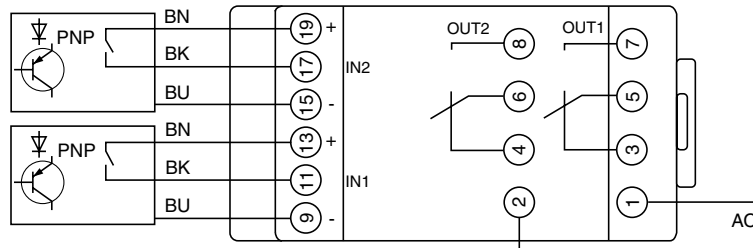
Terminals

- 1–2 AC supply
- 3 N.C. contact output, channel 1
- 4 N.C. contact output, channel 2
- 5 Common output, channel 1
- 6 Common output, channel 2
- 7 N.O. contact output, channel 1
- 8 N.O. contact output, channel 2
- 9 DC supply, 12 V (–) for the sensor controlling channel 1
- 11 Connection terminal for the output of the sensor controlling channel 1
- 13 DC supply, 12 V (+) for the sensor controlling channel 1
- 15 DC supply, 12 V (–) for the sensor controlling channel 2
- 17 Connection terminal for the output of the sensor controlling channel 2
- 19 DC supply, 12 V (+) for the sensor controlling channel 2

LED indicators

- D1 Supply (green)
- D2 Output, channel 1 (yellow)
- D3 Output, channel 2 (yellow)

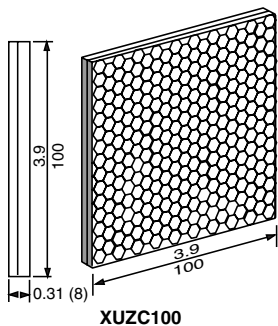
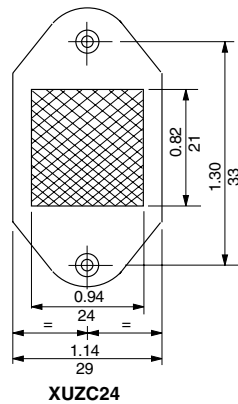
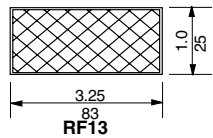
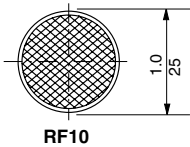
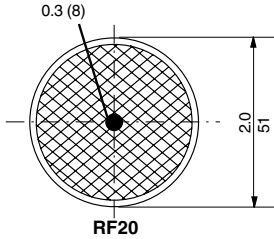
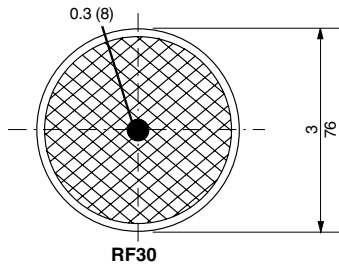
Connections



Photoelectric Sensors

XUZ Accessories

Reflectors



Corner cube reflectors used with retroreflective photoelectric sensors provide a high degree of reliability, since they return the light to its source even if the reflector and the switch are significantly skewed with respect to one another. Corner cube reflectors also have the only reflective surface that works with polarized photoelectric sensors.

The nominal sensing distance for every retroreflective switch model in this catalog was established using a 3 in. (76 mm) RF30 reflector. Smaller reflectors will result in shorter sensing distances. They are used to detect smaller targets comparable with their dimension. *The standard reflectors present a blind spot at about 10% of the sensing distance. Special reflectors XUZC24/50 are designed to eliminate this inconvenience and even allow the reflector to touch the sensor lenses.*

RF30 and RF20 models can be mounted with a bolt. RF10 models can be mounted using a bezel or plate (not provided) or using its own adhesive tape.

Rectangular shaped reflectors increase sensing precision. They are also easier to mount side by side to increase the reflective surface.

Reflective tape can be used to cover unusually shaped targets; it is not a corner cube reflector. Only super-reflective tape is a corner cube reflector; it can also be used with polarized retroreflective sensors.

Reflectors

Description	Reflectivity	Temperature Range	Catalog Number
3 in. (76 mm) diameter, acrylic lens	4000X	150 °F (65 °C)	RF30
2 in. (51 mm) diameter, acrylic lens	4000X	150 °F (65 °C)	RF20
1 in. (25 mm) diameter, acrylic lens	4000X	150 °F (65 °C)	RF10
3.25 x 1.5 in. (83 x 38 mm), acrylic lens (orange)	4000X	150 °F (65 °C)	RF13
4 x 4 in. (102 x 102 mm) diameter, acrylic lens	4000X	150 °F (65 °C)	XUZC100
1.3 x 1.1 in. (33 x 28 mm) close proximity—acrylic*	6000X	150 °F (65 °C)	XUZC24
2 x 2 in. (51 x 51 mm) close proximity—acrylic*	6000X	150 °F (65 °C)	XUZC50
0.63 in. (16 mm)	4000X	150 °F (65 °C)	XUZC16
0.83 in. (21 mm)	4000X	150 °F (65 °C)	XUZC21
1.22 in. (31 mm)	4000X	150 °F (65 °C)	XUZC31
1.53 in. (39 mm)	4000X	150 °F (65 °C)	XUZC39
3.15 in. (80 mm)	4000X	150 °F (65 °C)	XUZC80

* Note: XUZC24/50 reflectors must always be mounted in the vertical plane with respect to the optical axis of the switch.

Retroreflective Tape

Description	Typical Luminance Factor ^①	Temperature	Catalog Number
Photoelectric grade sheeting with adhesive backing ^②			
3 in. (76 mm) wide, 1 ft (0.3 m) long ^③	200X	200 °F (93.4 °C)	RF7590
High intensity sheeting with adhesive backing—vinyl sealed ^②			
3 in. (76 mm) wide, 1 ft (0.3 m) long ^③	670X	150 °F (65.6 °C)	RF3870
High gain sheeting with adhesive backing—porous surface ^②			
2 in. (51 mm) wide, 1 ft (0.3 m) long ^③	900X	175 °F (79.5 °C)	RF7610

Super Reflective Tape—corner cube type, adhesive backing

Can be used with polarized retroreflective systems

Description	Typical Luminance Factor ^①	Temperature	Catalog Number
1 in. (25 mm) wide, 3 ft (1 m) long	2000X	140 °F (60 °C)	XUZB11
1 in. (25 mm) wide, 16 ft (5 m) long	2000X	140 °F (60 °C)	XUZB15

^① Perpendicular reading. Expressed as times brighter than a perfectly diffusing, white surface.

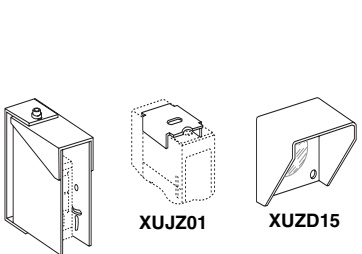
^② Not suitable for polarized models.

^③ Also available in 10 ft (3 m), 50 ft (15 m) and 100 ft (30 m) lengths.

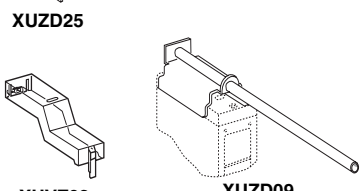
Photoelectric Sensors

XUZ Accessories

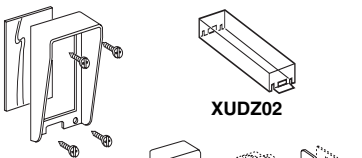
Covers, Masks, Mirrors, and Mounting Hardware



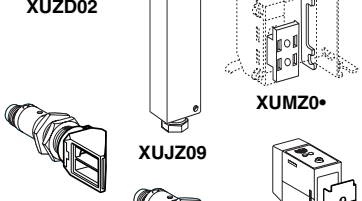
XUJZ01 XUJZ01 XUJZ01



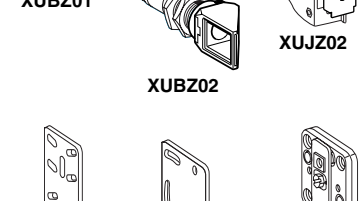
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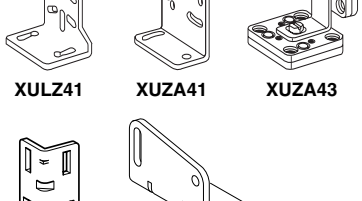
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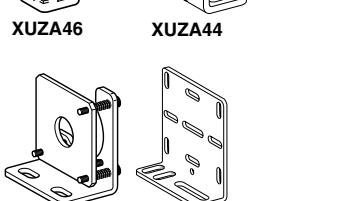
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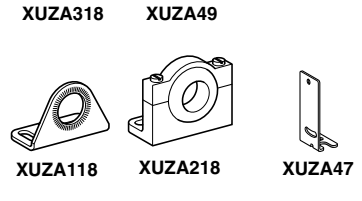
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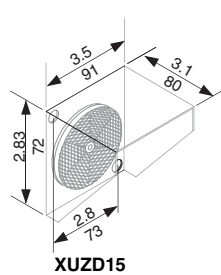
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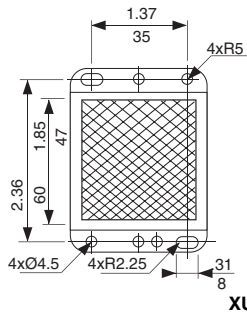
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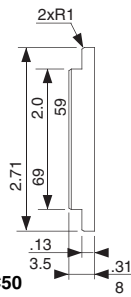
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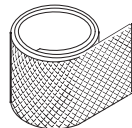
XUJZ01



XUJZ01



Dual Dimensions inches mm



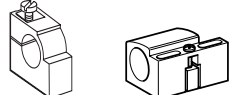
XUJZ01



XUJZ01

Description	For Use with	Catalog Number
Covers		
Protective Cover	XUJ, XUE	XUZD25
Potentiometer Cover	XUJ	XUJZ01
Reflector Cover	XUZC	XUZD15
Transparent Cover	XUD	XUDZ02
Transparent Cover	XUV	XUVZ02
Alignment Tool	XUJ, XUE (Thru-Beam)	XUZD09
Lens Hood	XUE	XUZD02
Bottom Entry Conduit Cover (9 mm)	XUJ	XUJZ09
Masks		
Range: 10 cm/40 cm (3.94/15.75 in.); Diameter: 0.5 mm/1 mm (0.02/0.04 in.)	Classic XUM (Thru-Beam except XUML)	XUMZ01
Range: 0.9 m/1.5 m (2.95/4.92 ft); Diameter: 1.5 mm/2 mm (0.06/0.08 in.)	Classic XUM (Thru-Beam except XUML)	XUMZ03
Range: 1 m (3.28 ft); Diameter: 6 mm (0.24 in.)	XUJ (Thru-Beam)	XUJZ02
Mirrors		
90° Mirror Adapter	XU 18 mm (Retroreflective and Diffuse)	XUBZ01
90° Mirror Adapter	XU 18 mm (Thru-Beam)	XUBZ02
Mounting Hardware		
Mounting Bracket (Plastic)	XUML*S	XUZA46
Mounting Bracket (Metal) *	XUL	XULZ41 XULZ43
Mounting Bracket (Metal)	XUJ	XUZA41
Adjustable Mounting Bracket (Metal)	XUJ	XUZA43
Mounting Bracket (Metal)	XUE	XUZA44
Mounting Bracket (Metal)	XUM	XUZA47
Mounting Bracket (Metal)	XUJL, XUJB	XUZA49
Mounting Bracket (Metal)	XU 18 mm, XUB	XUZA118
Swivel Mounting Bracket (Plastic)	XU 18 mm, XUB	XUZA218
Precision Adjustment Mounting Bracket (micro metric precision)	XU2 18 mm Laser, XUB	XUZA318
Mounting Bracket (Plastic)	XUA	XSAZ108
Mounting Bracket (Plastic)	XUA	XSZB108
Mounting Bracket (Plastic)	XU 18 mm, XUB	XSAZ118
Mounting Bracket (Plastic)	XU 18 mm, XUB	XSZB118
Mounting Nuts (Plastic)	XU 18 mm, XUB	XSAZ318
Swivel Mounting Bracket (Plastic)	XUC	XSZSB30

* See p. 145 for mounting positions of the XULZ41.

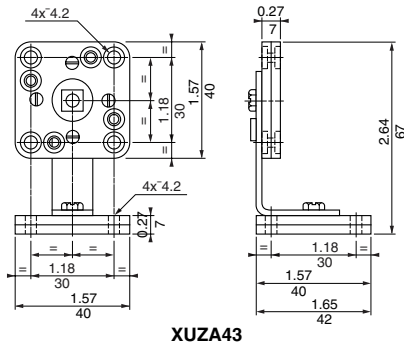
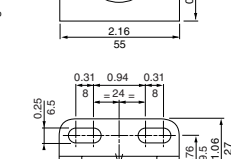
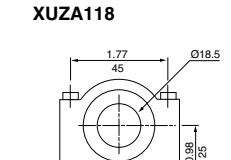
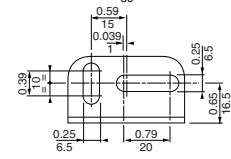
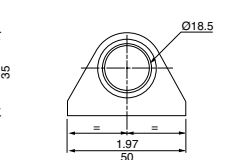
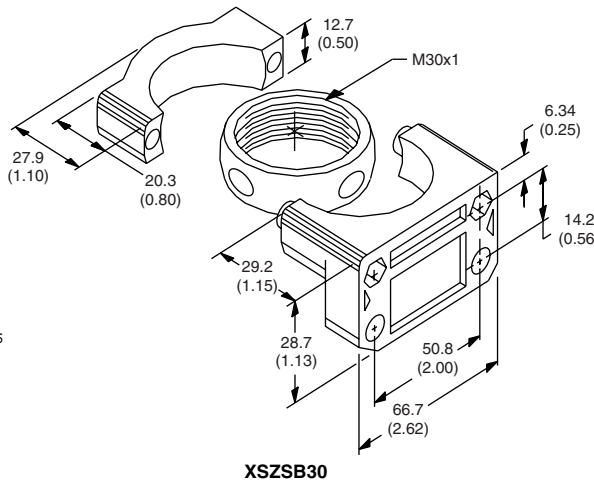
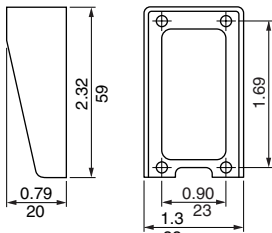
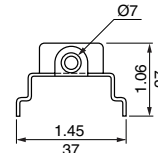
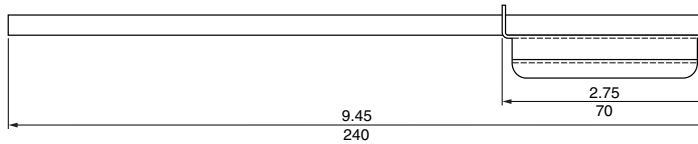
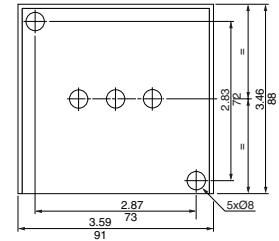
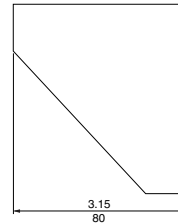
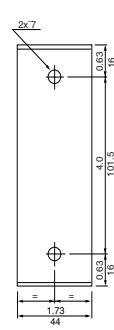
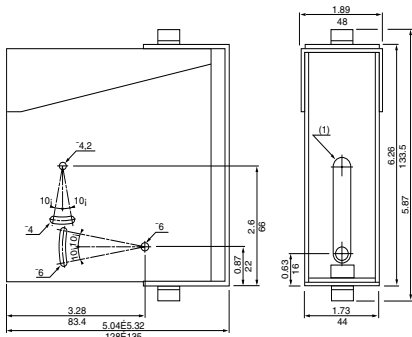


XSAZ108 XSZB108

Photoelectric Sensors

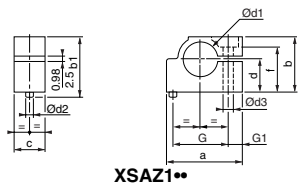
XUZ Accessories

Dimensions



XSAZ1 Dual Dimensions, in. (mm)**

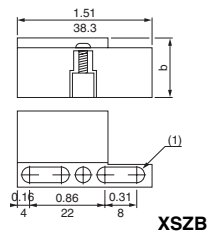
XSA	a	b	b1	c	d	∅ d1	∅ d2	∅ d3	f	g	g1
Z108	0.92 (23.5)	0.56 (14.2)	0.66 (16.7)	0.39 (10)	0.31 (8)	0.33 (8.5)	0.07 (2.0)	0.12 (3)	0.51 (13)	0.63 (16)	0.19 (5)
Z118	1.61 (41)	1.18 (30)	1.3 (33)	0.79 (20)	0.71 (18)	0.72 (18.5)	0.15 (3.9)	0.23 (6)	1.14 (29)	1.18 (30)	0.31 (8)
Z130	2.06 (53)	1.55 (39.5)	1.67 (42.5)	0.79 (20)	0.85 (21.5)	1.2 (30.)	0.15 (3.9)	0.19 (5)	1.53 (39)	1.57 (40)	0.39 (10)



XUZA218

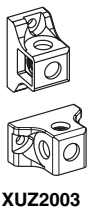
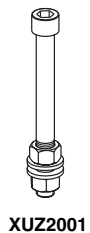
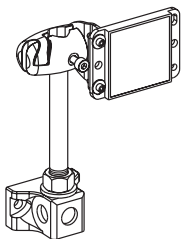
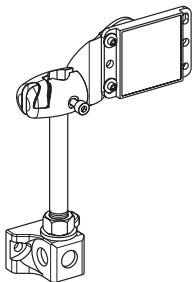
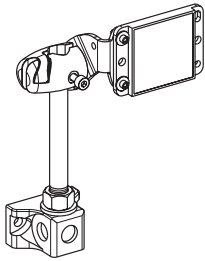
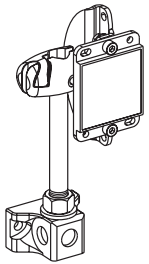
XSZB Dual Dimensions, in. (mm)

XSZ	a	a1	b	b1	b2	∅
B108	0.78 (19.9)	0.57 (14.5)	0.55 (14)	0.49 (12.5)	0.29 (7.5)	0.31 (8)
B118	1.02 (26.0)	0.62 (15.7)	0.86 (22)	0.79 (20.1)	0.45 (11.5)	0.71 (18)
B130	1.53 (39.0)	0.85 (21.7)	1.40 (35.5)	1.22 (31.0)	0.73 (18.5)	1.18 (30)



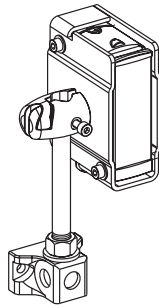
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors
XUZ Accessories
3-D Accessories

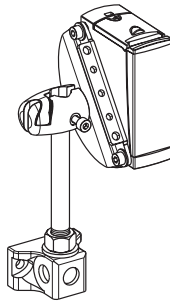


Description	For Use With	Catalog Number
3-D mounting kit for 18 mm tubular	XUB, XU18, XUZC50	XUZB2003
3-D mounting kit for miniature rectangular	XUM, XUZC50	XUZM2003
3-D mounting kit for subcompact, 50 x 50 mm	XUK, XUZC50	XUZK2003
3-D mounting kit for compact rectangular	XUX, XUZC50	XUX2003
Protective 3-D mounting kit for XUM	XUM	XUZM2004
Protective 3-D mounting kit for XUK	XUK	XUZK2004
Protective 3-D mounting kit for XUX	XUX	XUX2004
M12 stem, 75 mm (2.95 in.) usable length	XUZB, XUZM, XUZK, XUZX	XUZ2001
3-D mounting base	XUZ2001	XUZ2003

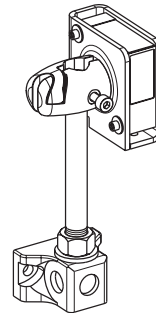
XUZ2004



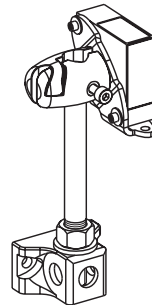
XUZ2003



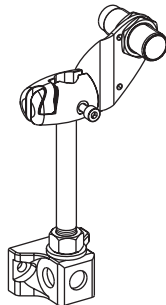
XUZK2004



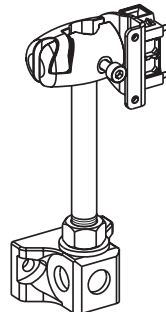
XUZK2003



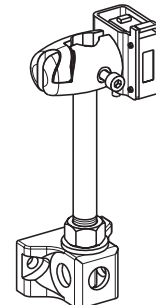
XUZB2003



XUZM2003



XUZM2004

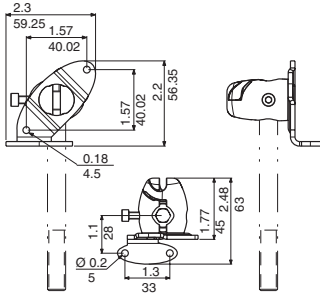


Photoelectric Sensors

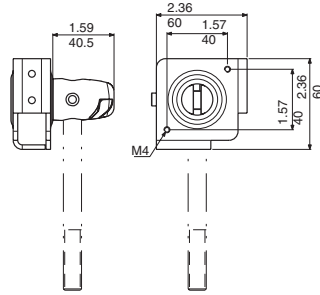
XUZ Accessories

3-D Accessories

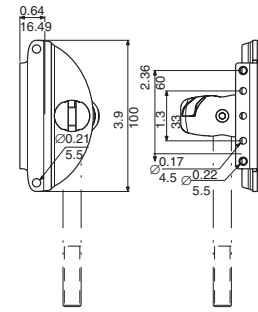
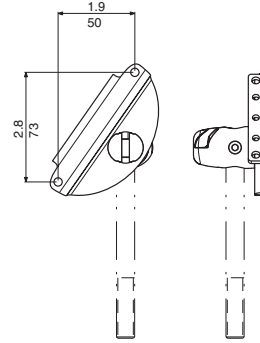
XUZK2003



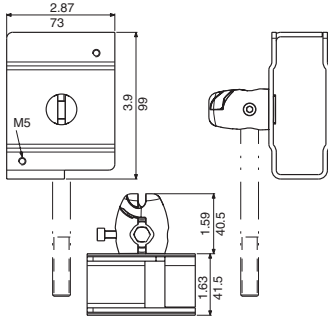
XUZK2004



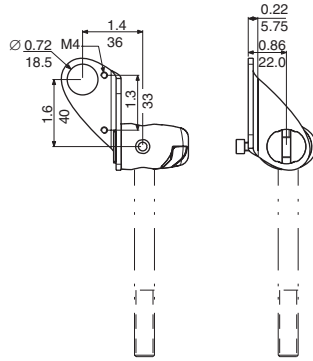
XUZX2003



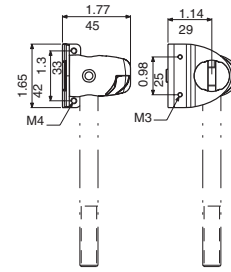
XUZX2004



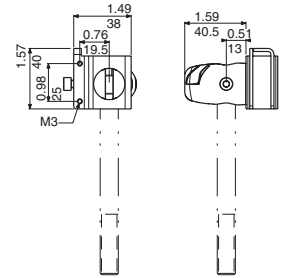
XUZB2003



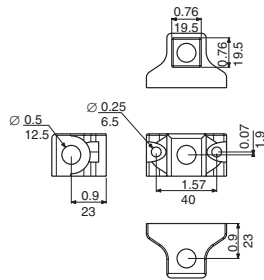
XUZM2003



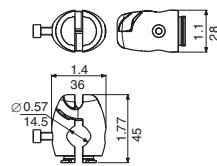
XUZM2004



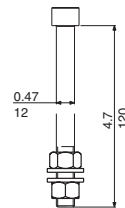
XUZ2003



Component



XUZ2001



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

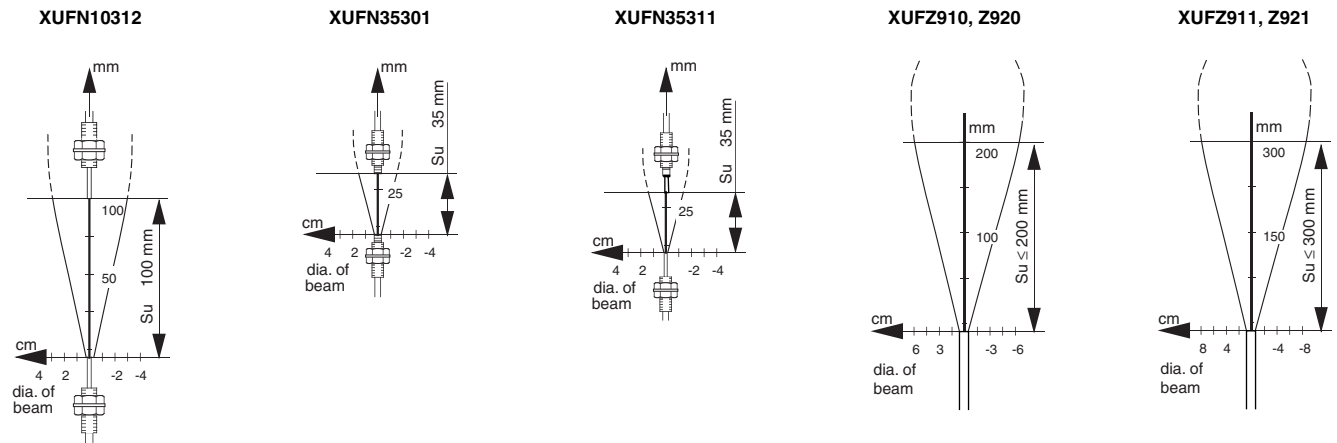
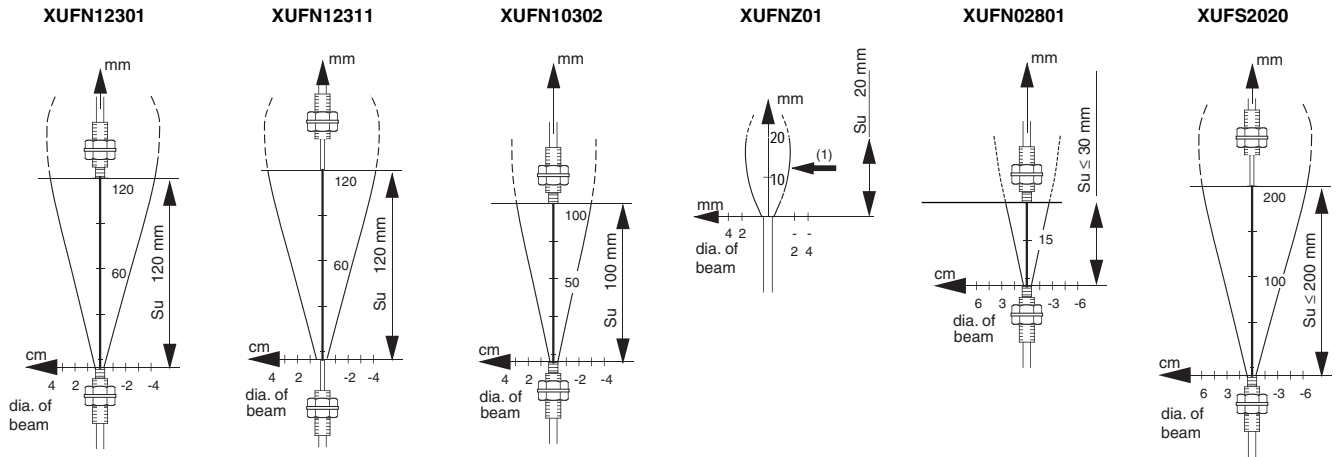
Photoelectric Sensors

Dimensions and Sensing Patterns

XUF Sensing Patterns

XUFN and XUFS Sensing Patterns

Thru-beam system

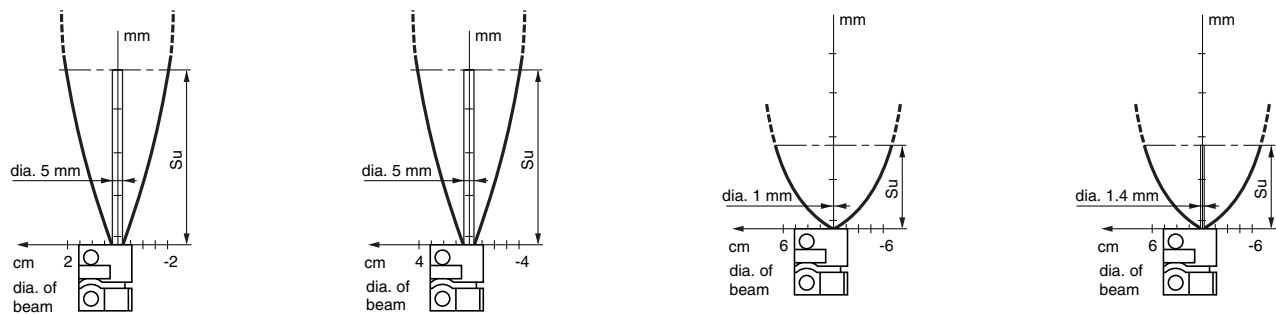


Brackets: XUFZ03, Z04 or Z05
Cable: XUFZ910 or Z920

Brackets: XUFZ03, Z04 or Z05
Cable: XUFZ911 or Z921

Brackets: XUFZ13, Z14 or Z15
Cable: XUFZ910 or Z920

Brackets: XUFZ13, Z14 or Z15
Cable: XUFZ911 or Z921



NOTE: Su = usable sensing distance

Photoelectric Sensors

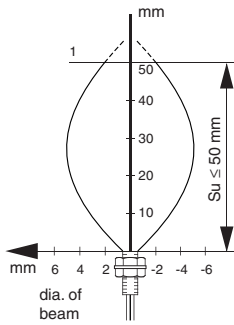
Dimensions and Sensing Patterns

XUF Sensing Patterns and XUL Dimensions

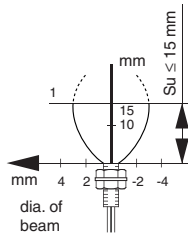
XUFN and XUFS Sensing Patterns

Proximity diffuse system

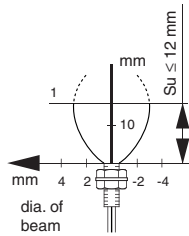
XUFN05312
XUFN05323
XUFN05331



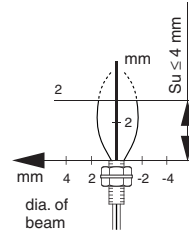
XUFN15322
XUFN15332



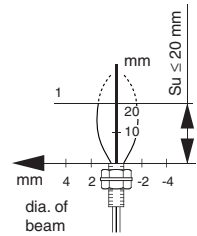
XUFN01321
XUFN01331



XUFN04331

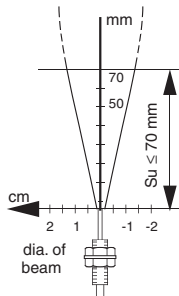


XUDZ01
XUFN02323

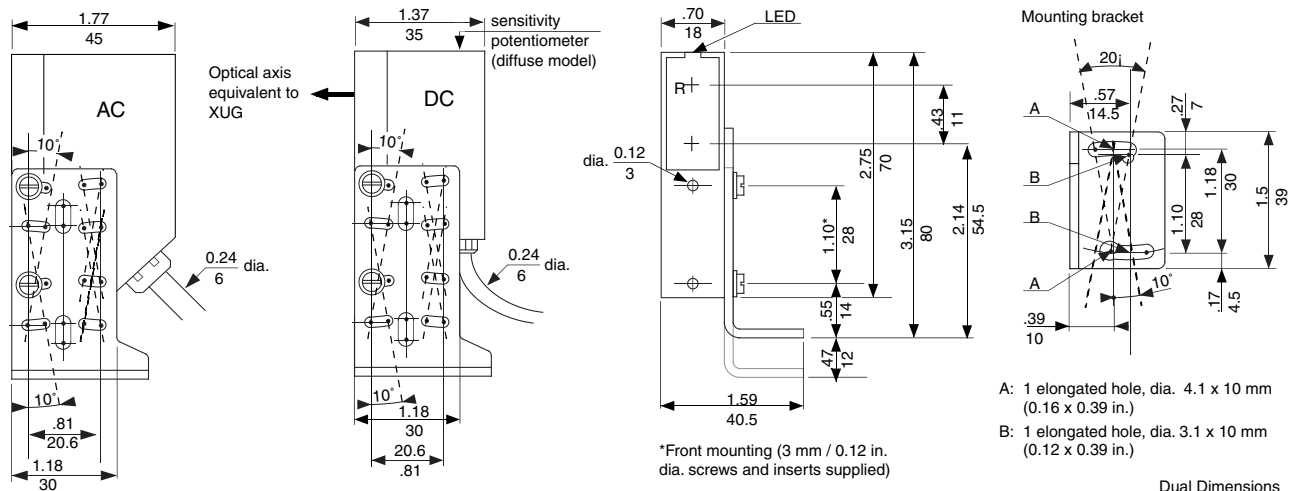


1. Target 30 x 30 cm, white 90%
 2. Target 15 x 15 cm, white 90%
- Su = usable sensing distance

XUFS0520



XUL Dimensions



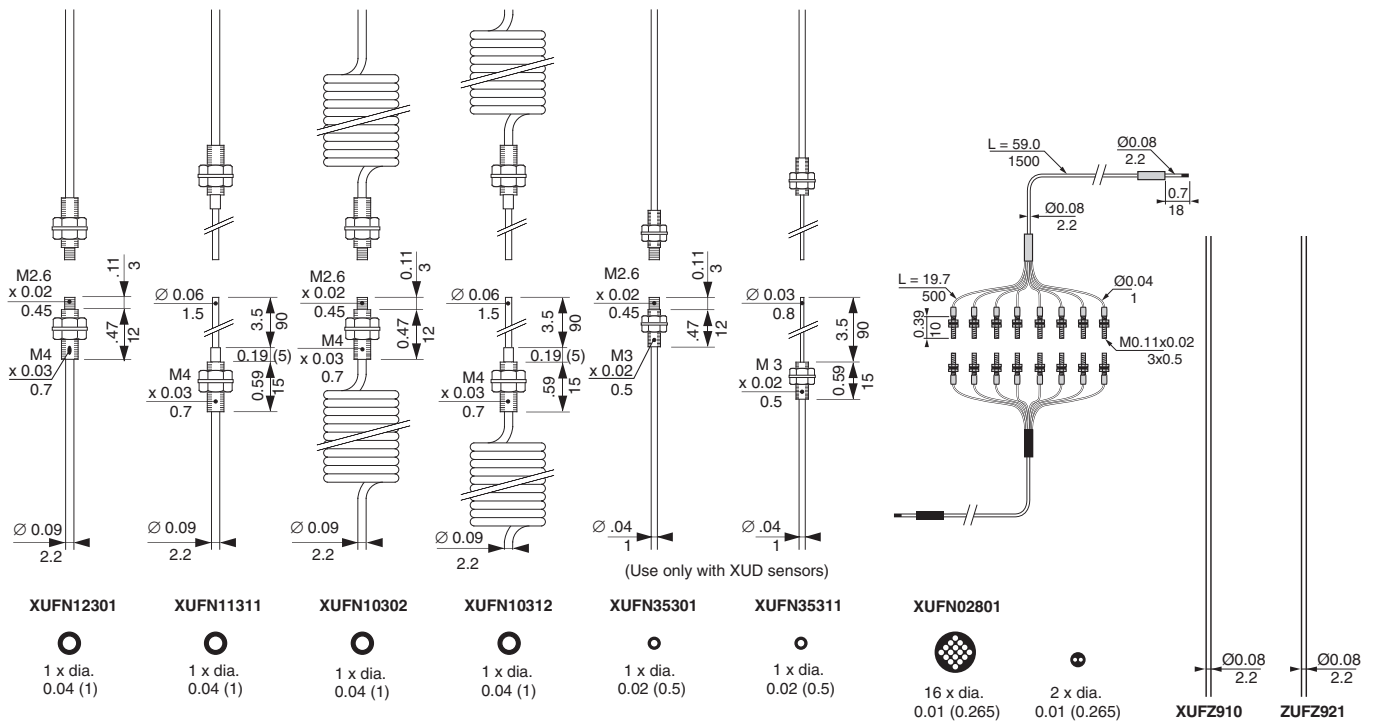
Photoelectric Sensors

Dimensions and Sensing Patterns

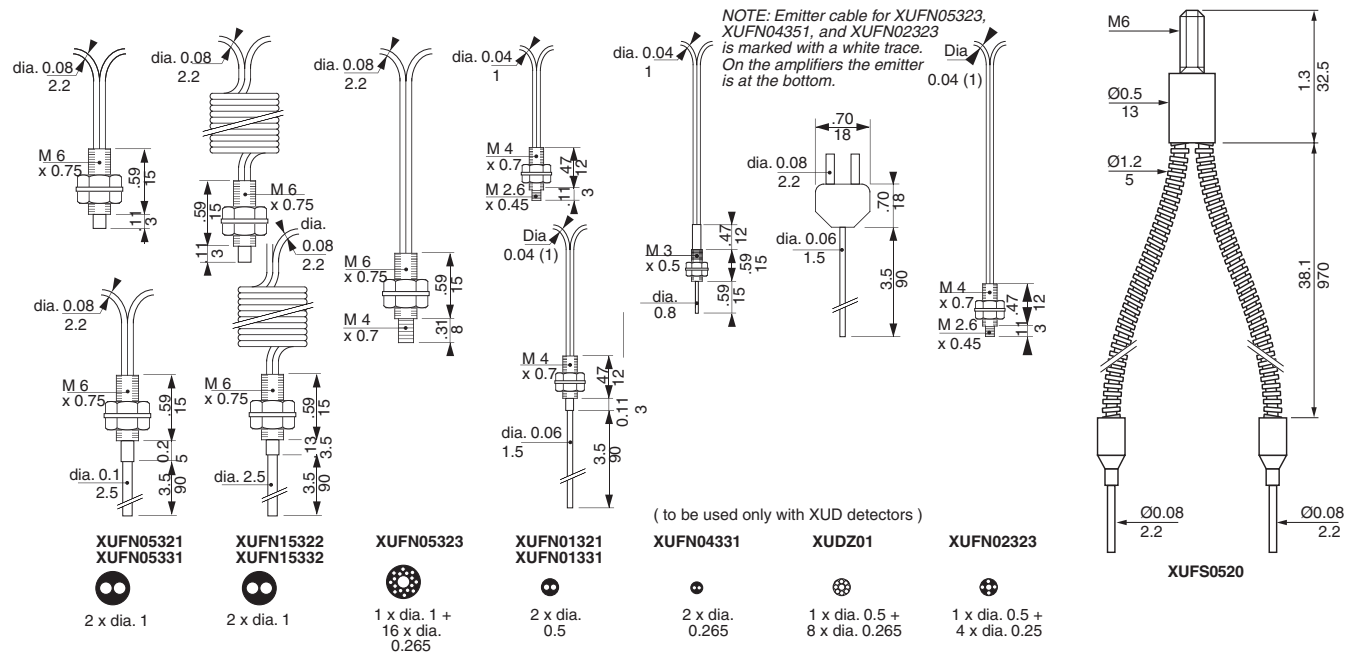
XUF Dimensions

XUFN and XUFZ Dimensions

Thru-beam (pairs)



Proximity (bifurcated)



Fiber tip diameter

Nuts	M6	M4	M3
Across flats	10	7	5

Note: Used only with XUD sensors

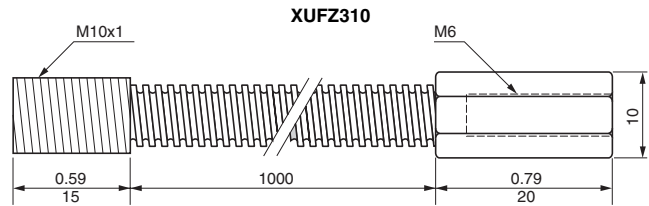
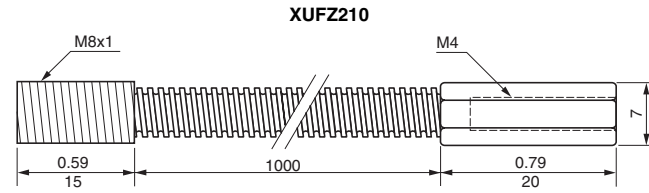
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors

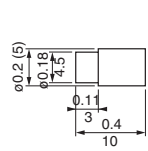
Dimensions and Sensing Patterns

Dimensions of Accessories for XUF, XUA

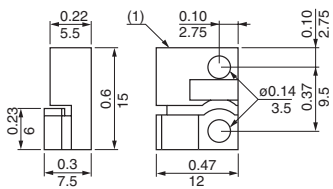
XUF



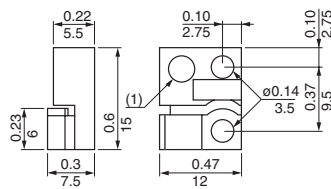
XUFZ01



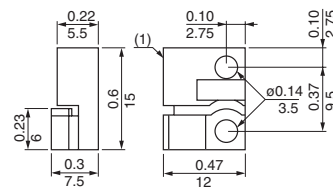
XUFZ03



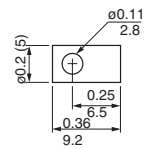
XUFZ04



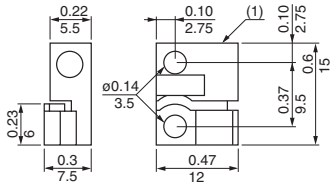
XUFZ05



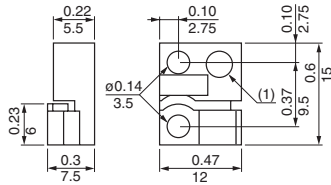
XUFZ02



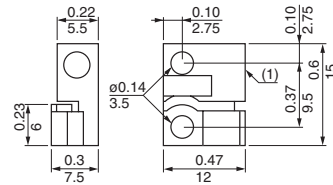
XUFZ13



XUFZ14

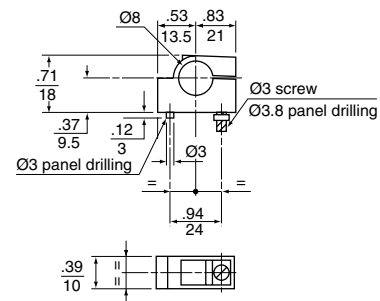


XUFZ15

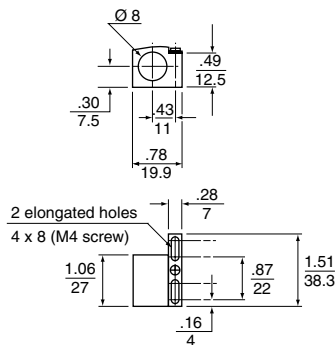


XUA

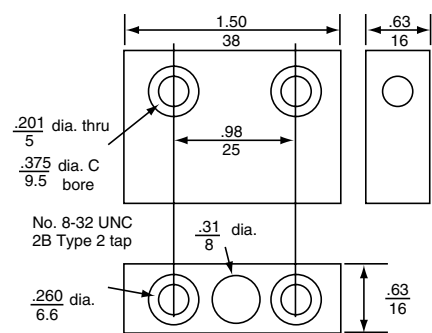
XSAZ108



XSZB108



831608



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

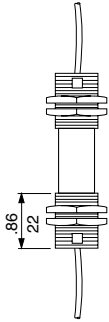
Photoelectric Sensors

Dimensions and Sensing Patterns

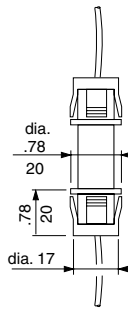
XUV Dimensions

Thru-beam (pairs)

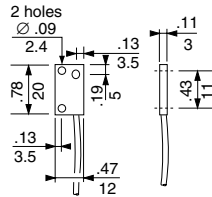
XUVN06240, 244



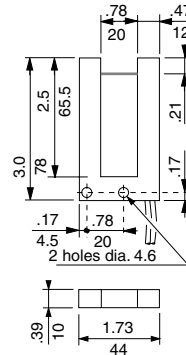
XUVN06520, 254



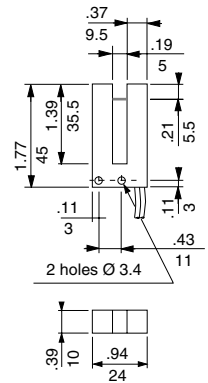
XUVN20210, 214



XUVN0243G, R

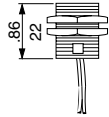


XUVN0143G, R

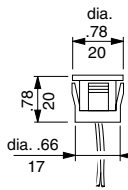


Reflex/Diffuse

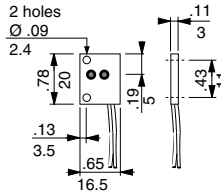
XUVN0244



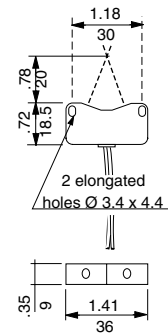
XUVN0245



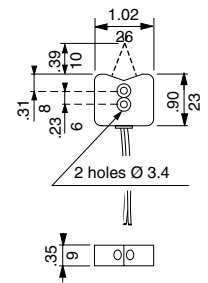
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XUVN02428

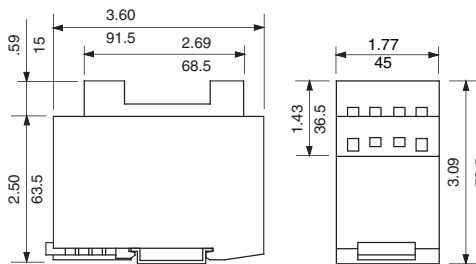


XUVN01428

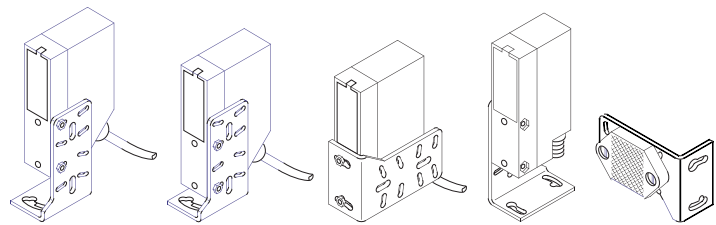


Amplifiers

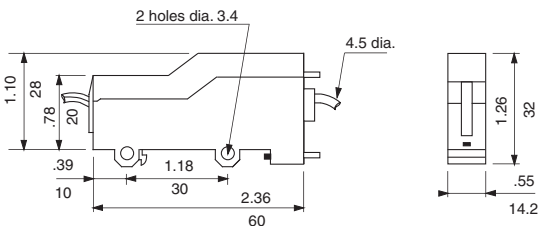
XUVF



Examples of utilization and mounting positions of the XULZ41 mounting bracket



XUVH/J



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Photoelectric Sensors Substitution Guide

Old Design	New Design	Old Design	New Design	Old Design	New Design
18 mm					
XU1B18NP340	XUB0ANSNL2 + XUZC50	XU1P18PP340WL5	XUB1APAWL5 + XUZC50	XU2P18PP340W	XUB2APBWL2R + XUB2AKSWL2T
XU1B18NP340D	XUB0ANSNM12 + XUZC50	XU1P18PP340WL5	XUB1APBWL5 + XUZC50	XU2P18PP340WD	XUB2APAWM12R + XUB2AKAWM12T
XU1B18PP340	XUB0APSNL2 + XUZC50	XU2B18NP340	XUB0ANSNL2 + XUB0AKSNL2T	XU2P18PP340WD	XUB2APBWM12R + XUB2AKAWM12T
XU1B18PP340D	XUB0APSNM12 + XUZC50	XU2B18NP340D	XUB0ANSNM12 + XUB0AKSNM12T	XU5B18NP340	XUB0ANSNL2
XU1N18NP340	XUB1BANL2 + XUZC50	XU2B18PP340	XUB0APSNL2 + XUB0AKSNL2T	XU5B18NP340D	XUB0ANSNM12
XU1N18NP340D	XUB1BNBNL2 + XUZC50	XU2B18PP340D	XUB0APSNM12 + XUB0AKSNM12T	XU5B18PP340	XUB0APSNL2
XU1N18NP340D	XUB1BNBNM12 + XUZC50	XU2M18NP340	XUB0BNSNL2 + XUB0BKSNL2T	XU5B18PP340D	XUB0APSNM12
XU1N18NP340L5	XUB1BANL5 + XUZC50	XU2M18NP340D	XUB0BNSNM12 + XUB0BKSNM12T	XU5B18PP340L5	XUB0APSNL5
XU1N18NP340L5	XUB1BNBNL5 + XUZC50	XU2M18NP340WD	XUB0BNSWM12 + XUB0BKSWM12T	XU5M18NP340	XUB0BNSNL2
XU1N18NP340T10	XUB1BANL2T10 + XUZC50	XU2M18PP340	XUB0BPSNL2 + XUB0BKSNL2T	XU5M18NP340D	XUB0BNSNM12
XU1N18NP340T10	XUB1BNBNL2T10 + XUZC50	XU2M18PP340D	XUB0BPSNM12 + XUB0BKSNM12T	XU5M18NP340L5	XUB0BNSNL5
XU1N18NP340W	XUB1BNAWL2 + XUZC50	XU2M18PP340L10	XUB0BPSNL10 + XUB0BKSNL10T	XU5M18NP340W	XUB0BNSWL2
XU1N18NP340W	XUB1BNBWL2 + XUZC50	XU2M18PP340L5	XUB0BPSNL5 + XUB0BKSNL5T	XU5M18NP340WL5	XUB0BNSWL5
XU1N18NP340WD	XUB1BNAWM12 + XUZC50	XU2M18PP340W	XUB0BPSWL2 + XUB0BKSWL2T	XU5M18PP340	XUB0BPSNL2
XU1N18NP340WD	XUB1BNBWM12 + XUZC50	XU2M18PP340WD	XUB0BPSWM12 + XUB0BKSWM12T	XU5M18PP340D	XUB0BPSNM12
XU1N18PP340	XUB1BPANL2 + XUZC50	XU2M18PP340WL5	XUB0BPSWL5 + XUB0BKSWL5T	XU5M18PP340L5	XUB0BPSNL5
XU1N18PP340D	XUB1BPANL2 + XUZC50	XU2N18NP340	XUB2BANL2R + XUB2BKSNL2T	XU5M18PP340W	XUB0BPSWL2
XU1N18PP340D	XUB1BPANM12 + XUZC50	XU2N18NP340D	XUB2BANL2R + XUB2BKSNL2T	XU5M18PP340WD	XUB0BPSWM12
XU1N18PP340L5	XUB1BPANL5 + XUZC50	XU2N18NP340D	XUB2BANM12R + XUB2BKSNM12T	XU5M18PP340WL5	XUB0BPSWL5
XU1N18PP340L5	XUB1BPANL5 + XUZC50	XU2N18NP340D	XUB2BANM12R + XUB2BKSNM12T	XU5N18NP340	XUB4BNANL2
XU1N18PP340T10	XUB1BPANL2T10 + XUZC50	XU2N18NP340WD	XUB2BANM12R + XUB2BKSNM12T	XU5N18NP340	XUB4BNBNL2
XU1N18PP340W	XUB1BPANL2 + XUZC50	XU2N18NP340WD	XUB2BANM12R + XUB2BKSNM12T	XU5N18NP340D	XUB4BNANM12
XU1N18PP340W	XUB1BPANL2 + XUZC50	XU2N18PP340	XUB2BPANL2R + XUB2BKSNL2T	XU5N18NP340D	XUB4BNBNM12
XU1N18PP340W	XUB1BPANL2 + XUZC50	XU2N18PP340	XUB2BPANL2R + XUB2BKSNL2T	XU5N18NP340L5	XUB4BNANL5
XU1N18PP340WD	XUB1BPANL2 + XUZC50	XU2N18PP340D	XUB2BPANM12R + XUB2BKSNM12T	XU5N18NP340T10	XUB4BNANL2T10
XU1N18PP340WD	XUB1BPANL2 + XUZC50	XU2N18PP340L5	XUB2BPANL5R + XUB2BKSNL5T	XU5N18NP340T10	XUB4BNBNL2T10
XU1N18PP340WL5	XUB1BPANL5 + XUZC50	XU2N18PP340L5	XUB2BPANL5R + XUB2BKSNL5T	XU5N18NP340W	XUB4BNANL2
XU1P18NP340	XUB1ANANL2 + XUZC50	XU2N18PP340W	XUB2BPANL2R + XUB2BKSNL2T	XU5N18NP340WD	XUB4BNBNL2
XU1P18NP340	XUB1ANBNL2 + XUZC50	XU2N18PP340W	XUB2BPANL2R + XUB2BKSNL2T	XU5N18NP340WD	XUB4BNANM12
XU1P18NP340D	XUB1ANANM12 + XUZC50	XU2N18PP340WD	XUB2BPANL2R + XUB2BKSNL2T	XU5N18NP340WL5	XUB4BNANL5
XU1P18NP340D	XUB1ANBNM12 + XUZC50	XU2N18PP340WD	XUB2BPANL2R + XUB2BKSNL2T	XU5N18NP340WL5	XUB4BNBNL5
XU1P18NP340L5	XUB1ANANL5 + XUZC50	XU2N18PP340WD	XUB2BPANL5R + XUB2BKSNL5T	XU5N18PP340	XUB4BPANL2
XU1P18NP340L5	XUB1ANBNL5 + XUZC50	XU2N18PP340WD	XUB2BPANL5R + XUB2BKSNL5T	XU5N18PP340D	XUB4BPBNL2
XU1P18NP340W	XUB1ANAWL2 + XUZC50	XU2N18PP340WD	XUB2BPANL5R + XUB2BKSNL5T	XU5N18PP340D	XUB4BPANM12
XU1P18NP340W	XUB1ANBWL2 + XUZC50	XU2N18PP340WD	XUB2BPANL5R + XUB2BKSNL5T	XU5N18PP340D	XUB4BPBNM12
XU1P18NP340WD	XUB1ANAWM12 + XUZC50	XU2N18PP340WL5	XUB2BPANL5R + XUB2BKSNL5T	XU5N18PP340L5	XUB4BPANL5
XU1P18NP340WD	XUB1ANBWM12 + XUZC50	XU2N18PP340WL5	XUB2BPANL5R + XUB2BKSNL5T	XU5N18PP340L5	XUB4BPBNL5
XU1P18PP340	XUB1APANL2 + XUZC50	XU2N18PP340WL5	XUB2BPANL5R + XUB2BKSNL5T	XU5N18PP340T10	XUB4BPANL2T10
XU1P18PP340	XUB1APBNL2 + XUZC50	XU2P18NP340	XUB2ANANL2R + XUB2AKSNL2T	XU5N18PP340T10	XUB4BPBNL2T10
XU1P18PP340D	XUB1APANM12 + XUZC50	XU2P18NP340	XUB2ANBNL2R + XUB2AKSNL2T	XU5N18PP340W	XUB4BPANL2
XU1P18PP340D	XUB1APBNM12 + XUZC50	XU2P18NP340D	XUB2ANANM12R + XUB2AKSNM12T	XU5N18PP340WD	XUB4BPANM12
XU1P18PP340L5	XUB1APANL5 + XUZC50	XU2P18NP340D	XUB2ANBNM12R + XUB2AKSNM12T	XU5N18PP340WD	XUB4BPANL5
XU1P18PP340L5	XUB1APBNL5 + XUZC50	XU2P18NP340W	XUB2ANANL2R + XUB2AKSNL2T	XU5N18PP340WD	XUB4BPBNL5
XU1P18PP340W	XUB1APAWL2 + XUZC50	XU2P18NP340W	XUB2ANANL2R + XUB2AKSNL2T	XU5N18PP340T10	XUB4BPANL2T10
XU1P18PP340W	XUB1APBWL2 + XUZC50	XU2P18NP340WD	XUB2ANANL2R + XUB2AKSNL2T	XU5N18PP340T10	XUB4BPBNL2T10
XU1P18PP340WD	XUB1APAWM12 + XUZC50	XU2P18NP340WD	XUB2ANANL2R + XUB2AKSNL2T	XU5N18PP340W	XUB4BPANL2
XU1P18PP340WD	XUB1APBWM12 + XUZC50	XU2P18NP340WD	XUB2ANANL2R + XUB2AKSNL2T	XU5N18PP340WD	XUB4BPANM12
XU1P18PP340WL5	XUB1APBNL2 + XUZC50	XU2P18NP340WD	XUB2ANANL2R + XUB2AKSNL2T	XU5N18PP340WL5	XUB4BPANL5
XU1P18PP340WL5	XUB1APBNL2 + XUZC50	XU2P18NP340WL5	XUB2ANANL2R + XUB2AKSNL2T	XU5N18PP340WL5	XUB4BPBNL5
XU1P18PP340T10	XUB1APBNL2 + XUZC50	XU2P18NP340WL5	XUB2ANANL2R + XUB2AKSNL2T	XU5P18NP340	XUB4ANANL2
XU1P18PP340W	XUB1APBNL2 + XUZC50	XU2P18NP340WL5	XUB2ANANL2R + XUB2AKSNL2T	XU5P18NP340D	XUB4ANBNL2
XU1P18PP340W	XUB1APBNL2 + XUZC50	XU2P18NP340WL5	XUB2ANANL2R + XUB2AKSNL2T	XU5P18NP340D	XUB4ANANM12
XU1P18PP340WD	XUB1APBNL2 + XUZC50	XU2P18NP340WL5	XUB2ANANL2R + XUB2AKSNL2T	XU5P18NP340D	XUB4ANBNM12
XU1P18PP340WD	XUB1APBNL2 + XUZC50	XU2P18NP340WL5	XUB2ANANL2R + XUB2AKSNL2T	XU5P18NP340D	XUB4ANBNM12

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Old Design	New Design	Old Design	New Design	Old Design	New Design
18 mm		XU9N18NP340	XUB9BNANL2 + XUZC50	XUDJ003937S	XUDA2NSMM8
XU5P18NP340L5	XUB4ANANL5	XU9N18NP340	XUB9BNBNL2 + XUZC50	Compact	
XU5P18NP340L5	XUB4ANBNL5	XU9N18NP340D	XUB9BNANM12 + XUZC50	XUEF010315	XUX0ARCTT16 + XUZX2000
XU5P18NP340W	XUB4ANAWL2	XU9N18NP340D	XUB9BNBNM12 + XUZC50	XUEF010315H7	XUX0ARCTT16 + XUZX2000 + XUZX2001
XU5P18NP340W	XUB4ANBWL2	XU9N18NP340L5	XUB9BNANL5 + XUZC50	XUEF080319	XUX0ARCTT16 + XUZX2000
XU5P18NP340WD	XUB4ANAWM12	XU9N18NP340L5	XUB9BNBNL5 + XUZC50	XUEF080319H4	XUX0ARCTT16 + XUZX2000 + XUZX2001
XU5P18NP340WD	XUB4ANBWM12	XU9N18NP340W	XUB9BNAWL2 + XUZC50	XUEF10031	XUX0ARCTT16 + XUZX2000
XU5P18PP340	XUB4APANL2	XU9N18NP340W	XUB9BNBWL2 + XUZC50	XUEF10031H7	XUX0ARCTT16 + XUZX2000 + XUZX2001
XU5P18PP340	XUB4APBNL2	XU9N18NP340WD	XUB9BNAWM12 + XUZC50	XUEF300314	XUX0ARCTT16 + XUZX2000
XU5P18PP340D	XUB4APANM12	XU9N18NP340WD	XUB9BNBWM12 + XUZC50	XUEF300314H7	XUX0ARCTT16 + XUZX2000 + XUZX2001
XU5P18PP340D	XUB4APBNM12	XU9N18PP340	XUB9BPANL2 + XUZC50	XUEH017535	XUX0AKSAT16 + XUZX2000
XU5P18PP340L10	XUB4APANL10	XU9N18PP340	XUB9BPBNL2 + XUZC50	XUEH017535H7	XUX0AKSAT16 + XUZX2000 + XUZX2001
XU5P18PP340L10	XUB4APBNL10	XU9N18PP340D	XUB9BPANM12 + XUZC50	XUEH10753	XUX0AKSAT16 + XUZX2000
XU5P18PP340L5	XUB4APANL5	XU9N18PP340D	XUB9BPBNM12 + XUZC50	XUEH10753H7	XUX0AKSAT16 + XUZX2000 + XUZX2001
XU5P18PP340L5	XUB4APBNL5	XU9N18PP340L5	XUB9BPANL5 + XUZC50	XUEH3000	XUX0AKSAT16T + XUZX2000
XU5P18PP340W	XUB4APAWL2	XU9N18PP340L5	XUB9BPBNL5 + XUZC50	XUEH3000H7	XUX0AKSAT16T + XUZX2000 + XUZX2001
XU5P18PP340W	XUB4APBWL2	XU9N18PP340W	XUB9BPAWL2 + XUZC50	XUEH307534	XUX0AKSAT16 + XUZX2000
XU5P18PP340WD	XUB4APAWM12	XU9N18PP340W	XUB9BPBWL2 + XUZC50	XUEH307534H7	XUX0AKSAT16 + XUZX2000 + XUZX2001
XU5P18PP340WD	XUB4APBWM12	XU9N18PP340WD	XUB9BPAWM12 + XUZC50	XUEH753538	XUX0AKSAT16 + XUZX2000
XU5P18PP340WL5	XUB4APAWL5	XU9N18PP340WD	XUB9BPBWM12 + XUZC50	XUEH753538H4	XUX0AKSAT16 + XUZX2000 + XUZX2001
XU5P18PP340WL5	XUB4APBWL5	XU9N18PP340WL5	XUB9BPAWL5 + XUZC50	XUET010315	XUX0ARCTT16 + XUZX2000
XU8B18NP340	XUB0ANSNL2	XU9N18PP340WL5	XUB9BPBWL5 + XUZC50	XUET010315H7	XUX0ARCTT16 + XUZX2000 + XUZX2001
XU8B18NP340D	XUB0ANSNM12	XU9P18NP340	XUB9ANANL2 + XUZC50	XUET080319	XUX0ARCTT16 + XUZX2000
XU8B18PP340	XUB0APSNL2	XU9P18NP340	XUB9ANBNL2 + XUZC50	XUET080319H4	XUX0ARCTT16 + XUZX2000 + XUZX2001
XU8B18PP340D	XUB0APSNM12	XU9P18NP340D	XUB9ANANM12 + XUZC50	XUET10031	XUX0ARCTT16 + XUZX2000
XU8B18PP340L10	XUB0APSNL10	XU9P18NP340D	XUB9ANBNM12 + XUZC50	XUET10031H7	XUX0ARCTT16 + XUZX2000 + XUZX2001
XU8M18NP340	XUB0BNSNL2	XU9P18NP340L5	XUB9ANANL5 + XUZC50	XUET300314	XUX0ARCTT16 + XUZX2000
XU8M18NP340D	XUB0BNSNM12	XU9P18NP340L5	XUB9ANBNL5 + XUZC50	XUET300314H7	XUX0ARCTT16 + XUZX2000 + XUZX2001
XU8M18NP340L5	XUB0BNSNL5	XU9P18NP340W	XUB9ANAWL2 + XUZC50	XUJK06353	XUX0AKSAT16 + XUZX2000
XU8M18NP340W	XUB0BNSWL2	XU9P18NP340W	XUB9ANBWL2 + XUZC50	XUJK063539	XUX0AKSAT16 + XUZX2000
XU8M18NP340WD	XUB0BNSWM12	XU9P18NP340WD	XUB9ANAWM12 + XUZC50	XUJK063539D1	XUX0AKSAM12 + XUZX2000
XU8M18PP340	XUB0BPSNL2	XU9P18NP340WD	XUB9ANBWM12 + XUZC50	XUJK063539D2	XUX0AKSAM12 + XUZX2000
XU8M18PP340D	XUB0BPSNM12	XU9P18PP340	XUB9APANL2 + XUZC50	XUJK063539H7	XUX0AKSAT16 + XUZX2000 + XUZX2001
XU8M18PP340L5	XUB0BPSNL5	XU9P18PP340	XUB9APBNL2 + XUZC50	XUJK063539P9	XUX0AKSAT16 + XUZX2000
XU8M18PP340W	XUB0BPSWL2	XU9P18PP340D	XUB9APANM12 + XUZC50	XUJK06353D1	XUX0AKSAM12 + XUZX2000
XU8M18PP340WD	XUB0BPSWM12	XU9P18PP340D	XUB9APBNM12 + XUZC50	XUJK06353D2	XUX0AKSAM12 + XUZX2000
XU9B18NP340	XUB0ANSNL2 + XUZC50	XU9P18PP340W	XUB9APAWL2 + XUZC50	XUJK06353H7	XUX0AKSAT16 + XUZX2000 + XUZX2001
XU9B18NP340D	XUB0ANSNM12 + XUZC50	XU9P18PP340W	XUB9APBWL2 + XUZC50	XUJK06353P9	XUX0AKSAT16 + XUZX2000
XU9B18PP340	XUB0APSNL2 + XUZC50	XU9P18PP340WD	XUB9APAWM12 + XUZC50	XUJK103534	XUX0AKSAT16 + XUZX2000
XU9B18PP340D	XUB0APSNM12 + XUZC50	XU9P18PP340WD	XUB9APBWM12 + XUZC50	XUJK103534D1	XUX0AKSAM12 + XUZX2000
XU9B18PP340L5	XUB0APSNL5 + XUZC50	XU9P18PP340WL5	XUB9APANL5 + XUZC50	XUJK103534D2	XUX0AKSAM12 + XUZX2000
XU9M18NP340	XUB0BNSNL2 + XUZC50	XU9P18PP340WL5	XUB9APANL5 + XUZC50	XUJK103534P9	XUX0AKSAT16 + XUZX2000
XU9M18NP340D	XUB0BNSNM12 + XUZC50	Amplifier Design		XUJK123538	XUX0AKSAT16 + XUZX2000
XU9M18NP340L5	XUB0BNSNL5 + XUZC50	XUDH003537	XUDA1PSML2	XUJK123538D1	XUX0AKSAM12 + XUZX2000
XU9M18NP340W	XUB0BNSWL2 + XUZC50	XUDH003537S	XUDA1PSMM8	XUJK123538D2	XUX0AKSAM12 + XUZX2000
XU9M18PP340	XUB0BPSNL2 + XUZC50	XUDH003537T10	XUDA1PSML2T10	XUJK123538P9	XUX0AKSAT16 + XUZX2000
XU9M18PP340D	XUB0BPSNM12 + XUZC50	XUDH003937	XUDA2PSML2	XUJK703538	XUX0AKSAT16 + XUZX2000
XU9M18PP340L5	XUB0BPSNL5 + XUZC50	XUDH003937S	XUDA2PSMM8	XUJK703538D1	XUX0AKSAM12 + XUZX2000
XU9M18PP340W	XUB0BPSWL2 + XUZC50	XUDJ003537	XUDA1NSML2	XUJK703538D2	XUX0AKSAM12 + XUZX2000
XU9M18PP340WD	XUB0BPSWM12 + XUZC50	XUDJ003537S	XUDA1NSMM8	XUJK703538H7	XUX0AKSAT16 + XUZX2000 + XUZX2001
XU9M18PP340WL5	XUB0BPSWL5 + XUZC50	XUDJ003937	XUDA2NSML2	XUJK703538P9	XUX0AKSAT16 + XUZX2000

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Old Design	New Design	Old Design	New Design	Old Design	New Design
Compact		XUJT060319P9	XUX0ARCTT16 + XUZX2000	XULH043539DH7	XUK9APANM12 + XUZX2003
XUJLM0811	XUX1ARCNT16 + XUZX2000	XUJT06031D1	XUX0ARCTT16 + XUZX2000	XULH043539DH7	XUK9APBNM12 + XUZX2003
XUJLM0811H7	XUX1ARCNT16 + XUZX2000 + XUZX2001	XUJT06031D2	XUX0ARCTT16 + XUZX2000	XULH043539H7	XUK9APANL2 + XUZX2003
XUJLM0811P9	XUX1ARCNT16 + XUZX2000	XUJT06031P9	XUX0ARCTT16 + XUZX2000	XULH043539H7	XUK9APBNL2 + XUZX2003
XUJLM0811T10	XUX1ARCNT16T10 + XUZX2000	XUJT100314	XUX0ARCTT16 + XUZX2000	XULH043539L05	XUK9APANL5 + XUZX2003
XUJLM1503	XUX0ARCTT16T + XUZX2000	XUJT100314D1	XUX0ARCTT16 + XUZX2000	XULH043539L05	XUK9APBNL5 + XUZX2003
XUJLM1503H7	XUX0ARCTT16T + XUZX2000 + XUZX2001	XUJT100314D2	XUX0ARCTT16 + XUZX2000	XULH043539L10	XUK9APANL10 + XUZX2003
XUJLM1503P9	XUX0ARCTT16T + XUZX2000	XUJT100314H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	XULH043539L10	XUK9APBNL10 + XUZX2003
XUJLM1514	XUX2ARCNT16R + XUZX2000	XUJT100314P9	XUX0ARCTT16 + XUZX2000	XUJLM0619	XUK9ARCNL2 + XUZX2000
XUJLM1514H7	XUX2ARCNT16R + XUZX2000 + XUZX2001	XUJT120318	XUX0ARCTT16 + XUZX2000	XUJLM0619H7	XUK9ARCNL2 + XUZX2000
XUJLM1514P9	XUX2ARCNT16R + XUZX2000	XUJT120318D1	XUX0ARCTT16 + XUZX2000	XUJLM0619P9	XUK9ARCNL2 + XUZX2000
XUJM06031	XUX0ARCTT16 + XUZX2000	XUJT120318D2	XUX0ARCTT16 + XUZX2000	XULH06353	XUK1APANL2 + XUZX2003
XUJM060319	XUX0ARCTT16 + XUZX2000	XUJT120318H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	XULH06353	XUK1APBNL2 + XUZX2003
XUJM060319D1	XUX0ARCTT16 + XUZX2000	XUJT120318P9	XUX0ARCTT16 + XUZX2000	XULH06353D	XUK1APANM12 + XUZX2003
XUJM060319D2	XUX0ARCTT16 + XUZX2000	XUJT700318	XUX0ARCTT16 + XUZX2000	XULH06353D	XUK1APBNM12 + XUZX2003
XUJM060319H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	XUJT700318D1	XUX0ARCTT16 + XUZX2000	XULH06353H7	XUK1APANL2 + XUZX2003
XUJM060319P9	XUX0ARCTT16 + XUZX2000	XUJT700318D2	XUX0ARCTT16 + XUZX2000	XULH06353H7	XUK1APBNL2 + XUZX2003
XUJM06031D1	XUX0ARCTT16 + XUZX2000	XUJT700318H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	XULH06353L05	XUK1APANL5 + XUZX2003
XUJM06031D2	XUX0ARCTT16 + XUZX2000	XUJT700318P9	XUX0ARCTT16 + XUZX2000	XULH06353L05	XUK1APBNL5 + XUZX2003
XUJM06031H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	Compact 50 x 50		XULH06353L10	XUK1APANL10 + XUZX2003
XUJM06031P9	XUX0ARCTT16 + XUZX2000	XUK1ARCTL10	XUK0ARCTL10 + XUZX2003 + XUZA50	XULH06353L10	XUK1APBNL10 + XUZX2003
XUJM1000	XUX0AKSAT16T + XUZX2000	XUK1ARCTL2	XUK0ARCTL2 + XUZX2003 + XUZA50	XULH083534	XUK2APANL2R + XUZX2003
XUJM1000	XUX0ARCTT16T + XUZX2000	XUK2AKSAL10	XUK0AKSAL10 + XUZX2003 + XUZX2003	XULH083534	XUK2APBNL2R + XUZX2003
XUJM1000D1	XUX0AKSAM12T + XUZX2000	XUK2AKSAL10R	XUK0AKSAL10 + XUZX2003	XULH083534D	XUK2APANM12R + XUZX2003
XUJM1000D1	XUX0ARCTT16T + XUZX2000	XUK2AKSAL10T	XUK0AKSAL10T + XUZX2003	XULH083534D	XUK2APBNM12R + XUZX2003
XUJM1000D2	XUX0AKSAM12T + XUZX2000	XUK2AKSAL2	XUK0AKSAL2 + XUZX2003 + XUZX2003	XULH083534DH7	XUK2APANM12R + XUZX2003
XUJM1000D2	XUX0ARCTT16T + XUZX2000	XUK2AKSAL2R	XUK0AKSAL2 + XUZX2003	XULH083534DH7	XUK 2APBNM12R + XUZX2003
XUJM1000H7	XUX0AKSAT16T + XUZX2000 + XUZX2001	XUK2AKSAL2T	XUK0AKSAL2T + XUZX2003	XULH083534L05	XUK2APANL5R + XUZX2003
XUJM1000H7	XUX0ARCTT16T + XUZX2000 + XUZX2001	XUK2AKSAM12	XUK0AKSAM12 + XUZX2003 + XUZX2003	XULH083534L05	XUK2APBNL5R + XUZX2003
XUJM1000P9	XUX0AKSAT16T + XUZX2000	XUK2AKSAM12R	XUK0AKSAM12 + XUZX2003	XULH083534L10	XUK2APANL10R + XUZX2003
XUJM1000P9	XUX0ARCTT16T + XUZX2000	XUK2AKSAM12T	XUK0AKSAM12T + XUZX2003	XULH083534L10	XUK2APBNL10R + XUZX2003
XUJM100314	XUX0ARCTT16 + XUZX2000	XUK2ARCTL10	XUK0ARCTL10 + XUZX2003 + XUZX2003	XULH153538	XUK0AKSAL2 + XUZX2003
XUJM100314D1	XUX0ARCTT16 + XUZX2000	XUK2ARCTL10R	XUK0ARCTL10 + XUZX2003	XULH153538D	XUK0AKSAM12 + XUZX2003
XUJM100314D2	XUX0ARCTT16 + XUZX2000	XUK2ARCTL10T	XUK2ARCTL10T + XUZX2003	XULH153538H7	XUK0AKSAL2 + XUZX2003
XUJM100314H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	XUK2ARCTL2	XUK0ARCTL2 + XUZX2003 + XUZX2003	XULH153538L05	XUK0AKSAL5 + XUZX2003
XUJM100314P9	XUX0ARCTT16 + XUZX2000	XUK2ARCTL2R	XUK0ARCTL2 + XUZX2003	XULH303538	XUK0AKSAL2 + XUZX2003
XUJM120318	XUX0ARCTT16 + XUZX2000	XUK2ARCTL2T	XUK2ARCTL2T + XUZX2003	XULH303538D	XUK0AKSAM12 + XUZX2003
XUJM120318D1	XUX0ARCTT16 + XUZX2000	XUK5AKSAL10	XUK0AKSAL10 + XUZX2003	XULH303538DH7	XUK0AKSAM12 + XUZX2003
XUJM120318D2	XUX0ARCTT16 + XUZX2000	XUK5AKSAL2	XUK0AKSAL2 + XUZX2003	XULH303538L05	XUK0AKSAL5 + XUZX2003
XUJM120318H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	XUK5AKSAM12	XUK0AKSAM12 + XUZX2003	XULH303538L10	XUK0AKSAL10 + XUZX2003
XUJM120318P9	XUX0ARCTT16 + XUZX2000	XUK5ARCTL10	XUK0ARCTL10 + XUZX2003	XULH703535	XUK5APANL2 + XUZX2003
XUJM700318	XUX0ARCTT16 + XUZX2000	XUK5ARCTL2	XUK0ARCTL2 + XUZX2003	XULH703535	XUK5APBNL2 + XUZX2003
XUJM700318D1	XUX0ARCTT16 + XUZX2000	XUK9AKSAL10	XUK0AKSAL10 + XUZX2003 + XUZA50	XULH703535D	XUK5APANM12 + XUZX2003
XUJM700318D2	XUX0ARCTT16 + XUZX2000	XUK9AKSAL2	XUK0AKSAL2 + XUZX2003 + XUZA50	XULH703535D	XUK5APBNM12 + XUZX2003
XUJM700318H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	XUK9AKSAM12	XUK0AKSAM12 + XUZX2003 + XUZA50	XULH703535H7	XUK5APANL2 + XUZX2003
XUJM700318P9	XUX0ARCTT16 + XUZX2000	XUK9ARCTL10	XUK0ARCTL10 + XUZX2003 + XUZA50	XULH703535H7	XUK5APBNL2 + XUZX2003
XUJT06031	XUX0ARCTT16 + XUZX2000	XUK9ARCTL2	XUK0ARCTL2 + XUZX2003 + XUZA50	XULH703535L05	XUK5APANL5 + XUZX2003
XUJT060319	XUX0ARCTT16 + XUZX2000	XULH043539	XUK9APANL2 + XUZX2003	XULH703535L05	XUK5APBNL5 + XUZX2003
XUJT060319D1	XUX0ARCTT16 + XUZX2000	XULH043539	XUK9APBNL2 + XUZX2003	XULH703535L10	XUK5APANL10 + XUZX2003
XUJT060319D2	XUX0ARCTT16 + XUZX2000	XULH043539D	XUK9APANM12 + XUZX2003	XULH703535L10	XUK5APBNL10 + XUZX2003
XUJT060319H7	XUX0ARCTT16 + XUZX2000 + XUZX2001	XULH043539D	XUK9APBNM12 + XUZX2003	XULJ043539	XUK9ANANL2 + XUZX2003

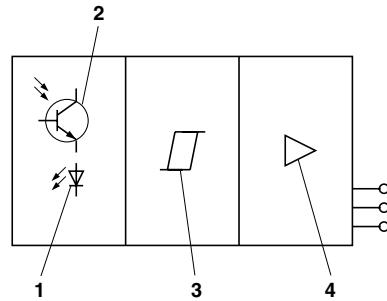
Photoelectric Sensors Substitution Guide

Old Design	New Design	Old Design	New Design	Old Design	New Design
Compact 50 x 50		Miniature		XUMLJ0259S	XUM9ANBNM8 + XUZM2003
XULJ043539	XUK9ANBNL2 + XUZK2003	XUMH023539	XUM0APSAL2 + XUZM2003	XUMLJ0451	XUM1ANANL2 + XUZM2003
XULJ043539D	XUK9ANANM12 + XUZK2003	XUMH023539L10	XUM0APSAL10 + XUZM2003	XUMLJ0451	XUM1ANBNL2 + XUZM2003
XULJ043539D	XUK9ANBNM12 + XUZK2003	XUMH03353	XUM0APSAL2 + XUZM2003	XUMLJ0451S	XUM1ANANM8 + XUZM2003
XULJ06353	XUK1ANANL2 + XUZK2003	XUMH03353L10	XUM0APSAL10 + XUZM2003	XUMLJ0451S	XUM1ANBM8 + XUZM2003
XULJ06353	XUK1ANBNL2 + XUZK2003	XUMH07301	XUM2AKSNL2T + XUZM2003	XUMLJ0854	XUM2ANANL2R + XUZM2003
XULJ06353D	XUK1ANANM12 + XUZK2003	XUMH07301L10	XUM2AKSNL10T + XUZM2003	XUMLJ0854	XUM2ANBNL2R + XUZM2003
XULJ06353D	XUK1ANBNM12 + XUZK2003	XUMH073534	XUM0APSAL2 + XUZM2003	XUMLJ0854S	XUM2ANANM8R + XUZM2003
XULJ06353L10	XUK1ANANL10 + XUZK2003	XUMH073534L10	XUM0APSAL10 + XUZM2003	XUMLJ0854S	XUM2ANBNM8R + XUZM2003
XULJ06353L10	XUK1ANBNL10 + XUZK2003	XUMH103535	XUM0APSAL2 + XUZM2003	XUMLJ1055	XUM6ANANL2 + XUZM2003
XULJ083534	XUK2ANANL2R + XUZK2003	XUMH15353R	XUM0APSAL2 + XUZM2003	XUMLJ1055	XUM6ANBNL2 + XUZM2003
XULJ083534D	XUK2ANANM12R + XUZK2003	XUMH703535	XUM0APSAL2 + XUZM2003	XUMLJ1055S	XUM6ANANM8 + XUZM2003
XULJ153538	XUK0AKSAL2 + XUZK2003	XUMJ023539	XUM0ANSAL2 + XUZM2003	XUMLJ1055S	XUM6ANBNM8 + XUZM2003
XULJ153538D	XUK0AKSAM12 + XUZK2003	XUMJ03353	XUM0ANSAL2 + XUZM2003	XUMLJ4055	XUM5ANANL2 + XUZM2003
XULJ153538H7	XUK0AKSAL2 + XUZK2003	XUMJ073534	XUM0ANSAL2 + XUZM2003	XUMLJ4055	XUM5ANBNL2 + XUZM2003
XULJ153538L05	XUK0AKSAL5 + XUZK2003	XUMJ103535	XUM0ANSAL2 + XUZM2003	XUMLJ4055S	XUM5ANANM8 + XUZM2003
XULJ303538	XUK0AKSAL2 + XUZK2003	XUMJ15353R	XUM0ANSAL2 + XUZM2003	XUMLJ4055S	XUM5ANBNM8 + XUZM2003
XULJ303538D	XUK0AKSAM12 + XUZK2003	XUMJ703535	XUM0ANSAL2 + XUZM2003		
XULJ303538L05	XUK0AKSAL5 + XUZK2003	XUMLH0259	XUM9APANL2 + XUZM2003		
XULJ703535	XUK5ANANL2 + XUZK2003	XUMLH0259	XUM9APBNL2 + XUZM2003		
XULJ703535	XUK5ANBNL2 + XUZK2003	XUMLH0259S	XUM9APANM8 + XUZM2003		
XULJ703535D	XUK5ANANM12 + XUZK2003	XUMLH0259S	XUM9APBNM8 + XUZM2003		
XULJ703535D	XUK5ANBNM12 + XUZK2003	XUMLH0451	XUM1APANL2 + XUZM2003		
XULK0830	XUK2AKSNL2T + XUZK2003	XUMLH0451	XUM1APBNL2 + XUZM2003		
XULK0830D	XUK2AKSNM12T + XUZK2003	XUMLH0451L10	XUM1APANL10 + XUZM2003		
XULK0830L05	XUK2AKSNL5T + XUZK2003	XUMLH0451L10	XUM1APBNL10 + XUZM2003		
XULK0830L10	XUK2AKSNL10T + XUZK2003	XUMLH0451S	XUM1APANM8 + XUZM2003		
XULM040319	XUK9ARCNL2 + XUZK2003	XUMLH0451S	XUM1APBNM8 + XUZM2003		
XULM040319H7	XUK9ARCNL2 + XUZK2003	XUMLH0451T10	XUM1APANL2T10 + XUZM2003		
XULM040319L05	XUK9ARCNL5 + XUZK2003	XUMLH0451T10	XUM1APBNL2T10 + XUZM2003		
XULM040319L10	XUK9ARCNL10 + XUZK2003	XUMLH0803	XUM2AKSNL2T + XUZM2003		
XULM0600	XUK2ARCNL2T + XUZK2003	XUMLH0803S	XUM2AKSNM8T + XUZM2003		
XULM0600H7	XUK2ARCNL2T + XUZK2003	XUMLH0854	XUM2APANL2R + XUZM2003		
XULM0600L05	XUK2ARCNL5T + XUZK2003	XUMLH0854	XUM2APBNL2R + XUZM2003		
XULM0600L10	XUK2ARCNL10T + XUZK2003	XUMLH0854S	XUM2APANM8R + XUZM2003		
XULM06031	XUK1ARCNL2 + XUZK2003	XUMLH0854S	XUM2APBNM8R + XUZM2003		
XULM06031H7	XUK1ARCNL2 + XUZK2003	XUMLH1055	XUM6APANL2 + XUZM2003		
XULM06031H7L10	XUK1ARCNL10 + XUZK2003	XUMLH1055	XUM6APBNL2 + XUZM2003		
XULM06031L05	XUK1ARCNL5 + XUZK2003	XUMLH1055S	XUM6APANM8 + XUZM2003		
XULM06031L10	XUK1ARCNL10 + XUZK2003	XUMLH1055S	XUM6APBNM8 + XUZM2003		
XULM080314	XUK2ARCNL2R + XUZK2003	XUMLH4055	XUM5APANL2 + XUZM2003		
XULM080314H7	XUK2ARCNL2R + XUZK2003	XUMLH4055	XUM5APBNL2 + XUZM2003		
XULM080314L05	XUK2ARCNL5R + XUZK2003	XUMLH4055S	XUM5APANM8 + XUZM2003		
XULM080314L10	XUK2ARCNL10R + XUZK2003	XUMLH4055S	XUM5APBNM8 + XUZM2003		
XULM300318	XUK0ARCTL2 + XUZK2003	XUMLH4055T10	XUM5APANL2T10 + XUZM2003		
XULM300318H7	XUK0ARCTL2 + XUZK2003	XUMLH4055T10	XUM5APBNL2T10 + XUZM2003		
XULM300318H7L10	XUK0ARCTL10 + XUZK2003	XUMLJ0259	XUM9ANANL2 + XUZM2003		
XULM300318L05	XUK0ARCTL5 + XUZK2003	XUMLJ0259	XUM9ANBNL2 + XUZM2003		
XULM300318L10	XUK0ARCTL10 + XUZK2003	XUMLJ0259S	XUM9ANANM8 + XUZM2003		

Principles of optical detection

Composition of a photoelectric sensor

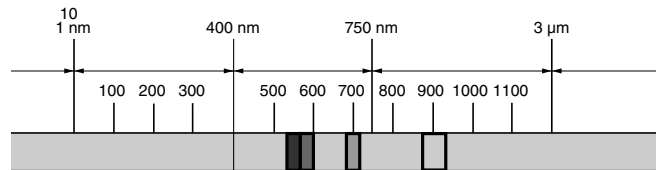
A photoelectric sensor basically comprises a light beam emitter (light emitting diode) and a light sensitive receiver (photo-transistor). A light emitting diode (LED) is an electronic semi-conductor component that emits light when an electrical current flows through it. This light can be visible or invisible, depending on the transmission wavelength. Detection occurs when an object enters the transmitted light beam and, in so doing, affects the intensity of the light at the receiver. As the light intensity at the receiver decreases, a point is reached whereby the output of the sensor changes state.



- 1 Light beam emitter
- 2 Light beam receiver
- 3 Processing stage
- 4 Output stage

Light spectrum

Depending on the model, the transmission beam is either infrared, visible red, or visible green. Visible red LEDs and photo-transistors are used for plastic fiber-optic and polarized retroreflective system sensors.

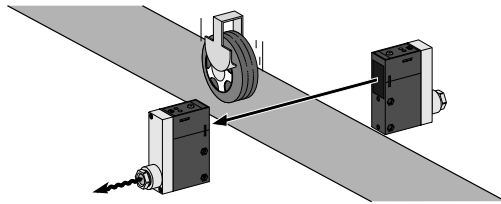


Modulation

The advantage of LEDs is their very fast response. To render the system insensitive to ambient light, the current flowing through the LED is modulated to produce a pulsed light transmission. Only the pulsed signal is used by the photo-transistor and processed to control the load.

Photoelectric Sensors Detection Systems

Thru-beam system



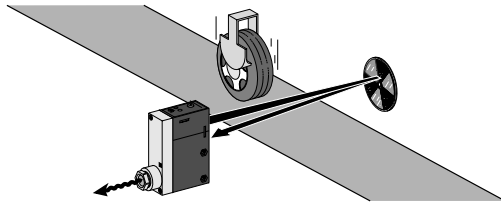
The thru-beam system comprises two components: an emitter and a receiver.

- long sensing distance—up to 203 ft (62 m)
- precise and reliable detection
- good resistance in polluted environments (dust, stray light beams, etc.)

But:

- the object to be detected must be opaque
- it requires two components that must be mounted facing each other (emitter and receiver)

Retroreflective system

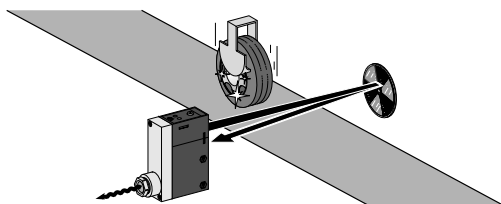


The retroreflective system comprises an emitter/receiver unit and a reflector for returning the transmitted light beam back to the receiver.

- medium sensing distance
- precise detection
- simple installation and setup (only one component to be wired)
- detection of opaque objects (general retroreflective system) or non-reflective transparent objects (retroreflective system specifically for transparent materials)

But: recommended for use only in clean environments.

Polarized retroreflective system

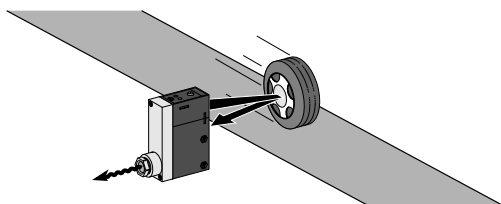


The polarized retroreflective system is an extension of the retroreflective system and incorporates light beam polarization filters. These filters enable reflective objects to be detected.

Its characteristics are identical to those of the retroreflective system, but include the following features:

- reliable detection of all types of reflective objects, due to the polarization filters
- visible light beam transmission (red), which assists alignment of the system

Proximity diffuse system

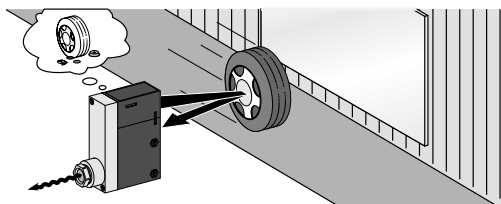


The proximity diffuse system comprises one emitter/receiver unit. The object itself reflects the transmitted light beam back to the receiver.

- short sensing distance that depends on the color of the object (reflection coefficient)
- simple installation and setup (only one component to be mounted and wired)
- detection of any type of object (opaque, reflective or transparent)

But: only recommended for use in clean environments.

Proximity diffuse system with background suppression



The proximity diffuse system with background suppression is an extension of the proximity diffuse system and incorporates features that make it insensitive to background objects.

Its characteristics are identical to those of the proximity diffuse system, but include the following features:

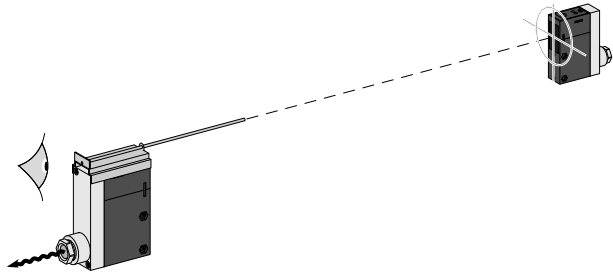
- sensing distance not related to color of object
- insensitive to background objects, even if they are more reflective than the object to be detected

Photoelectric Sensors Detection Systems Characteristics

Thru-beam system

Aligning the emitter and receiver

A thru-beam system requires precise alignment of the emitter and receiver. The mechanical alignment tool is recommended for thru-beam systems with long sensing distances.



Retroreflective system

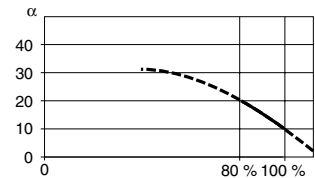
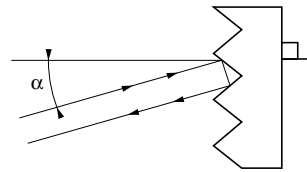
Function of the reflector

The reflector comprises numerous corner cube cavities that ensure total reflection of all light rays back along the same path.

Types of reflector:

- circular
- rectangular
- reflective tape

The reflector orientation angle (α) must be between 10 and 20° (see the sensing distance correction coefficient graph below).

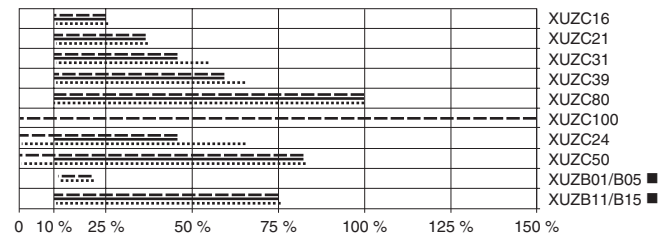


Angle of incidence α

Correction coefficient

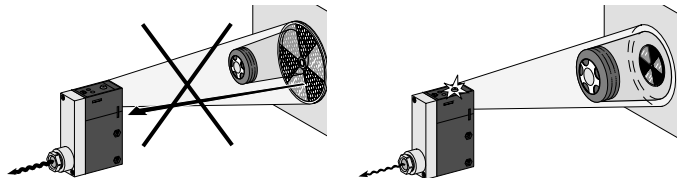
Choosing a reflector

Effect of the reflector size on the sensing distance of the sensor.



- XUJ, XUJ, XUL, XUM, ZUC
- XUJ, XUJ, XUL, XUM polarized retroreflective, ZUC
- XUB, XUP, XU**18
- For a surface area equivalent to the XUJC80.

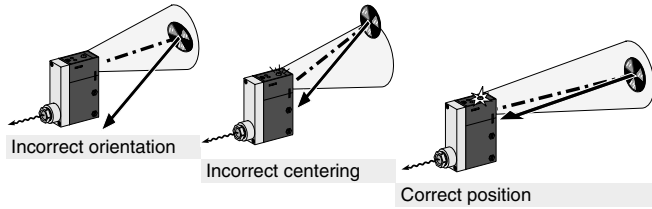
The reflector must be smaller than the object to be detected.



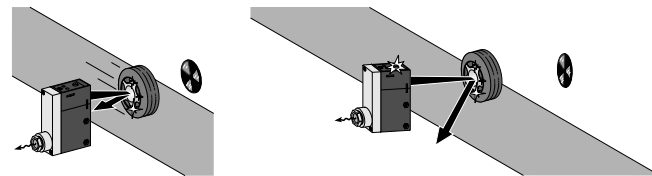
Retroreflective system (cont.)

Positioning the reflector

The positioning of the reflector must be very precise to reflect the transmitted beam back to the receiver.



To avoid inadvertent operation due to stray reflections, avoid mounting the sensor-reflector optical axis at right-angles to the object to be detected, or any other reflective objects.



Using reflectors for short sensing distances

When using a reflector with small corner cubes (for example XUZC80) for short sensing distances ($D < 10\% S_n$), almost all of the beam is reflected back to the emitter and the sensor fails to operate correctly. Using a reflector with large corner cubes (for example XUZC24 and XUZC50) ensures that the light beam will be reflected back towards the receiver.



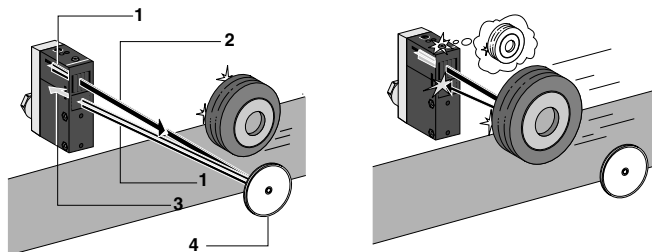
$D < 10\% S_n$

Polarized retroreflective system

Detecting highly reflective objects

In the polarized retroreflective system, the transmitted light beam is filtered so that only the rays on a vertical plane are passed through. The corner cube reflector depolarizes the beam and reflects it back to the receiver, which is designed to accept light rays on a horizontal plane only.

Applications: A reflective object sends back the light rays in the same plane on which they were received (vertical plane). The beam is blocked by the receiver filter, since only rays on a horizontal plane are accepted.



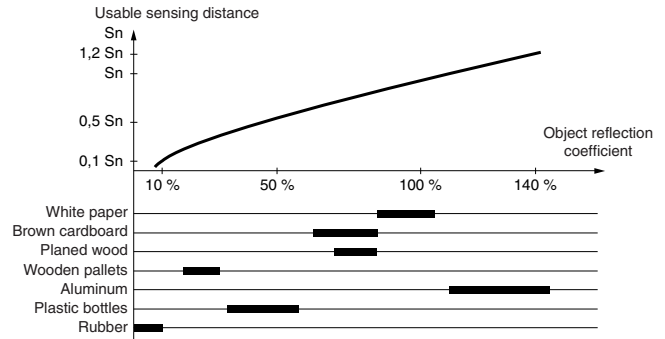
- 1 Non-polarized
- 2 Vertically polarized
- 3 Horizontally polarized
- 4 The reflector depolarizes the light beam

Photoelectric Sensors Detection Systems Characteristics

Proximity diffuse system

Influence of the object material to be detected

The sensing distance of a proximity diffuse system sensor is influenced by the object material (reflection coefficient, color, etc.).

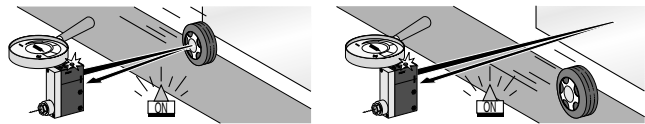


The curve above indicates the usable sensing distance (S_n) correction factor related to the reflection coefficient of the object.

Note: If the application requires that different object materials be detected at the same distance, the choice of sensor and adjustment of the sensitivity is based on the object that has the lowest reflection coefficient.

Influence of background objects

If background objects are more reflective than the object to be detected, the proximity diffuse system is not suitable. To avoid background detection, use a proximity diffuse system with background suppression.

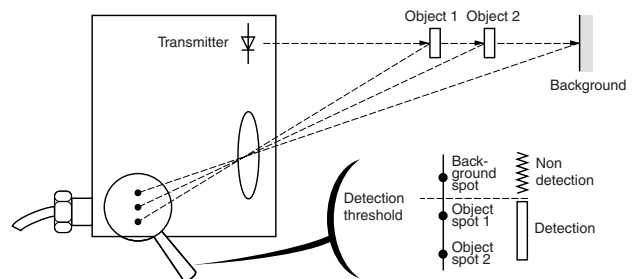


Proximity diffuse system with background suppression

Principle

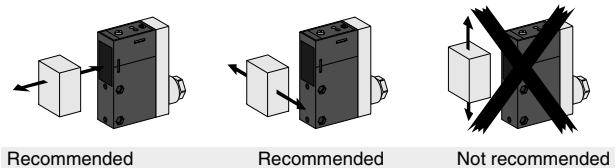
This system enables detection of an object at a given distance regardless of its color (reflection coefficient), while ignoring any background objects.

It is a proximity diffuse system that focuses the light beam such that the luminous spot being reflected back to the photo-sensitive receiver is at a distance equal to that of the object to be detected. By relating to the distance of this spot, the sensor differentiates the object from the background.



Setup recommendations


Recommended trajectories of objects



Fiber optics

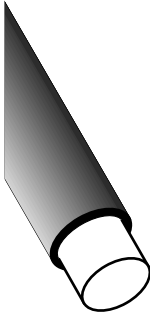
Principle

The fiber optic acts as a light conductor. Light rays entering the fiber at a certain angle are conveyed to the required place, with minimum loss.



1 core 2 sheath

Plastic fibers

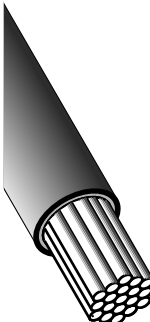


The core of the fiber is flexible plastic (PMMA). There is usually a single fiber, 0.25 to 1 mm, depending on the model. Plastic fibers are used with amplifiers transmitting red light. Minimum bend radius:

- 10 mm for fiber with 0.25 mm core,
- 25 mm for fiber with 1 mm core.

Advantage: Fibers can be cut to the required length.

Glass fibers



The core of the fiber is silica. For maximum flexibility, each fiber comprises numerous strands of approximate diameter 50 μ . Glass fibers are used with amplifiers transmitting infrared or red light. Minimum bend radius:

- 10 mm (0.39 in.) with plastic sheath
- 90 mm (3.54 in.) with stainless steel sheath

Advantages:

- suitable for use in temperatures up to 250 °C (482 °F)
- stainless steel sheathed fibers provide protection against mechanical impacts and crushing.

Specific aspects




Separate amplifier

- Compact size
- Detection of very small objects
- Precise detection

Optical heads

Specific aspects



Separate amplifier

- Very small detection head
- Extensive range of heads (fork, extra flat, convergent, etc.) for specific applications
- Detection of small objects

Proximity diffuse system for color mark reading

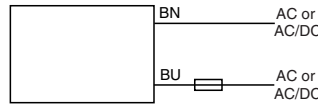
Detection of contrasting colors

Detection of color index mark on contrasting plain color background. Principle of operation based on the difference between the colors (contrast) of the background and index mark in green or red light. The stronger the contrast between the colors, the higher the difference between the received signal strengths and the more reliable the detection.

Photoelectric Sensors Outputs and Wiring

2-wire

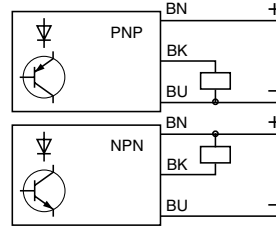
2-wire AC or AC/DC



- Not protected against overload and short-circuit
- Light or dark switching output function, depending on model

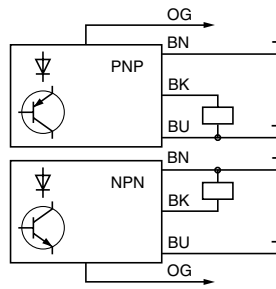
3-wire

3-wire DC PNP or NPN type



- Protected against overload and short-circuit
- 4 models:
 - PNP light switching
 - NPN light switching
 - PNP dark switching
 - NPN dark switching

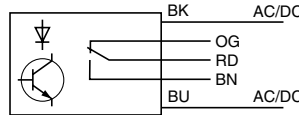
3-wire DC PNP or NPN type, light or dark programmable switching



- Protected against overload and short-circuit
- 2 models:
 - PNP light/dark programmable switching
 - NPN light/dark programmable switching
- Light or dark switching programming by means of connecting orange wire (OG) to either:
 - brown wire (BN) for light switching
 - blue wire (BU) for dark switching

5-wire

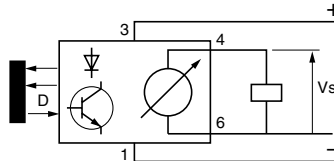
5-wire AC/DC output relay



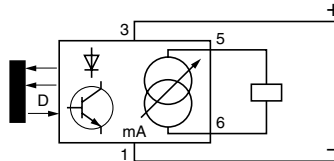
- Light switching or light/dark programmable switching, depending on model
- AC or DC supply with wide voltage range
- 1 N.C./N.O. output relay, either 2 A ($\cos \varphi = 1$) or 0.5 A ($\cos \varphi = 0.4$)

Analog output

Output voltage



Output current

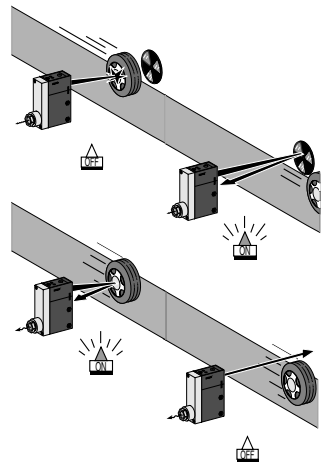


- Analog output sensors are based on a proximity diffuse system with background suppression and provide an output signal proportional to the distance of the object from the sensor (signal not dependent on the reflection coefficient of the object).
- 2 output configurations possible on the same unit:
 - Output voltage: The output voltage varies between 0 and 10 V, in proportion to the sensor-object distance.
 - Output current: The output current varies between 4 and 20 mA, in proportion to the sensor-object distance.

Photoelectric Sensors Outputs and Connections

Output functions

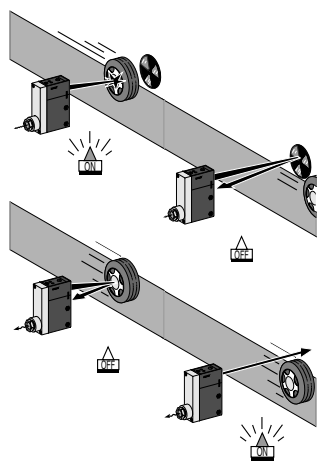
▶ **Light switching:
beam received
= output On**



Thru-beam and retroreflective systems:
Output On = no object present

Proximity diffuse system:
Output On = object present

▶ **Dark switching:
beam not received
(broken)
= output On**




Thru-beam and retroreflective systems:
Output On = object present

Proximity diffuse system:
Output On = no object present

Connection methods

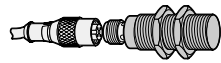
▶ **Pre-cabled**

Factory-fitted molded cable—good protection against splashing liquids



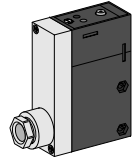
▶ **Connector**

Ease of installation and maintenance



▶ **Screw terminals**

Flexibility—cable runs to required length



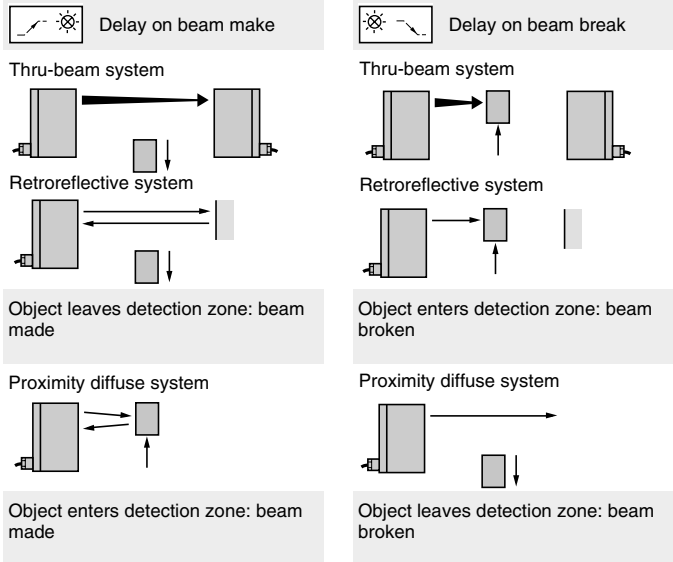
Output signal time delay

Principle

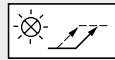
Some models of XUJ, XUX, XUV, and XUC sensors incorporate an adjustable time delay.

The following configurations are possible:

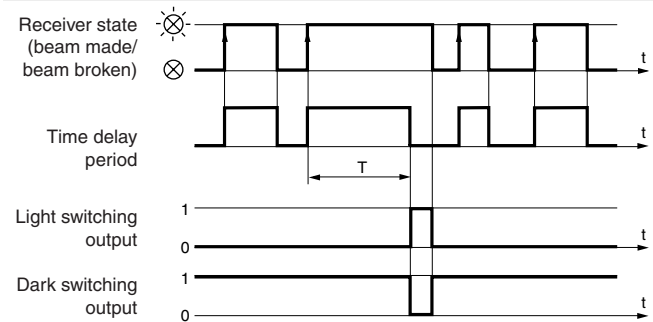
- light switching output, time delay on beam break
- dark switching output, time delay on beam break
- light switching output, time delay on beam make
- dark switching output, time delay on beam make



Time delay on beam make



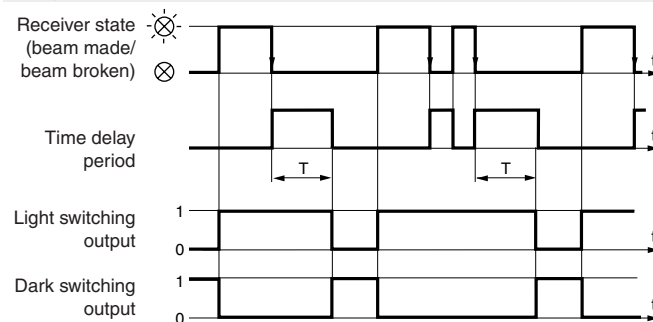
The time delay is triggered as the beam is made and the output will not change state until the preset time (T) has elapsed. If the beam is broken and re-made during this period, the timer resets to zero.



Time delay on beam break



The time delay is triggered as the beam is broken and the output will not change state until the preset time (T) has elapsed. If the beam is made and re-broken during this period, the timer resets to zero.



Photoelectric Sensors Complementary Functions

One shot function

Principle

The one shot function is an extension of the time delay function and can either be on beam make or on beam break.
As the beam is made or broken, the output of the sensor immediately changes state and remains in this condition during the preset time T, regardless of further beam makes or breaks.
After the preset time T has elapsed, the output returns to its initial state until the next beam make or beam break.

Time delay and one shot function

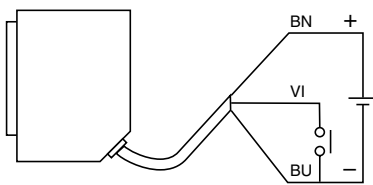
Sensors incorporating feature

Sensor type	Time delay function	Monostable function	Time delay
XUJT.....	 and/or		Adjustable 0.25 to 15 s
XUX..... ▲	 or	 or	Adjustable 0.03 to 1 s or 1 to 60 s
XUVH..... XUVJ.....			40 ms fixed
XUVF.....			40 ms fixed
XUVT..... ▲	 or	 or	Adjustable 0.03 to 3 s or 1 to 60 s

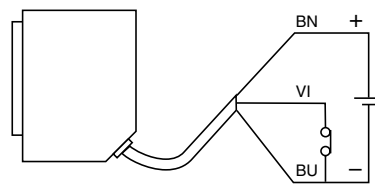
■ Time delay on beam make and/or beam break.
 ★ Switchable selection of beam make or beam break.
 ▲ Switchable selection of time delay or monostable.

Beam break test

To confirm the correct operation of the sensor, a test input enables the transmitted beam to be broken, verifying that the output of the sensor changes state. This function is incorporated in sensor types XUM and XUV.



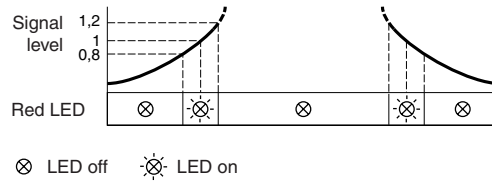
Beam made



Beam broken

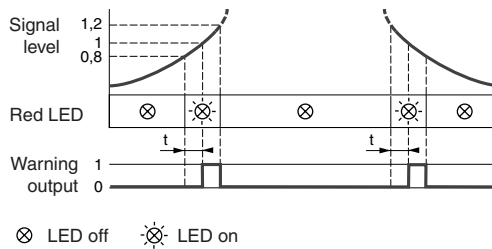
Photoelectric Sensors Complementary Functions

Verification of correct operation



A red LED illuminates when the intensity of the light beam at the receiver is no longer strong enough to ensure correct operation of the sensor. This can result from dirty lenses, excessively polluted atmosphere, disturbance of optical alignment, etc.

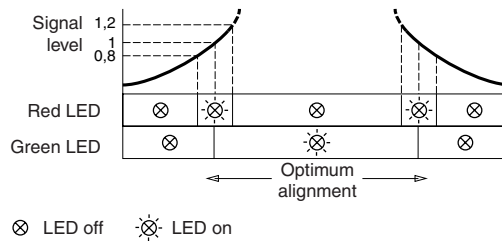
This function is incorporated in retroreflective and thru-beam system sensor types XU•B18, XU•M18 (DC), XUM, XUJ, XUD and XUV.



In addition to the red LED indicating loss of received beam strength, a warning output is available for remote signalling. The output signal is delayed by 160 ms to eliminate temporary conditions.

This function is incorporated in retroreflective and thru-beam system sensor types XUM, XUJ and XUV.

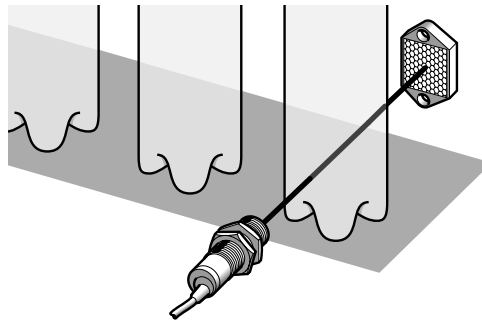
Optical alignment aid



A green LED assists setup by illuminating when optimum optical alignment of the sensor is achieved.

This function is incorporated in sensor types XUJ, XUX, XUD, and XUV.

Detecting transparent objects



These retroreflective system sensors, with low hysteresis, are specifically designed for detecting transparent object materials, such as:

- PET and PVC bottles and receptacles
- clear glass bottles, etc.
- PE (polyethylene) films

These systems use visible red beam transmission.

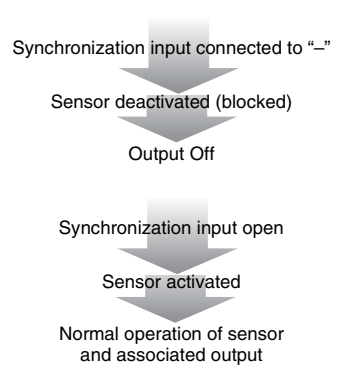
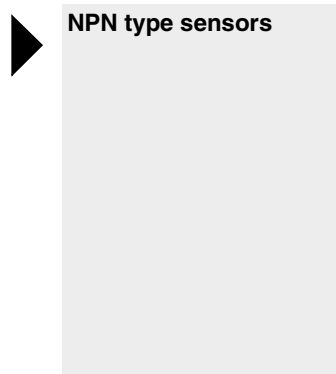
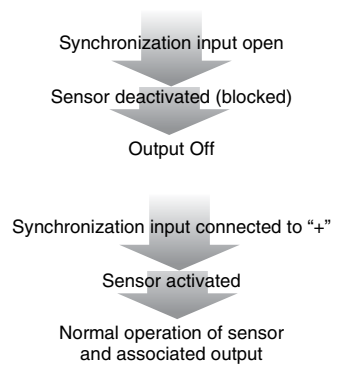
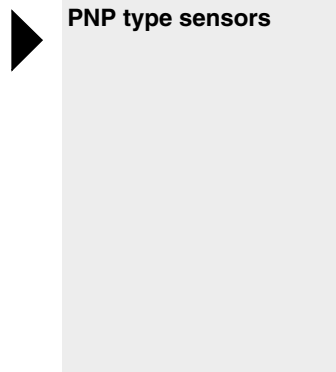
They are used in conjunction with a close-range reflector, type XUZC24 or XUZC50.

The sensing distance of the sensor depends on the reflector used.

The sensor-reflector distance depends on both the reflector used and the material to be detected.

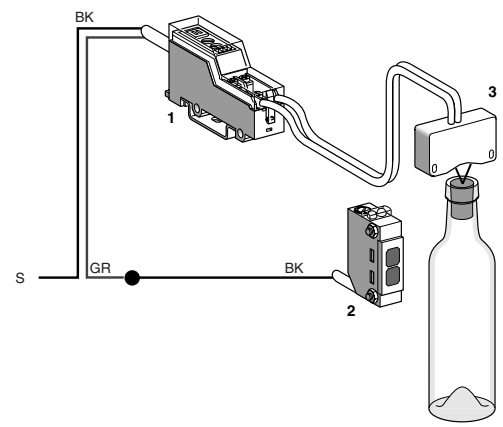
Synchronization inputs

The synchronization input is an additional wire used externally to either activate or deactivate the sensor. When the sensor is deactivated (blocked) its output is Off, regardless of the presence or absence of an object. This synchronization input is incorporated in amplifiers for use with optical sensing heads (type XUV).



Application example: Verification of cork presence in bottle
The synchronization feature makes it possible to verify the presence of a cork in a bottle and to feed this information to a PLC in the form **S** = no cork present. This is achieved by two detections: “presence of bottle” (synchronization sensor **2**) and “absence of cork” (optical sensing head **3**).

- Advantages:
- Processing speed is very fast (unrelated to the cycle time of the PLC).
 - Use of a PLC input is saved.
 - This delocalized function can be used in an autonomous way, without a PLC, to directly control an actuator for the removal of a defective product.

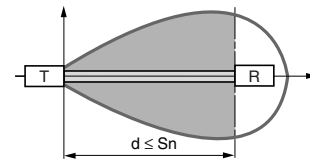


- 1 Amplifier type XUV (PNP).
 - 2 Proximity diffuse system with a light-switching, PNP-type photoelectric sensor (detecting bottle presence/absence).
 - 3 Convergent optical sensing head type XUVN02428 (detecting cork presence/absence).
- BK** = output signal wires from amplifier 1 and sensor 2.
GR = synchronization input wire of amplifier 1.

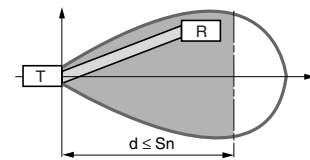
Detection curves

Thru-beam system

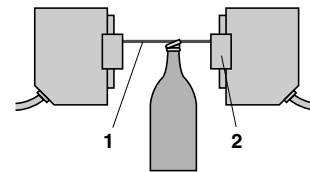
Ideal detection



Acceptable detection



Example: detecting an object's excessive height



The zone indicates the positioning tolerance of the receiver. The zone represents the usable sensing zone of the system. Any opaque object entering this zone breaks the beam and causes the sensor's output to change state.

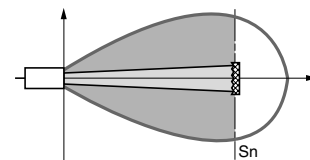
T = emitter
R = receiver

Special cases: It is possible to modify the usable beam to suit the application by masking the lenses.

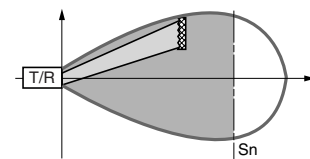
- 1 Effective beam
- 2 Mask

Retroreflective and polarized retroreflective systems

Ideal detection



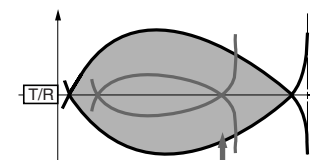
Acceptable detection



The zone indicates the positioning tolerance of the reflector. The zone represents the usable sensing zone of the system. Any opaque object entering this zone breaks the beam and causes the sensor's output to change state.

T = emitter
R = receiver

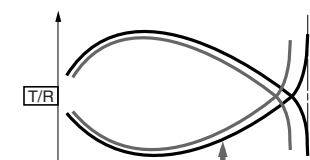
Proximity diffuse and proximity diffuse with background suppression systems



Object 20 x 20 cm

The zone represents the sensor's sensitivity zone. All of this zone is usable: any sufficiently reflective object entering this zone, in the direction of the arrow, causes the sensor's output to change state. The black line corresponds to a white surface and the gray line to a darker surface. A test, using the object to be detected, enables calculation of the zone of sensitivity in relation to the object's reflection coefficient.

- 90% white object
- 18% gray object



Object 20 x 20 cm

Proximity diffuse systems with background suppression enable the detection of colored objects, or objects with different reflection coefficients, at virtually the same distance.

- 90% white object
- 6% black object

Gain curves

Principle

The operating distance (S_a) is the assured operating distance of the sensor, accounting for the environment (dust, etc.) and the reflector used.

$S_a < S_n$ (S_n = nominal sensing distance).

The gain curve indicates the acceptable safety margin for a thru-beam or retroreflective system sensor before jeopardizing its correct operation.

The gain is defined by the following ratio:

$$\text{gain} = \frac{\text{signal received by the photo-transistor}}{\text{signal needed for switching}}$$

Gain 1 corresponds to the minimum signal received that causes the sensor's output to change state.

The following thresholds should be used, depending on the ambient conditions:

- gain ≥ 5 : slightly dusty environment
- gain ≥ 10 : polluted environment (dusty ambient air, slight mist)
- gain ≥ 50 : very polluted environment (fog, smoke, etc.)

The measured values are generally transcribed onto a log/log graph:

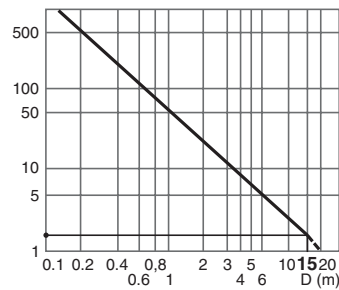
- the distances are shown by the x-axis
- the gain is shown by the y-axis

NOTE: The sensing distance varies with the temperature.

The nominal sensing distances, as indicated on the reference/characteristic pages for the various types of photoelectric sensors, account for these variations within the temperature limits shown.

Examples of excess gain curves

Thru-beam system: **XUJM1000 + XUJM100314**
(measurement made at ambient temperature 25 °C / 77 °F).

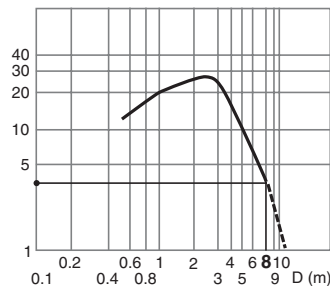


Nominal sensing distance
 $S_n = 20$ m

Polluted environment
(necessary gain = 10)
 $S_a \leq 3$ m

Very polluted environment
(necessary gain = 50)
 $S_a \leq 1$ m

Retroreflective system: **XUJM06031**
(measurement made at ambient temperature 25 °C / 77 °F, with reflector XUZC80).



Nominal sensing distance
 $S_n = 12$ m

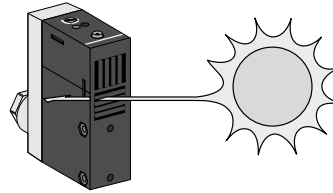
Polluted environment
(necessary gain = 10)
 $S_a \leq 5$ m

Photoelectric Sensors Standards and Certifications Parameters Related to the Environment

Influence of climatic environment

Ambient light

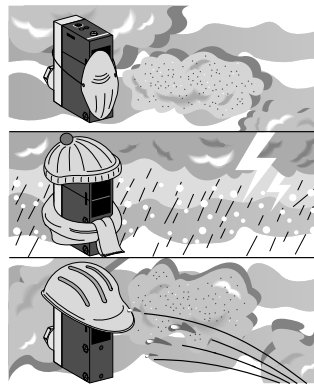
Standard photoelectric sensors are designed to have a high immunity to ambient light.



NOTE: Take precautions in the event of pulsed lights (such as neon signs, flashing beacons, and flash lights).

Dust, fumes, pollution, temperature, humidity

If the operating temperatures indicated on the reference/characteristic pages for the various sensors are not followed, the sensing distances will be affected, jeopardizing the correct operation of the unit.

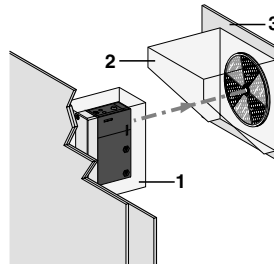


Behavior in environments with high levels of interference:

- retroreflective system: risk of unreliable operation
- proximity diffuse system: not recommended
- thru-beam system: recommended

Correction coefficients to be applied to sensing distances indicated:

- **1.00**: clean environment
- **0.60**: lightly polluted environment
- **0.25**: moderately polluted environment
- **0.10**: heavily polluted environment (for thru-beam system).



- 1 Protective cover
- 2 Sun shade
- 3 Thermally insulated support

Outdoor mounting:

Ensure that the sensor (and reflector) are well protected. Mount the sensor (and reflector) on a thermally insulated surface to prevent frost, ice, or condensation from affecting the optical components.

Resistance to chemicals in the environment

Due to the very wide range of chemicals encountered in modern industry, it is very difficult to give general guidelines common to all sensors. To ensure lasting efficient operation, it is essential that the chemicals coming into contact with the sensors do not affect their casings and, in doing so, prevent their reliable operation. Refer to "Enclosure Materials" on the specification pages relating to the various sensor models.

Resistance to shock

The sensors are tested in accordance with the standard IEC 60068-2-27.

Resistance to vibration

The sensors are tested in accordance with the standard IEC 60068-2-6.

Degrees of protection

Refer to the reference/characteristic pages for the various sensors.

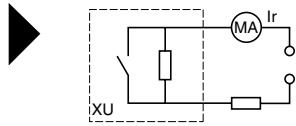
IP67: Protection against the effects of immersion, tested in accordance with the standard IEC 60529. Sensor immersed for 30 minutes in 1 m (3.28 ft) of water.

No deterioration in either operating or insulation characteristics is permitted.

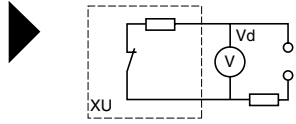
Photoelectric Sensors

Specific Aspects of Electronic Sensors

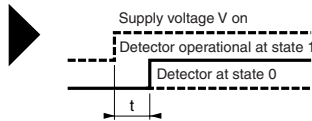
Terminology



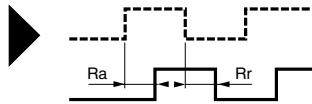
Leakage current (Ir):
The leakage current (Ir) corresponds to the current flowing through the sensor when in the open state.
Characteristic of 2-wire type photoelectric sensors.



Voltage drop (Vd):
The voltage drop (Vd) corresponds to the voltage at the sensor's terminals when in the closed state.
(Value measured at nominal current rating of sensor).
Characteristic of 2-wire type photoelectric sensors.



First-up delay:
The time (t) between the connection of the power supply to the photoelectric sensor and its fully operational state.



Other delays:

- **Response time (Ra):**
The time delay between entry of an object into the operating zone of the sensor, and the subsequent change of output state.
This parameter limits the speed and size of the object.
- **Recovery time (Rr):**
The time delay between an object leaving the operating zone, in which it is being detected, and the subsequent change of output state.
This parameter limits the interval between successive objects.

Supply

▶ **Photoelectric sensors for AC circuits**
(AC and AC/DC models)

Check that the voltage limits of the sensor are compatible with the rated voltage of the AC supply used.

▶ **Photoelectric sensors for DC circuits**

DC source: Check that the voltage limits of the sensor and the acceptable level of ripple, are compatible with the supply used.

AC source (comprising the transformer, rectifier, and smoothing capacitor):
The supply voltage must be within the operating limits specified for the sensor.
Where the voltage is derived from a single-phase AC supply, the voltage must be rectified and smoothed to ensure that:

- The peak voltage of the DC supply is lower than the maximum voltage rating of the sensor.
Peak voltage = nominal voltage $\times \sqrt{2}$
- The minimum voltage of the DC supply is greater than the minimum voltage rating of the sensor, given that:
 $\Delta V = (I \times t) / C$
 ΔV = maximum ripple: 10% (V)
I = anticipated load current (mA)
t = period of 1 cycle
(10 ms full wave rectified for a 50 Hz supply frequency voltage)
C = capacitance (μF)

As a general rule, use a transformer with a lower secondary voltage (Ve) than the required DC voltage (V).

Example:

18 Vac to obtain 24 Vdc

36 Vac to obtain 48 Vdc

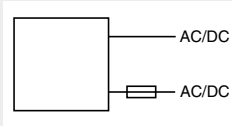
Fit a smoothing capacitor of 400 μF minimum per sensor, or 2,000 μF minimum per ampere required.

Photoelectric Sensors

Specific Aspects of Electronic Sensors

Types of output

2-wire



These sensors are wired in series with the load to be switched. As a result, they are subject to:

- a leakage current (in the open state)
- a voltage drop (in the closed state)

For polarized (polarity conscious) DC sensors, the supply polarities must be observed.

For non-polarized (not polarity conscious) AC sensors, the supply polarity load connections to + or - are immaterial.

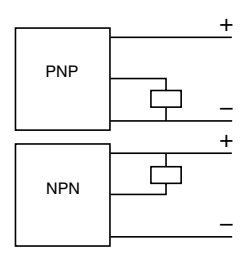
Advantages:

- The sensors can be wired in the same way as mechanical limit switches.
- For AC and AC/DC models, they can be connected to either positive (PNP) or negative (NPN) logic inputs (no risk of incorrect connections).

But:

Check the possible effects of residual current and voltage drop on the input device being controlled (pick-up and drop-out thresholds).

3-wire



These sensors comprise 2 wires for the DC supply and a third wire for transmission of the output signal.

- PNP type: switching the positive side to the load
- NPN type: switching the negative side to the load

The programmable universal sensors provide a choice of function, either: PNP/N.O., PNP/N.C., NPN/N.O., NPN/N.C.

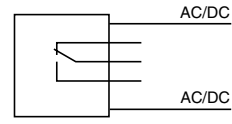
Advantages:

- No residual current, low voltage drop
- N.O. + N.C. versions, for solid-state input coincidence control (4-wire type: XUJ, XUC, and XUX)
- Programmable models, reduced stock levels

But:

Certain models must be used only with their designated PNP or NPN type of logic input.

5-wire



Sensors incorporating output relay.

Both AC and DC sensors have electrically separate supply and output circuits.

Advantages:

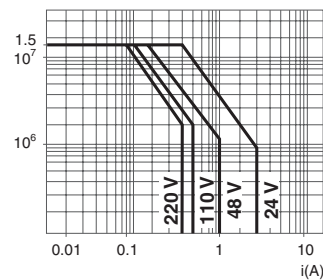
- Higher output current, no voltage drop, no residual current
- Flexibility of output voltage
- Suitability for use with PLCs

But:

Reduced service life and operating rate

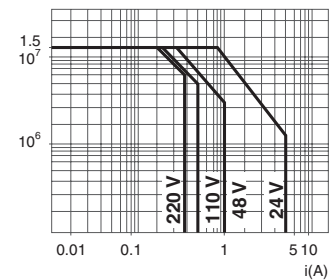
Example: XUJ, XUC, XUL and XUX sensors incorporating an output relay

Number of operating cycles



Service life for $\cos \varphi = 0.4$

Number of operating cycles



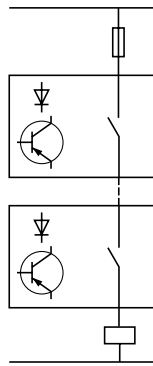
Service life for $\cos \varphi = 1$

Photoelectric Sensors

Electrical Installation of Electronic Sensors

Connection in series

2-wire type

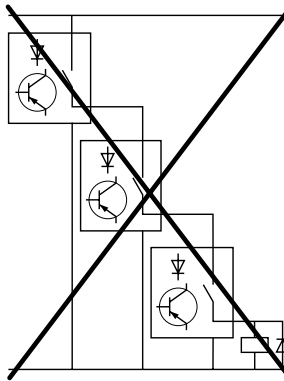


Consider the following points:

- Multivoltage sensors cannot be connected in series.
- When in the open state, all sensors share the supply voltage, i.e.:

$$U_{\text{sensor}} = \frac{U_{\text{supply}}}{n \text{ sensors}}$$
 (assuming that each sensor has the same residual current value).
 U sensor and U supply must remain within the sensor's voltage limits.
- If only one sensor in the circuit is in the open state, it will be supplied at a voltage almost equal to the supply voltage.
- When in the closed state, a small voltage drop is present across each sensor. The resultant loss of voltage at the load will be the sum of the individual voltage drops and, therefore, the load voltage should be selected accordingly.

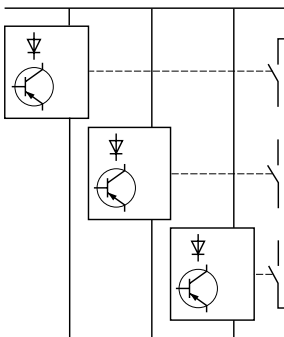
3-wire type



Not recommended. Prone to incorrect operation, must be pretested. Consider the following points:

- Sensor 1 carries the load current in addition to the no-load current consumption values of the other sensors connected in series. For certain models, this connection method is not possible unless a current limiting resistor is used.
- When in the closed state, each sensor produces a voltage drop and, therefore, the load voltage should be selected accordingly.
- When sensor 1 closes, sensor 2 does not operate until a certain time T has elapsed (corresponding to the first-up delay) and likewise for each sensor in the sequence.
- Flywheel diodes should be used when the load being switched is inductive.

5-wire type



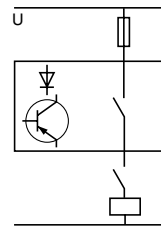
For these sensors the supply and output circuits are electrically separate.

- The sensor/relay contact galvanic isolation is 1,500 to 2,500 V, depending on the model.
- The maximum voltage across each contact is 250 V.

Connection in series (continued)

Wiring sensor with mechanical contact

2- and 3-wire type sensors

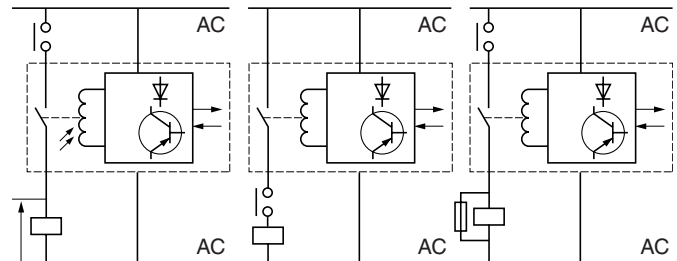


Consider the following points:

- When the mechanical contact is open, the photoelectric sensor is not supplied.
- When the contact closes, the sensor does not operate until a certain time T has elapsed (corresponding to the first-up delay).

5-wire type sensors

Usage of schemes 2 or 3 is recommended. In scheme 1, as the external series contact opens, the voltage transient caused by the breaking of the inductive load will appear inside the sensor and, if greater than the recommended maximum insulation voltage, may cause a flashover within the sensor. The return path of this voltage will be back to one line of the supply, through the sensor, and should flashover occur anywhere on the printed circuit board, severe damage could occur.



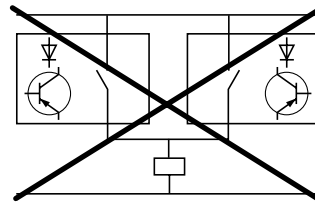
Scheme 1

Scheme 2

Scheme 3

Connection in parallel

2-wire type



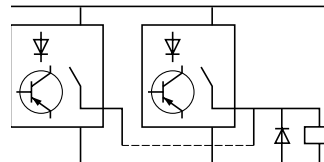
Using sensors wired in parallel, either between themselves or together with mechanical contacts, is not recommended.

Should one of the sensors be in the closed state, the sensor in parallel will be shorted out and no longer supplied. As the first sensor passes into the open state, the second sensor will become energized and will be subject to its first-up delay.

The configuration is only permissible where the sensors will be working alternately.

This method of connection can lead to irreversible damage of the units.

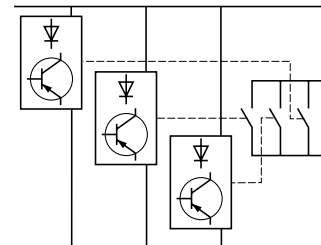
3-wire type



No restrictions.

Using flywheel diodes is recommended when an inductive load (relay) is being switched.

5-wire type



No restrictions.

For these sensors, the supply and output circuits are electrically separate.

The sensor/relay contact galvanic isolation is 1,500 to 2,500 V, depending on the model.

The maximum voltage across each contact is 250 Vac, depending on the model.

Photoelectric Sensors

Electrical Installation of Electronic Sensors

Wiring advice

Cable length

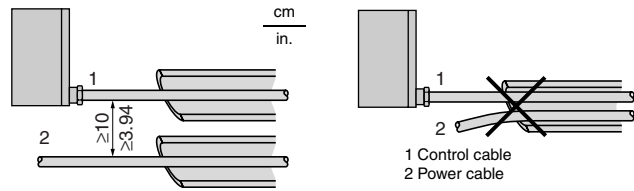
No limitation up to 200 m (656 ft) or up to a line capacitance of $\leq 0.1 \mu\text{F}$ (characteristics of the sensor remain unaffected). However, it is advisable to account for voltage drop on the line.

Separation of control and power cables

Telemecanique® photoelectric sensors are immune to electrical interference encountered in normal industrial conditions. Where extreme conditions of electrical noise could occur (large motors, spot-welders, etc.), protect against transients in the normal way:

- suppress interference at the source
- limit the cable length
- separate power and control wiring from each other
- filter the supply
- use twisted and shielded cable pairs for output signals

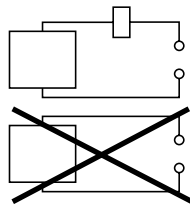
In cases necessitating intervention at the machine (such as arc welding), disconnect the sensors.



Dust and damp protection of cable glands

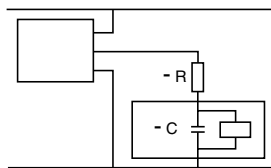
The level of dust and damp protection depends on how carefully the screws, seals, cable glands, blanking plugs, etc. are tightened. To ensure efficient dust and damp protection, use the correct diameter cable for the cable gland used.

AC supply



2-wire type sensors must not be connected directly to an AC supply. *This would result in immediate destruction of the sensor and considerable danger to the user.* An appropriate load (refer to the instruction sheet supplied with the sensor) must always be connected in series with the sensor.

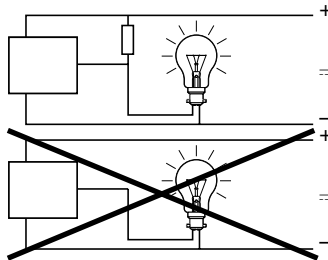
Capacitive load (greater than 0.1 μF)



At switch-on, it is necessary to limit (by resistor) the charging current of the capacitive load C. The voltage drop in the sensor can also be accounted for by subtracting it from the supply voltage for calculation of R.

$$R = \frac{V \text{ (supply)}}{I \text{ max. (sensor)}}$$

Load comprising an incandescent lamp



If the load comprises an incandescent lamp, the cold state resistance can be one-tenth that of the hot state resistance. This can cause very high current levels on switching. Fit a pre-heat resistance in parallel with the photoelectric sensor.

$$R = \frac{V^2}{P} \times 10$$

V = supply voltage
P = lamp power

Photoelectric Sensors

Electrical Installation of Electronic Sensors

Troubleshooting

Problem	Possible causes	Remedy
The sensor's output does not change state when an object enters the operating zone.	Output stage faulty or complete failure of the sensor (in either case, the sensor must be replaced), or the short-circuit protection has tripped	Check that the sensor is compatible with the supply being used. Check the load current characteristics: <ul style="list-style-type: none"> If load current $I \geq$ maximum current, a relay should be interposed between the sensor and the load. If load current $I \leq$ maximum current, check for wiring faults (short circuit). In any case, a quick-blow fuse should be placed in series with the sensor.
	Wiring error	Verify that the wiring conforms to the wiring shown on the sensor label or instruction sheet.
	Supply fault	Check that the sensor is compatible with the supply (AC or DC). Check that the supply voltage is within the voltage limits of the sensor. Remember that with rectified, filtered supply: $d(U_{\text{peak}} = U_{\text{nominal}} \times \sqrt{2})$.
	With a retroreflective system: <ul style="list-style-type: none"> incorrect use of reflector poor state of reflector 	The retroreflective system must operate in conjunction with a reflector. Respect the operating distances. Clean the reflector. Replace the reflector if it has been damaged.
Operation is false or erratic, with or without the presence of an object in the operating zone	Influence of reflective background or object surface (stray reflections)	Refer to the instruction sheet supplied with the sensor. For adjustable sensors, reduce or increase the sensing distance.
	Operating distance poorly defined for the reflector or object used	Apply the correction coefficients. Realign the system. Clean the reflector or, if damaged, replace it.
	Influence of immediate environment	Clean the lenses and reflector. Fit a lens hood, where required.
	Influence of transient interference on the supply lines.	Ensure that any DC supplies, when derived from rectified AC, are correctly smoothed ($C > 400 \mu\text{F}$). Separate AC power cables and DC low level cables. Where very long distances are involved, use suitable cable: screened and twisted pairs of the correct cross-sectional area.
	Presence of equipment liable to emit electromagnetic interference	Position the sensors as far away as possible from any sources of interference.
	Response time of the sensor too slow for the particular object to be detected	Check the suitability of the sensor for the object to be detected. If necessary, select a photoelectric sensor with a higher switching frequency.
	Influence of high temperature	Eliminate sources of radiated heat, or protect the sensor casing with a heat shield. Adjust the temperature around the mounting support, and realign.
No detection following a period of service	Vibration, shock	Realign. Change the support, or protect the sensor.
	Contact deterioration	On an inductive load, use an RC suppressor connected in parallel with the load. Example: LA4D*** To eliminate contact contamination, the minimum current recommended is 15 mA. The relay output models are not recommended for rapid counting of objects, since their service life is too short. Use models with a solid-state output.
	Dusty atmosphere	Clean the lenses and reflectors with a soft cloth.

Proximity Sensors

Catalog
September

07

File 9006



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Proximity Sensors

Inductive Sensors

Interpretation of Catalog Numbers

Proximity

Proximity Sensors	Example	X	S	8	C	1	A	1	P	A	L	2					
Inductive Sensor																	
TYPE																	
Tubular Optimum				5													
Tubular Universal				6													
Optimum Rectangular				7													
Universal Rectangular				8													
Application Specific				9													
FORMAT OR MODE																	
Rectangular 8 x 8 x 20 mm					J	1											
Rectangular 8 x 15 x 32 mm					F	1											
Rectangular 13 x 26 x 26 mm					E	1											
Rectangular 15 x 40 x 40 mm					C	1											
Rectangular 26 x 80 x 80 mm					D	1											
Tubular Smooth 4 mm					L	4											
Tubular 5 mm					0	5											
Tubular Smooth 6 mm					L	6											
Tubular 8 mm					0	8											
Tubular 12 mm					1	2											
Tubular 18 mm					1	8											
Tubular 30 mm					3	0											
FAMILY TYPE OR MATERIAL																	
Applications									1-9								
Plastic									A								
Metal									B								
Stainless Steel									S								
APPLICATION																	
Operating Mode									1-9								
Food and Beverage									A								
Namur									E								
Ferrous Only									F								
Light Industry									L								
Ferrous/Non-Ferrous									M								
Non-Ferrous only									N								
Speed Control									R								
Serdac									S								
Weld Field Immune									W								
OUTPUTS																	
DC 3-Wire PNP									P								
DC 3-Wire NPN									N								
DC 3-Wire PNP/NPN									K								
DC 2-Wire (3/4)									D								
DC 2-Wire Automobile (1/4)									C								
DC Analog Output									A								
AC 2-Wire									F								
AC/DC 2-Wire									M								
AC/DC 2-Wire SCP Protect									S								
AC/DC Relay Output									R								
Bus									B								
FUNCTION																	
Analog 0-10 mA									1								
Analog 4-20 mA									2								
N.O.									A								
N.C.									B								
N.O. + N.C.									C								
Programmable/Wiring									P								
Programmable									S								
CABLING OR CONNECTION																	
M8 x 1 Nano (S)										M	8						
M12 x 1 Micro (D)										M	1	2					
7/8 16UN Mini (A)										U	7	8					
1/2 20 UNF Micro (K)										U	2	0					
Cable 0.1 m (3.9 in.)										L	0	1					
Cable 2 m (6.6 ft)										L	2						
Cable 5 m (16.4 ft)										L	5						
Cable 10 m (32.8 ft)										L	1	0					
M12 Micro on 0.1 m (3.9 in.) Pigtail										L	0	1		M	1	2	
PG 16 Cable Gland										T	1	6					

NOTE: Use these tables only for interpreting the catalog number. Some combinations are not available. Consult your local field office.

Proximity Sensors

Inductive Sensors

Interpretation of Catalog Numbers

Rectangular	Example	X	S	7	C	4	0	P	C	4	4	0	R30	H*
SENSOR TYPE														
Self Contained		X												
Component		Z												
SENSING TECHNOLOGY														
Inductive Proximity			S											
Capacitive Proximity			T											
BODY STYLE														
Miniature				5										
Shielded				7										
Non-Shielded				8										
Block Style				D										
FAMILY TYPE														
Limit Switch Style—Plastic Body					C									
Compact Block					G									
Subcompact Block					H									
Miniature					L									
Cubic					T									
MANUFACTURING CODES														
						.	.							
OUTPUT TYPE														
NPN								N	P					
PNP								P	P					
AC/DC Universal								M	A					
2-Wire N.O./N.C.								D	P					
NPN N.O.+N.C.								N	C					
PNP N.O.+N.C.								P	C					
MANUFACTURING CODES														
										.	.	.		
SUFFIX														
2 m Cable or Conduit Opening													Blank	
Micro-Connector—DC													D	
Alternate Frequency													F	
Micro-Connector—AC/DC													K	
5 m (16.4 ft) Cable													L2	
10 m (32.8 ft) Cable													L10	
Mini-Connector, Normally Open													R30	
Mini-Connector, Normally Closed													R31	
Nano-Connector—DC													S	
Bulk Pack													TQ	

* H suffix, which may appear on the device or carton label, is for manufacturing purposes only. It designates compliance with specific national standards. EX: H7 = UL and CSA approval, 0.5 in. conduit opening (where applicable). Do not use H suffixes when ordering (except when non-U.S. standards are required)


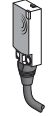

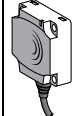
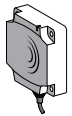
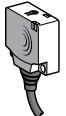


Tubular	Example	X	S	1	M	1	8	P	A	3	7	0	D
SENSOR TYPE													
Self Contained		X											
SENSING TECHNOLOGY													
Inductive Proximity			S										
Capacitive Proximity			T										
BODY TYPE													
Shielded—Metal Body				1									
Non-Shielded—Metal Body				2									
Non-Shielded—Plastic Body				4									
TYPE OF ENCLOSURE OR FAMILY													
Economy					D								
Standard Length—Threaded Metal Case					M								
Short Length—Threaded Metal Case					N								
Unthreaded Metal Case					L								
Threaded Plastic Case					P								
BARREL DIAMETER													
4 mm						0	4						
5 mm						0	5						
6 mm						0	6						
8 mm						0	8						
12 mm						1	2						
18 mm						1	8						
30 mm						3	0						
32 mm						3	2						
MODEL TYPE													
Analog								AB					
DC PNP								P					
DC NPN								N					
DC PNP/NPN, N.O./N.C. (Selectable)								K					
DC 2-Wire								D					
AC/DC 2-Wire (Universal)								M					
OUTPUT MODE													
N.O. (Normally Open)									A				
N.C. (Normally Closed)									B				
N.O. + N.C. Complementary									C				
N.O. or N.C. Selectable									P				
MANUFACTURING CODES													
										.	.	.	
CONNECTORS													
Nano (M8), DC Only													S
Micro, DC Only													D
Micro, AC Only													K
Mini, AC or DC													A
Micro, DC Pigtail													LD
Mini, AC or DC Pigtail													LA
EXTENDED CABLE LENGTH													
5 m													L1
10 m													L2


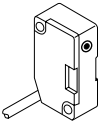

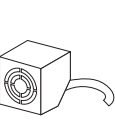
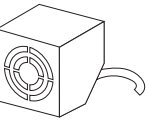
Proximity

Proximity Sensors

Selection Guide

Rectangular

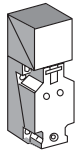
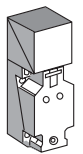
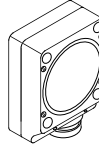
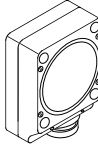
Description	Plastic, Shielded, Fixed and Adjustable Sensing Range							
	Fixed Sensing Range					Auto-Adaptable Adjustable Sensing Range		
	XS7					XS8		
								
Size / Dimensions H x W x D (mm)	J 22 x 8 x 8	F 32 x 15 x 8	E 26 x 26 x 13	C 40 x 40 x 15	D 80 x 80 x 26	E 26 x 26 x 13	C 40 x 40 x 15	D 80 x 80 x 26
Nominal Sensing Distance S _n (mm)	2.5	5	10	15	40	15	25	60
Supply (Voltage Limits)								
DC 3-Wire	10–36 V	10–36 V	10–36 V	10–36 V	10–36 V	10–36 V	10–36 V	10–36 V
Maximum Load	100 mA	100 mA	100 mA	100 mA	100 mA	100 mA	200 mA	200 mA
DC 2-Wire	10–36 V	10–36 V	10–36 V	10–36 V	10–36 V	—	—	—
Maximum Load	100 mA	100 mA	100 mA	100 mA	100 mA	—	—	—
AC/DC 2-Wire	—	—	—	—	—	20–264 V	20–264 V	20–264 V
Maximum Load	—	—	—	—	—	200 mA	300 mA	300 mA
Enclosure Rating								
Cable Version	IP68	IP68	IP68	IP68	IP68	IP68	IP68	IP68
Connector Version	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67
Connection								
Cable	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)
Connector	M8	M8	M8/M12	M8/M12	M12	M8/M12 / U20	M8/M12 / U20	M12 / U20
Temperature Range	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)
Page Number	182	182	182	182	182	180	180	180

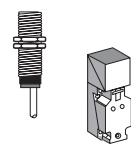


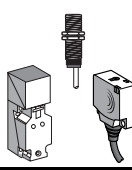
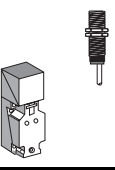

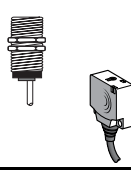
Description	Plastic, Classic, Rectangular, Shielded and Non-Shielded					
	Miniature		Compact			
	XS5L		XS7G/H/T; XS8G/H/T			
						
Size (mm)	8 x 43		10 x 28	26 x 40	26 x 26	40 x 40
Nominal Sensing Distance Shielded S _n (mm)	1.5		2	2	10	15
Nominal Sensing Distance Non-Shielded S _n (mm)	—		3	4	15	20
Supply (Voltage Limits)						
DC 3-Wire	10–30 V		10–30 V	10–30 V	10–58 V	10–58 V
Maximum Load	100 mA		200 mA	200 mA	200 mA	200 mA
DC 2-Wire	—		—	—	10–58 V	10–58 V
Maximum Load	—		—	—	100 mA	100 mA
DC 4-Wire	—		—	10–58 V	10–58 V	10–58 V
Maximum Load	—		—	200 mA	200 mA	200 mA
AC 2-Wire	—		—	—	—	—
Maximum Load	—		—	—	—	—
AC/DC 2-Wire	—		—	20–264 V	—	—
Maximum Load	—		—	200 mA	—	—
Dimensions	Cable 43 x 8 x 8		28 x 10 x 16	40 x 12 x 26	26 x 26 x 26	40 x 40 x 40
(mm)	Connector 49 x 8 x 8		—	45 x 12 x 31	26 x 26 x 29	40 x 40 x 44
Enclosure Rating						
Cable Version	IP67		IP67	IP67	IP67	IP67
Connector Version	IP67		—	IP67	IP67	IP67
Connection						
Cable	2 m (6.6 ft)		2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)
Connector	M8		—	M8	M12	M12
Temperature Range	-13 to +158 °F (-25 to +70 °C)		-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)
Page Number	246		248	250	252	252

Proximity Sensors

Selection Guide

Rectangular and Application Specific












Description	Plastic, Classic, Rectangular, Shielded and Non-Shielded			
	Limit switch style		Long Range Block	
	XS7C/XS8C	XS8 IQ Prox	XSD	
				
Dimensions (mm)	117 x 40 x 40	117 x 40 x 40	100 x 80 x 40	100 x 80 x 40
Nominal Sensing Distance Shielded Sn (mm)	15	25	40	—
Nominal Sensing Distance Non-Shielded Sn (mm)	20	25	50	30–60
Supply (Voltage Limits)				
DC 3-Wire	10–58 V	19–30 V	—	—
Maximum Load	200 mA	200 mA	—	—
DC 2-Wire	10–58 V	—	10–58 V	10–58 V
Maximum Load	100 mA	—	100 mA	100 mA
DC 4-Wire	10–58 V	—	10–58 V	10–58 V
Maximum Load	200 mA	—	200 mA	200 mA
AC 2-Wire	20–264 V	—	20–264 V	20–264 V
Maximum Load	350 mA	—	500 mA	500 mA
AC/DC 2-Wire	20–264 V	—	—	—
Maximum Load	200 mA	—	—	—
Enclosure Rating				
Conduit Version	IP67	IP67	IP67	IP67
Connection				
Conduit	1/2 in. NPT	1/2 in. NPT	1/2 in. NPT	1/2 in. NPT
Temperature Range	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)
Page Number	254	256	258	260

Description	Tubular and Rectangular, Application Specific						
	Selective F, NF, N&NF	WFI	Factory Mutual (FM)	Analog	Capacitive	Magnet-Actuated	Rotation Control
							
Size (mm)	18, 30 mm Limit Switch	12, 18 mm Compact Block Style	4, 5, 6.5, 8, 12, 18, 30 mm Block Style	12, 18, 30 mm, F, E, C, D Limit Switch	12, 18, 30, 32 mm Limit Switch	Compact Block or Tubular Style	30 mm E, C
Nominal Sensing Distance Shielded Sn (mm) Maximum Sn shown	5–40	2–10	0.8–40	2–60	2–15	—	10–15
Supply (Voltage Limits)							
DC 3-Wire	10–38 V	10–36 V	—	24 V / 48 V	10–38 V	—	10–58 V
Maximum Load	200 mA	250 mA	—	—	300 mA	—	200 mA
DC 4-Wire	10–38 V	—	—	—	—	—	—
Maximum Load	200 mA	—	—	—	—	—	—
DC 2-Wire	—	10–58 V	7–12 V	24 V / 48 V	—	200 V	—
Maximum Load	—	100 mA	1.65 mA	—	—	0.5 A	—
AC 2-Wire	—	93–132 V	—	—	20–264 V	120–240 V	—
Maximum Load	—	150 mA	—	—	350 mA	0.5 A	—
AC/DC 2-Wire	20–264 V	—	—	—	—	130–200 V	20–264 V
Maximum Load	300 mA	—	—	—	—	0.5 A	0.35 A
Enclosure Rating							
Cable Version	IP68	IP67	IP64/IP67	IP67	IP63/IP67	IP67	IP67
Connector Version	IP67	IP67	—	IP67	—	IP67	IP67
Conduit Entry	IP67	IP67	—	IP67	—	IP67	—
Temperature Range	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-13 to +158 °F (-25 to +70 °C)	-40 to +140 °F (-40 to +60 °C)	-13 to +158 °F (-25 to +70 °C)
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Proximity Sensors

Selection Guide












Tubular

Description	Metal, Fully Shielded, Fixed Sensing Range								Metal, Fully Shielded/ Non-Shielded		
	Standard Sensing Range				Extended Sensing Range				Auto-Adaptable Adjustable Range		
	XS5				XS6				XS6		
											
Diameter (mm)	Ø 8	Ø 12	Ø 18	Ø 30	Ø 8	Ø 12	Ø 18	Ø 30	Ø 12	Ø 18	Ø 30
Nominal Sensing Distance Sn (mm)	1.5	2	5	10	2.5	4	8	15	4	8	15
Supply (Voltage Limits)											
DC 3-Wire	10–36 V	10–36 V	10–36 V	10–36 V	10–58 V	10–58 V	10–58 V	10–58 V	10–36 V	10–36 V	10–36 V
Maximum Load	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA	100 mA	100 mA	100 mA
Dimensions (mm)	Cable	M8 x 33	M12 x 33	M18 x 36.5	M30 x 40.6	M8 x 50	M12 x 50	M18 x 60	M18 x 60	—	—
	Connector	M8 x 42	M12 x 48	M18 x 48.6	M30 x 50.7	M8 x 61	M12 x 61	M18 x 72.2	M30 x 72.2	M12 x 50	M18 x 60
DC 2-Wire	10–58 V	10–58 V	10–58 V	10–58 V	—	—	—	—	—	—	—
Maximum Load	100 mA	100 mA	100 mA	100 mA	—	—	—	—	—	—	—
Dimensions (mm)	Cable	M8 x 50	M12 x 50	M18 x 52.5	M30 x 50	—	—	—	—	—	—
	Connector	M8 x 61	M12 x 61	M18 x 64.6	M30 x 64.2	—	—	—	—	—	—
DC 4-Wire	—	—	—	—	—	—	—	—	—	—	—
Maximum Load	—	—	—	—	—	—	—	—	—	—	—
Dimensions (mm)	Cable	—	—	—	—	—	—	—	—	—	—
	Connector	—	—	—	—	—	—	—	—	—	—
AC/DC 2-Wire	—	—	—	—	—	20–264 V	20–264 V	20–264 V	—	—	—
Maximum Load	—	—	—	—	—	100 mA	100 mA	100 mA	—	—	—
Dimensions (mm)	Cable	—	—	—	—	M12 x 50	M18 x 60	M30 x 60	—	—	—
	Connector	—	—	—	—	M12 x 61	M18 x 72.2	M30 x 72.2	—	—	—
Enclosure Rating											
Cable	IP67	IP68	IP68	IP68	IP67	IP68	IP68	IP68	—	—	—
Connector	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67
Connection											
Cable Version	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	—	—	—
Connector Version	M8	M12	M12	M12	M8	M12/U20	M12/U20	M12/U20	—	—	—
Operating Temperature	°F	-13 to +158	-13 to +158	-13 to +158	-13 to +158	-13 to +158	-13 to +158	-13 to +158	-13 to +158	-13 to +158	-13 to +158
	°C	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70
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Proximity Sensors

Selection Guide

Tubular

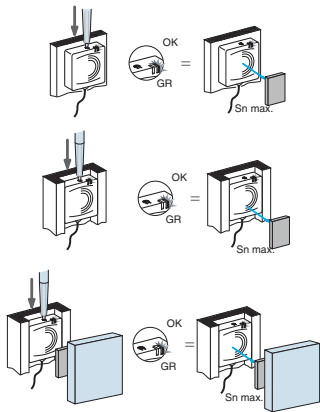
Description	Plastic, Non-Shielded				Metal, Shielded/Non-Shielded, Fixed Sensing Range							
	Standard Sensing Range				Standard Sensing Range (Classic)				Nominal Range, Miniature			
	XS4P				XS1M/N; XS2M/N				XS1L/N; XS2L/N			
												
Diameter (mm)	Ø 8	Ø 12	Ø 18	Ø 30	Ø 8	Ø 12	Ø 18	Ø 30	Ø 4	Ø 5	Ø 6.5	
Nominal Sensing Distance Shielded Sn (mm)	—	—	—	—	1.5	2	5	10	1	1	1.5	
Nominal Sensing Distance Non-Shielded Sn (mm)	2.5	4	8	15	2.5	4	8	15	—	—	2.5	
Supply (Voltage Limits)												
DC 3-Wire	10–38 V	10–38 V	10–38 V	10–38 V	10–58 V	10–58 V	10–58 V	10–58 V	5–30 V	5–30 V	10–38 V	
Maximum Load	200 mA	200 mA	200 mA	200 mA	100 mA	200 mA	200 mA	200 mA	100 mA	100 mA	200 mA	
Dimensions (mm)	Cable	M8 x 33	M12 x 33	M18 x 33	M30 x 40	M8 x 50	M12 x 50	M18 x 60	M30 x 60	M4 x 29	M5 x 29	M6.5 x 33
	Connector	M8 x 45	M12 x 45	M18 x 45	M30 x 50	M8 x 61	M12 x 61	M18 x 70	M30 x 70	M4 x 41	M5 x 41	M6.5 x 45
DC 2-Wire	—	—	—	—	10–58 V	10–58 V	10–58 V	10–58 V	—	—	—	
Maximum Load	—	—	—	—	100 mA	100 mA	100 mA	100 mA	—	—	—	
Dimensions (mm)	Cable	—	—	—	—	—	—	—	—	—	—	
	Connector	—	—	—	—	—	—	—	—	—	—	
DC 4-Wire	10–38 V	10–38 V	10–38 V	10–38 V	—	—	—	—	—	—	10–38 V	
Maximum Load	200 mA	200 mA	200 mA	200 mA	—	—	—	—	—	—	200 mA	
Dimensions (mm)	Cable	M8 x 50	M12 x 50	M18 x 60	M30 x 60	—	—	—	—	—	M6.5 x 50	
	Connector	M8 x 61	M12 x 61	M18 x 70	M30 x 70	—	—	—	—	—	—	
AC/DC 2-Wire	20–264 V	20–264 V	20–264 V	20–264 V	20–264 V	20–264 V	20–264 V	20–264 V	—	—	—	
Maximum Load	100 mA	200 mA	200 mA	200 mA	100 mA	200 mA	200 mA	200 mA	—	—	—	
Dimensions (mm)	Cable	M8 x 50	M12 x 50	M18 x 60	M30 x 60	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	—	—	—
	Connector	M8 x 61	M12 x 61	M18 x 70	M30 x 70	U20	U20	U20/U78	U20/U78	—	—	—
Enclosure Rating												
Cable	IP67	IP68	IP68	IP68	IP67	IP68	IP68	IP68	IP67	IP67	IP67	
Connector	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	
Connection												
Cable	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	2 m (6.6 ft)	
Connector	M8/U20	M12/U20	M12/U20	M12/U20	M12/U20	M12/U20	M12/U20	M12/U20	M8	M8	M8/M12	
Operating Temperature	°F	-13 to +158	-13 to +158	-13 to +158	-13 to +158	-13 to +176	-13 to +176	-13 to +176	-13 to +176	-13 to +158	-13 to +158	-13 to +158
	°C	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +80	-25 to +80	-25 to +80	-25 to +80	-25 to +70	-25 to +70	-25 to +70
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Proximity

Proximity Sensors

Selection Guide

Auto-Adaptable Technology

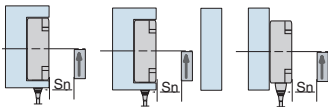


Principle of Operation

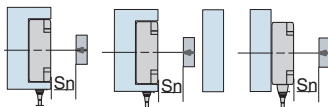
Osiconcept technology offers simplicity through innovation.

With Osiconcept, a single product meets all metal-object detection needs. By simply pressing the Teach Mode button, the product automatically adapts to an optimum configuration for all detection, flush mountability, and environmental requirements. Other advantages of Osiconcept technology include:

- Increased Performance
 - Sensing distance is optimized regardless of the mounting configuration, the object, the environment, or the background.
 - Products are suitable for all metal environments.
- Simplified Use
 - Osiconcept technology is associated with the availability of the flattest, most compact sensors on the market, ensuring that the sensor is fully built into the machine, limiting risks of mechanical damage.
 - Using the teach mode eliminates mechanical adjustments.
- Lower Costs
 - Adjustment times and complex supports are eliminated.
 - The elimination of flush-mountable and non-flush-mountable versions halves the number of catalog numbers.
 - Product selection is easier and quicker.



Precision side-approach detection



Precision frontal-approach detection

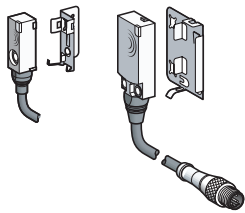
Fine Adjustment for Precise Positioning

- Precision **side-approach** detection makes it possible to accurately define the position where the object is detected as it passes the sensor. With Osiconcept technology, the desired detection position can be stored in memory by simply pressing the teach button.
- Precision **frontal-approach** detection makes it possible to accurately define the position where the object is detected as it approaches the sensor. With Osiconcept technology, the desired detection position can be stored in memory by simply pressing the teach button.

Installation

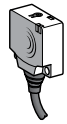
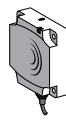
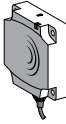
A full line of support brackets allows for simple, fast installation or maintenance. No tools are necessary; clip the sensor into place, and it is mounted and ready for operation. Brackets are available for all sizes—J, F, E, C, D—in flat and 90° styles.

Brackets are also available to substitute for existing XS•E, XS•C, and XS•D. See page 284.






Proximity Sensors Selection Guide Auto-Adaptable Technology

Flat

Dimensions, in. (mm)	0.51 x 1.0 x 1.0 (13 x 26 x 26)	1.57 x 1.57 x 0.59 (40 x 40 x 15)	3.14 x 3.14 x 1.0 (80 x 80 x 26)
	Size E 	Size C 	Size D 
Applications	Machine Tooling, Molding, Welding Machinery, and Packaging		Material Handling, Conveyors
Sn—Flush Mounted, in. (mm)	0.2–0.39 (5–10)	0.31–0.59 (8–15)	0.78–1.57 (20–40)
Sn—Non-Flush Mounted, in. (mm)	0.2–0.59 (5–15)	0.31–0.98 (8–25)	0.78–2.36 (20–60)
Catalog Number	XS8E1A1	XS8CE1A1	XS8D1A1
Pages	180	180	180

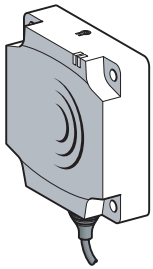
Tubular

Dimensions, in. (mm)	0.47 (12)	0.71 (18)	1.18 (30)
			
Applications	Machining, Food Industry		
Sn—Flush Mounted, in. (mm)	0.07–0.13 (1.7–3.4)	6.14–0.27 (3.5–7)	0.24–0.47 (6–12)
Sn—Non-Flush Mounted, in. (mm)	0.07–0.20 (1.7–5)	0.14–0.40 (3.5–10)	0.24–0.71 (6–18)
Catalog Number	XS612B•	XS618B•	XS630B•
Pages	184	184	184

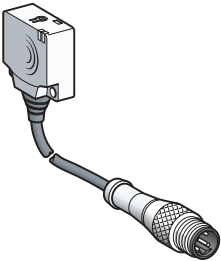
Proximity Sensors

XS8 Auto-Adaptable Inductive Sensor

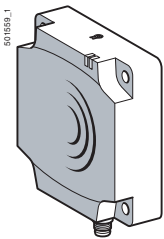
Flat Rectangular, DC and AC/DC



XS8 •1A1...L2

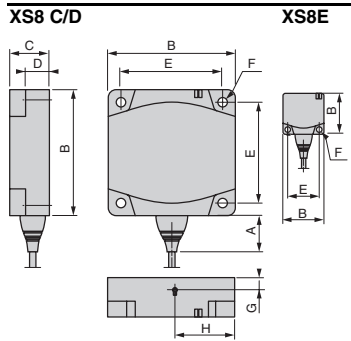


XS8 E1A1...M8



XS8 E1A1...M8
XS8 C1A1...M8

Dimensions



XS8	A	A	B	C	D	E	F	G	H
	L2	M12							
E	0.55	0.4	1.0	0.5	0.3	0.8	0.1	0.26	0.25
	14	11	26	13	8.8	20	3.5	6.8	6.6
C	0.55	0.4	1.6	0.6	0.4	1.3	0.1	0.32	0.53
	14	11	40	15	9.8	33	4.5	8.3	13.6
D	0.9	0.5	3.1	1.0	0.6	2.5	0.2	0.33	1.5
	23	14	80	26	16	65	5.5	8.5	37.8

in.
mm

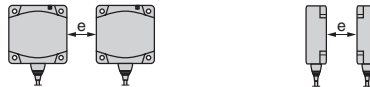
Features

- Enhanced sensing distances
- Self-adapting to flush or non-flush mounted environments
- 3-wire DC and 2-wire AC/DC
- Self-teaching

Nominal Sensing Distance	Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency	Catalog Number
DC						
Size E (13 x 26 x 26 mm) 2 m (6.6 ft) cable ▲						
15 mm	PNP	N.O.*	12–24 Vdc	100 mA	1,000 Hz	XS8E1A1PAL2
15 mm	NPN	N.O.*	12–24 Vdc	100 mA	1,000 Hz	XS8E1A1NAL2
Size E (13 x 26 x 26 mm) M8 connector						
15 mm	PNP	N.O.*	12–24 Vdc	100 mA	1,000 Hz	XS8E1A1PAM8
15 mm	NPN	N.O.*	12–24 Vdc	100 mA	1,000 Hz	XS8E1A1NAM8
Size E (13 x 26 x 26 mm) M12 pigtail, 0.1 m (3.9 in.)						
15 mm	PNP	N.O.*	12–24 Vdc	100 mA	1,000 Hz	XS8E1A1PAL01M12
15 mm	NPN	N.O.*	12–24 Vdc	100 mA	1,000 Hz	XS8E1A1NAL01M12
Size C (15 x 40 x 40 mm) 2 m (6.6 ft) cable ▲						
25 mm	PNP	N.O.*	12–24 Vdc	200 mA	1,000 Hz	XS8C1A1PAL2
25 mm	NPN	N.O.*	12–24 Vdc	200 mA	1,000 Hz	XS8C1A1NAL2
Size C (15 x 40 x 40 mm) M8 connector						
25 mm	PNP	N.O.*	12–24 Vdc	200 mA	1,000 Hz	XS8C1A1PAM8
25 mm	NPN	N.O.*	12–24 Vdc	200 mA	1,000 Hz	XS8C1A1NAM8
Size C (15 x 40 x 40 mm) M12 pigtail, 0.1 m (3.9 in.)						
25 mm	PNP	N.O.*	12–24 Vdc	200 mA	1,000 Hz	XS8C1A1PAL01M12
25 mm	NPN	N.O.*	12–24 Vdc	200 mA	1,000 Hz	XS8C1A1NAL01M12
Size D (26 x 80 x 80 mm) 2 m (6.6 ft) cable ▲						
60 mm	PNP	N.O.*	12–24 Vdc	200 mA	100 Hz	XS8D1A1PAL2
60 mm	NPN	N.O.*	12–24 Vdc	200 mA	100 Hz	XS8D1A1NAL2
Size D (26 x 80 x 80 mm) M12 connector						
60 mm	PNP	N.O.*	12–24 Vdc	200 mA	100 Hz	XS8D1A1PAM12
60 mm	NPN	N.O.*	12–24 Vdc	200 mA	100 Hz	XS8D1A1NAM12
AC						
Size E (13 x 26 x 26 mm) 2 m (6.6 ft) cable ▲						
15 mm	2-wire	N.O.*	24–240 Vac/24–210 Vdc	5–200 mA	1,000/50 Hz	XS8E1A1MAL2
Size E (13 x 26 x 26 mm) U20 pigtail, 0.1 m (3.9 in.)						
15 mm	2-wire	N.O.*	24–240 Vac/24–210 Vdc	5–200 mA	1,000/50 Hz	XS8E1A1MAL01U20
Size C (15 x 40 x 40 mm) 2 m (6.6 ft) cable ▲						
25 mm	2-wire	N.O.*	24–240 Vac/24–210 Vdc	5–300 mA	1,000/50 Hz	XS8C1A1MAL2
Size C (15 x 40 x 40 mm) U20 pigtail, 0.1 m (3.9 in.)						
25 mm	2-wire	N.O.*	24–240 Vac/24–210 Vdc	5–300 mA	1,000/50 Hz	XS8C1A1MAL01U20
Size D (26 x 80 x 80 mm) 2 m (6.6 ft) cable ▲						
60 mm	2-wire	N.O.*	24–240 Vac/24–210 Vdc	5–300 mA	100/50 Hz	XS8D1A1MAL2
Size D (26 x 80 x 80 mm) U20 connector						
60 mm	2-wire	N.O.*	24–240 Vac/24–210 Vdc	5–300 mA	100/50 Hz	XS8D1A1MAU20

★ To order a normally closed (N.C.) version, change the A to B. Example: XS8C1A1PAL2 to XS8C1A1PBL2.
▲ For a 5 m (16.4 ft) cable length, add suffix L5. For a 10 m (32.8 ft) cable length, add suffix L10.

Minimum Mounting Clearances, in. (mm)



	Side by Side		Face to Face	
XS8E	e ≥ 1.6 (40)	e ≥ 5.9 (150)	e ≥ 3.1 (80)	e ≥ 11.8 (300)
XS8C	e ≥ 2.4 (60)	e ≥ 4.9 (125)	e ≥ 4.7 (120)	e ≥ 9.8 (250)
XS8D	e ≥ 7.9 (200)	e ≥ 23.6 (600)	e ≥ 15.7 (400)	

Proximity Sensors

XS8 Auto-Adaptable Inductive Sensor

Flat Rectangular, DC and AC/DC

Wiring

Connector

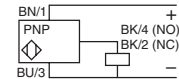
M8 M12 0.5 in. 20-UNF



Cable

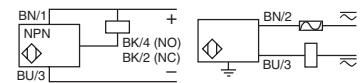
PNP/M12 or M8

Blue BU -
Brown BN +
Black BK Output



NPN/M12 or M8

Type 2-Wire 0.5 in. 20-UNF



M8 connector, N.O. and N.C. to pin 4.

Specifications

Mechanical		Shielded	Non-Shielded
Fine Detection Zone	XS8E	5–10 mm	5–15 mm
	XS8C	8–15 mm	8–25 mm
	XS8D	20–40 mm	20–60 mm
Sn	XS8E	0–10 mm	0–15 mm
	XS8C	0–15 mm	0–25 mm
	XS8D	0–40 mm	0–60 mm
Temperature Range	Storage	-40 to +185 °F (-40 to +85 °C)	
	Operation	-13 to +158 °F (-25 to +70 °C)	
Enclosure Rating	NEMA Type	1, 4X, 12	
	IEC	IP68 cable version / IP67 connector version	
Vibration	25 g, ±2 mm amplitude (10–55 Hz)		
Shock Resistance	50 g, 11 ms duration		
Differential (% of Sr)	1–15%		
Repeatability (% of Sr)	2%		
LED Indicator	Output	Yellow	
	Power and Teach	Green	
Enclosure material	PBT		
Cable	PVR 3 x 0.34 mm ²		
Connector	M8 Nano 3-pin, M12 Micro 4-pin, U20 Micro 3-pin		
Electrical		2-wire AC/DC	3-wire DC
Voltage Range		24–240 Vac/24–210 Vdc	12–24 Vdc
Voltage Limit (Including Ripple)		20–264 Vac/Vdc	10–36 Vdc
Voltage Drop		5.5 V	2 V
Maximum Load Current	XS8E	5–200 mA	100 mA
	XS8C	DC: 5–300 mA; AC: 5–260 mA	200 mA
	XS8D	DC: 5–300 mA; AC: 5–260 mA	200 mA
Maximum Leakage (Residual) Current—Open State		1.5 mA	—
Current Consumption		—	10 mA
Power-up Delay (Maximum)	XS8E	10 ms	5 ms
	XS8C	10 ms	5 ms
	XS8D	15 ms	10 ms
On Delay (Maximum)	XS8E	0.3 ms	0.3 ms
	XS8C	0.3 ms	0.3 ms
	XS8D	0.3 ms	0.3 ms
Off Delay (Maximum)	XS8E	0.7 ms	0.7 ms
	XS8C	0.7 ms	0.7 ms
	XS8D	5 ms	5 ms
Protective Circuitry	Short Circuit Protection	No	Yes
	Overload Protection	No	Yes
Agency Listings	UL	SP	CE

Connector Cables (M8 or S suffix; M12 or D suffix; U20 or K suffix)

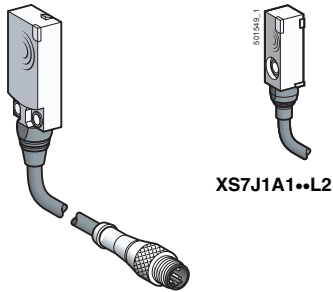
XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths. . . . page 626

Proximity Sensors

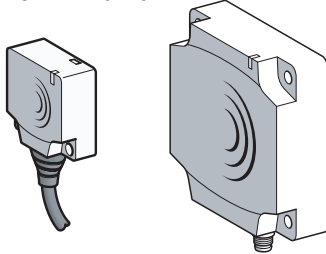
XS7 Inductive Sensor

Flat Rectangular, DC



XS7J1A1..L2

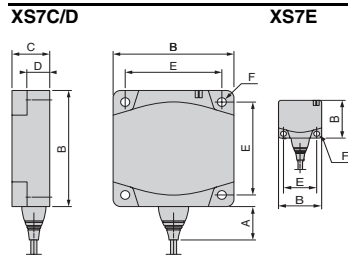
XS7FA1..L01M8



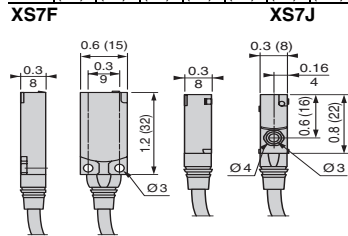
XS7 1A1..L2

XS7 D1A1..M12

Dimensions



XS7	A L2	A M12	B	C	D	E	F
E	0.55 (14)	0.4 (11)	1.0 (26)	0.5 (13)	0.3 (8.8)	0.8 (20)	0.1 (3.5)
C	0.55 (14)	0.4 (11)	1.6 (40)	0.6 (15)	0.4 (9.8)	1.3 (33)	0.1 (4.5)
D	0.9 (23)	0.5 (14)	3.1 (80)	1.0 (26)	0.6 (16)	2.5 (65)	0.2 (5.5)



in. (mm)

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

Entire range of flat proximity sensors dedicated to OEMs and their applications.

- Complete flat range offering
- 2- and 3-wire DC
- Normally open or normally closed outputs available
- Cable and connector versions
- PNP or NPN

Nominal Sensing Distance	Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency	Catalog Number
Size J (8 x 8 x 22 mm) 2 m (6.6 ft) cable ▲						
2.5 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	4,000 Hz	XS7J1A1DAL2
2.5 mm	PNP	N.O.★	12–24 Vdc	100 mA	2,000 Hz	XS7J1A1PAL2
2.5 mm	NPN	N.O.★	12–24 Vdc	100 mA	2,000 Hz	XS7J1A1NAL2
Size J (8 x 8 x 22 mm) M8 pigtail, 0.1 m (3.9 in.)						
2.5 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	4,000 Hz	XS7J1A1DAL01M8
2.5 mm	PNP	N.O.★	12–24 Vdc	100 mA	2,000 Hz	XS7J1A1PAL01M8
2.5 mm	NPN	N.O.★	12–24 Vdc	100 mA	2,000 Hz	XS7J1A1NAL01M8
Size F (8 x 15 x 32 mm) 2 m (6.6 ft) cable ▲						
5 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	5,000 Hz	XS7F1A1DAL2
5 mm	PNP	N.O.★	12–24 Vdc	100 mA	2,000 Hz	XS7F1A1PAL2
5 mm	NPN	N.O.★	12–24 Vdc	100 mA	2,000 Hz	XS7F1A1NAL2
Size F (8 x 15 x 32 mm) M8 pigtail, 0.1 m (3.9 in.)						
5 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	5,000 Hz	XS7F1A1DAL01M8
5 mm	PNP	N.O.★	12–24 Vdc	100 mA	2,000 Hz	XS7F1A1PAL01M8
5 mm	NPN	N.O.★	12–24 Vdc	100 mA	2,000 Hz	XS7F1A1NAL01M8
Size E (13 x 26 x 26 mm) 2 m (6.6 ft) cable ▲						
10 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	1,000 Hz	XS7E1A1DAL2
10 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7E1A1PAL2
10 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7E1A1NAL2
Size E (13 x 26 x 26 mm) M8 connector						
10 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	1,000 Hz	XS7E1A1DAM8
10 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7E1A1PAM8
10 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7E1A1NAM8
Size E (13 x 26 x 26 mm) M12 pigtail, 0.1 m (3.9 in.) ◆						
10 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	1,000 Hz	XS7E1A1DAL01M12
10 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7E1A1PAL01M12
10 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7E1A1NAL01M12
Size C (15 x 40 x 40 mm) 2 m (6.6 ft) cable ▲						
15 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	1,000 Hz	XS7C1A1DAL2
15 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7C1A1PAL2
15 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7C1A1NAL2
Size C (15 x 40 x 40 mm) M8 connector						
15 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	1,000 Hz	XS7C1A1DAM8
15 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7C1A1PAM8
15 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7C1A1NAM8
Size C (15 x 40 x 40 mm) M12 pigtail, 0.1 m (3.9 in.) ◆						
15 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	1,000 Hz	XS7C1A1DAL01M12
15 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7C1A1PAL01M12
15 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	XS7C1A1NAL01M12
Size D (26 x 80 x 80 mm) 2 m (6.6 ft) cable ▲						
40 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	100 Hz	XS7D1A1DAL2
40 mm	PNP	N.O.★	12–24 Vdc	100 mA	100 Hz	XS7D1A1PAL2
40 mm	NPN	N.O.★	12–24 Vdc	100 mA	100 Hz	XS7D1A1NAL2
Size D (26 x 80 x 80 mm) M12 connector						
40 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	100 Hz	XS7D1A1CAM12
40 mm	2-wire	N.O.★	12–24 Vdc	1.5–100 mA	100 Hz	XS7D1A1DAM12
40 mm	PNP	N.O.★	12–24 Vdc	100 mA	100 Hz	XS7D1A1PAM12
40 mm	NPN	N.O.★	12–24 Vdc	100 mA	100 Hz	XS7D1A1NAM12

★ To order a normally closed (N.C.) version, change the A to B. Example: XS718B1PAL2 to XS718B1PBL2.

◆ 0.8 m and 0.15 m pigtail length available on 2-wire E and C.

▲ For a 5 m (16.4 ft) cable length, add suffix L5. For a 10 m (32.8 ft) cable length, add suffix L10.

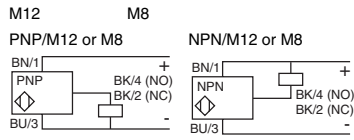
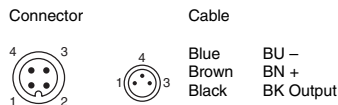
Proximity Sensors

XS7 Inductive Sensor

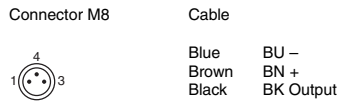
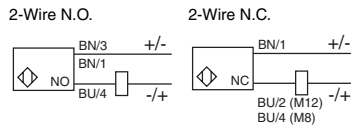
Flat Rectangular, DC

Wiring

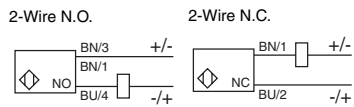
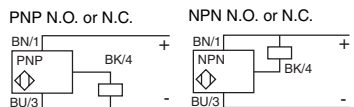
XS7E, XS7C, XS7D



M8 connector, N.O. and N.C. to pin 4.



XS7J, XS7F



Connector Cables (M8 or S suffix; M12 or D suffix)

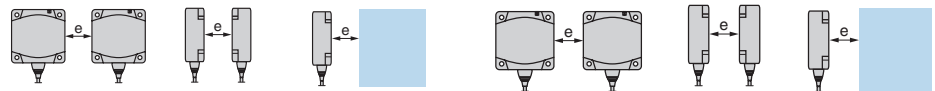
XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths... page 626

Specifications

Mechanical		
Usable Sensing Range	XS7J	0–2 mm
	XS7F	0–4 mm
	XS7E	0–8 mm
	XS7C	0–12 mm
	XS7D	0–32 mm
Temperature Range	Storage	-40 to +185 °F (-40 to +85 °C)
	Operational	-13 to +158 °F (-25 to +70 °C)
Enclosure Rating	NEMA Type	1, 4X, 12
	IEC	IP68 Cable version / IP67 Connector version
Vibration		25 g, ±2 mm amplitude (10–55 Hz)
Shock Resistance		50 g, 11 ms duration
Differential (% of Sr)		1–15%
Repeatability (% of Sr)		2%
LED Indicator		Yellow output
Enclosure Material		PBT
Cable		PVR, 3 x 0.34 mm ²
Connector		Nano-style 3-pin M8 / micro-style 4-pin M12
Electrical		
Voltage Range	2-wire	3-wire
Voltage Range	12–24 Vdc	12–24 Vdc
Voltage Limit (Including Ripple)	10–36 Vdc	10–36 Vdc
Voltage Drop	2 V	4 V
Current Limit Maximum	100 mA	100 mA
Current consumption	0.5 mA	10 mA
Power-up Delay (Maximum)	XS7J	10 ms
	XS7F	5 ms
	XS7E	5 ms
	XS7C	5 ms
	XS7D	10 ms
On Delay (Maximum)	XS7J	0.5 ms
	XS7F	0.5 ms
	XS7E	0.3 ms
	XS7C	0.3 ms
	XS7D	10 ms
Off Delay (Maximum)	XS7J	1 ms
	XS7F	5 ms
	XS7E	0.7 ms
	XS7C	0.7 ms
	XS7D	10 ms
Protective Circuitry	Short Circuit Protection	Yes
	Overload Protection	Yes
Agency Listings	UL E164869 CCN NRKH	SP
		CE

Minimum Mounting Clearances (mm)

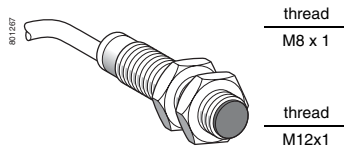


	Side by Side	Face to Face	Face to Metal Object		Side by Side	Face to Face	Face to Metal Object	
XS7E	e ≥ 0.2 (4)	e ≥ 0.9 (24)	e ≥ 0.2 (6)	XS7J	e ≥ 0.03 (1)	e ≥ 0.2 (6)	e ≥ 0.08 (2)	
XS7C	e ≥ 0.4 (10)	e ≥ 2.4 (60)	e ≥ 0.6 (15)		XS7F	e ≥ 0.8 (20)	e ≥ 0.4 (12)	e ≥ 0.12 (3)
XS7D	e ≥ 0.8 (20)	e ≥ 4.7 (120)	e ≥ 1.2 (30)					

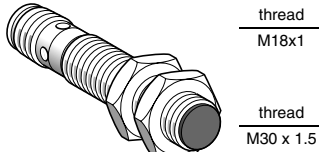
Proximity Sensors

XS6 Extended Range and Auto-Adaptable Inductive Sensor

Metal Tubular, DC and AC/DC

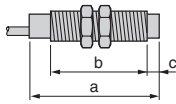


XS6 ••B1••L2



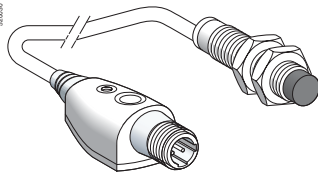
XS6 ••B1••M12

Dimensions



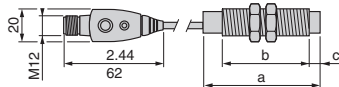
	Cable		Connector	
	a	b	a	b
Ø 8	1.9 (50)	1.6 (42)	2.4 (61)	1.6 (40)
Ø 12	1.9 (50)	1.6 (42)	2.4 (61)	1.6 (42)
Ø 18	2.3 (60)	0.09 (51)	2.8 (72.2)	2.0 (51)
Ø 30	2.3 (60)	0.09 (51)	2.8 (72.2)	2.0 (51)

in. (mm)



XS6••B2••L01M12

Dimensions



	Connector M12		
	a	b	c
Ø 12	1.9 (50)	1.4 (37)	0.2 (5)
Ø 18	2.3 (60)	1.5 (38.5)	0.31 (8)
Ø 30	29.9 (760)	1.5 (38.5)	0.5 (13)

in. (mm)

Dual Dimensions inches/mm

Features

Entire range of fully shielded metal body tubular inductive proximity sensors

- Increased sensing range, fully shielded
- 2-wire AC/DC and 3-wire DC
- Normally open or normally closed outputs available
- Cable and connector versions
- PNP or NPN, DC
- Self-Teach available on 12–30 mm versions

Nominal Sensing Distance	Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency		Catalog Number
					DC	AC	
8 mm Diameter, 2 m (6.6 ft) cable ▲							
2.5 mm	PNP	N.O.★	12–48 Vdc	200 mA	5,000 Hz	—	XS608B1PAL2
2.5 mm	NPN	N.O.★	12–48 Vdc	200 mA	5,000 Hz	—	XS608B1NAL2
8 mm Diameter, M12 connector							
2.5 mm	PNP	N.O.★	12–48 Vdc	200 mA	5,000 Hz	—	XS608B1PAM8
2.5 mm	NPN	N.O.★	12–48 Vdc	200 mA	5,000 Hz	—	XS608B1NAM8
12 mm Diameter, 2 m (6.6 ft) cable ▲							
4 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	4,000 Hz	25 Hz	XS612B1MAL2
4 mm	PNP	N.O.★	12–48 Vdc	200 mA	5,000 Hz	—	XS612B1PAL2
4 mm	NPN	N.O.★	12–48 Vdc	200 mA	5,000 Hz	—	XS612B1NAL2
12 mm Diameter, M12 connector							
4 mm	2-wire	N.O.★	24–240 Vac/24–210 Vdc	1.5–100 mA	4,000 Hz	25 Hz	XS612B1MAU20
4 mm	PNP	N.O.★	12–48 Vdc	200 mA	5,000 Hz	—	XS612B1PAM12
4 mm	NPN	N.O.★	12–48 Vdc	200 mA	5,000 Hz	—	XS612B1NAM12
18 mm Diameter, 2 m (6.6 ft) cable ▲							
8 mm	2-wire	N.O.★	24–240 Vac/24–210 Vdc	1.5–100 mA	3,000 Hz	25 Hz	XS618B1MAL2
8 mm	PNP	N.O.★	12–48 Vdc	200 mA	2,000 Hz	—	XS618B1PAL2
8 mm	NPN	N.O.★	12–48 Vdc	200 mA	2,000 Hz	—	XS618B1NAL2
18 mm Diameter, M12 connector							
8 mm	2-wire	N.O.★	24–240 Vac/24–210 Vdc	1.5–100 mA	3,000 Hz	25 Hz	XS618B1MAU20
8 mm	PNP	N.O.★	12–48 Vdc	200 mA	2,000 Hz	—	XS618B1PAM12
8 mm	NPN	N.O.★	12–48 Vdc	200 mA	2,000 Hz	—	XS618B1NAM12
30 mm Diameter, 2 m (6.6 ft) cable ▲							
15 mm	2-wire	N.O.★	24–240 Vac/24–210 Vdc	1.5–100 mA	2,000 Hz	25 Hz	XS630B1MAL2
15 mm	PNP	N.O.★	12–48 Vdc	200 mA	1,000 Hz	—	XS630B1PAL2
15 mm	NPN	N.O.★	12–48 Vdc	200 mA	1,000 Hz	—	XS630B1NAL2
30 mm Diameter, M12 connector							
15 mm	2-wire	N.O.★	24–240 Vac/24–210 Vdc	1.5–100 mA	2,000 Hz	25 Hz	XS630B1MAU20
15 mm	PNP	N.O.★	12–48 Vdc	200 mA	1,000 Hz	—	XS630B1PAM12
15 mm	NPN	N.O.★	12–48 Vdc	200 mA	1,000 Hz	—	XS630B1NAM12

Self-Teach version◆ (Auto-Adaptable)

12 mm Diameter, M12 connector pigtail 0.1 m (3.9 in.)							
5 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	—	XS612B2PAL01M12
5 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	—	XS612B2NAL01M12
18 mm Diameter, M12 connector pigtail 0.1 m (3.9 in.)							
9 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	—	XS618B2PAL01M12
9 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	—	XS618B2NAL01M12
30 mm Diameter, M12 connector pigtail 0.1 m (3.9 in.)							
15 mm	PNP	N.O.★	12–24 Vdc	100 mA	1,000 Hz	—	XS630B2PAL01M12
15 mm	NPN	N.O.★	12–24 Vdc	100 mA	1,000 Hz	—	XS630B2NAL01M12

★ To order a normally closed (N.C.) version, change the A to B. Example: XS518B1PAL2 to XS518B1PBL2.

◆ Self-teach version only

▲ For a 5 m (16.4 ft) cable length, add suffix L5. For a 10 m (32.8 ft) cable length, add suffix L10.

Minimum Mounting Clearances, in. (mm)

Auto-Adaptable				Extended Range				
Side by Side		Face to Face		Side by Side	Face to Face	Face to Metal Object		
Flush	Not Flush	Flush	Not Flush					
Ø 12	e ≥ 0.55 (14)	1.9 (50)	e ≥ 1.9 (50)	3.9 (100)	Ø 12	e ≥ 0.1 (3)	e ≥ 0.7 (18)	e ≥ 0.17 (4.5)
Ø 18	e ≥ 1.1 (28)	3.9 (100)	e ≥ 3.9 (100)	7.9 (200)	Ø 18	e ≥ 0.2 (4)	e ≥ 0.9 (24)	e ≥ 0.2 (6)
Ø 30	e ≥ 1.9 (48)	7.1 (180)	e ≥ 7.1 (180)	14.1 (360)	Ø 30	e ≥ 0.4 (10)	e ≥ 2.4 (60)	e ≥ 0.6 (15)
						e ≥ 0.8 (20)	e ≥ 4.7 (120)	e ≥ 1.2 (30)

Proximity Sensors

XS6 Extended Range and Auto-Adaptable Inductive Sensor

Metal Tubular, DC and AC/DC

Wiring

3-Wire Selectable

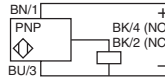
Connector M12



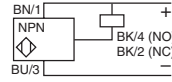
Cable

Blue BU -
Brown BN +
Black BK Output

PNP



NPN



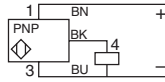
Connector M12



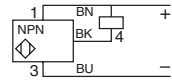
Cable

Blue BU -
Brown BN +
Black BK Output

PNP



NPN



2-Wire AC/DC

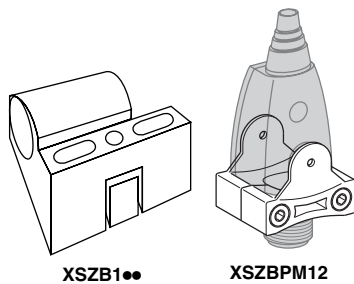
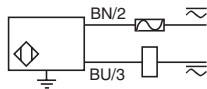
Connector U20



Cable

Blue BU -
Brown BN +
Black BK Output

2-Wire Non-Polarized



XSZB100

XSZBPM12

Connector Cables (M12 or D suffix; U20 or K suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths... page 626

Specifications

Mechanical	Extended Range	Auto-Adaptable		
		Shielded	Non-Shielded	
Fine Detection Zone	8 mm	0-2 mm	—	—
	12 mm	0-3.2 mm	1.7-3.4 mm	1.7-5 mm
	18 mm	0-6.4 mm	3.5-6 mm	3.5-9 mm
	30 mm	0-12 mm	6-12 mm	6-18 mm
Sn	12 mm	—	0-3.4 mm	0-5 mm
	18 mm	—	0-6 mm	0-9 mm
	30 mm	—	0-12 mm	0-18 mm
Temperature Rating	Storage	-40 to +185 °F (-40 to +85 °C)		
	Operation	-13 to +158 °F (-25 to +70 °C)		
Enclosure Rating	NEMA Type	3, 4X, 6P, 12, 13		
	IEC	IP68 cable versions (IP67 connector versions)		
Enclosure Material	Case	Nickel-plated brass		
	Face	PBT		
Maximum Tightening Torque	8 mm	9 N•m (6.7 lb-ft)		
	12 mm	15 N•m (11 lb-ft)		
	18 mm	35 N•m (26 lb-ft)		
	30 mm	50 N•m (37 lb-ft)		
Vibration	25 g, ±2 mm amplitude (10-55 Hz)			
Shock Resistance	50 g, 11 ms duration			
Differential (% of Sr)	15%			
Repeatability (% of Sr)	3%			
LED Indicator	Power and Teach	—		Green
	Output	Yellow		
Cable	PVR 3 x 0.34 mm ² / PVR2 x 0.5 mm ²		PVR - 4.2 mm (0.17 in.) O.D.	
Connector	M12 4-pin / U20 3-pin micro-style		M12 micro-style 4-pin	
Electrical	2-wire AC/DC	3-wire DC	Auto-adaptable DC	
Voltage Range	24-240 Vac; 24-210 Vdc	12-48 Vdc	12-24 Vdc	
Voltage Limit (Including Ripple)	20-264 Vac/Vdc	10-58 Vdc	10-36 Vdc	
Voltage Drop	5.5 V	2 V	2 V	
Maximum Leakage (Residual) Current—Open State	0.8 mA	—	—	
Current Consumption	—	10 mA	10 mA	
Maximum Current Limit	AC: 5-300 mA; DC: 5-200 mA	200 mA	100 mA	
Power-up Delay (Maximum)	20 ms-12 mm; 25 ms-18/30 mm	5 ms	5 ms	
On Delay (Maximum)	8 mm	—	0.2 ms	—
	12 mm	0.5 ms	0.2 ms	0.3 ms
	18 mm	0.5 ms	0.3 ms	0.3 ms
	30 mm	0.5 ms	0.6 ms	0.3 ms
Off Delay (Maximum)	8 mm	—	0.2 ms	—
	12 mm	0.2 ms	0.2 ms	0.7 ms
	18 mm	0.5 ms	0.7 ms	0.7 ms
	30 mm	2 ms	1.4 ms	0.7 ms
Operating Frequency, Maximum	8 mm	—	2,500 Hz	—
	12 mm	AC: 25 Hz / DC: 1,000 Hz	2,500 Hz	1,000 Hz
	18 mm	AC: 25 Hz / DC: 1,000 Hz	1,000 Hz	1,000 Hz
Protective Circuitry	Short Circuit Protection	No	Yes	Yes
	Overload Protection	Yes	Yes	Yes
	Reverse Polarity Protection	Yes	Yes	Yes
Agency Listings				

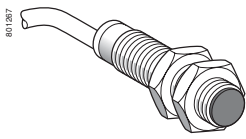
Accessories

Description	Catalog Number
Mounting bracket for teach connector	XSZBPM12
8 mm tubular mounting bracket	XSZB108
12 mm tubular mounting bracket	XSZB112
18 mm tubular mounting bracket	XSZB118
30 mm tubular mounting bracket	XSZB130

Proximity Sensors

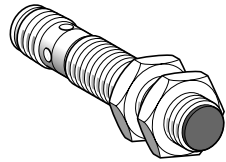
XS5 Inductive Sensor

Metal Tubular, DC



XS5 ••B1••L2

thread
M8 x 1



XS5 ••B1••M12

thread
M12x1

thread
M18x1

thread
M30x1.5

Features

Complete range of tubular proximity sensors dedicated to OEMs and their applications

- Low cost shielded tubular inductive proximity sensors
- 2- and 3-wire DC
- Normally open or normally closed outputs available
- Cable and connector versions
- PNP or NPN

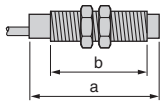
Nominal Sensing Distance	Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency	Catalog Number
8 mm Diameter, 2 m (6.6 ft) cable ▲						
1.5 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	4,000 Hz	XS508B1DAL2
1.5 mm	PNP	N.O.★	12–24 Vdc	200 mA	5,000 Hz	XS508B1PAL2
1.5 mm	NPN	N.O.★	12–24 Vdc	200 mA	5,000 Hz	XS508B1NAL2
8 mm Diameter, M12 connector						
1.5 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	4,000 Hz	XS508B1DAM8
1.5 mm	PNP	N.O.★	12–24 Vdc	200 mA	5,000 Hz	XS508B1PAM8
1.5 mm	NPN	N.O.★	12–24 Vdc	200 mA	5,000 Hz	XS508B1NAM8
12 mm Diameter, 2 m (6.6 ft) cable ▲						
2 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	4,000 Hz	XS512B1DAL2
2 mm	PNP	N.O.★	12–24 Vdc	200 mA	5,000 Hz	XS512B1PAL2
2 mm	NPN	N.O.★	12–24 Vdc	200 mA	5,000 Hz	XS512B1NAL2
12 mm Diameter, M12 connector						
2 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	4,000 Hz	XS512B1DAM12
2 mm	PNP	N.O.★	12–24 Vdc	200 mA	5,000 Hz	XS512B1PAM12
2 mm	NPN	N.O.★	12–24 Vdc	200 mA	5,000 Hz	XS512B1NAM12
18 mm Diameter, 2 m (6.6 ft) cable ▲						
5 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	3,000 Hz	XS518B1DAL2
5 mm	PNP	N.O.★	12–24 Vdc	200 mA	2,000 Hz	XS518B1PAL2
5 mm	NPN	N.O.★	12–24 Vdc	200 mA	2,000 Hz	XS518B1NAL2
18 mm Diameter, M12 connector						
5 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	3,000 Hz	XS518B1DAM12
5 mm	PNP	N.O.★	12–24 Vdc	200 mA	2,000 Hz	XS518B1PAM12
5 mm	NPN	N.O.★	12–24 Vdc	200 mA	2,000 Hz	XS518B1NAM12
30 mm Diameter, 2 m (6.6 ft) cable ▲						
10 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	2,000 Hz	XS530B1DAL2
10 mm	PNP	N.O.★	12–24 Vdc	200 mA	1,000 Hz	XS530B1PAL2
10 mm	NPN	N.O.★	12–24 Vdc	200 mA	1,000 Hz	XS530B1NAL2
30 mm Diameter, M12 connector						
10 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	2,000 Hz	XS530B1DAM12
10 mm	PNP	N.O.★	12–24 Vdc	200 mA	1,000 Hz	XS530B1PAM12
10 mm	NPN	N.O.★	12–24 Vdc	200 mA	1,000 Hz	XS530B1NAM12

★ To order a normally closed (N.C.) version, change the A to B. Example: XS518B1PAL2 to XS518B1PBL2.

▲ For a 5 m (16.4 ft) cable length, add suffix L5. For a 10 m (32.8 ft) cable length, add suffix L10.

Dimensions

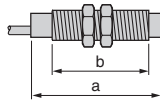
2-Wire



	Cable		Connector	
	a	b	a	b
∅ 8	1.9 (50)	1.6 (42)	2.4 (61)	1.6 (40)
∅ 12	1.9 (50)	1.6 (42)	2.4 (61)	1.6 (40)
∅ 18	2.0 (52.5)	1.7 (44)	2.5 (64.6)	1.7 (44)
∅ 30	1.9 (50)	1.6 (42)	2.5 (64.2)	1.6 (41)

in. (mm)

3-wire

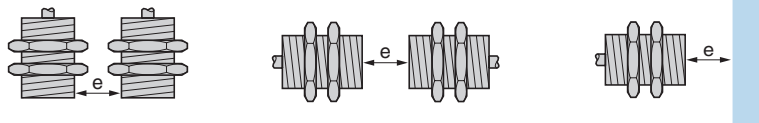


	Cable		Connector	
	a	b	a	b
∅ 8	1.3 (33)	1.0 (25)	1.6 (42)	1.0 (26)
∅ 12	1.3 (33)	1.0 (25)	1.9 (48)	1.1 (29)
∅ 18	1.4 (36.5)	1.1 (28)	1.9 (48.6)	1.1 (28)
∅ 30	1.6 (40.6)	1.2 (32)	2.0 (50.7)	1.3 (32)

in. (mm)

Dual Dimensions inches/mm

Minimum Mounting Clearances, in. (mm)



	Side by Side	Face to Face	Facing a Metal Object
∅ 8	e ≥ 0.11 (3)	e ≥ 0.7 (18)	e ≥ 0.17 (4.5)
∅ 12	e ≥ 0.15 (4)	e ≥ 0.9 (24)	e ≥ 0.2 (6)
∅ 18	e ≥ 0.4 (10)	e ≥ 2.4 (60)	e ≥ 0.6 (15)
∅ 30	e ≥ 0.8 (20)	e ≥ 4.7 (120)	e ≥ 1.2 (30)

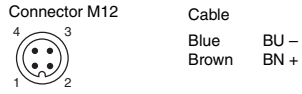
Proximity Sensors

XS5 Inductive Sensor

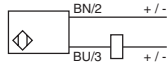
Metal Tubular, DC

Wiring

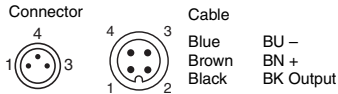
2-Wire



2-Wire Non-Polarized

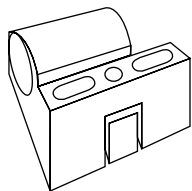
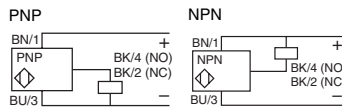


3-Wire



M8

M12



XSZB100

Connector Cables (M8 or S suffix; M12 or D suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . page 626

Specifications

Mechanical

Usable Sensing Range	8 mm	0–1.2 mm	
	12 mm	0–1.6 mm	
	18 mm	0–4 mm	
	30 mm	0–8 mm	
Temperature Range	Storage	-40 to +185 °F (-40 to +85 °C)	
	Operation	-13 to +158 °F (-25 to +70 °C)	
Enclosure Rating	NEMA Type	3, 4X, 6P, 12, 13	
	IEC	IP68 cable version (except 8 mm and connector version: IP67)	
Enclosure Material	Case	Nickel-plated brass	
	Face	PBT	
Maximum Tightening Torque	8 mm	5 N•m (3.7 lb-ft)	
	12 mm	6 N•m (4.4 lb-ft)	
	18 mm	15 N•m (11 lb-ft)	
	30 mm	40 N•m (29.5 lb-ft)	
Vibration	25 g, ±2 mm amplitude (10–50 Hz)		
Shock Resistance	50 g, 11 ms duration		
Differential (% of Sr)	15%		
Repeatability (% of Sr)	3%		
LED Indicator	Output status		
Cable	PVR 2 x 0.5 mm ²	PVR 3 x 0.34 mm ²	
Connector	M12 4-pin	M8 3-pin / M12 4-pin	
Electrical	2-wire	3-wire	
Voltage Range	12–48 Vdc	12–24 Vdc	
Voltage Limit (Including Ripple)	10–58 Vdc	10–36 Vdc	
Voltage Drop	4 V	2 V	
Maximum Load Current	1.5–100 mA	200 mA	
Maximum Leakage (Residual) Current—Open State	0.5 mA	—	
Current consumption	—	10 mA	
Power-up Delay (maximum)	5 ms	5 ms	
On Delay (maximum)	8 mm	0.2 ms	0.1 ms
	12 mm	0.2 ms	0.1 ms
	18 mm	0.2 ms	0.15 ms
	30 mm	0.3 ms	0.2 ms
Off Delay (maximum)	8 mm	0.2 ms	0.1 ms
	12 mm	0.2 ms	0.1 ms
	18 mm	0.2 ms	0.35 ms
	30 mm	0.3 ms	0.7 ms
Protective Circuitry	Short Circuit Protection	Yes	Yes
	Overload Protection	Yes	Yes
	Radio Frequency Immunity (RFI)	IEC 61000-4-3 Level 3	IEC 61000-4-3 Level 3
	Reverse Polarity Protection	Yes	Yes
Agency Listings	UL	CSA	CE

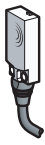
Accessories

Description	Catalog Numbers
8 mm tubular mounting bracket	XSZB108
12 mm tubular mounting bracket	XSZB112
18 mm tubular mounting bracket	XSZB118
30 mm tubular mounting bracket	XSZB130

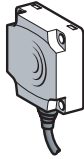
Proximity Sensors

XS9 Application-Specific Inductive Sensor

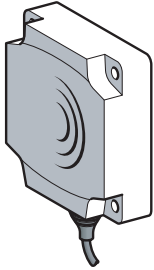
Flat Rectangular Analog Output, DC



XS9F111●●●L2



XS9E111●●●L2



XS9D111●●●L2

Features

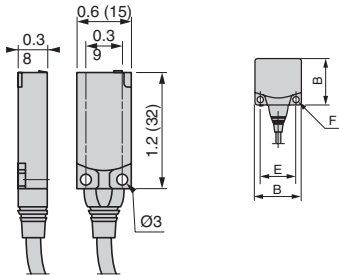
- DC output current is directly proportional to the target distance
- Four sizes: F (8 x 15 x 32); E (13 x 26 x 26); C (15 x 40 x 40); and D (26 x 80 x 80)
- Cable and connector versions

Nominal Sensing Distance	Circuit Type	Voltage Range	Output	Operating Frequency	Catalog Number
Size F (8 x 15 x 32), 2 m (6.6 ft) cable ▲					
5 mm	3-wire	12–24 Vdc	1–10 V	2,000 Hz	XS9F111A1L2
5 mm	3-wire	12–24 Vdc	4–20 mA	2,000 Hz	XS9F111A2L2
Size F (8 x 15 x 32), M8 connector pigtail 0.1 m (3.9 in.)					
5 mm	3-wire	12–24 Vdc	1–10 V	2,000 Hz	XS9F111A1L01M8
5 mm	3-wire	12–24 Vdc	4–20 mA	2,000 Hz	XS9F111A2L01M8
Size E (13 x 26 x 26), 2 m (6.6 ft) cable ▲					
10 mm	3-wire	12–24 Vdc	1–10 V	1,000 Hz	XS9E111A1L2
10 mm	3-wire	12–24 Vdc	4–20 mA	1,000 Hz	XS9E111A2L2
Size E (13 x 26 x 26), M12 connector pigtail 0.1 m (3.9 in.)					
10 mm	3-wire	12–24 Vdc	1–10 V	1,000 Hz	XS9E111A1L01M12
10 mm	3-wire	12–24 Vdc	4–20 mA	1,000 Hz	XS9E111A2L01M12
Size C (15 x 40 x 40), 2 m (6.6 ft) cable ▲					
15 mm	3-wire	12–24 Vdc	1–10 V	1,000 Hz	XS9C111A1L2
15 mm	3-wire	12–24 Vdc	4–20 mA	1,000 Hz	XS9C111A2L2
Size C (15 x 40 x 40), M12 connector pigtail 0.1 m (3.9 in.)					
15 mm	3-wire	12–24 Vdc	1–10 V	1,000 Hz	XS9C111A1L01M12
15 mm	3-wire	12–24 Vdc	4–20 mA	1,000 Hz	XS9C111A2L01M12
Size D (26 x 80 x 80), 2 m (6.6 ft) cable ▲					
40 mm	3-wire	12–24 Vdc	1–10 V	100 Hz	XS9D111A1L2
40 mm	3-wire	12–24 Vdc	4–20 mA	100 Hz	XS9D111A2L2
Size D (26 x 80 x 80), M12 connector					
40 mm	3-wire	12–24 Vdc	1–10 V	100 Hz	XS9D111A1M12
40 mm	3-wire	12–24 Vdc	4–20 mA	100 Hz	XS9D111A2M12

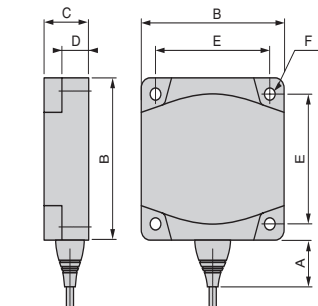
▲ For a 5 m (16.4 ft) cable length, add suffix L5. For a 10 m (32.8 ft) cable length, add suffix L10.

Dimensions

XS9 F XS9 E



XS9C/D



XS9	A L2	A M12	B	C	D	E	F
E	0.55 (14)	—	1.0 (26)	0.5 (13)	0.3 (8.8)	0.8 (20)	0.1 (3.5)
C	0.55 (14)	—	1.6 (40)	0.6 (15)	0.4 (9.8)	1.3 (33)	0.1 (4.5)
D	0.9 (23)	0.5 (14)	3.1 (80)	1.0 (26)	0.6 (16)	2.5 (65)	0.2 (5.5)

in. (mm)

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Minimum Mounting Clearances, in. (mm)

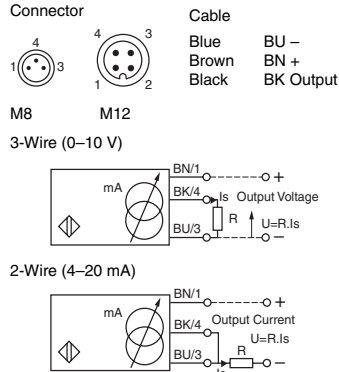
	Side by Side	Face to Face	Face to Metal Object
XS9F	$e \geq 0.08$ (2)	$e \geq 0.47$ (12)	$e \geq 0.12$ (3)
XS9E	$e \geq 0.16$ (4)	$e \geq 0.9$ (24)	$e \geq 0.23$ (6)
XS9C	$e \geq 0.40$ (10)	$e \geq 2.3$ (60)	$e \geq 0.6$ (15)
XS9D	$e \geq 0.8$ (20)	$e \geq 4.7$ (120)	$e \geq 1.2$ (30)

Proximity Sensors

XS9 Application-Specific Inductive Sensor

Flat Rectangular Analog Output, DC

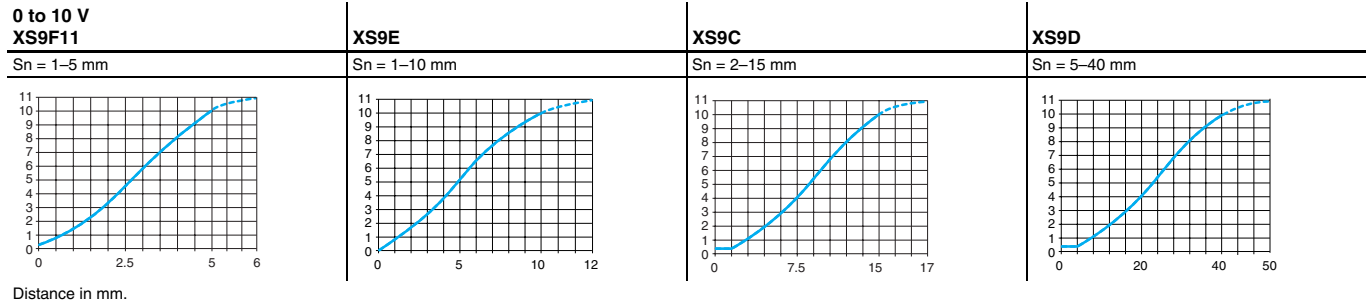
Wiring



Specifications

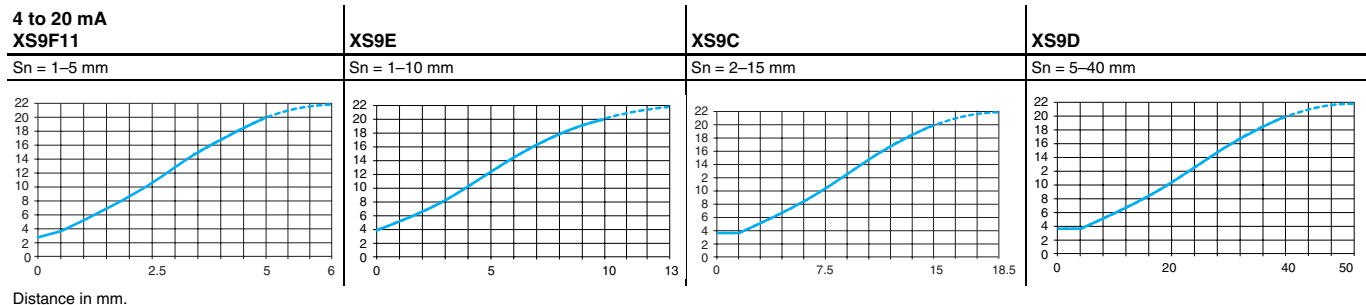
Mechanical		
Usable sensing range	XS9F	1–5 mm
	XS9E	1–10 mm
	XS9C	2–15 mm
	XS9D	5–40 mm
Temperature range	Storage	-40 to +185 °F (-40 to +85 °C)
	Operation	-13 to +158 °F (-25 to +70 °C)
Enclosure rating	NEMA Type	1, 4X (indoor only), 12
	IEC	IP68 cable version / IP67 connector version
Vibration		25 g, ±2 mm amplitude (10–55 Hz)
Shock		50 g, 11 ms duration
Enclosure material		PBT
Cable		PVR 3 x 0.34 mm ²
Connector		M8 nano-style 3-pin / M12 micro-style 4-pin
Electrical		
		2-wire DC
Voltage range		12–24 Vdc
Voltage limit (including ripple)		10–36 Vdc
Maximum output current drift with the rated operating temperature		<10%
Linearity error		±5%
Protective circuitry	Short circuit protection	Yes
	Overload protection	Yes
Agency listings		

Output Curves



	Output Current	Resistance	Output Voltage	Resistance
12 V	0–10 mA	$R \leq 560 \Omega$	0–10 V	Indeterminate
24 V	0–10 mA	$R \leq 1,500 \Omega$	0–10 V	$R = 1,000 \Omega$

Note: Ensure a minimum of 5 V between the (+) positive and the sensor output (terminal 3).



Connector Cables (M8 or S suffix; M12 or D suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . page 626

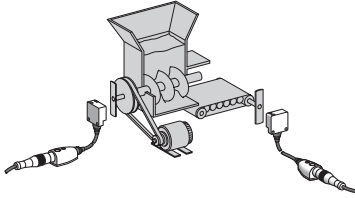
	Output Current	Resistance
12 V	4–20 mA	$R \leq 82 \Omega$
24 V	4–20 mA	$R \leq 560 \Omega$

Note: Ensure a minimum of 10 V between the (+) positive and the sensor output (terminal 3).

Proximity Sensors

XS9 Application-Specific Inductive Sensor

Flat Rectangular Motion Detection, DC and AC/DC



Features

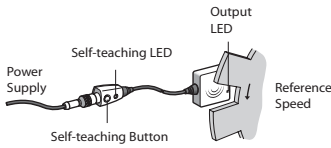
- Universal AC/DC versions
- Linear speed threshold adjustment
- Built-in fixed startup delay to overcome startup inertia
- Reverse polarity protection on DC models
- Ease of mounting (flat body style)

Principle and Applications

- Inductive proximity sensors for monitoring rotation or rolling speed operate by comparing a speed threshold preset by the operator with an instantaneous measurement of the speed of the moving part to be monitored or protected.
- These devices provide a simple and economical solution for monitoring drift, belt breakage, couplings, overloads, etc.
- They are commonly used for applications such as crushers and grinders, mixers and blenders, pumps, centrifuges and centrifugal separators, conveyor belts, bucket elevators, and archimedean screws.

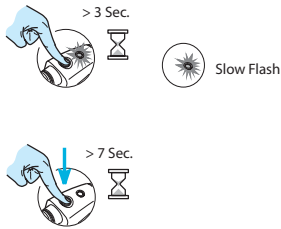
Installation and Setup

Installing and Positioning the Sensor



- The sensor must be properly positioned at the outset to ensure detection of all target points on the monitored moving part. The XS9 sensor facilitates this task with its ability to operate as a standard inductive sensor (Telemecanique® patent pending).
- Using this system, positioning is 100% reliable and can be checked at any time without changing the product parameters.

Self-Teaching Speed Setup



- The normal or reference speed for the moving part (1) to be monitored can be set by simply pressing the self-teaching button (2). It is then confirmed with the display LED.
 - The product can be restarted at any time to return to the factory setting.
 - To ensure that the moving part can attain its normal speed (inertia), the product output remains closed for 9 s.
 - By default, the sensor's underspeed trip speed equals the preset speed minus 30%. For example, if the preset speed is 1000 rotations/minute, underspeed tripping occurs when the speed of the moving part falls below $1000 - (1000 \times 0.3) = 700$ rotations/minute. Thresholds of -20%, -11% and -6% can be set by pressing the self-teaching button.

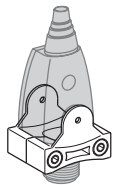
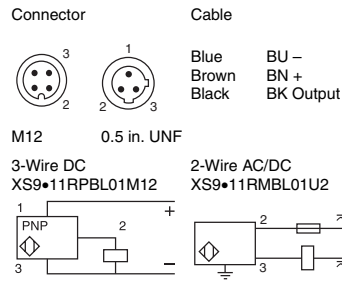
Nominal Sensing Distance	Circuit Type	Threshold Range (Pulse/Min.)	Voltage Range	Load Current Maximum	Maximum Frequency (Pulse/Min.)	Startup Delay	Catalog Number
Size E (13 x 26 x 26 mm) M12 pigtail, 0.1 m (3.9 in.)							
10 mm	PNP	6–6,000	12–24 Vdc	100 mA	48,000	9 s	XS9E11RPBL01M12
Size E (13 x 26 x 26 mm) U20 pigtail, 0.1 m (3.9 in.)							
10 mm	2-wire	6–6,000	24–240 Vac/ 24–210 Vdc	5–100 mA	48,000	9 s	XS9E11RMBL01U20
Size C (15 x 40 x 40 mm) M12 pigtail, 0.1 m (3.9 in.)							
15 mm	PNP	6–6,000	12–24 Vdc	200 mA	48,000	9 s	XS9C11RPBL01M12
Size C (15 x 40 x 40 mm) U20 pigtail, 0.1 m (3.9 in.)							
15 mm	2-wire	6–6,000	24–240 Vac/ 24–210 Vdc	5–200 mA AC 5–300 mA DC	48,000	9 s	XS9C11RMBL01U20

Proximity Sensors

XS9 Application-Specific Inductive Sensor

Flat Rectangular Motion Detection, DC and AC/DC

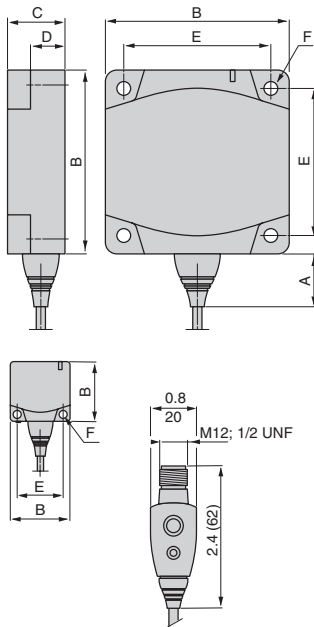
Wiring



XSZBPM12

Dimensions

XS9 E/C



Type	A	B	C	D	E	F
XS9 E	0.55 (14)	1.0 (26)	0.5 (13)	0.3 (8.8)	0.8 (20)	0.1 (3.5)
XS9 C	0.55 (14)	1.6 (40)	0.6 (15)	0.4 (9.8)	1.3 (33)	0.1 (4.5)

in. (mm)

Connector Cables (M12 or D suffix; U20 or K suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths... page 626

Specifications

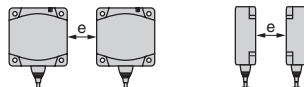
Mechanical		
Usable Sensing Range	XS9E	0–8 mm
	XS9C	0–12 mm
Temperature Range	Storage	-40 to +185 °F (-40 to +85 °C)
	Operation	-13 to +158 °F (-25 to +70 °C)
Enclosure Rating	NEMA Type	1, 4X, 12
	IEC	IP67
Vibration	25 g, ±2 mm amplitude (10–55 Hz)	
Shock Resistance	50 g, 11 ms duration	
LED Indicator	Output	Yellow
	Power	Green
Enclosure Material	PBT	
Connector	DC: M12 4-pin; AC/DC: U20 3-pin	
Electrical		2-wire AC/DC
Voltage Range		24–240 Vac/24–210 Vdc
Voltage Limit (Including Ripple)		20–264 Vac/Vdc
Voltage Drop		5.5 V
Maximum Leakage (Residual) Current—Open State		1.5 mA
Current Consumption		—
Load Current Maximum	XS9E	100 mA
	XS9C	200 mA
Maximum Frequency (Pulse/Minute)		48,000
Startup Delay (Maximum)	XS9E	9 s + 1/Fr ★
	XS9C	9 s + 1/Fr ★
Protection Circuitry	Overload Protection	Yes
	Short Circuit Protection	Yes
Agency Listings		

★ 1/Fr in the startup delay formula is the actual preset frequency adjusted via potentiometer

Accessories

Description	Catalog Number
Teach connector mounting bracket	XSZBPM12

Minimum Mounting Clearances, in. (mm)

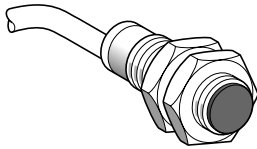


	Side by Side	Face to Face
XS9E	e ≥ 1.6 (40)	e ≥ 3.1 (80)
XS9C	e ≥ 2.4 (60)	e ≥ 4.7 (120)

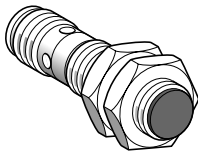
Proximity Sensors

Basic, Plastic, Cylindrical, Non-Flush Mountable

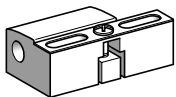
Three-Wire DC, Solid-State Output



XS2**AL**2



XS2**AL**12



XSZB1**

Selection

Sensing distance Sn mm (in.)	Function	Output	Connection	Reference	Weight g (oz)
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Ø 8, threaded M8 x 1

Three-wire 12-24 Vdc, non-flush mountable

2.5 (0.10)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS208ALPAL2	30 (1.06)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS208ALNAL2	30 (1.06)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS208ALPBL2	30 (1.06)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS208ALNBL2	30 (1.06)

Ø 12, threaded M12 x 1

Three-wire 12-24 Vdc, non-flush mountable

4 (0.16)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS212ALPAL2	65 (2.29)
			M12 connector	XS212ALPAM12	10 (0.35)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS212ALNAL2	65 (2.29)
			M12 connector	XS212ALNAM12	10 (0.35)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS212ALPBL2	65 (2.29)
			M12 connector	XS212ALPBM12	10 (0.35)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS212ALNBL2	65 (2.29)
			M12 connector	XS212ALNBM12	10 (0.35)

Ø 18, threaded M18 x 1

Three-wire 12-24 Vdc, non-flush mountable

8 (0.31)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS218ALPAL2	95 (3.35)
			M12 connector	XS218ALPAM12	25 (0.88)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS218ALNAL2	95 (3.35)
			M12 connector	XS218ALNAM12	25 (0.88)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS218ALPBL2	95 (3.35)
			M12 connector	XS218ALPBM12	25 (0.88)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS218ALNBL2	95 (3.35)
			M12 connector	XS218ALNBM12	25 (0.88)

Ø 30, threaded M30 x 1.5

Three-wire 12-24 Vdc, non-flush mountable

15 (0.59)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS230ALPAL2	135 (4.76)
			M12 connector	XS230ALPAM12	65 (2.29)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS230ALNAL2	135 (4.76)
			M12 connector	XS230ALNAM12	65 (2.29)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS230ALPBL2	135 (4.76)
			M12 connector	XS230ALPBM12	65 (2.29)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS230ALNBL2	135 (4.76)
			M12 connector	XS230ALNBM12	65 (2.29)

Accessories (3)

Description	Reference	Weight g (oz)	
Mounting clamps	Ø 8	XSZB108	6 (0.21)
	Ø 12	XSZB112	6 (0.21)
	Ø 18	XSZB118	10 (0.35)
	Ø 30	XSZB130	20 (0.71)

(1) For a 5 m (16.4 ft) cable, replace L2 with L5.

Example: XS208ALPAL2 becomes XS208ALPAL5 with a 5 m cable.

(2) For a 5 m (16.4 ft) cable, replace L2 with L5; for a 10 m (32.8 ft) cable, replace L2 with L10.

Example: XS218ALPAL2 becomes XS218ALPAL5 with a 5 m cable.

(3) For more information, see page 284.

Proximity Sensors

Basic, Plastic, Cylindrical, Non-Flush Mountable

Three-Wire DC, Solid-State Output

Specifications

Sensor type		XS2●●ALP●L2 XS2●●ALN●L2		XS2●●ALP●M12 XS2●●ALN●M12	
Product certifications		UL, CSA, cE			
Connection		Pre-cabled, length: 2 m (6.6 ft)		M12 connector	
Operating zone (1)	Ø 8	mm (in.)	0–2 (0–0.08)		
	Ø 12	mm (in.)	0–3.2 (0–0.13)		
	Ø 18	mm (in.)	0–6.4 (0–0.25)		
	Ø 30	mm (in.)	0–12 (0–0.47)		
Differential travel		%	1–15 of real sensing distance (Sr)		
Degree of protection		Conforming to IEC 60529		IP67	
Temperature	Storage	°C (°F)	-40 to +85 (-40 to +185)		
	Operating	°C (°F)	-25 to +70 (-13 to +158)		
Materials	Case	PPS			
	Cable	PVC 3 x 0.34 mm ² , except Ø 8: 3 x 0.11 mm ²		—	
Vibration resistance		Conforming to IEC 60068-2-6		25 gn, amplitude ±2 mm (@ 10 to 55 Hz)	
Shock resistance		Conforming to IEC 60068-2-27		50 gn, duration 11 ms	
Output state indication		Yellow LED on rear		Yellow LED: 4 viewing ports at 90°	
Rated supply voltage		Vdc	12–24 with protection against reverse polarity		
Voltage limits (including ripple)		Vdc	10–36		
Switching capacity		mA	≤100 (except Ø 8 ≤ 50) with overload and short-circuit protection		
Voltage drop, closed state		V	≤2		
Current consumption, no-load		mA	≤10		
Maximum switching frequency	Ø 8	Hz	3000		
	Ø 12	Hz	1000		
	Ø 18	Hz	250		
	Ø 30	Hz	60		
Delays	First-up	ms	≤5 (except Ø 30 ≤ 10)		
	Response	ms	≤0.5 for Ø 8, Ø 12; ≤1 for Ø 18; ≤2 for Ø 30		
	Recovery	ms	≤1 for Ø 8; ≤0.5 for Ø 12; ≤2 for Ø 18; 6 for Ø 30		

(1) Detection curves, see page 307.

Wiring

Connector	Pre-cabled	PNP	NPN
M12 4 3 2 1	BU: Blue BN: Brown BK: Black		

For connection information, refer to the *Cabling* section beginning on page 625.

Setup

Sensors	Minimum mounting distances, mm (in.)			
	Side by side	Face to face	Facing a metal object	Mounted in a metal support
Ø 8 XS208AL	e > 10 (0.39)	e > 30 (1.18)	e > 7.5 (0.30)	d > 24 (0.94), h > 5 (0.20)
Ø 12 XS212AL	e > 16 (0.63)	e > 48 (1.89)	e > 12 (0.47)	d > 36 (1.42), h > 8 (0.31)
Ø 18 XS218AL	e > 16 (0.63)	e > 96 (3.78)	e > 24 (0.94)	d > 54 (2.13), h > 16 (0.63)
Ø 30 XS230AL	e > 60 (2.36)	e > 180 (7.09)	e > 45 (1.77)	d > 90 (3.54), h > 30 (1.18)

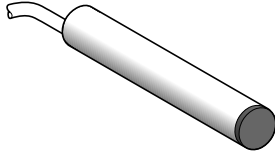
Dimensions

Sensors		Pre-cabled, mm (in.)		Connector, mm (in.)	
		a	b	a	b
Ø 8	XS208AL	49 (1.93)	40 (1.57)	—	—
Ø 12	XS212AL	49 (1.93)	42 (1.65)	61 (2.40)	42 (1.65)
Ø 18	XS218AL	58.8 (2.31)	51.5 (2.03)	70.3 (2.77)	51.5 (2.03)
Ø 30	XS230AL	58.8 (2.31)	51.5 (2.03)	70.3 (2.77)	51.5 (2.03)

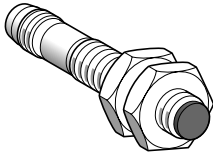
Proximity Sensors

Basic, Metal, Cylindrical, Flush and Non-Flush Mountable

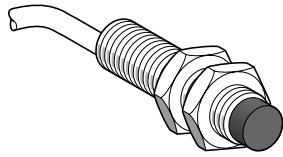
Two-Wire AC; Three-Wire DC, Solid-State Output



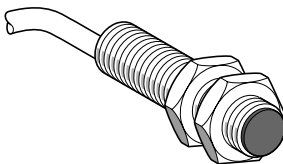
XS106BL•L2



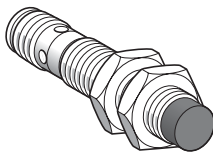
XS108BL•M8



XS208BL•L2



XS112BL•L2



XS212BL•M12

Selection

Sensing distance Sn mm (in.)	Function	Output	Connection	Reference	Weight g (oz)
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Ø 6.5, plain

Three-wire 12-24 Vdc, flush mountable

1.5 (0.06)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS106BLPAL2	30 (1.06)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS106BLNAL2	30 (1.06)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS106BLPBL2	30 (1.06)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS106BLNBL2	30 (1.06)

Ø 8, threaded M8 x 1

Three-wire 12-24 Vdc, flush mountable

1.5 (0.06)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS108BLPAL2	35 (1.23)
			M8 connector	XS108BLPAM8	8 (0.28)
			M12 connector	XS108BLPAM12	15 (0.53)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS108BLNAL2	35 (1.23)
			M8 connector	XS108BLNAM8	8 (0.28)
			M12 connector	XS108BLNAM12	15 (0.53)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS108BLPBL2	35 (1.23)
			M8 connector	XS108BLPBM8	8 (0.28)
			M12 connector	XS108BLPBM12	15 (0.53)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS108BLNBL2	35 (1.23)
			M8 connector	XS108BLNBM8	8 (0.28)
			M12 connector	XS108BLNBM12	15 (0.53)

Three-wire 12-24 Vdc, non-flush mountable

2.5 (0.10)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS208BLPAL2	35 (1.23)
			M8 connector	XS208BLPAM8	8 (0.28)
			M12 connector	XS208BLPAM12	15 (0.53)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS208BLNAL2	35 (1.23)
			M8 connector	XS208BLNAM8	8 (0.28)
			M12 connector	XS208BLNAM12	15 (0.53)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS208BLPBL2	35 (1.23)
			M8 connector	XS208BLPBM8	8 (0.28)
			M12 connector	XS208BLPBM12	15 (0.53)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS208BLNBL2	35 (1.23)
			M8 connector	XS208BLNBM8	8 (0.28)
			M12 connector	XS208BLNBM12	15 (0.53)

Ø 12, threaded M12 x 1

Three-wire 12-24 Vdc, flush mountable

2 (0.08)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS112BLPAL2	70 (2.47)
			M12 connector	XS112BLPAM12	15 (0.53)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS112BLNAL2	70 (2.47)
			M12 connector	XS112BLNAM12	15 (0.53)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS112BLPBL2	70 (2.47)
			M12 connector	XS112BLPBM12	15 (0.53)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS112BLNBL2	70 (2.47)
			M12 connector	XS112BLNBM12	15 (0.53)

Two-wire 24-240 Vac, flush mountable

2 (0.08)	NO	Pre-cabled, 2 m (6.6 ft) (2)	XS112BLFAL2	75 (2.65)
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Three-wire 12-24 Vdc, non-flush mountable

4 (0.16)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS212BLPAL2	70 (2.47)
			M12 connector	XS212BLPAM12	15 (0.53)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS212BLNAL2	70 (2.47)
			M12 connector	XS212BLNAM12	15 (0.53)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (2)	XS212BLPBL2	70 (2.47)
			M12 connector	XS212BLPBM12	15 (0.53)
		NPN	Pre-cabled, 2 m (6.6 ft) (2)	XS212BLNBL2	70 (2.47)
			M12 connector	XS212BLNBM12	15 (0.53)

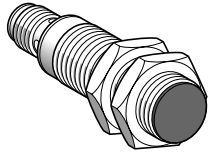
(1) For a 5 m (16.4 ft) cable, replace L2 with L5. Example: XS106BLPAL2 becomes XS106BLPAL5 with a 5 m cable.

(2) For a 5 m (16.4 ft) cable, replace L2 with L5; for a 10 m (32.8 ft) cable, replace L2 with L10. Example: XS112BLPAL2 becomes XS112BLPAL5 with a 5 m cable.

Proximity Sensors

Basic, Metal, Cylindrical, Flush and Non-Flush Mountable

Two-Wire AC; Three-Wire DC, Solid-State Output



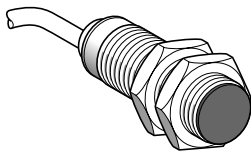
XS118BL**M12

Sensing distance Sn mm (in.)	Function	Output	Connection	Reference	Weight g (oz)
Ø 18, threaded M18 x 1					
Three-wire 12-24 Vdc, flush mountable					

5 (0.20)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS118BLPAL2	105 (3.70)
			M12 connector	XS118BLPAM12	35 (1.23)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS118BLNAL2	105 (3.70)
			M12 connector	XS118BLNAM12	35 (1.23)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS118BLPBL2	105 (3.70)
			M12 connector	XS118BLPBM12	35 (1.23)
NPN		Pre-cabled, 2 m (6.6 ft) (1)	XS118BLNBL2	105 (3.70)	
		M12 connector	XS118BLNBM12	35 (1.23)	

Two-wire 24-240 Vac, flush mountable					
5 (0.20)	NO	—	Pre-cabled, 2 m (6.6 ft) (1)	XS118BLFAL2	120 (4.23)

Three-wire 12-24 Vdc, non-flush mountable					
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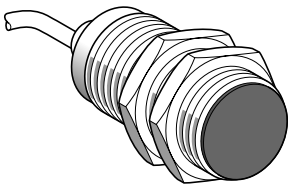


XS118BL***L2

8 (0.31)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS218BLPAL2	105 (3.70)
			M12 connector	XS218BLPAM12	35 (1.23)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS218BLNAL2	105 (3.70)
			M12 connector	XS218BLNAM12	35 (1.23)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS218BLPBL2	105 (3.70)
			M12 connector	XS218BLPBM12	35 (1.23)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS218BLNBL2	105 (3.70)
			M12 connector	XS218BLNBM12	35 (1.23)

Ø 30, threaded M30 x 1.5					
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Three-wire 12-24 Vdc, flush mountable					
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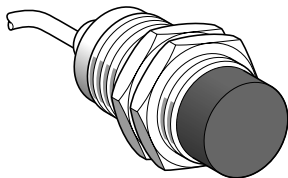


XS130BL**L2

10 (0.39)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS130BLPAL2	165 (5.82)
			M12 connector	XS130BLPAM12	75 (2.65)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS130BLNAL2	165 (5.82)
			M12 connector	XS130BLNAM12	75 (2.65)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS130BLPBL2	165 (5.82)
			M12 connector	XS130BLPBM12	75 (2.65)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS130BLNBL2	165 (5.82)
			M12 connector	XS130BLNBM12	75 (2.65)

Two-wire 24-240 Vac, flush mountable					
10 (0.39)	NO	—	Pre-cabled, 2 m (6.6 ft) (1)	XS130BLFAL2	205 (7.23)

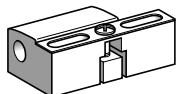
Three-wire 12-24 Vdc, non-flush mountable					
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XS230BL**L2

15 (0.59)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS230BLPAL2	155 (5.47)
			M12 connector	XS230BLPAM12	85 (3.00)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS230BLNAL2	155 (5.47)
			M12 connector	XS230BLNAM12	85 (3.00)
	NC	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS230BLPBL2	155 (5.47)
			M12 connector	XS230BLPBM12	85 (3.00)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS230BLNBL2	155 (5.47)
			M12 connector	XS230BLNBM12	85 (3.00)

Accessories (2)



XSZB1**

Description	Reference	Weight g (oz)	
Mounting clamps	Ø 6.5	XSZB165	5 (0.18)
	Ø 8	XSZB108	6 (0.21)
	Ø 12	XSZB112	6 (0.21)
	Ø 18	XSZB118	10 (0.35)
	Ø 30	XSZB130	20 (0.71)

(1) For a 5 m (16.4 ft) cable, replace L2 with L5; for a 10 m (32.8 ft) cable, replace L2 with L10.
Example: XS118BLPAL2 becomes XS118BLPAL5 with a 5 m cable.

(2) For further information, see page 284.

Proximity Sensors

Basic, Metal, Cylindrical, Flush and Non-Flush Mountable

Two-Wire AC; Three-Wire DC, Solid-State Output

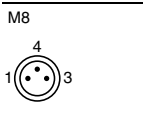
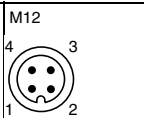
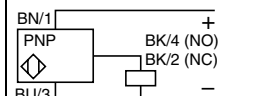
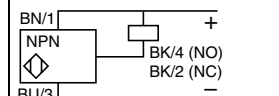
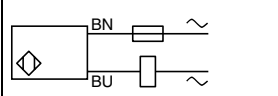
Specifications

Sensor type		XS1●●BLP●L2 XS1●●BLN●L2	XS1●●BLP●M● XS1●●BLN●M●	XS2●●BLP●L2 XS2●●BLN●L2	XS2●●BLP●M● XS2●●BLN●M●	XS1●●BLFAL2
Product certifications		UL, CSA, CE				
Connection	Pre-cabled	Length 2 m (6.6 ft)	—	Length 2 m (6.6 ft)	—	Length 2 m (6.6 ft)
	Connector	—	M8 on Ø 8 M12 on Ø 8, Ø 12, Ø 18 and Ø 30	—	M8 on Ø 8 M12 on Ø 8, Ø 12, Ø 18 and Ø 30	—
Operating zone (1)	Ø 6.5	mm (in.)	0–1.2 (0–0.05)	—	—	—
	Ø 8	mm (in.)	0–1.2 (0–0.05)	0–2 (0–0.08)	—	—
	Ø 12	mm (in.)	0–1.6 (0–0.06)	0–3.2 (0–0.13)	—	0–1.6 (0–0.06)
	Ø 18	mm (in.)	0–4 (0–0.16)	0–6.4 (0–0.25)	—	0–4 (0–0.16)
	Ø 30	mm (in.)	0–8 (0–0.31)	0–12 (0–0.47)	—	0–8 (0–0.31)
Differential travel	%	1–15 of real sensing distance (Sr)				
Degree of protection	Conforming to IEC 60529	IP67				
Storage temperature	°C (°F)	-40 to +85 (-40 to +185)				
Operating temperature	°C (°F)	-25 to +70 (-13 to +158)				
Materials	Case	Nickel plated brass				
	Cable	PVC 3 x 0.34 mm ² except Ø 6.5 and Ø 8: 3 x 0.11 mm ²	—	PVC 3 x 0.34 mm ² except Ø 6.5 and Ø 8: 3 x 0.11 mm ²	—	PVC 2 x 0.34 mm ²
Vibration resistance	Conforming to IEC 60068-2-6	25 gn, amplitude ±2 mm (@ 10 to 55 Hz)				
Shock resistance	Conforming to IEC 60068-2-27	50 gn, duration 11 ms				
Output state indication		Yellow LED, on rear	Yellow LED: 4 viewing ports at 90°	Yellow LED, on rear	Yellow LED: 4 viewing ports at 90°	Yellow LED, on rear
Rated supply voltage	V	12–24 Vdc with protection against reverse polarity				24–240 Vac
Voltage limits (including ripple)	V	10–36 Vdc				20–264 Vac
Switching capacity	mA	≤100 (except Ø 6.5 and 8: ≤50) with overload and short-circuit protection				5–300 (5–200 for Ø 12) (2)
Voltage drop, closed state	V	≤2				≤4.5 (≤7 for Ø 12)
Current consumption, no-load	mA	≤10				—
Residual current, open state	mA	—				≤1.5
Maximum switching frequency	Ø 6.5, Ø 8	Hz	3000		—	—
	Ø 12	Hz	2000	1000	—	25
	Ø 18	Hz	2000	250	—	25
	Ø 30	Hz	200	60	—	25
Delays	First-up	ms	≤5 (except Ø 30: ≤10)			≤40
	Response	ms	≤0.5 for Ø 8, Ø 12; ≤1 for Ø 18; ≤2 for Ø 30			≤10
	Recovery	ms	≤1 for Ø 8; ≤0.5 for Ø 12; ≤2 for Ø 18; ≤6 for Ø 30			≤15

(1) For detection curves, see page 307.

(2) These sensors do not incorporate overload or short-circuit protection, so it is essential to connect a 0.4 A quick-blow fuse in series with the load. See page 284.

Wiring Diagrams

Connector	Pre-cabled	PNP	NPN	2-wire ~
 M8	 M12			
BU: Blue BN: Brown BK: Black				

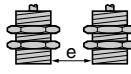
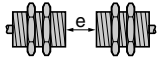
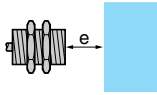
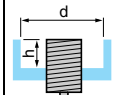
For connection information, refer to the *Cabling* section beginning on page 625.

Proximity Sensors

Basic, Metal, Cylindrical, Flush and Non-Flush Mountable

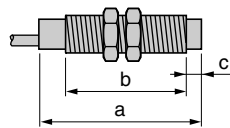
Two-Wire AC; Three-Wire DC, Solid-State Output

Setup

		Minimum mounting distances, mm (in.)			
					
Sensors		Side by side	Face to face	Facing a metal object	Mounted in a metal support
Ø 6.5 flush mountable	XS106	$e \geq 3$ (0.12)	$e \geq 18$ (0.71)	$e \geq 4.5$ (0.18)	$d \geq 6.5$ (0.26) $h \geq 0$
Ø 8 flush mountable	XS108	$e \geq 3$ (0.12)	$e \geq 18$ (0.71)	$e \geq 4.5$ (0.18)	$d \geq 8$ (0.31) $h \geq 0$
Ø 8 non-flush mountable	XS208	$e \geq 10$ (0.39)	$e \geq 30$ (1.18)	$e \geq 7.5$ (0.30)	$d \geq 24$ (0.94) $h \geq 5$ (0.20)
Ø 12 flush mountable	XS112	$e \geq 4$ (0.16)	$e \geq 24$ (0.94)	$e \geq 6$ (0.24)	$d \geq 12$ (0.47) $h \geq 0$
Ø 12 non-flush mountable	XS212	$e \geq 16$ (0.63)	$e \geq 48$ (1.89)	$e \geq 12$ (0.47)	$d \geq 36$ (1.42) $h \geq 8$ (0.31)
Ø 18 flush mountable	XS118	$e \geq 10$ (0.39)	$e \geq 60$ (2.36)	$e \geq 15$ (0.59)	$d \geq 18$ (0.71) $h \geq 0$
Ø 18 non-flush mountable	XS218	$e \geq 16$ (0.63)	$e \geq 96$ (3.78)	$e \geq 24$ (0.94)	$d \geq 54$ (2.13) $h \geq 16$ (0.63)
Ø 30 flush mountable	XS130	$e \geq 20$ (0.79)	$e \geq 120$ (4.72)	$e \geq 30$ (1.18)	$d \geq 30$ (1.18) $h \geq 0$
Ø 30 non-flush mountable	XS230	$e \geq 60$ (2.36)	$e \geq 180$ (7.09)	$e \geq 45$ (1.77)	$d \geq 90$ (3.54) $h \geq 30$ (1.18)

Dimensions

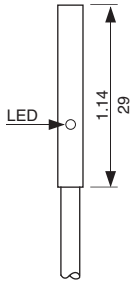
		Flush mountable in metal							
Sensors		Pre-cabled, mm (in.)		M8 connector, mm (in.)			M12 connector, mm (in.)		
		a	b	a	b	a	b		
Ø 6.5	XS106	42 (1.65)	—	—	—	—	—	—	
Ø 8	XS108	42 (1.65)	39.4 (1.55)	52.2 (2.06)	41.3 (1.63)	61.4 (2.42)	39 (1.54)	—	
Ø 12	XS112	41.3 (1.63)	38.7 (1.52)	—	—	53 (2.09)	39 (1.54)	—	
Ø 18	XS118	51.3 (2.02)	48.4 (1.91)	—	—	64 (2.52)	48.5 (1.91)	—	
Ø 30	XS130	51.3 (2.02)	48.4 (1.91)	—	—	64 (2.52)	48.5 (1.91)	—	
		Non-flush mountable in metal							
Sensors		Pre-cabled, mm (in.)		M8 connector, mm (in.)			M12 connector, mm (in.)		
		a	b	a	b	c	a	b	c
Ø 8	XS208	42 (1.65)	35.8 (1.41)	52.2 (2.06)	37.7 (1.48)	4 (0.16)	61.4 (2.42)	35.4 (1.39)	4 (0.16)
Ø 12	XS212	41.3 (1.63)	34.1 (1.34)	—	—	—	52.6 (2.07)	34 (1.34)	5 (0.20)
Ø 18	XS218	50.6 (1.99)	40.4 (1.59)	—	—	—	63.4 (2.50)	40.5 (1.59)	8 (0.31)
Ø 30	XS230	50.6 (1.99)	35.4 (1.39)	—	—	—	63.4 (2.50)	35.5 (1.40)	13 (0.51)



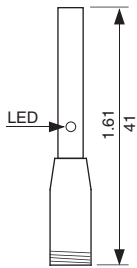
Proximity Sensors

XS Tubular, Inductive Sensors

4 mm Diameter, DC



XS1L●



XS1L●S

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

- Rugged case designed for the industrial environment
- Mounting space savings due to short length
- Significant savings in replacement time by using the patented plastic mounting bracket (no gauging) or connectors
- Extensive protective circuitry for trouble-free operation
- Works with 24 V secondary transformers
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Operating Frequency	Mating Connector Style (See page 626)	Catalog Number
--------------------------	--------------	---------------	-------------	---------------------	---------------------------------------	----------------

Nickel-plated brass case

Shielded, 2 m (6.6 ft) cable

1 mm	PNP	5–24 V	N.O.★	5,000 Hz	—	XS1L04PA310
1 mm	NPN	5–24 V	N.O.★	5,000 Hz	—	XS1L04NA310

Shielded, nano-style connector

1 mm	PNP	5–24 V	N.O.★	5,000 Hz	1 thru 8	XS1L04PA310S
1 mm	NPN	5–24 V	N.O.★	5,000 Hz	1 thru 8	XS1L04NA310S

Stainless steel case

Shielded, 2 m (6.6 ft) cable

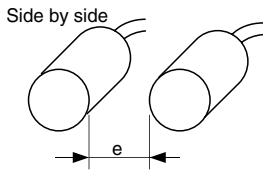
0.8 mm	PNP	5–24 V	N.O.	5,000 Hz	—	XS1L04PA311
0.8 mm	NPN	5–24 V	N.O.	5,000 Hz	—	XS1L04NA311

Shielded, nano-style connector

0.8 mm	PNP	5–24 V	N.O.	5,000 Hz	1 thru 8	XS1L04PA311S
0.8 mm	NPN	5–24 V	N.O.	5,000 Hz	1 thru 8	XS1L04NA311S

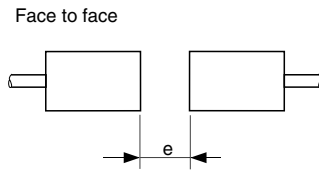
★ To order a normally closed (N.C.) version, change the **A** to **B**, example: XS1L04PA310 to XS1L04PB310.

Minimum Mounting Clearances, mm (in.)

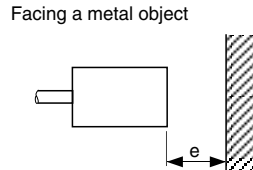


XS1 Shielded

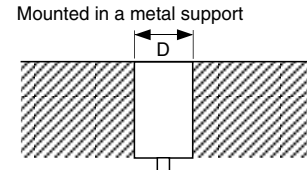
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e: 12 (0.47)



e: 3 (0.12)



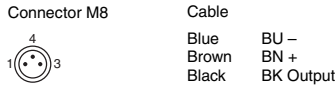
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Proximity Sensors

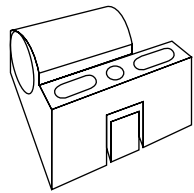
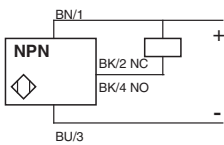
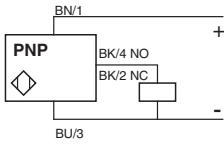
XS Tubular, Inductive Sensors

4 mm Diameter, DC

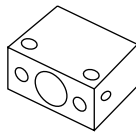
Wiring



3 wire NO or NC
wire color/connector pin



XSZB104



831604

Specifications

Mechanical		
Usable sensing range	Shielded brass case	0 to 0.8 mm
	Stainless steel case	0 to 0.64 mm
Standard temperature range		-25 to +70 °C (-13 to +158 °F)
Enclosure rating—cable (for connector, see page 626)	NEMA Types	3, 4X, 6P, 12, 13
	CENELEC	IP67
	Brass case	Nickel-plated brass
Enclosure material	Stainless steel case	Stainless steel
	Sensing face	PBT
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)		4 x 4 mm (0.16 x 0.16 in.)
Differential (% of Sr)		15%
Repeatability (% of Sr)		3%
LED indicator type		Side-mounted LED shows output status
Cable	3-wire	27 AWG (0.11 mm ²), PvR
Electrical		
Voltage range—nominal		5 to 24 Vdc
Voltage limit (Including Ripple)		5 to 30 Vdc
Voltage drop (across switch), closed state		2 V
Maximum load current		100 mA
Current consumption (no load)		10 mA
On delay (maximum)		0.1 ms
Off delay (maximum)		0.1 ms
Power-up delay (maximum)		5 ms
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 L3
	Electrostatic; transients; impulse	IEC 6100-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3
	Reverse polarity protection	Yes
Agency listings	E164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range (cable type only)	Down to -40° C (-40° F) TF
Extended cable length	5 m (16.4 ft) cable L1
	10 m (32.8 ft) cable L2

Accessories

Description	Catalog Number
Plastic mounting bracket	XSZB104
Diecast zinc mounting bracket	831604

Note: Refer to page 327 for target material correction coefficient Km.

Connector Cables (M8 or S suffix)

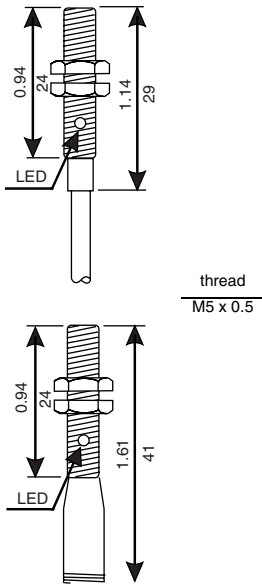
XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
Accessories page 284

Proximity Sensors

XS Tubular, Inductive Sensors

5 mm Diameter, DC; Economy Short Length



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

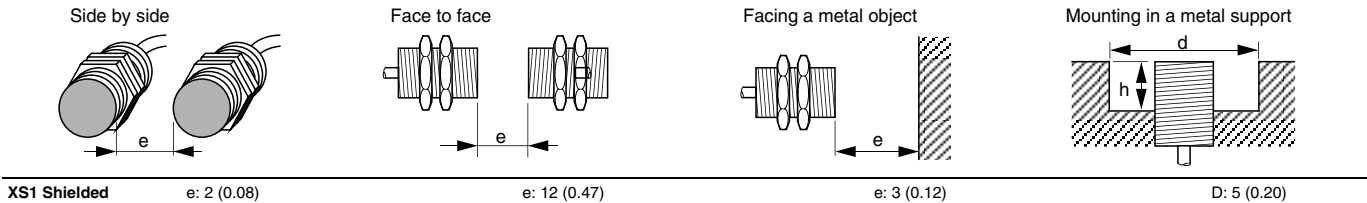
Features

- Rugged case designed for the industrial environment
- Mounting space savings due to short length
- Significant savings in replacement time by using the patented plastic mounting bracket (no gauging) or connectors
- Extensive protective circuitry for trouble-free operation
- Works with 24 V secondary transformers
- Metal mounting nuts included, diecast zinc
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Operating Frequency	Mating Connector Style (See page 518)	Catalog Number
Nickel-plated brass case						
Shielded, 2 m (6.6 ft) cable						
1 mm	PNP	5–24 V	N.O.★	5,000 Hz	—	XS1N05PA310
1 mm	NPN	5–24 V	N.O.★	5,000 Hz	—	XS1N05NA310
Stainless steel case						
Shielded, 2 m (6.6 ft) cable						
0.8 mm	PNP	5–24 V	N.O.	5,000 Hz	—	XS1N05PA311
0.8 mm	NPN	5–24 V	N.O.	5,000 Hz	—	XS1N05NA311
Shielded, nano-style connector						
0.8 mm	PNP	5–24 V	N.O.	5,000 Hz	1 thru 8	XS1N05PA311S
0.8 mm	NPN	5–24 V	N.O.	5,000 Hz	1 thru 8	XS1N05NA311S

★ To order a normally closed (N.C.) version, change the **A** to **B**, example: XS1N05PA310 to XS1N05PB310

Minimum Mounting Clearances, mm (in.)

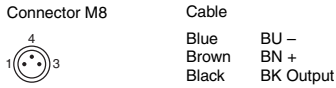


Proximity Sensors

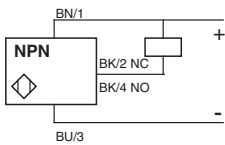
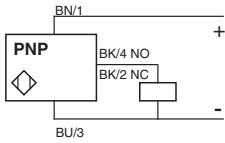
XS Tubular, Inductive Sensors

5 mm Diameter, DC; Economy Short Length

Wiring



3 wire NO or NC
wire color/connector pin



Specifications

Mechanical		
Usable sensing range	Shielded brass case	0 to 0.8 mm
	Stainless steel case	0 to 0.64 mm
Standard temperature range	-25 to +70° C (-13 to +158° F)	
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP67
Enclosure material	Brass case	Nickel-plated brass
	Stainless steel case	Stainless steel
	Sensing face	PBT
Maximum tightening torque	Brass	1.6 N•m (1.2 lb-ft)
	Stainless steel	2.2 N•m (1.75 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)	4 x 4 mm (0.16 x 0.16 in.)	
Differential (% of Sr)	15%	
Repeatability (% of Sr)	3%	
LED indicator type	Side-mounted LED shows output status	
Cable	3-wire	27 AWG (0.11 mm ²), PvR
Electrical		
Voltage range—nominal	5 to 24 Vdc	
Voltage limit (including ripple)	5 to 30 Vdc	
Voltage drop (across switch), closed state	2 V	
Maximum load current	100 mA	
Current consumption (no load)	10 mA	
On delay (maximum)	0.1 ms	
Off delay (maximum)	0.1 ms	
Power-up delay (maximum)	5 ms	
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 L3
	Electrostatic; transients; impulse	IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3
	Reverse polarity protection	Yes
Agency listings	E164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix	
Extended temperature range (cable type only)	Down to -40° C (-40° F)	TF
Extended cable length	5 m (16.4 ft) cable	L1
	10 m (32.8 ft) cable	L2

Accessories

Description	Catalog Number
Metal, diecast zinc mounting nuts and lockwasher	XSZE105
Plastic mounting bracket	XSZB105
Diecast zinc mounting bracket	831605
Stainless steel mounting nuts and lockwasher	XSZE305

Note: Refer to page 327 for target material correction coefficient Km.

Connector Cables (M8 or S suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°

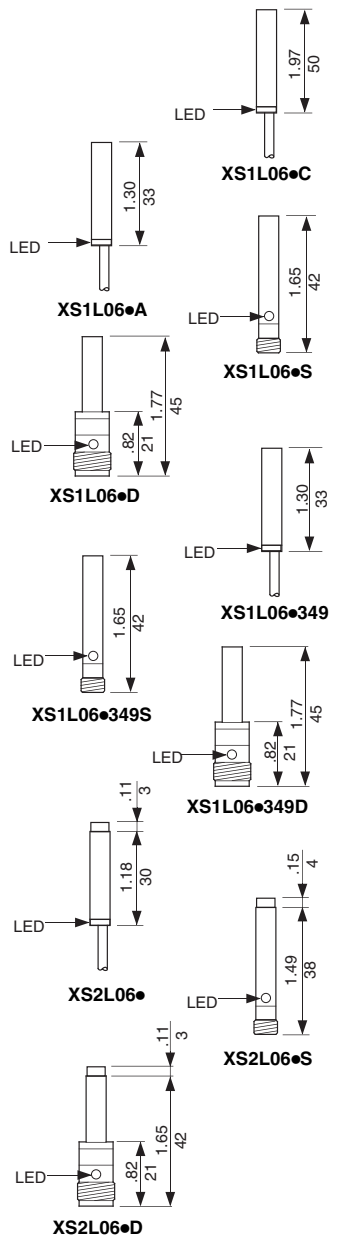
Additional cable options and lengths... page 626
Accessories... page 284

Proximity Sensors

XS Tubular, Inductive Sensors

6.5 mm Diameter, DC; Economy, Short Length, Smooth Barrel

Proximity



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- Economy of size offered by extended range model
- Reduction of relay or software logic using complementary N.O. + N.C. outputs
- Significant savings in replacement time by using the patented plastic mounting bracket (no gauging) or connectors
- Extensive protective circuitry for trouble-free operation
- Works with an unregulated DC supply powered by a 24 V secondary transformer
- Metal mounting nuts included
- Diecast zinc
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Operating Frequency	Indicator LED (see next page)	Mating Connector (see page 626)	Catalog Number
Stainless steel case							
Shielded, 2 m (6.6 ft) cable							
1.5 mm	PNP	12–24 V	N.O. ★	5,000 Hz	A	—	XS1L06PA340
1.5 mm	NPN	12–24 V	N.O. ★	5,000 Hz	A	—	XS1L06NA340
1.5 mm	PNP	12–24 V	N.O.+N.C.	5,000 Hz	A	—	XS1L06PC410
1.5 mm	NPN	12–24 V	N.O.+N.C.	5,000 Hz	A	—	XS1L06NC410
Shielded, nano-style connector							
1.5 mm	PNP	12–24 V	N.O. ★	5,000 Hz	B	1 thru 8	XS1L06PA340S
1.5 mm	NPN	12–24 V	N.O. ★	5,000 Hz	B	1 thru 8	XS1L06NA340S
Shielded, micro-style connector							
1.5 mm	PNP	12–24 V	N.O.	5,000 Hz	B	11, 12, 13, 15, 16	XS1L06PA340D
1.5 mm	NPN	12–24 V	N.O.	5,000 Hz	B	11, 12, 14, 15, 16	XS1L06NA340D
Nickel-plated brass case							
Shielded♦, Extended Range, 2 m (6.6 ft) cable							
2.5 mm	PNP	12–24 V	N.O. ★	2,500 Hz	A	—	XS1L06PA349
2.5 mm	NPN	12–24 V	N.O. ★	2,500 Hz	A	—	XS1L06NA349
Shielded♦, Extended Range, nano-style connector							
2.5 mm	PNP	12–24 V	N.O.	2,500 Hz	B	1 thru 8	XS1L06PA349S
2.5 mm	NPN	12–24 V	N.O.	2,500 Hz	B	1 thru 8	XS1L06NA349S
Shielded♦, Extended Range, micro-style connector							
2.5 mm	PNP	12–24 V	N.O.	2,500 Hz	B	11, 12, 13, 15, 16	XS1L06PA349D
2.5 mm	NPN	12–24 V	N.O.	2,500 Hz	B	11, 12, 14, 15, 16	XS1L06NA349D
Stainless steel case							
Non-Shielded, 2 m (6.6 ft) cable							
2.5 mm	PNP	12–24 V	N.O.	5,000 Hz	A	—	XS2L06PA340
2.5 mm	NPN	12–24 V	N.O.	5,000 Hz	A	—	XS2L06NA340
Non-Shielded, nano-style connector							
2.5 mm	PNP	12–24 V	N.O.	5,000 Hz	B	1 thru 8	XS2L06PA340S
2.5 mm	NPN	12–24 V	N.O.	5,000 Hz	B	1 thru 8	XS2L06NA340S
Non-Shielded, micro-style connector DC							
2.5 mm	PNP	12–24 V	N.O.	5,000 Hz	B	11, 12, 13, 15, 16	XS2L06PA340D
2.5 mm	NPN	12–24 V	N.O.	5,000 Hz	B	11, 12, 14, 15, 16	XS2L06NA340D
2.5 mm	PNP	12–24 V	N.O.+N.C.	5,000 Hz	B	11, 12, 13, 15, 16	XS2L06PC410D
2.5 mm	NPN	12–24 V	N.O.+N.C.	5,000 Hz	B	11, 12, 14, 15, 16	XS2L06NC410D

★ To order a normally closed (N.C.) version, change A to B, example; XS1L06PA340 to XS1L06PB340.
♦ See dimension x below.

Minimum Mounting Clearances, mm (in.)

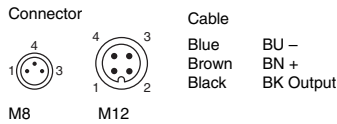
	Side to side	Face to face	Facing a metal object	Mounted in a metal support	Mounted in a metal support
XS1 Shielded	e: 3 (0.12)	e: 18 (0.71)	e: 4.5 (0.17)	—	D: 6.5 (0.26); x: 0
XS1 Extended range	e: 5 (0.20)	e: 30 (1.18)	e: 7.5 (0.30)	—	D: 10 (0.39); x: 1.6 (0.06)
XS2 Non-shielded	e: 10 (0.39)	e: 30 (1.18)	e: 7.5 (0.30)	D: 19.5 (0.77); H: 5 (0.20)	—

Proximity Sensors

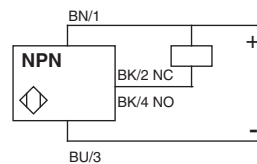
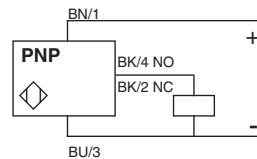
XS Tubular, Inductive Sensors

6.5 mm Diameter, DC; Economy, Short Length, Smooth Barrel

Wiring

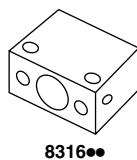
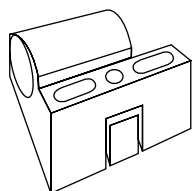
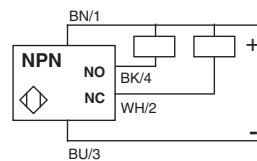
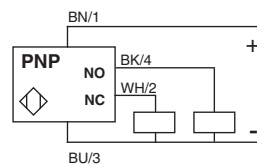


3 wire NO or NC
wire color/ connector pin



M8 connector, N.O. and N.C. to pin 4.

4 wire NO + NC



Connector Cables (M8 or S suffix; M12 or D suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths ... page 626
Accessories ... page 284

Specifications

Mechanical			
Usable sensing range	Shielded	Standard sensing range	0 to 1.2 mm
		Extended sensing range	0 to 2 mm
	Non-shielded		0 to 2 mm
Standard temperature range		Standard sensing range	-25 to +70 °C (-13 to +158 °F)
		Extended sensing range	-25 to 50 °C (13 to 122 °F)
Enclosure rating—cable (for connector see page 626)	NEMA Type		3, 4X, 6P, 12, 13
	IEC		IP67
Enclosure material	Case		Nickel-plated brass
	Sensing face		PBT
Vibration resistance	(IEC 60068.2.6)		25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)		50 G, 11 ms duration
Standard target size (steel)			6.5 x 6.5 mm (0.26 x 0.26 in.)
Differential (% of Sr)			15%
Repeatability (% of Sr)			3%
LED indicator type	A		360° ring LED shows output status
	B		One LED visible from 4 quadrants shows output status
Cable	3-wire		27 AWG (0.11 mm ²), PvR
	4-wire (N.O. + N.C.)		28 AWG (0.08 mm ²), PvR
Electrical			
Voltage range—nominal			12–24 Vdc
Voltage limit (including ripple)			10–38 Vdc
Voltage drop (across switch), closed state			2 V (2.6 V extended sensing range)
Maximum load current			200 mA
Current consumption (no load)			10 mA
On delay (maximum)		Standard sensing range	0.1 ms
		Extended sensing range	0.2 ms
Off delay (maximum)		Standard sensing range	0.1 ms
		Extended sensing range	0.2 ms
Power-up delay (maximum)			5 ms
Protective circuitry	Short circuit protection		Yes
	Overload		Yes
	Radio frequency immunity (RFI)		IEC 61000-4-3 L3
	Electrostatic; transients; impulse		IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3
	Reverse polarity protection		Yes
Agency listings	UL E164869 CCN NRKH	SP CR 44087 Class 3211 03	CE

Options

Description		Suffix
Extended temperature range (cable type and standard sensing distance only)	Down to -40° C (-40° F)	TF
Extended cable length	5 m (16.4 ft) cable	L1
	10 m (32.8 ft) cable	L2

Accessories

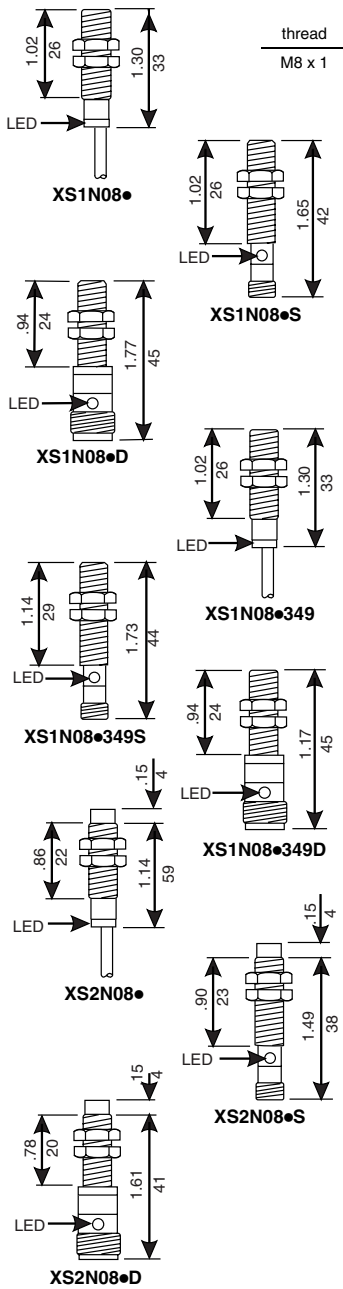
Description	Catalog Number
Plastic mounting bracket	XSZB165
Diecast zinc mounting bracket	831606

Note: Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

8 mm Diameter, DC; Economy Short Length



Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- Economy of size offered by extended range model
- Significant savings in replacement time by using the patented plastic mounting bracket (no gauging) or connectors
- Extensive protective circuitry for trouble-free operation
- Works with an unregulated DC supply powered by a 24 V secondary transformer
- Metal mounting locknuts included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Operating Frequency	Indicator LED (see next page)	Mating Connector Style (See page 626)	Catalog Number
Nickel-plated brass case							
Shielded, micro-style connector							
1.5 mm	PNP	12–24 V	N.O. ★	5,000 Hz	B	11, 12, 13, 15, 16	XS1N08PA340D
1.5 mm	NPN	12–24 V	N.O. ★	5,000 Hz	B	11, 12, 14, 15, 16	XS1N08NA340D
Shielded, ♦ Extended Range, 2 m (6.6 ft) cable							
2.5 mm	PNP	12–24 V	N.O. ★	2,500 Hz	A	—	XS1N08PA349
2.5 mm	NPN	12–24 V	N.O. ★	2,500 Hz	A	—	XS1N08NA349
Shielded, ♦ Extended Range, nano-style connector							
2.5 mm	PNP	12–24 V	N.O. ★	2,500 Hz	B	1 thru 8	XS1N08PA349S
2.5 mm	NPN	12–24 V	N.O. ★	2,500 Hz	B	1 thru 8	XS1N08NA349S
Shielded, ♦ Extended Range, micro-style connector DC							
2.5 mm	PNP	12–24 V	N.O. ★	2,500 Hz	B	11, 12, 13, 15, 16	XS1N08PA349D
2.5 mm	NPN	12–24 V	N.O. ★	2,500 Hz	B	11, 12, 14, 15, 16	XS1N08NA349D
Non-shielded, 2 m (6.6 ft) cable							
2.5 mm	NPN	12–24 V	N.O. ★	5,000 Hz	A	—	XS2N08NA340
Non-shielded, micro-style connector							
2.5 mm	NPN	12–24 V	N.O.	5,000 Hz	B	11, 12, 14, 15, 16	XS2N08NA340D

★ To order a normally closed (N.C.) version, change A to B, example; XS1N08PA349 to XS1N08PB349.
 ♦ See dimension x below.

Minimum Mounting Clearances mm (in.)

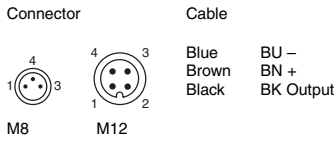
	Side by side	Face to face	Facing a metal object	Mounting in a metal support	Mounted in a metal support
XS1 Shielded	e: 3 (0.12)	e: 18 (0.71)	e: 4.5 (0.18)	D: 8 (0.31); H: 0	x: 0
XS1 Extended range	e: 5 (0.20)	e: 30 (1.18)	e: 7.5 (0.30)	D: 10 (0.39); H: 1.6 (0.06)	D: 8 (0.31); x: 1.6 (0.06)
XS2 Non-shielded	e: 10 (0.39)	e: 30 (1.18)	e: 7.5 (0.30)	D: 24 (0.94); H: 5 (0.20)	—

Proximity Sensors

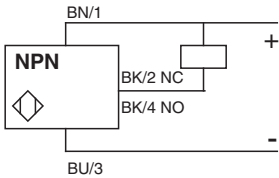
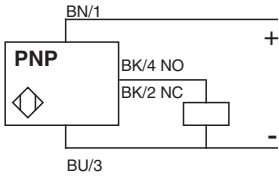
XS Tubular, Inductive Sensors

8 mm Diameter, DC; Economy Short Length

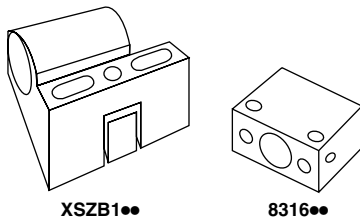
Wiring



3 wire NO or NC
wire color/ connector pin



M8 connector, N.O. and N.C. to pin 4.



Connector Cables (M8 or S suffix; M12 or D suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths... page 626
Accessories... page 284

Specifications

Mechanical			
Usable sensing range	Shielded	Standard sensing range	0 to 1.2 mm
		Extended sensing range	0 to 2 mm
	Non-shielded		0 to 2 mm
Standard temperature range		Standard sensing range	-25 to +70 °C (-13 to +158 °F)
		Extended sensing range	-25 to 50 °C (-13 to 122 °F)
Enclosure rating—cable (see page 626)	NEMA Types		3, 4X, 6P, 12, 13
	IEC		IP67
Enclosure material	Case		Nickel-plated brass
	Sensing face		PBT
Maximum tightening torque			5 N•m (3.7 lb-ft)
Vibration resistance	(IEC 60068.2.6)		25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)		50 G, 11 ms duration
Standard target size (steel)			8 x 8 mm (0.31 x 0.31 in.)
Differential (% of Sr)			15%
Repeatability (% of Sr)			3%
LED indicator type	A		360° ring LED shows output status
	B		One LED visible from 4 quadrants shows output status
Cable	3-wire		27 AWG (0.11 mm ²), PvR

Electrical			
Voltage range—nominal			12–24 Vdc
Voltage limit (including ripple)			10–38 Vdc
Voltage drop (across switch), closed state			2 V (2.6 V extended sensing range)
Maximum load current			200 mA
Current consumption (no load)			10 mA
On delay (maximum)	Standard sensing range		0.1 ms
	Extended sensing range		0.2 ms
Off delay (maximum)	Standard sensing range		0.1 ms
	Extended sensing range		0.2 ms
Power-up delay (maximum)	Standard/extended sensing range		5 ms
Protective circuitry	Short circuit protection		Yes
	Overload		Yes
	Radio frequency immunity (RFI)		IEC 61000-4-3 L3
	Electrostatic; transients; impulse		IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3 Extended sensing range: IEC 61000-4-4 L3
	Reverse polarity protection		Yes
Agency listings	UL E164869 CCN NRKH	SF CR 44087 Class 3211 03	CE

Options

Description	Suffix
Extended temperature range (cable type and standard sensing distance only)	Down to -40° C (-40° F) TF
Extended cable length	5 m (16.4 ft) cable L1
	10 m (32.8 ft) cable L2

Accessories

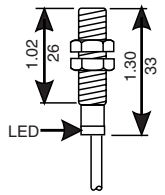
Description	Catalog Number
Metal mounting locknuts	XSZE108
Plastic mounting bracket	XSZB108
Diecast zinc mounting bracket	831608

Note: Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

8 mm Diameter, DC; Economy Short Length, Non-Corrosive

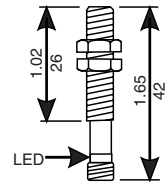


XS4P08•

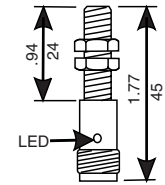
thread
M8 x 1

Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- Designed for chemically aggressive environments—cutting oils, grease, washdown, etc.
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Extensive protective circuitry for trouble-free operation
- Works with an unregulated DC supply powered by a 24 V secondary transformer
- Plastic mounting nuts included
- UL Listed, CSA Certified, and CE Marked



XS4P08•D



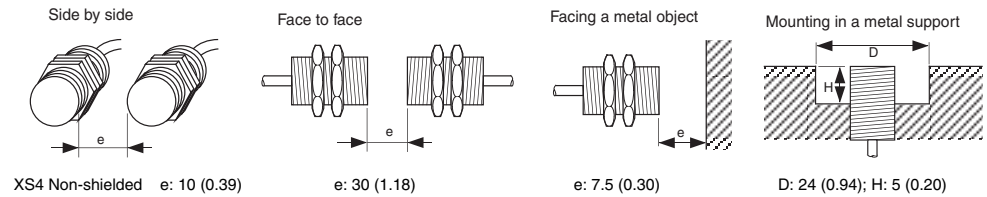
XS4P08•D

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Operating Frequency	Indicator LED (see next page)	Mating Connector Style (See page 626)	Catalog Number
Plastic							
Non-shielded, 2 m (6.6 ft) cable							
2.5 mm	PNP	12–24 V	N.O. ★	5,000 Hz	A	—	XS4P08PA340
2.5 mm	NPN	12–24 V	N.O. ★	5,000 Hz	A	—	XS4P08NA340
Non-shielded, nano-style connector							
2.5 mm	PNP	12–24 V	N.O.	5,000 Hz	A	1 thru 8	XS4P08PA340S
2.5 mm	NPN	12–24 V	N.O.	5,000 Hz	A	1 thru 8	XS4P08NA340S
Non-shielded, micro-style connector							
2.5 mm	PNP	12–24 V	N.O.	5,000 Hz	B	11, 12, 13, 15, 16	XS4P08PA340D
2.5 mm	NPN	12–24 V	N.O.	5,000 Hz	B	11, 12, 13, 15, 16	XS4P08NA340D

★ To order a normally closed (N.C.) version, change **A** to **B**, example XS3P08PA340 to XS3P08PB340

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Minimum Mounting Clearances, mm (in.)

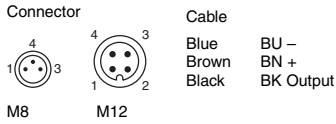


Proximity Sensors

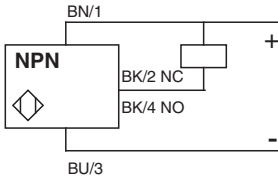
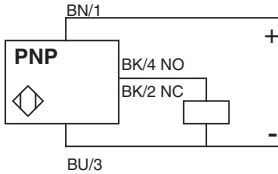
XS Tubular, Inductive Sensors

8 mm Diameter, DC; Economy Short Length, Non-Corrosive

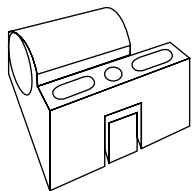
Wiring



3 wire NO or NC
wire color/ connector pin



M8 connector, N.O. and N.C. to pin 4.



XSZB100

Connector Cables (M8 or S suffix; M12 or D suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths...Page 626
Accessories...Page 284, 281

Specifications

Mechanical			
Usable sensing range	Shielded	0 to 1.2 mm	
	Non-shielded	0 to 2 mm	
Standard temperature range	-25 to +80 °C (-13 to +176 °F)		
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13	
	IEC	IP67	
Enclosure material	Case	PBT	
	Sensing face	PBT	
Tightening torque (maximum)	1 N•m (0.74 lb-ft)		
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz	
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration	
Standard target size (steel)	8 x 8 mm (0.31 x 0.31 in.)		
Differential (% of Sr)	15%		
Repeatability (% of Sr)	3%		
LED indicator type	A	360° ring LED shows output status	
	B	One LED visible from 4 quadrants shows output status	
Cable	3-wire	27 AWG (0.11 mm ²), PvR	
Electrical			
Voltage range—nominal	12–24 Vdc		
Voltage limit (including ripple)	10–38 Vdc		
Voltage drop (across switch), closed state	2 V		
Maximum load current	200 mA		
Current consumption (no load)	10 mA		
On delay (maximum)	0.1 ms		
Off delay (maximum)	0.1 ms		
Power-up delay (maximum)	5 ms		
Protective circuitry	Short circuit protection	Yes	
	Overload	Yes	
	Radio frequency immunity (RFI)	IEC 61000-4-3 L3	
	Electrostatic; transients; impulse	IEC 61000-4-2 L3; IEC 61000-4-4 L3; 60947.5.2 L	
	Reverse polarity protection	Yes	
Agency listings	E164869 CCN NRKH	CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range (cable type only)	Down to -40 °C (-40 °F)
Extended cable length	5 m (16.4 ft) cable
	10 m (32.8 ft) cable

Accessories

Description	Catalog Number
Plastic mounting nuts	XSZE208
Plastic mounting bracket	XSZB108

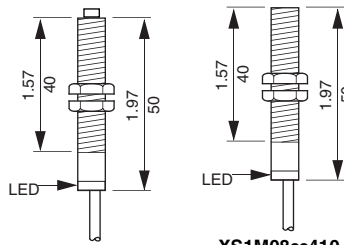
Note: Refer to page 327 for target material correction coefficient Km.

Proximity

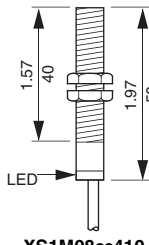
Proximity Sensors

XS Tubular, Inductive Sensors

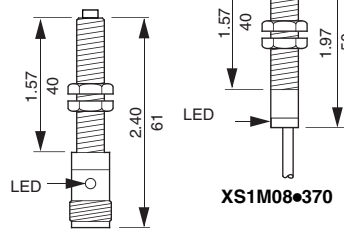
8 mm Diameter, DC; Universal Standard Length



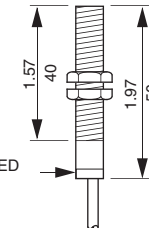
XS2M08PC410
XS2M08NC410



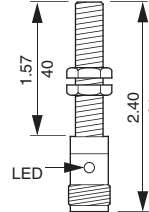
XS1M08



XS2M08PC410D
XS2M08NC410D

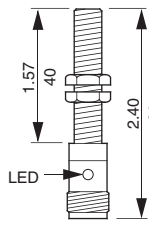


XS1M08



XS1M08

thread
M8 x 1



XS1M08

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- Rugged case designed for very aggressive environments—cutting oils, grease, etc.
- Pigtail connectors maintain the cutting oil enclosure rating while removing the connector from the aggressive environment
- Worry-free replacement: standard length, extended temperature and supply voltage range, improved enclosure rating
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Extensive protective circuitry for trouble-free operation
- Works with unfiltered rectified power supply
- Metal mounting locknuts included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Output Mode ★	Voltage Range	Maximum Load	Operating Frequency	Indicator LED (see next page)	Mating Connector Style (see page 626)	Catalog Number
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Stainless steel case

Shielded, 2 m (6.6 ft) cable

1.5 mm	PNP	N.O. ★	12–48 V	200 mA	5,000 Hz	A	—	XS1M08PA370
1.5 mm	NPN	N.O. ★	12–48 V	200 mA	5,000 Hz	A	—	XS1M08NA370
1.5 mm	PNP	N.O.	12–48 V	200 mA	5,000 Hz	A	—	XS1M08PA371

Shielded, micro-style connector DC

1.5 mm	PNP	N.O. ★	12–48 V	200 mA	5,000 Hz	B	11, 12, 15, 16	XS1M08PA370D
1.5 mm	NPN	N.O. ★	12–48 V	200 mA	5,000 Hz	B	11, 12, 15, 16	XS1M08NA370D

Plastic case

Non-shielded, 2 m (6.6 ft) cable

2.5 mm	PNP	N.O.★	12–48 V	200 mA	5,000 Hz	A	—	XS4P08PA370
2.5 mm	NPN	N.O.★	12–48 V	200 mA	5,000 Hz	A	—	XS4P08NA370
2.5 mm	PNP	N.O.+N.C.★	12–24 V	200 mA	5,000 Hz	A	—	XS4P08PC410
2.5 mm	NPN	N.O.+N.C.★	12–24 V	200 mA	5,000 Hz	A	—	XS4P08NC410

Nickel-plated brass case, complementary N.O.+N.C. outputs

Shielded, 2 m (6.6 ft) cable

1.5 mm	PNP	N.O.+N.C.	12–24 V	200 mA	5,000 Hz	A	—	XS1M08PC410
1.5 mm	NPN	N.O.+N.C.	12–24 V	200 mA	5,000 Hz	A	—	XS1M08NC410

Shielded, micro-style connector

1.5 mm	PNP	N.O.+N.C.	12–24 V	200 mA	5,000 Hz	B	11, 12, 15, 16	XS1M08PC410D
1.5 mm	NPN	N.O.+N.C.	12–24 V	200 mA	5,000 Hz	B	11, 12, 15, 16	XS1M08NC410D

Non-shielded, 2 m (6.6 ft) cable

2.5 mm	PNP	N.O.+N.C.	12–24 V	200 mA	5,000 Hz	A	—	XS2M08PC410
2.5 mm	NPN	N.O.+N.C.	12–24 V	200 mA	5,000 Hz	A	—	XS2M08NC410

Non-shielded, micro-style connector

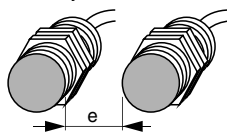
2.5 mm	PNP	N.O.+N.C.	12–24 V	200 mA	5,000 Hz	B	11, 12, 15, 16	XS2M08PC410D
2.5 mm	NPN	N.O.+N.C.	12–24 V	200 mA	5,000 Hz	B	11, 12, 15, 16	XS2M08NC410D

Ⓢ With stainless steel mounting nuts and washers.

★ To order a normally closed (N.C.) version, change **A** to **B**, example; XS1M08PA370 to XS1M08PB370.

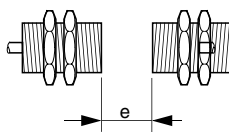
Minimum Mounting Clearances, mm (in.)

Side by side



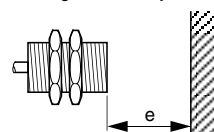
XS1Shielded	e: 3 (0.11)
XS2/XS4 Non-shielded	e: 10 (0.39)

Face to face



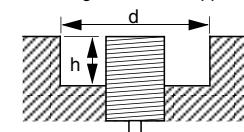
e: 18 (0.71)
e: 30 (1.18)

Facing a metal object



e: 4.5 (0.18)
e: 7.5 (0.30)

Mounting in a metal support



D: 8 (0.31); H: 0
D: 24 (0.94); H: 5 (0.20)

Proximity Sensors

XS Tubular, Inductive Sensors

8 mm Diameter, DC; Universal Standard Length

Wiring

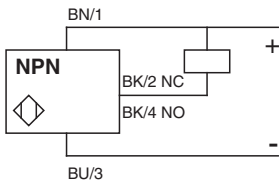
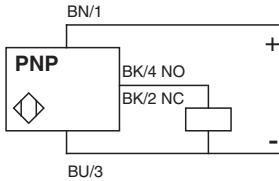
Connector M12



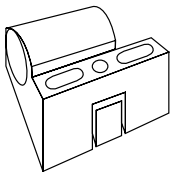
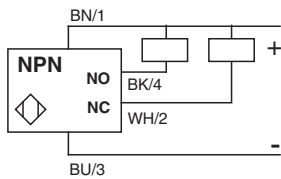
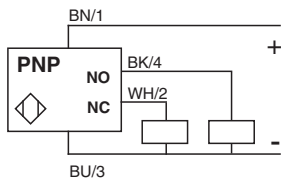
Cable

Blue BU -
Brown BN +
Black BK Output

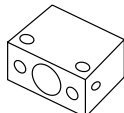
3 wire NO or NC
wire color/connector pin



4 wire NO + NC



XSZB100



831608

Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths.Page 626
AccessoriesPage 284, 281

Specifications

Mechanical		
Usable sensing range	Shielded	0 to 1.2 mm
	Non-shielded	0 to 2 mm
Standard temperature range		-25 to +80 °C (-13 to +176 °F)
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP67
Enclosure material	Stainless steel case	stainless steel
	Nickel-plated brass	Case: Nickel-plated brass Sensing face: PBT
	Plastic	PBT
Maximum tightening torque	Stainless steel	9 N•m (6.7 lb-ft)
	Plastic	1 N•m (0.74 lb-ft)
	Nickel-plated brass	9 N•m
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)		8 x 8 mm (0.31 x 0.31 in.)
Differential (% of Sr)		15%
Repeatability (% of Sr)		3%
LED indicator type	A	360° ring LED shows output status
	B	One LED visible from 4 quadrants shows output status
Cable	3-wire	27 AWG (0.11 mm ²), PvR
Electrical		
Voltage range—nominal		12–48 Vdc (12–24 complementary output)
Voltage limit (including ripple)		10–58 Vdc (10–38 complementary output)
Voltage drop (across switch), closed state	3-wire	2 V
Maximum load current	3-wire	100 mA
	4-wire complementary output	200 mA
Current consumption (no load)	3-wire	10 mA
On delay (maximum)	3-wire	0.1 ms
Off delay (maximum)	3-wire	0.1 ms
Power-up delay (maximum)	3-wire	5 ms
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 L3
	Electrostatic; transients; impulse	3-wire IEC 61000-4-2 L2, IEC 61000-4-4 L3; 60947.5.2 L2
	Reverse polarity protection	Yes
Agency listings	E164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix	
Extended temperature range (cable type only)	Down to -40° C (-40° F)	TF
Extended cable length	5 m (16.4 ft) cable	L1
	10 m (32.8 ft) cable	L2

Accessories

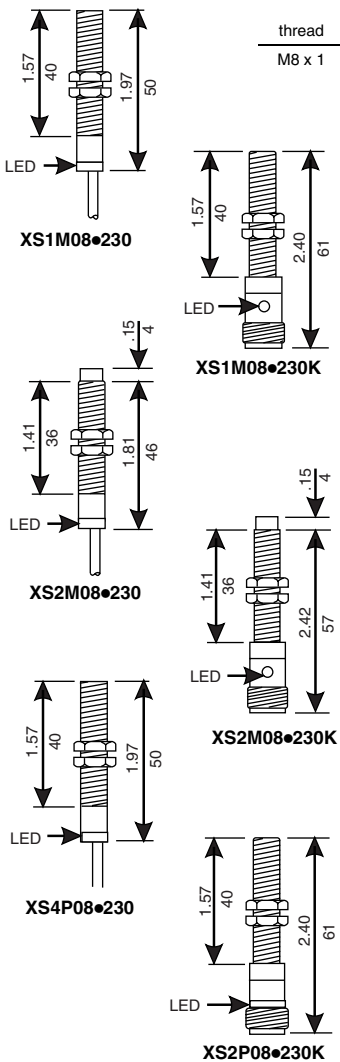
Description	Catalog Number
Plastic mounting nuts	XSZE208
Metal mounting nuts and lockwashers	XSZE108
Plastic mounting bracket	XSZB108
Diecast zinc mounting bracket	831608
Stainless steel mounting nuts	XSZE208
Stainless steel lockwashers	XSZE908

Note: Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

8 mm Diameter, AC/DC; Universal Standard Length



Features

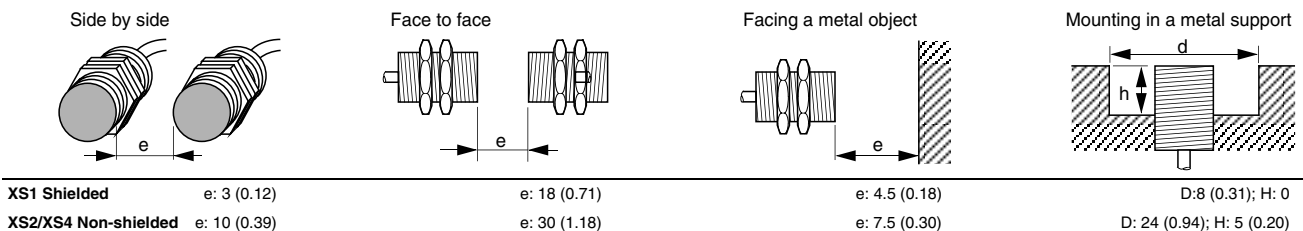
- Faster troubleshooting aided by high-visibility, 360° indicator
- Rugged case designed for aggressive environments.
- Worry-free replacement: standard length, extended temperature range, AC or DC power supply
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Extensive protective circuitry for trouble-free operation
- Normally closed (N.C.) output available on versions marked ★
- Plastic mounting nuts for plastic and locknuts for metal housing included
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Output Mode	Voltage Range		Operating Frequency		Indicator LED (see next page)	Mating Connector Style (see page 626)	Catalog Number
		AC	DC	AC	DC			
Nickel-plated brass case								
Shielded, 2 m (6.6 ft) cable								
1.5 mm	N.O. ★	24–240 V	24–210 V	25 Hz	4,000 Hz	A	—	XS1M08MA230
Shielded, micro-style connector AC								
1.5 mm	N.O. ★	24–240 V	24–210 V	25 Hz	4,000 Hz	B	17, 18	XS1M08MA230K
Non-shielded, 2 m (6.6 ft) cable								
2.5 mm	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	A	—	XS2M08MA230
Non-shielded, micro-style connector AC								
2.5 mm	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	B	17, 18	XS2M08MA230K
Plastic case								
Non-shielded, 2 m (6.6 ft) cable								
2.5 mm	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	A	—	XS4P08MA230
Non-shielded, micro-style connector AC								
2.5 mm	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	A	17, 18	XS4P08MA230K

★ To order a normally closed (N.C.) version, change A to B, example; XS1M08MA230 to XS1M08MB230.

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Minimum Mounting Clearances, mm (in.)

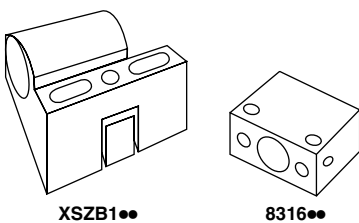
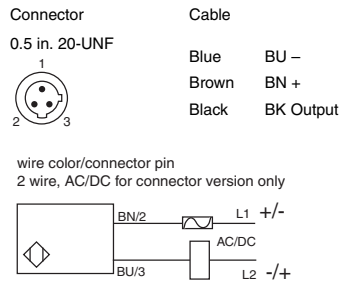


Proximity Sensors

XS Tubular, Inductive Sensors

8 mm Diameter, AC/DC; Universal Standard Length

Wiring



Connector Cables (U20 or K suffix)

XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths ... page 626
Accessories ... page 284

Specifications

Mechanical		
Usable sensing range	Shielded	0 to 1.2 mm
	Non-shielded	0 to 2 mm
Standard temperature range		-25 to +80 °C (-13 to +176 °F)
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP67
Enclosure material	Nickel-plated brass	Case: nickel-plated brass Sensing face: PBT
	Plastic	PBT
Tightening torque (maximum)	Nickel-plated brass	9 N•m (79.6 lb-ft)
	Plastic	1 N•m (0.74 lb-ft)
Vibration resistance	IEC 60068.2.6	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	IEC60068.2.27	50 G, 11 ms duration
Standard target size (steel)		8 x 8 mm (0.31 x 0.31 in.)
Differential (% of Sr)		15%
Repeatability (% of Sr)		3%
LED indicator type	A	360° ring LED shows output status
	B	One LED visible from 4 quadrants shows output status
Cable	2-wire	27 AWG (0.11 mm ²), PvR
Electrical		
Voltage range		24 to 240 Vac (50/60 Hz), 24 to 210 Vdc
Voltage limit (including ripple)		20 to 264 Vac/Vdc
Maximum voltage drop (across switch), closed state		5.5 V
Inrush current (inductive @ 20 ms)		2 A
Minimum load current		5 mA
Maximum load current		100 mA 20 ≤ Vdc ≤ 58 IEC 60947-5-2 Utilization category DC-13 Vdc > 58 IEC 60947-5-2 Utilization category DC-12
Residual (leakage) current, open state	24 Vac/Vdc	0.8 mA
	120 Vac/Vdc	1.5 mA
On delay (maximum)		0.2 ms
Off delay (maximum)		0.2 ms
Power-up delay (maximum)		40 ms
Protective circuitry	Short circuit protection	No (see page 284 for protective fuses)
	Radio frequency immunity (RFI)	IEC 61000-4-3 L3
	Electrostatic; transients; impulse	IEC 61000-4-2 L4; IEC 61000-4-4 L4; 60947.5.2 L3
Agency listings	E164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description		Suffix
Extended temperature range (cable type only)	Down to -40° C (-40° F)	TF
Extended cable length	5 m (16.4 ft) cable	L1
	10 m (32.8 ft) cable	L2

Accessories

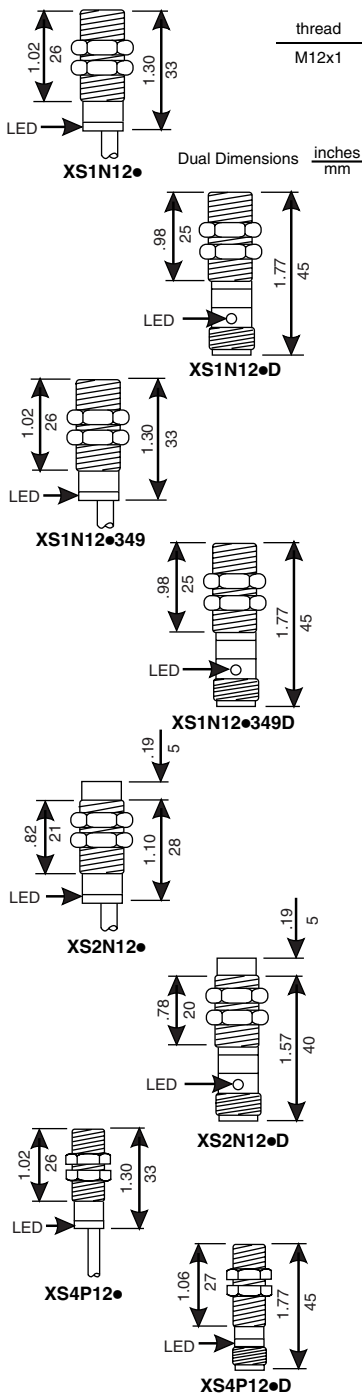
Description	Catalog Number
Plastic mounting nuts	XSZE208
Metal mounting locknuts	XSZE108
Plastic mounting bracket	XSZB108
Diecast zinc mounting bracket	831608

Note: Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

12 mm Diameter, DC; Economy Short Length



Features

- 360° LED indicators
- Extended range models
- Complementary N.O. + N.C. models
- Rugged metal or plastic cases
- Patented plastic mounting bracket
- Connector options
- Extensive protective circuitry
- Works with an unregulated DC supply powered by a 24 V secondary transformer
- Metal locknuts or plastic mounting nuts included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Operating Frequency	Indicator LED (see next page)	Mating Connector Style (see p. 626)	Catalog Number
Nickel-plated brass case							
Shielded, 2 m (6.6 ft) cable							
2 mm	PNP	12–24 V	N.O. + N.C.	5,000 Hz	A	—	XS1N12PC410
2 mm	NPN	12–24 V	N.O. + N.C.	5,000 Hz	A	—	XS1N12NC410
Shielded, micro-style connector							
2 mm	PNP	12–24 V	N.O. + N.C.	5,000 Hz	B	11, 12, 13, 15, 16	XS1N12PC410D
2 mm	NPN	12–24 V	N.O. + N.C.	5,000 Hz	B	11, 12, 14, 15, 16	XS1N12NC410D
Shielded♦, Extended Range, 2 m (6.6 ft) cable							
4 mm	PNP	12–24 V	N.O. ★	2,500 Hz	A	—	XS1N12PA349
4 mm	NPN	12–24 V	N.O. ★	2,500 Hz	A	—	XS1N12NA349
Shielded♦, Extended Range, micro-style connector DC							
4 mm	PNP	12–24 V	N.O.★	2,500 Hz	B	11, 12, 13, 15, 16	XS1N12PA349D
4 mm	NPN	12–24 V	N.O.★	2,500 Hz	B	11, 12, 14, 15, 16	XS1N12NA349D
Non-shielded, 2 m (6.6 ft) cable							
4 mm	PNP	12–24 V	N.O. + N.C.	5,000 Hz	A	—	XS2N12PC410
4 mm	NPN	12–24 V	N.O. + N.C.	5,000 Hz	A	—	XS2N12NC410
Non-shielded, micro-style connector DC							
4 mm	PNP	12–24 V	N.O. + N.C.	5,000 Hz	B	11, 12, 13, 15, 16	XS2N12PC410D
4 mm	NPN	12–24 V	N.O. + N.C.	5,000 Hz	B	11, 12, 14, 15, 16	XS2N12NC410D
Plastic case							
Non-shielded, 2 m (6.6 ft) cable							
4 mm	PNP	12–24 V	N.O. ★	5,000 Hz	A	—	XS4P12PA340
4 mm	NPN	12–24 V	N.O. ★	5,000 Hz	A	—	XS4P12NA340
4 mm	PNP	12–24 V	N.O. + N.C.	5,000 Hz	A	—	XS4P12PC410
4 mm	NPN	12–24 V	N.O. + N.C.	5,000 Hz	A	—	XS4P12NC410
Non-shielded, micro-style connector DC							
4 mm	PNP	12–24 V	N.O. ★	5,000 Hz	A	11, 12, 13, 15, 16	XS4P12PA340D
4 mm	NPN	12–24 V	N.O. ★	5,000 Hz	A	11, 12, 14, 15, 16	XS4P12NA340D
4 mm	PNP	12–24 V	N.O. + N.C.	5,000 Hz	A	11, 12, 13, 15, 16	XS4P12PC410D
4 mm	NPN	12–24 V	N.O. + N.C.	5,000 Hz	A	11, 12, 14, 15, 16	XS4P12NC410D

♦ See X dimension below.

★ To order a normally closed (N.C.) version, change A to B, example; XS1M08MA230 to XS1M08MB230.

Minimum Mounting Clearances, mm (in.)

	Side by side	Face to face	Facing a metal object	Mounting in a metal support	Mounted in a metal support
XS1 Shielded	e: 4 (0.16)	e: 24 (0.94)	e: 6 (0.24)	D: 12 (0.47)	x: 0
XS1 Extended range	e: 8 (0.31)	e: 48 (1.89)	e: 12 (0.47)	D: 12 (0.47)	D: 12 (0.47); x: 2.4 (0.09)
XS2/XS4 Non-shielded	e: 16 (0.63)	e: 48 (1.89)	e: 12 (0.47)	D: 36 (1.42); H: 8 (0.31)	D: 12 (0.47); X: 2.4 (0.09)

Proximity Sensors

XS Tubular, Inductive Sensors

12 mm Diameter, DC; Economy Short Length

Wiring

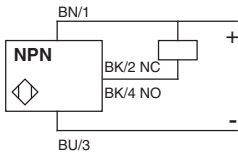
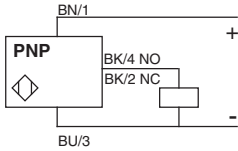
Connector M12



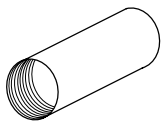
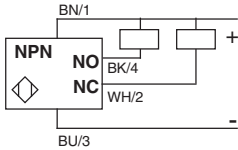
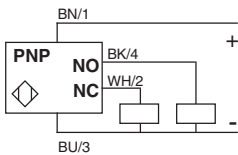
Cable

Blue BU -
Brown BN +
Black BK Output

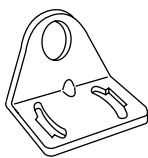
3 wire NO or NC
wire color/connector pin



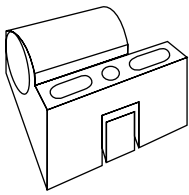
4 wire NO + NC



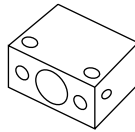
74281



9006PA



XSZB1



8316

Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
Accessories page 284, 280

Specifications

Mechanical

Usable sensing range	Shielded	Standard sensing range	0 to 1.6 mm
		Extended sensing range	0 to 3.2 mm
Temperature range	Standard sensing range	Nickel-plated brass	-25 to +70 °C (-13 to +158 °F)
		Plastic	-25 to +80 °C (-13 to +176 °F)
	Extended sensing range		-25 to +50 °C (-13 to +122 °F)
Enclosure rating—cable (for connector see page 626)	Nickel-plated brass	NEMA Type	3, 4X, 6P, 12, 13
		IEC	IP67
Enclosure material	Plastic case	NEMA Type	3, 4X, 6P, 12, 13
		IEC	IP68
Enclosure material	Nickel-plated brass	Case	Nickel-plated brass
	Plastic case	Sensing face	PBT
Tightening torque (maximum)	Nickel-plated brass		6 N•m (4.4 lb-ft)
	Plastic		2 N•m (1.5 lb-ft)
Vibration resistance	(IEC 60068.2.6)		25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)		50 G, 11 ms duration
Standard target size (steel)			12 x 12 mm (0.47 x 0.47 in.)
Differential (% of Sr)			15%
Repeatability (% of Sr)			3%
LED indicator type	A		360° ring LED shows output status
	B		One LED visible from 4 quadrants shows output status
Cable	3-wire		22 AWG (0.34 mm ²), PvR
	4-wire (N.O. + N.C.)		21 AWG (0.22 mm ²), PvR

Electrical

Voltage range—nominal		12–24 Vdc
Voltage limit (including ripple)		10–38 Vdc
Voltage drop (across switch), closed state		2 V
Maximum load current		200 mA
Current consumption (no load)		10 mA
On delay (maximum)	Standard sensing range	0.1 ms
	Extended sensing range	0.2 ms
Off delay (maximum)	Standard sensing range	0.1 ms
	Extended sensing range	0.2 ms
Power-up delay (maximum)	Standard/extended sensing range	5 ms
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 L3
	Electrostatic; transients; impulse	IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3
	Reverse polarity protection	Yes
Agency listings	E164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix	
Extended temperature range (cable type only)	Down to -40 °C (-40 °F)	TF
Extended cable length	5 m (16.4 ft) cable	L1
	10 m (32.8 ft) cable	L2

Accessories

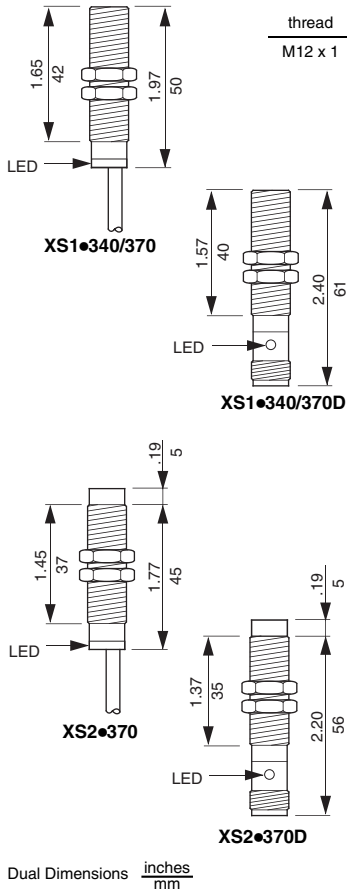
Description	Catalog Number	
Plastic mounting nuts	XSZE212	
Metal mounting nuts	XSZE112	
Steel mounting bracket, 90°	9006PA12	
Plastic mounting bracket	XSZB112	
Diecast zinc mounting bracket	831612	
0.5 in. (12.7 mm) NPT conduit adapter, length: 2 in. (50.8 mm)	Aluminum	74281

Note: Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

12 mm Diameter, DC; Universal Standard Length



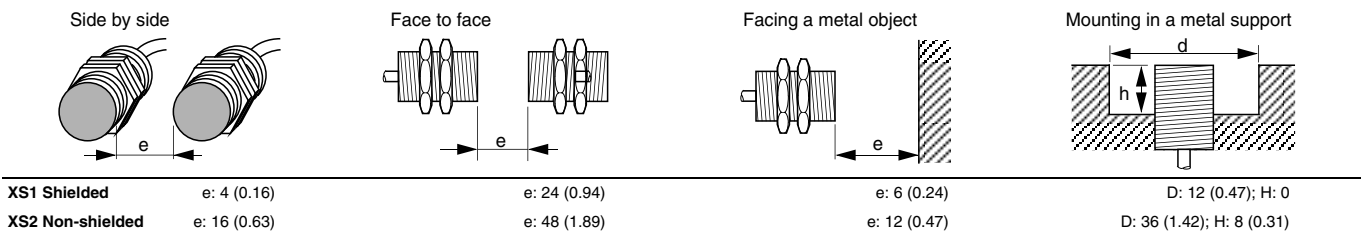
Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- Rugged case designed for aggressive environments
- Worry free replacement: standard length, extended temperature and supply voltage range, improved enclosure ratings (IP68), 3-wire complementary PNP + NPN with selectable N.O./N.C. output circuit
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Pigtail connector version (0.8 m / 2.6 ft cable) provides cutting oil rating (IP68) and connection for aggressive environments
- Trouble free operation ensured by extensive protective circuitry
- Works with unfiltered rectified power supply
- Metal mounting locknuts included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Maximum Load	Operating Frequency	Indicator LED (see page 215)	Mating Connector Style (see page 626)	Catalog Number
Nickel-plated brass case								
Shielded, 2 m (6.6 ft) cable								
2 mm	2-wire	12–48 V	N.O. ★	1.5–100 mA	4,000 Hz	A	—	XS1M12DA210TF◆
2 mm	PNP	12–48 V	N.O. ★	200 mA	5,000 Hz	A	—	XS1M12PA370
2 mm	NPN	12–48 V	N.O. ★	200 mA	5,000 Hz	A	—	XS1M12NA370
2 mm	PNP/NPN	12–24V	N.O./N.C.	200 mA	5,000 Hz	A	—	XS1M12KP340
Shielded, micro-style connector DC								
2 mm	PNP	12–48 V	N.O. ★	200 mA	5,000 Hz	B	11, 12, 13, 15, 16	XS1M12PA370D
2 mm	NPN	12–48 V	N.O. ★	200 mA	5,000 Hz	B	11, 12, 14, 15, 16	XS1M12NA370D
2 mm	PNP/NPN	12–24V	N.O./N.C.	200 mA	5,000 Hz	B	11, 12, 15, 16	XS1M12KP340D
Non-shielded, 2 m (6.6 ft) cable								
4 mm	PNP	12–48 V	N.O. ★	200 mA	5,000 Hz	A	—	XS2M12PA370
4 mm	NPN	12–48 V	N.O. ★	200 mA	5,000 Hz	A	—	XS2M12NA370
4 mm	PNP + NPN	12–24V	N.O./N.C.	200 mA	5,000 Hz	A	—	XS2M12KP340
Non-shielded, micro-style connector DC								
4 mm	PNP	12–48 V	N.O. ★	200 mA	5,000 Hz	B	11, 12, 13, 15, 16	XS2M12PA370D
4 mm	NPN	12–48 V	N.O. ★	200 mA	5,000 Hz	B	11, 12, 14, 15, 16	XS2M12NA370D
4 mm	PNP + NPN	12–24V	N.O./N.C.	200 mA	5,000 Hz	B	11, 12, 15, 16	XS2M12KP340D

★ To order a normally closed (N.C.) version, change the **A** to **B**. Example: XS1M12PA370 to XS1M12PB370.
 ◆ Available with TF suffix only (extended temperature range, down to -40 °C).

Minimum Mounting Clearances, mm (in.)

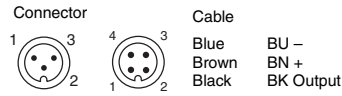


Proximity Sensors

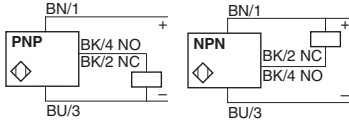
XS Tubular, Inductive Sensors

12 mm Diameter, DC; Universal Standard Length

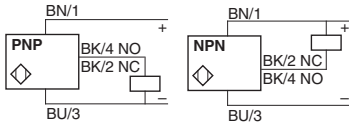
Wiring



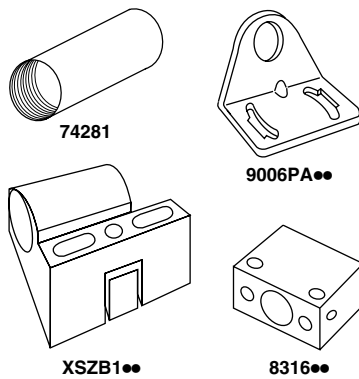
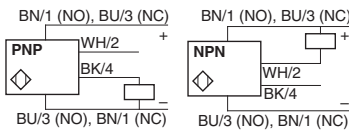
Wire color/connector pin 3 wire NO or NC



3 wire, selectable PNP/NPN, NO/NC



4 wire, programmable, NO or NC output



Connector Cables (M12 or D suffix; U78 or A suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCA101Y	Micro-style, 3-pin, 2 m, straight
XSZCA111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths ... page 626
Accessories ... page 284, 280

Specifications

Mechanical		
Usable sensing range ★	Shielded	0 to 1.6 mm
	Non-shielded	0 to 3.2 mm
Standard temperature range	-25 to +80 °C (-13 to +176 °F)	
Enclosure rating—cable (for connector, see page 626)	NEMA Types	3, 4X, 6P, 12, 13
	IEC	IP68—cutting oil proof
Enclosure material	Nickel-plated brass	Case Nickel-plated brass
		Sensing face PBT
Tightening torque (maximum)	Nickel-plated brass	15 N•m (11 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)	12 x 12 mm (0.47 x 0.47 in.)	
Differential (% of Sr)	15%	
Repeatability (% of Sr)	3%	
LED indicator type	A	360° ring LED shows output status
	B	One LED visible from 4 quadrants: Shows output status
Cable	3-wire	22 AWG (0.34 mm ²), PvR
Electrical		Standard
Voltage range—nominal		12–48 Vdc
Voltage limit (including ripple)		10–58 Vdc
Voltage drop (across switch), closed state		2 V
Maximum load current		200 mA
Current consumption (no load)		10 mA
On delay (maximum)		0.1 ms
Off delay (maximum)		0.1 ms
Power-up delay (maximum)		5 ms
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse (L—indicates level number)	3-wire: IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3
	Reverse polarity protection	Yes
Agency listings	E164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range (cable type only)	Down to -40° C (-40° F)
	TF
Extended cable length	5 m (16.4 ft) cable
	L1
	10 m (32.8 ft) cable
	L2

Accessories

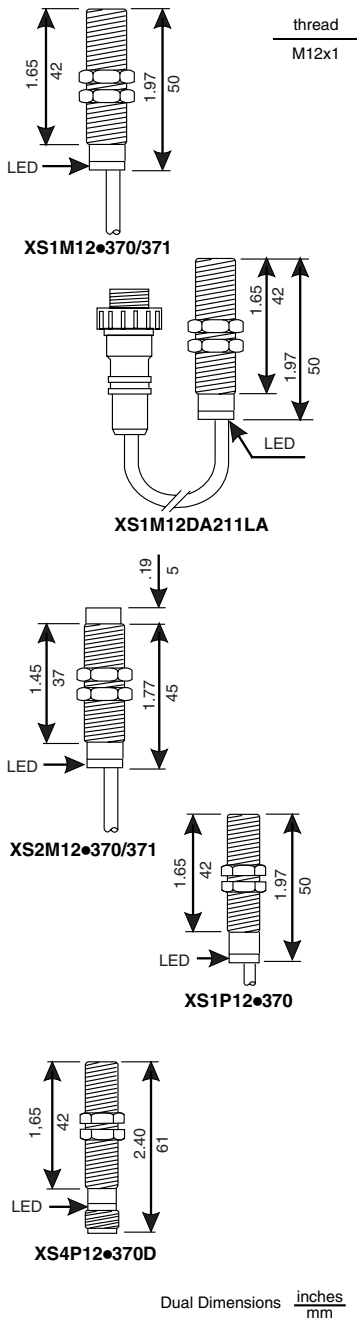
Description	Catalog Number
Plastic mounting nuts	XSZE212
Metal mounting locknuts	XSZE112
Steel mounting bracket, 90°	9006PA12
Plastic mounting bracket	XSZB112
Diecast zinc mounting bracket	831612
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum 74281

★ Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

12 mm Diameter, DC; Universal Standard Length, Non-Corrosive



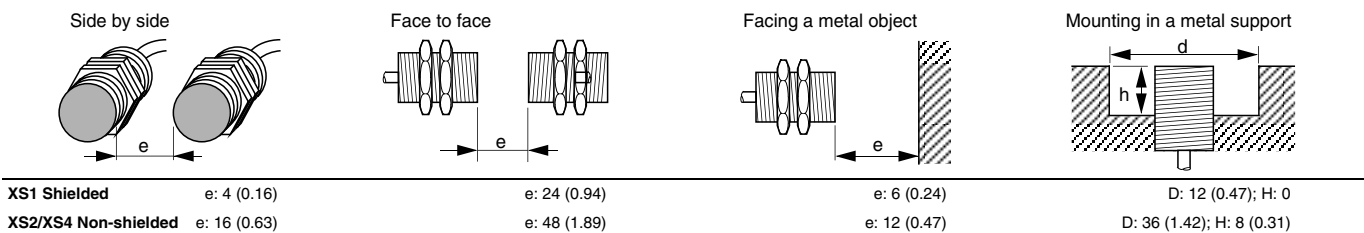
Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- 2-wire versions simplify wiring
- High-impact stainless steel and plastic cases for aggressive environments—cutting oils, grease, solvents, etc.
- Worry free replacement: standard length, extended temperature and supply voltage range, improved enclosure ratings (IP68), 3-wire complementary PNP + NPN with selectable N.O./N.C. output circuit
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Pigtail connector version (0.8 m / 2.6 ft cable) provides cutting oil rating (IP68) and connection for aggressive environments.
- Trouble free operation ensured by extensive protective circuitry
- Works with unfiltered rectified power supply
- Stainless steel locknuts for metal or plastic mounting nuts for plastic housings included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Maximum Load	Operating Frequency	Indicator LED (see page 217)	Mating Connector Style (see page 626)	Catalog Number
Stainless steel case								
Shielded, 2 m (6.6 ft) cable								
2 mm	2-wire	12–48 V	N.O.	1.5–100 mA	4,000 Hz	A	—	XS1M12DA211
2 mm	PNP	12–48 V	N.O.	200 mA	5,000 Hz	A	—	XS1M12PA371
2 mm	NPN	12–48 V	N.O.	200 mA	5,000 Hz	A	—	XS1M12NA371
Shielded, mini-style connector—0.8 m (2.6 ft) pigtail								
2 mm	2-wire	12–48 V	N.O.	1.5–100 mA	4,000 Hz	A	21, 22	XS1M12DA211LA
Non-shielded, 2 m (6.6 ft) cable								
4 mm	PNP	12–48 V	N.O.	200 mA	5,000 Hz	A	—	XS2M12PA371
4 mm	NPN	12–48 V	N.O.	200 mA	5,000 Hz	A	—	XS2M12NA371
Plastic case								
Non-shielded, 2 m (6.6 ft) cable								
4 mm	PNP	12–48 V	N.O.★	200 mA	5,000 Hz	A	—	XS4P12PA370
4 mm	NPN	12–48 V	N.O.★	200 mA	5,000 Hz	A	—	XS4P12NA370
4 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	5,000 Hz	A	—	XS4P12KP340
Non-shielded, micro-style connector DC								
4 mm	PNP	12–48 V	N.O.★	200 mA	5,000 Hz	A	11, 12, 13, 15, 16	XS4P12PA370D
4 mm	NPN	12–48 V	N.O.★	200 mA	5,000 Hz	A	11, 12, 14, 15, 16	XS4P12NA370D
4 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	5,000 Hz	A	11, 12, 15, 16	XS4P12KP340D

★ To order a normally closed (N.C.) version, change the **A** to **B**. Example: XS1M12PA371 to XS1M12PB371.

Minimum Mounting Clearances, mm (in.)

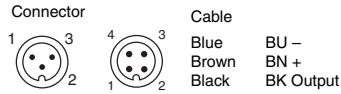


Proximity Sensors

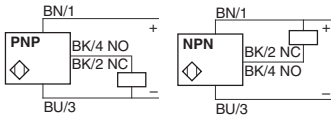
XS Tubular, Inductive Sensors

12 mm Diameter, DC; Universal Standard Length, Non-Corrosive

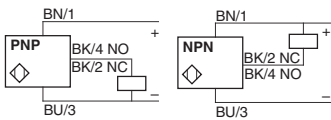
Wiring



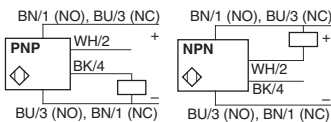
Wire color/connector pin 3 wire NO or NC



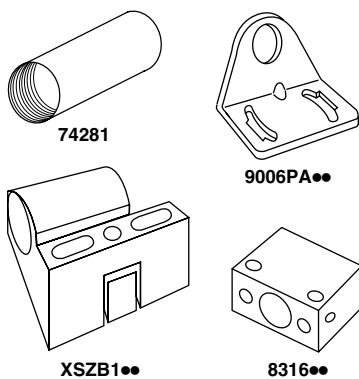
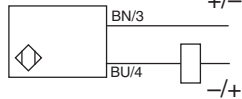
3 wire, selectable PNP/NPN, NO/NC



4 wire, programmable, NO or NC output



2 wire non-polarized



Connector Cables (M12 or D suffix; U78 or A suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCA101Y	Mini-style, 3-pin, 2 m, straight
XSZCA111Y	Mini-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
Accessories page 284, 280

Specifications

Mechanical

Usable sensing range ★	Shielded	0 to 1.6 mm
	Non-shielded	0 to 3.2 mm
Standard temperature range		-25 to +80 °C (-13 to +176 °F)
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP68
Enclosure material	Stainless steel case	#303 stainless steel
	Sensing face	PBT
Tightening torque (maximum)	Stainless steel	30 N•m (22 lb-ft)
	Plastic	2 N•m (1.5 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)		12 x 12 mm (0.47 x 0.47 in.)
Differential (% of Sr)		15%
Repeatability (% of Sr)		3%
LED indicator type	A	360° ring LED shows output status
Cable	2- or 3-wire	22 AWG (0.34 mm ²), PvR

Electrical

	Standard	KP Models
Voltage range—nominal	12–48 Vdc	12–24 Vdc
Voltage limit (including ripple)	10–58 Vdc	10–38 Vdc
Voltage drop (across switch), closed state	3-wire	2 V
	2-wire	4 V
Minimum load current	2-wire	1.5 mA
Maximum load current	2-wire	100 mA
	3-wire	200 mA
Current consumption (no load)	3-wire	10 mA
Residual (leakage) current, open state	2-wire	0.6 mA
On delay (maximum)	2-wire	0.5 ms
	3-wire	0.1 ms
Off delay (maximum)	2-wire	0.5 ms
	3-wire	0.1 ms
Power-up delay (maximum)	2-wire	5 ms
	3-wire	5 ms
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse (L—indicates level number)	2-wire: IEC 61000-4-2 L3; IEC 61000-4-4 L3; 60947.5.2 L3 3-wire: IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3
	Reverse polarity protection	Yes
Agency listings	E164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description		Suffix
Extended temperature range (cable type only)	Down to -40° C (-40° F)	TF
Extended cable length	5 m (16.4 ft) cable	L1
	10 m (32.8 ft) cable	L2

Accessories

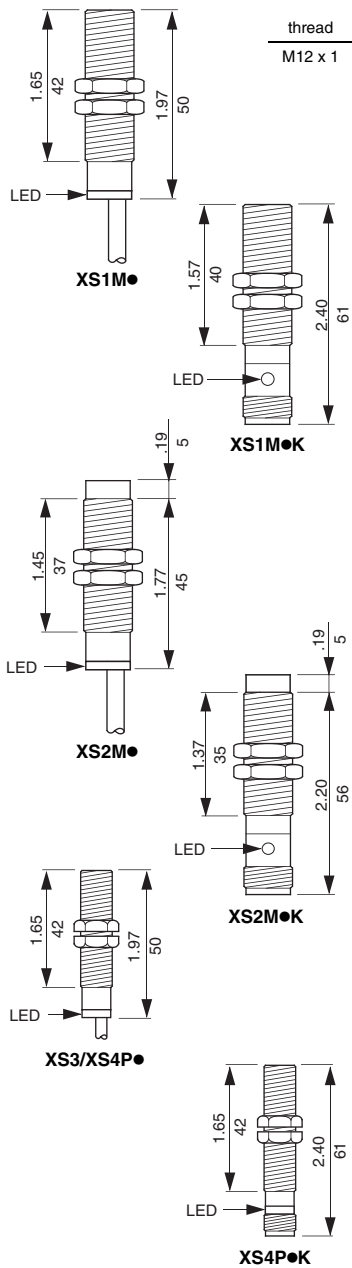
Description	Catalog Number
Plastic mounting nuts	XSZE212
Stainless steel mounting nuts	XSZE312
Stainless steel locknut washers	XSZE912
Steel mounting bracket, 90°	9006PA12
Plastic mounting bracket	XSZB112
Diecast zinc mounting bracket	831612
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum 74281

★ Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

12 mm Diameter, AC/DC; Universal Standard Length



Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- Rugged metal or plastic cases designed for aggressive environments—cutting oils, grease, etc.
- Worry free replacement: standard length, extended temperature and supply voltage range, improved enclosure ratings (IP68), AC/DC power supply
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Metal locking nuts for metal or plastic mounting nuts for plastic housings included
- Normally closed (N.C.) output available on versions marked ★
- **UL Listed, CSA Certified, and CE Marked**

Nominal Sensing Distance	AC or AC/DC	Output Mode ★	Voltage Range		Operating Frequency		SCP	Indicator LED (see page 219)	Mating Connector Style (see page 626)	Catalog Number
			AC	DC	AC	DC				

Nickel-plated brass case

Shielded, 2 m (6.6 ft) cable

2 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	4,000 Hz	no	A	—	XS1M12MA230
2 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	4,000 Hz	yes	A	—	XS1M12MA250

Shielded, micro-style connector AC

2 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	4,000 Hz	no	B	17, 18	XS1M12MA230K
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Non-shielded, 2 m (6.6 ft) cable

4 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	no	A	—	XS2M12MA230
4 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	yes	A	—	XS2M12MA250

Non-shielded, micro-style connector AC

4 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	no	B	17, 18	XS2M12MA230K
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Plastic case

Non-shielded, 2 m (6.6 ft) cable

4 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	4,000 Hz	no	A	—	XS4P12MA230
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Non-shielded, micro-style connector

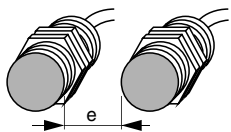
4 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	no	A	17, 18	XS4P12MA230K
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★ To order a normally closed (N.C.) version, change the **A** to **B**. Example: XS1M12PA260 to XS1M12PB260.

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

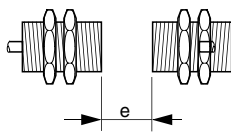
Minimum Mounting Clearances, mm (in.)

Side by side



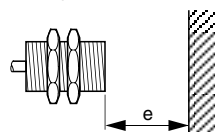
XS1 Shielded e: 4 (0.16)
XS2/XS4 Non-shielded e: 16 (0.63)

Face to face



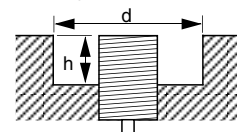
e: 24 (0.94)
 e: 48 (1.89)

Facing a metal object



e: 6 (0.24)
 e: 12 (0.47)

Mounting in a metal support



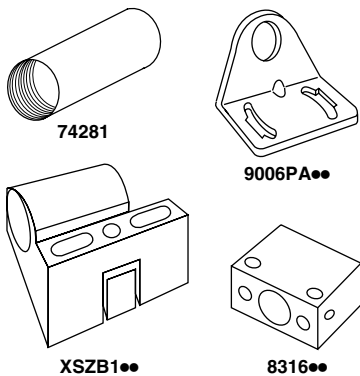
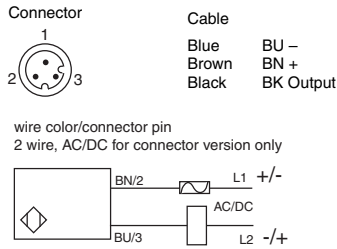
D: 12 (0.47); H: 0
 D: 36 (1.42); H: 8 (0.31)

Proximity Sensors

XS Tubular, Inductive Sensors

12 mm Diameter, AC/DC; Universal Standard Length

Wiring



Connector Cables (U20 or K suffix)

XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths. . . . page 626
Accessories page 284, 280

Specifications

Mechanical		
Usable sensing range ★	Shielded	0 to 1.6 mm
	Non-shielded	0 to 3.2 mm
Standard temperature range	-25 to +80 °C (-13 to +176 °F)	
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP68
Enclosure material	Nickel-plated brass	Case Sensing face
	Plastic case	Nickel-plated brass PBT
Tightening torque (maximum)	Nickel-plated brass	15 N•m (11 lb-ft)
	Plastic	2 N•m (1.5 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)	12 x 12 mm (0.47 x 0.47 in.)	
Differential (% of Sr)	15%	
Repeatability (% of Sr)	3%	
LED indicator type	A	360° ring LED shows output status
	B	One LED visible from 4 quadrants shows output status
Cable	2-wire	22 AWG (0.34 mm ²), PvR
Electrical		
Voltage range	24 to 240 Vac (50/60 Hz), 24 to 210 Vdc	
Voltage limit (including ripple)	20 to 264 Vac/Vdc	
Maximum voltage drop (across switch), closed state	5.5 V	
Inrush current (inductive @ 20 ms)	2 A	
Minimum load current	5 mA	
Maximum load current	200 mA 20 ≤ Vdc ≤ 58 IEC 60947-5-2 Utilization category DC-13 Vdc > 58 IEC 60947-5-2 Utilization category DC-12	
Residual (leakage) current, open state	0.6 mA	
On delay (maximum)	0.2 ms	
Off delay (maximum)	0.2 ms	
Power-up delay (maximum)	Without SCP	40 ms
	With SCP	70 ms
Protective circuitry	Short circuit protection	Optional▲
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse (L—level number)	IEC 61000-4-2 L4; IEC 61000-4-4 L4; 60947.5.2 L3
Agency listings	E164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range (cable type only)	TF
Extended cable length	5 m (16.4 ft) cable
	10 m (32.8 ft) cable

Accessories

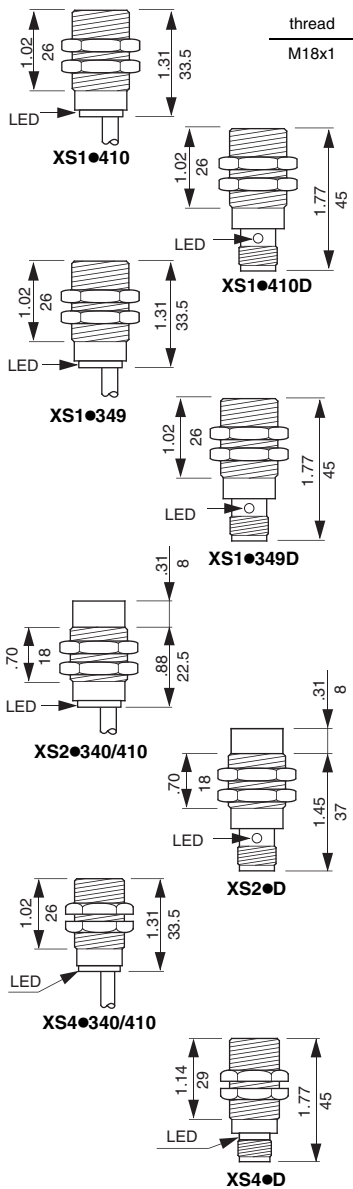
Description	Catalog Number
Plastic mounting nuts	XSZE212
Metal mounting nuts and lockwashers	XSZE112
Steel mounting bracket, 90°	9006PA12
Plastic mounting bracket	XSZB112
Diecast zinc mounting bracket	831612
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum 74281

★ Refer to page 327 for target material correction coefficient Km.
▲ For devices without SCP, see page 284 for protective fuses.

Proximity Sensors

XS Tubular, Inductive Sensors

18 mm Diameter, DC; Economy Short Length



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

- 360° LED indicators
- Extended range models
- Complementary N.O. + N.C. models
- Rugged metal or plastic cases
- Patented plastic mounting bracket
- Connector options
- Extensive protective circuitry
- Works with an unregulated DC supply powered by a 24 V secondary transformer
- Metal locknuts or plastic mounting nuts included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Operating Frequency	Indicator LED (see page 221)	Mating Connector Style (see page 626)	Catalog Number
Nickel-plated brass case							
Shielded, 2 m (6.6 ft) cable							
5 mm	PNP	10–38 V	N.O. + N.C.	2,000 Hz	A	—	XS1N18PC410
5 mm	NPN	10–38 V	N.O. + N.C.	2,000 Hz	A	—	XS1N18NC410
Shielded, micro-style connector DC							
5 mm	PNP	10–38 V	N.O. + N.C.	2,000 Hz	B	11, 12, 13, 15, 16	XS1N18PC410D
5 mm	NPN	10–38 V	N.O. + N.C.	2,000 Hz	B	11, 12, 14, 15, 16	XS1N18NC410D
Shielded♦, Extended Range, 2 m (6.6 ft) cable							
10 mm	PNP	10–38 V	N.O. ★	1,000 Hz	A	—	XS1N18PA349
10 mm	NPN	10–38 V	N.O. ★	1,000 Hz	A	—	XS1N18NA349
Shielded♦, Extended Range, micro-style connector							
10 mm	PNP	10–38 V	N.O. ★	1,000 Hz	B	11, 12, 13, 15, 16	XS1N18PA349D
10 mm	NPN	10–38 V	N.O. ★	1,000 Hz	B	11, 12, 14, 15, 16	XS1N18NA349D
Non-shielded, 2 m (6.6 ft) cable							
8 mm	PNP	10–38 V	N.O. + N.C.	2,000 Hz	A	—	XS2N18PC410
8 mm	NPN	10–38 V	N.O. + N.C.	2,000 Hz	A	—	XS2N18NC410
Non-shielded, micro-style connector							
8 mm	PNP	10–38 V	N.O. + N.C.	2,000 Hz	B	11, 12, 13, 15, 16	XS2N18PC410D
8 mm	NPN	10–38 V	N.O. + N.C.	2,000 Hz	B	11, 12, 14, 15, 16	XS2N18NC410D
Plastic case							
Non-shielded, 2 m (6.6 ft) cable							
8 mm	PNP	10–38 V	N.O. ★	2,000 Hz	A	—	XS4P18PA340
8 mm	NPN	10–38 V	N.O. ★	2,000 Hz	A	—	XS4P18NA340
8 mm	PNP	10–38 V	N.O. + N.C.	2,000 Hz	A	—	XS4P18PC410
8 mm	NPN	10–38 V	N.O. + N.C.	2,000 Hz	A	—	XS4P18NC410
Non-shielded, micro-style connector							
8 mm	PNP	10–38 V	N.O. ★	2,000 Hz	A	11, 12, 13, 15, 16	XS4P18PA340D
8 mm	NPN	10–38 V	N.O. ★	2,000 Hz	A	11, 12, 14, 15, 16	XS4P18NA340D
8 mm	PNP	10–38 V	N.O. + N.C.	2,000 Hz	A	11, 12, 13, 15, 16	XS4P18PC410D
8 mm	NPN	10–38 V	N.O. + N.C.	2,000 Hz	A	11, 12, 14, 15, 16	XS4P18NC410D

★ To order a normally closed (N.C.) version, change the A to B. Example: XS1N18PA349 to XS1N18PB349.

♦ See dimension X below.

Minimum Mounting Clearances, mm (in.)

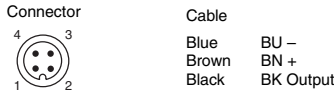
	Side by side	Face to face	Facing a metal object	Mounting in a metal support	Mounted in a metal support
XS1 Shielded	e: 10 (0.39)	e: 60 (2.36)	e: 15 (0.59)	D: 18 (0.71); H: 0	D: 18 (0.71)
XS1 Extended range	e: 20 (0.79)	e: 96 (3.78)	e: 24 (0.94)		D: 18 (0.71); X: 3.6 (0.14)
XS2/XS4 Non-shielded	e: 16 (0.63)	e: 96 (3.78)	e: 24 (0.94)	D: 54 (2.13); H: 16 (0.63)	

Proximity Sensors

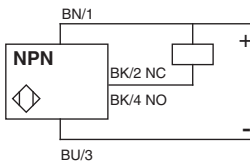
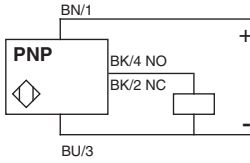
XS Tubular, Inductive Sensors

18 mm Diameter, DC; Economy Short Length

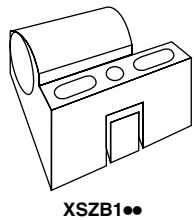
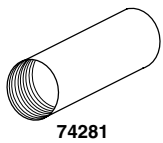
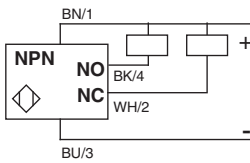
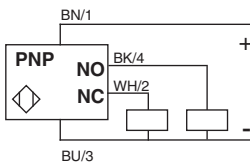
Wiring



Wire color/connector pin 3 wire NO or NC



4 wire NO + NC



Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths. page 626
Accessories page 284, 280

Specifications

Mechanical			
Usable sensing range★	Shielded	Standard sensing range	0 to 4 mm
		Extended sensing range	0 to 8 mm
	Non-shielded		0 to 6.4 mm
Temperature range	Standard sensing range	Nickel-plated brass	-25 to +70 °C (-13 to +158 °F)
		Plastic	-25 to +80 °C (-13 to +176 °F)
	Extended sensing range		-25 to +50 °C (-13 to +122 °F)
Enclosure rating—cable for connector, see page 626	Nickel-plated brass	NEMA Type	3, 4X, 6P, 12, 13
		IEC	IP67
	Plastic	NEMA Type	3, 4X, 6P, 12, 13
		IEC	IP68
Enclosure material	Nickel-plated brass	Case	Nickel-plated brass
		Sensing face	PBT
	Plastic	Case	PBT
		Sensing face	PBT
Tightening torque (maximum)	Nickel-plated brass		15 N•m (11 lb-ft)
	Plastic		5 N•m (3.7 lb-ft)
Vibration resistance	(IEC 60068.2.6)		25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)		50 G, 11 ms duration
Standard target size (steel)	Shielded	Standard sensing range	18 x 18 mm (0.71 x 0.71 in.)
		Extended sensing range	30 x 30 mm (1.18 x 1.18 in.)
	Non-shielded		24 x 24 mm (0.94 x 0.94 in.)
Differential (% of Sr)			15%
Repeatability (% of Sr)			3%
LED indicator type	A	360° ring LED shows output status	
	B	One LED visible from 4 quadrants shows output status	
Cable	3- or 4-wire		22 AWG (0.34 mm ²), PvR
Electrical			
Voltage range—nominal			12–24 Vdc
Voltage limit (including ripple)			10–38 Vdc
Voltage drop (across switch), closed state			2 V
Maximum load current			200 mA
Current consumption (no load)			10 mA
On delay (maximum)			0.15 ms
Off delay (maximum)			0.35 ms
Power-up delay (maximum)			5 ms
Protective circuitry	Short circuit protection		Yes
	Overload		Yes
	Radio frequency immunity (RFI)		IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse		IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3 Extended sensing range: IEC 61000-4-4 L3
	Reverse polarity protection		Yes
Agency listings	UL E 164869 CCN NRKH	CSA CR 44087 Class 3211 03	CE

Options

Description	Suffix
Extended temperature range (cable type and standard sensing distance only)	Down to -40° C (-40° F) TF
Extended cable length	5 m (16.4 ft) cable L1
	10 m (32.8 ft) cable L2

Accessories

Description	Catalog Number
Plastic mounting nuts	XSZE218
Metal mounting nuts and lockwasher	XSZE118
Steel mounting bracket, 90°	9006PA18
Plastic mounting bracket, long length	XSZB118
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum 7428
	Stainless 74282

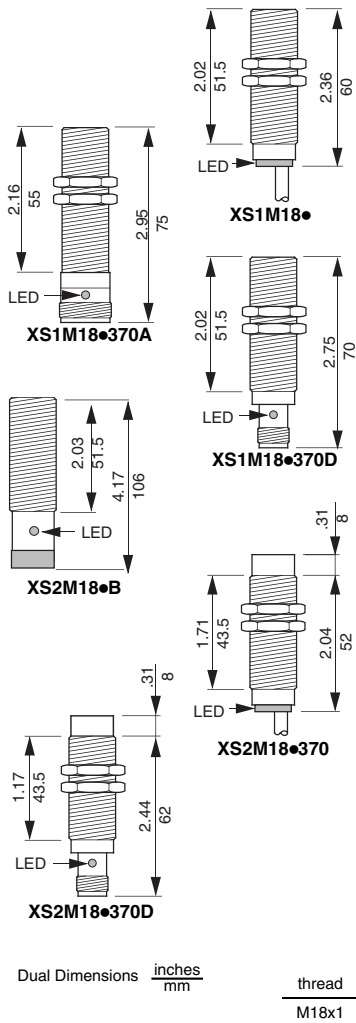
★ Refer to page 327 for target material correction coefficient Km.

Proximity

Proximity Sensors

XS Tubular, Inductive Sensors

18 mm Diameter, DC; Universal Standard Length



Features

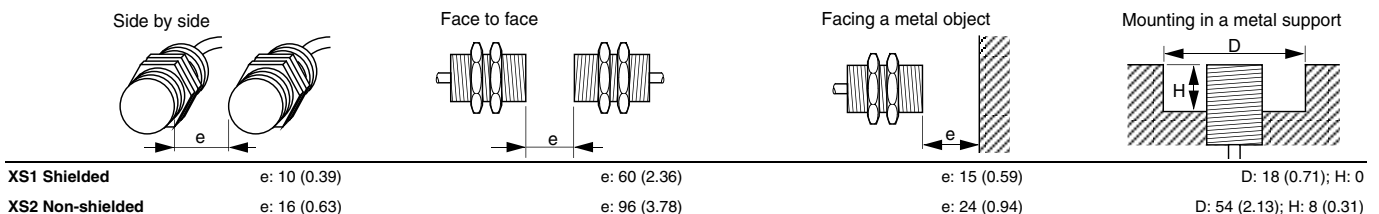
- Faster troubleshooting aided by high-visibility, 360° indicators
- Rugged case designed for aggressive industrial environments
- Worry free replacement: standard length, extended temperature and supply voltage range, improved enclosure ratings (IP68), 3-wire complementary PNP + NPN with selectable N.O./N.C. output circuit
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Trouble free operation ensured by extensive protective circuitry
- Works with unfiltered rectified power supply
- Pigtail connector version (0.8 m / 2.6 ft cable) provides cutting oil ratings (IP68) and connection for aggressive environments. Screw terminals models for wiring special cables.
- Metal mounting locknuts included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nickel-plated brass case

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Maximum Load	Operating Frequency	Indicator LED ①	Mating Connector Style (see page 626)	Catalog Number
Shielded, 2 m (6.6 ft) cable								
5 mm	PNP	12–48 V	N.O. ★	200 mA	2,000 Hz	A	—	XS1M18PA370
5 mm	NPN	12–48 V	N.O. ★	200 mA	2,000 Hz	A	—	XS1M18NA370
5 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	2,000 Hz	A	—	XS1M18KP340
Shielded, micro-style connector, DC								
5 mm	PNP	12–48 V	N.O. ★	200 mA	2,000 Hz	B	11, 12, 13, 15, 16	XS1M18PA370D
5 mm	NPN	12–48 V	N.O. ★	200 mA	2,000 Hz	B	11, 12, 14, 15, 16	XS1M18NA370D
5 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	2,000 Hz	B	11, 12, 15, 16	XS1M18KP340D
Shielded, mini-style connector, 3-pin								
5 mm	PNP	12–48 V	N.O. ★	200 mA	2,000 Hz	B	21, 22	XS1M18PA370A
5 mm	NPN	12–48 V	N.O. ★	200 mA	2,000 Hz	B	21, 22	XS1M18NA370A
Shielded, screw terminal connection								
5 mm	PNP	12–48 V	N.O. ★	200 mA	2,000 Hz	B	—	XS1M18PA370B
5 mm	NPN	12–48 V	N.O. ★	200 mA	2,000 Hz	B	—	XS1M18NA370B
Non-shielded, 2 m (6.6 ft) cable								
8 mm	PNP	12–48 V	N.O. ★	200 mA	2,000 Hz	A	—	XS2M18PA370
8 mm	NPN	12–48 V	N.O. ★	200 mA	2,000 Hz	A	—	XS2M18NA370
8 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	2,000 Hz	A	—	XS2M18KP340
Non-shielded, micro-style connector								
8 mm	PNP	12–48 V	N.O. ★	200 mA	2,000 Hz	B	11, 12, 13, 15, 16	XS2M18PA370D
8 mm	NPN	12–48 V	N.O. ★	200 mA	2,000 Hz	B	11, 12, 14, 15, 16	XS2M18NA370D
8 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	2,000 Hz	B	11, 12, 15, 16	XS2M18KP340D

★ To order a normally closed (N.C.) version, change the A to B. Example: XS1M18PA370 to XS1M18PB370.
 ① See page 223 under specifications for LED function.

Minimum Mounting Clearances, mm (in.)

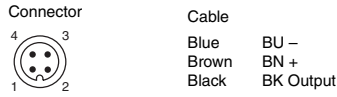


Proximity Sensors

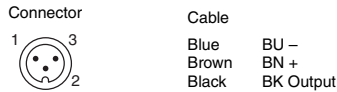
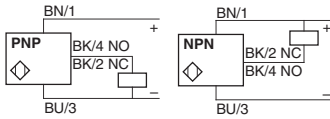
XS Tubular, Inductive Sensors

18 mm Diameter, DC; Universal Standard Length

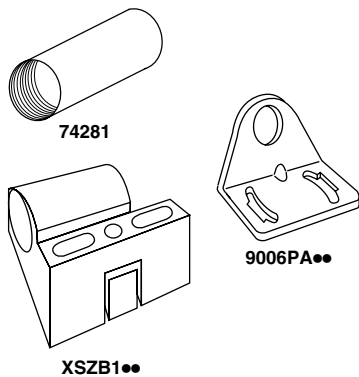
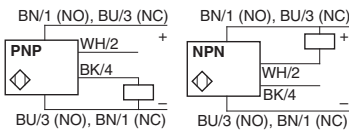
Wiring



Wire color/connector pin
3 wire NO or NC



4 wire, programmable, NO or NC output



Connector Cables (M12 or D suffix; U78 or A suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCA101Y	Micro-style, 3-pin, 2 m, straight
XSZCA111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
Accessories page 284, 280

Specifications

Mechanical		
Usable sensing range ★	Shielded	0 to 4 mm
	Non-shielded	0 to 6.4 mm
Standard temperature range	-25 to +80 °C (-13 to +176 °F)	
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP68—cutting oil proof; IP67 for B screw terminal
Enclosure material	Nickel-plated brass	Case: Nickel-plated brass Sensing face: PBT
Tightening torque (maximum)	Nickel-plated brass	35 N•m (26 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)	Shielded	18 x 18 mm (0.71 x 0.71 in.)
	Non-shielded	24 x 24 mm (0.94 x 0.94 in.)
Differential (% of Sr)	15%	
Repeatability (% of Sr)	3%	
LED indicator type	A	360° ring LED shows output status
	B	One LED visible from 4 quadrants shows output status
Cable	3-wire	22 AWG (0.34 mm ²), PvR
Electrical		
Voltage range—nominal	Standard	12–48 Vdc
Voltage limit (including ripple)	Standard	10–58 Vdc
Voltage drop (across switch), closed state	3-wire	2 V
Maximum load current	3-wire	200 mA
Current consumption (no load)	3-wire	10 mA
On delay (maximum)	3-wire	0.15 ms
Off delay (maximum)	3-wire	0.35 ms
Power-up delay (maximum)	5 ms	
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse (L—indicates level number)	3-wire: IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3
	Reverse polarity protection	Yes
Agency listings	E 164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range (cable type only)	Down to -40° C (-40° F)
Extended cable length	5 m (16.4 ft) cable
	10 m (32.8 ft) cable

Accessories

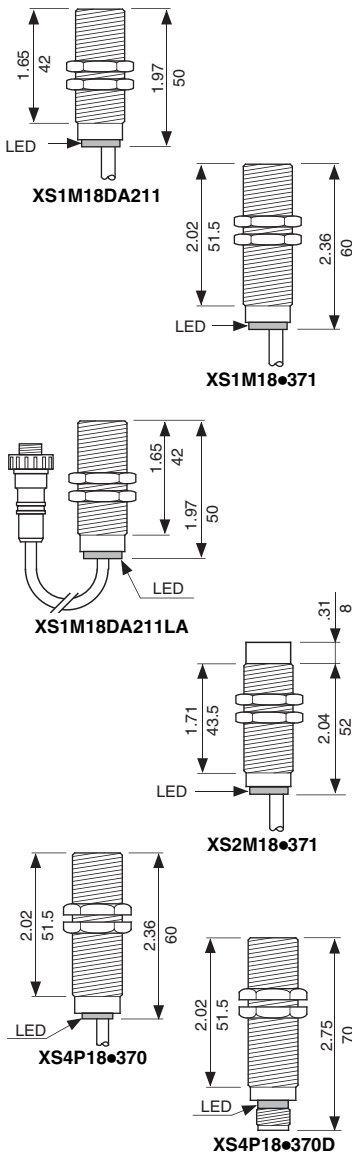
Description	Catalog Number
Plastic mounting nuts	XSZE218
Metal mounting nuts and lockwashers	XSZE118
Steel mounting bracket, 90°	9006PA18
Plastic mounting bracket	XSZB118
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum
	Stainless

★ Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

18 mm Diameter, DC; Universal Standard Length, Non-Corrosive



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$ thread M18x1

Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- 2-wire versions simplify wiring
- High-impact stainless steel and plastic cases for aggressive environments—cutting oils, grease, solvents, etc.
- Worry free replacement: standard length, extended temperature and supply voltage range, improved enclosure ratings (IP68)
- Pigtail connector version (0.8 m / 2.6 ft cable) provides cutting oil ratings (IP68) and connection for aggressive environments.
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Trouble free operation ensured by extensive protective circuitry
- Works with unfiltered rectified power supply
- Stainless steel locknuts for metal or plastic mounting nuts for plastic housings included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Maximum Load	Operating Frequency	Indicator LED ①	Mating Connector Style (see page 626)	Catalog Number
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Stainless steel case

Shielded, 2 m (6.6 ft) cable

5 mm	2-wire	12–48 V	N.O. ★	1.5–100 mA	3,000 Hz	A	—	XS1M18DA211
5 mm	PNP	12–48 V	N.O.	200 mA	2,000 Hz	A	—	XS1M18PA371
5 mm	NPN	12–48 V	N.O.	200 mA	2,000 Hz	A	—	XS1M18NA371

Shielded, mini-style connector—0.8 m (2.6 ft) pigtail

5 mm	2-wire	12–48 V	N.O. ★	1.5–100 mA	3,000 Hz	A	21, 22	XS1M18DA211LA
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Non-shielded, 2 m (6.6 ft) cable

8 mm	PNP	12–48 V	N.O.	200 mA	2,000 Hz	A	—	XS2M18PA371
8 mm	NPN	12–48 V	N.O.	200 mA	2,000 Hz	A	—	XS2M18NA371

Plastic case

Non-shielded, 2 m (6.6 ft) cable

8 mm	PNP	12–48 V	N.O. ★	200 mA	2,000 Hz	A	—	XS4P18PA370
8 mm	NPN	12–48 V	N.O. ★	200 mA	2,000 Hz	A	—	XS4P18NA370
8 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	2,000 Hz	A	—	XS4P18KP340

Non-shielded, micro-style connector

8 mm	PNP	12–48 V	N.O. ★	200 mA	2,000 Hz	A	11, 12, 13, 15, 16	XS4P18PA370D
8 mm	NPN	12–48 V	N.O. ★	200 mA	2,000 Hz	A	11, 12, 14, 15, 16	XS4P18NA370D
8 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	2,000 Hz	A	11, 12, 15, 16	XS4P18KP340D

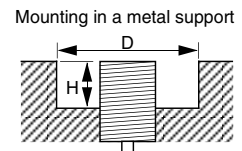
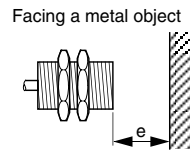
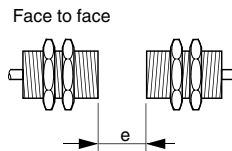
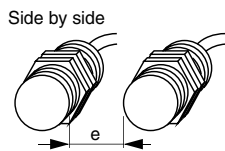
Non-shielded, screw terminal connector

8 mm	PNP	12–48 V	N.O.	200 mA	2,000 Hz	A	—	XS4P18PA370B
8 mm	NPN	12–48 V	N.O.	200 mA	2,000 Hz	A	—	XS4P18NA370B

★ To order a normally closed (N.C.) version, change the **A** to **B**. Example: XS1M12PA371 to XS1M12PB371.

① See page 225 under specifications for LED function.

Minimum Mounting Clearances, mm (in.)



XS1 Shielded

e: 10 (0.39)

e: 60 (2.36)

e: 15 (0.59)

D: 18 (0.71); H: 0

XS2/XS4 Non-shielded

e: 16 (0.63)

e: 96 (3.78)

e: 24 (0.94)

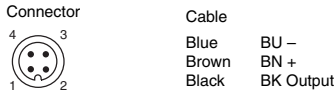
D: 54 (2.13); H: 8 (0.31)

Proximity Sensors

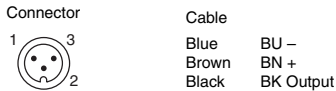
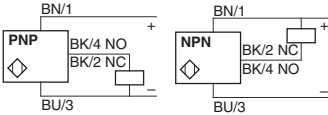
XS Tubular, Inductive Sensors

18 mm Diameter, DC; Universal Standard Length, Non-Corrosive

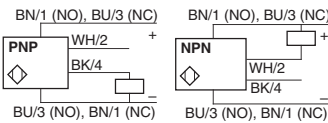
Wiring



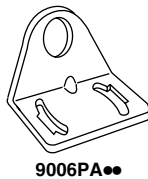
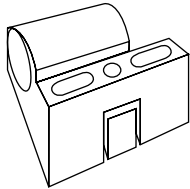
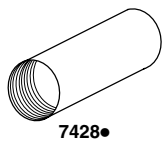
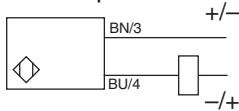
Wire color/connector pin 3 wire NO or NC



4 wire, programmable, NO or NC output



2 wire non-polarized



Connector Cables (M12 or D suffix; U78 or A suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCA101Y	Micro-style, 3-pin, 2 m, straight
XSZCA111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
Accessories page 284, 280

Specifications

Mechanical				
Usable sensing range★	Shielded	0 to 4 mm		
	Non-shielded	0 to 6.4 mm		
Standard temperature range	-25 to +80 °C (-13 to +176 °F)			
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13		
	IEC	IP68		
Enclosure material	Stainless steel	Case #303 stainless steel		
	Plastic	Sensing face PBT		
Tightening torque (maximum)	Stainless steel	50 N•m (37 lb-ft)		
	Plastic	5 N•m (3.7 lb-ft)		
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz		
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration		
Standard target size (steel)	Shielded	18 x 18 mm (0.71 x 0.71 in.)		
	Non-shielded	24 x 24 mm (0.94 x 0.94 in.)		
Differential (% of Sr)	15%			
Repeatability (% of Sr)	3%			
LED indicator type	A	360° ring LED shows output status		
Cable	2-wire	20 AWG (0.5 mm ²), PvR		
	3-wire	22 AWG (0.34 mm ²), PvR		
Electrical		Standard	KP Models	
Voltage range		12–48 Vdc	12–24 Vdc	
Voltage limit (including ripple)		10–58 Vdc	10–38 Vdc	
Voltage drop (across switch), closed state	Nickel-plated brass or stainless	2-wire	4 V	—
		3-wire	2 V	—
	Plastic	4-wire	—	2.6
Minimum load current	2-wire	1.5 mA		
	3-wire	200 mA		
Maximum load current	2-wire	100 mA		
Residual (leakage) current, open state	2-wire	0.6 mA		
On delay (maximum)	0.15 ms			
Off delay (maximum)	0.35 ms			
Power-up delay (maximum)	5 ms			
Protective circuitry	Short circuit protection	Yes		
	Overload	Yes		
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3		
	Electrostatic; transients; impulse (L—indicates level number)	2-wire: IEC 61000-4-2 L3; IEC 61000-4-4 L3; 60947.5.2 L3		
		3-wire: IEC 6000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L3		
Reverse polarity protection	Yes			
Agency listings	E 164869 CCN NRKH	CR 44087 Class 3211 03		

Options

Description	Suffix
Extended temperature range (cable type only)	TF
Extended cable length	5 m (16.4 ft) cable
	10 m (32.8 ft) cable

Accessories

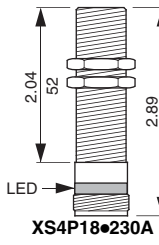
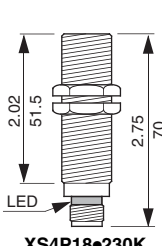
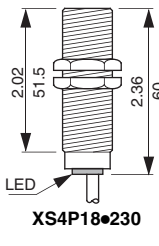
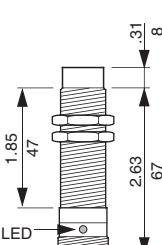
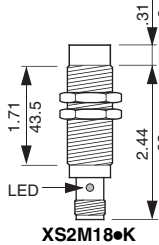
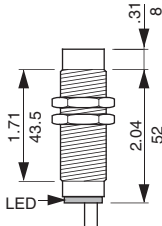
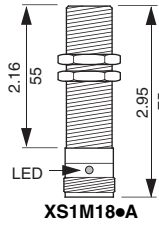
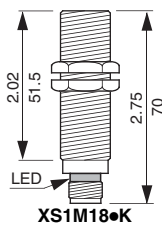
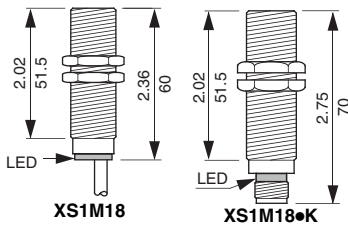
Description	Catalog Number
Plastic mounting nuts	XSZE218
Stainless steel mounting nuts	XSZE318
Stainless steel locknut washers	XSZE918
Steel mounting bracket, 90°	9006PA18
Plastic mounting bracket	XSZB118
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum
	Stainless
	7428
	74282

★ Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

18 mm Diameter, AC/DC; Universal Standard Length



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

thread
M18x1

Features

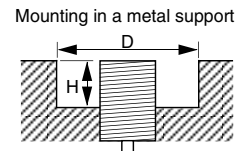
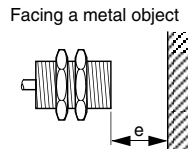
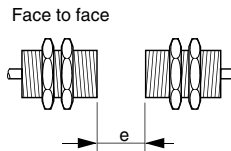
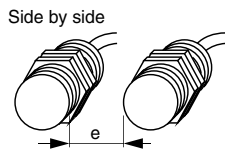
- 360° LED indicators
- Extended temperature range
- Extended supply voltage range
- IP68 AC/DC power supply
- Patented plastic mounting bracket
- Connector options
- Extensive protective circuitry
- Metal locknuts for metal or plastic mounting nuts for plastic housings included
- Normally closed (N.C.) output available on versions marked ★
- **UL Listed, CSA Certified, and CE Marked**

Nominal Sensing Distance	AC or AC/DC	Output Mode	Voltage Range		Operating Frequencies		SCP	Indicator LED ①	Mating Connector Style (see page 626)	Catalog Number
			AC	DC	AC	DC				
Nickel-plated brass case										
Shielded, 2 m (6.6 ft) cable										
5 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	no	A	—	XS1M18MA230
5 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	yes	C	—	XS1M18MA250
Shielded, micro-style connector AC										
5 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	no	B	17, 18	XS1M18MA230K
5 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	yes	B	17, 18	XS1M18MA250K
Shielded, mini-style connector										
5 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	no	B	23, 24	XS1M18MA230A
5 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	yes	C	23, 24	XS1M18MA250A
Shielded, screw terminal connection										
5 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	3,000 Hz	no	B	—	XS1M18MA230B
Non-shielded, 2 m (6.6 ft) cable										
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	A	—	XS2M18MA230
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	yes	C	—	XS2M18MA250
Non-shielded, micro-style connector AC										
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	B	17, 18	XS2M18MA230K
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	yes	B	23, 24	XS2M18MA250K
Non-shielded, mini-style connector										
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	B	22	XS2M18MA230A
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	yes	C	22	XS2M18MA250A
Plastic case										
Non-shielded, 2 m (6.6 ft) cable										
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	A	—	XS4P18MA230
Non-shielded, micro-style connector										
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	A	17, 18	XS4P18MA230K
Non-shielded, mini-style connector										
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	A	23, 24	XS4P18MA230A
Shielded, screw terminal connection										
8 mm	AC/DC	N.O. ★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	B	—	XS4P18MA230B

★ To order a normally closed (N.C.) version, change the **A** to **B**. Example: XS1M12PA260 to XS1M12PB260.

① See page 227 under specifications for LED function.

Minimum Mounting Clearances, mm (in.)



XS1 Shielded

e: 10 (0.39)

e: 60 (2.36)

e: 15 (0.59)

D: 18 (0.71); H: 0

XS2/XS4 Non-shielded

e: 16 (0.63)

e: 96 (3.78)

e: 24 (0.94)

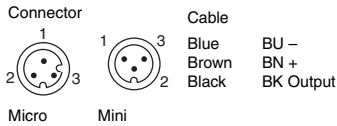
D: 54 (2.13); H: 8 (0.31)

Proximity Sensors

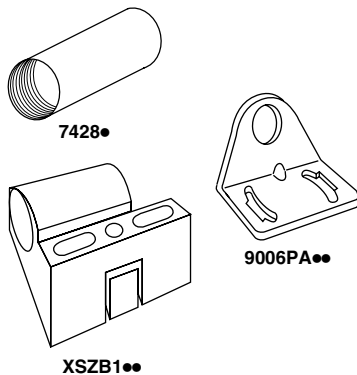
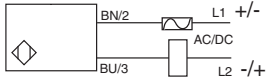
XS Tubular, Inductive Sensors

18 mm Diameter, AC/DC; Universal Standard Length

Wiring



Wire color/connector pin
2 wire, AC/DC or AC



Connector Cables (U20 or K suffix; U78 or A suffix)

XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°
XSZCA101Y	Micro-style, 3-pin, 2 m, straight
XSZCA111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths... page 626
Accessories... page 284, 280

Specifications

Mechanical

Usable sensing range ★	Shielded	0 to 4 mm
	Non-shielded	0 to 6.4 mm
Standard temperature range		-25 to +80 °C (-13 to +176 °F)
Enclosure rating—cable (for connector, see page 626)	NEMA Type	4X, 6P, 12, 13
	IEC	IP68
Enclosure material	Nickel-plated brass	Case Nickel-plated brass
	Plastic	Sensing face PBT
Tightening torque (maximum)	Nickel-plated brass	35 N•m (26 lb-ft)
	Plastic	5 N•m (3.7 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)	Shielded	18 x 18 mm (0.71 x 0.71 in.)
	Non-shielded	24 x 24 mm (0.94 x 0.94 in.)
Differential (% of Sr)		15%
Repeatability (% of Sr)		3%
LED indicator type	A	360° ring LED shows output status
	B	One LED visible from 4 quadrants shows output status
	C	2 LED indicators: red shows output status; green shows normal operation (SCP only)
Cable	2-wire	20 AWG (0.5 mm ²), PvR
	3-wire	22 AWG (0.34 mm ²), PvR

Electrical

Voltage range		24 to 240 Vac, 24–210 Vdc
Voltage limit (including ripple)		20 to 264 Vac/Vdc
Voltage drop (across switch), closed state (maximum)		5.5 V
Inrush current		2 A
Minimum load current		5 mA
Maximum load current		200 mA 20 ≤ Vdc ≤ 58 IEC 60947-5-2 Utilization category DC-13 Vdc > 58 IEC 60947-5-2 Utilization category DC-12
Residual (leakage) current, open state	without SCP	0.6 mA
	with SCP	1.5 mA
On delay (maximum)	without SCP	0.2 ms
	with SCP	2 ms
Off delay (maximum)	without SCP	0.2 ms
	with SCP	4 ms
Power-up delay (maximum)	without SCP	40 ms
	with SCP	70 ms
Protective circuitry	Short circuit protection	Optional▲
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse	IEC 61000-4-2 L4; IEC 61000-4-4 L4; 60947.5.2 L3
Agency listings	E 164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range (cable type only)	Down to -40° C (-40° F) TF
Extended cable length	5 m (16.4 ft) cable L1
	10 m (32.8 ft) cable L2

Accessories

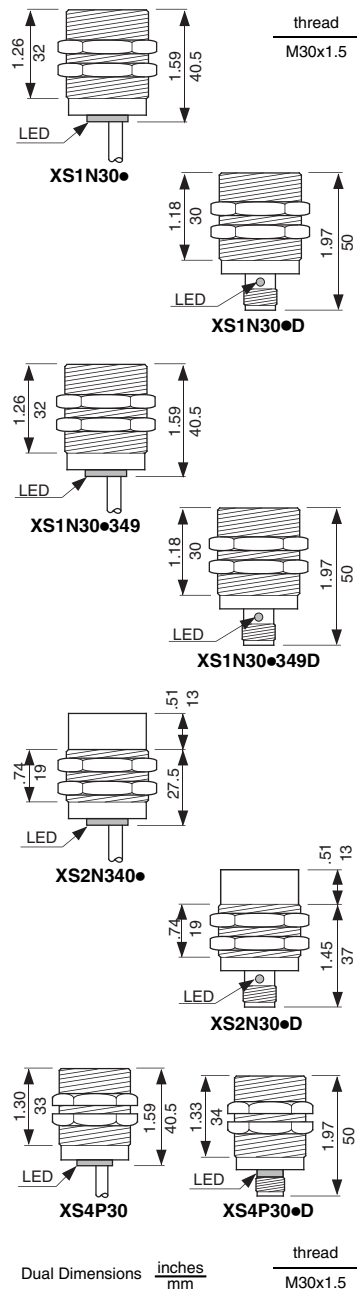
Description	Catalog Number
Plastic mounting nuts	XSZE218
Metal mounting nuts and lockwashers	XSZE118
Steel mounting bracket, 90°	9006PA18
Plastic mounting bracket	XSZB118
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum 7428
	Stainless 74282

★ Refer to page 327 for target material correction coefficient Km.
▲ For devices without SCP, see page 284 for protective fuses.

Proximity Sensors

XS Tubular, Inductive Sensors

30 mm Diameter, DC; Economy Short Length



Features

- 360° LED indicators
- Extended range models
- Complementary N.O. + N.C. models
- Rugged metal or plastic cases
- Patented plastic mounting bracket
- Connector options
- Extensive protective circuitry
- Works with an unregulated DC supply powered by a 24 V secondary transformer
- Metal locknuts for metal or plastic mounting nuts for plastic housing included
- Normally closed (N.C.) output available on versions mode marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Operating Frequency	Indicator LED ①	Mating Connector Style (see page 626)	Catalog Number
Nickel-plated brass case							
Shielded, 2 m (6.6 ft) cable							
10 mm	PNP	12–24 V	N.O. + N.C.	1,000 Hz	A	—	XS1N30PC410
10 mm	NPN	12–24 V	N.O. + N.C.	1,000 Hz	A	—	XS1N30NC410
Shielded◆, micro-style connector							
10 mm	PNP	12–24 V	N.O. + N.C.	1,000 Hz	B	11, 12, 13, 15, 16	XS1N30PC410D
10 mm	NPN	12–24 V	N.O. + N.C.	1,000 Hz	B	11, 12, 14, 15, 16	XS1N30NC410D
Shielded◆, Extended Range, 2 m (6.6 ft) cable							
20 mm	PNP	12–24 V	N.O.★	500 Hz	A	—	XS1N30PA349
20 mm	NPN	12–24 V	N.O.★	500 Hz	A	—	XS1N30NA349
Shielded, Extended Range, micro-style connector							
20 mm	PNP	12–24 V	N.O.★	500 Hz	B	11, 12, 13, 15, 16	XS1N30PA349D
20 mm	NPN	12–24 V	N.O.★	500 Hz	B	11, 12, 14, 15, 16	XS1N30NA349D
Non-shielded, 2 m (6.6 ft) cable							
15 mm	PNP	12–24 V	N.O. + N.C.	1,000 Hz	A	—	XS2N30PC410
15 mm	NPN	12–24 V	N.O. + N.C.	1,000 Hz	A	—	XS2N30NC410
Non-shielded, micro-style connector							
15 mm	PNP	12–24 V	N.O. + N.C.	1,000 Hz	B	11, 12, 13, 15, 16	XS2N30PC410D
15 mm	NPN	12–24 V	N.O. + N.C.	1,000 Hz	B	11, 12, 14, 15, 16	XS2N30NC410D
Plastic case							
Non-shielded, 2 m (6.6 ft) cable							
15 mm	PNP	12–24 V	N.O.	1,000 Hz	A	—	XS4P30PA340
15 mm	NPN	12–24 V	N.O.	1,000 Hz	A	—	XS4P30NA340
15 mm	PNP	12–24 V	N.O. + N.C.	1,000 Hz	A	—	XS4P30PC410
15 mm	NPN	12–24 V	N.O. + N.C.	1,000 Hz	A	—	XS4P30NC410
Non-shielded, micro-style connector							
15 mm	PNP	12–24 V	N.O.	1,000 Hz	A	11, 12, 13, 15, 16	XS4P30PA340D
15 mm	NPN	12–24 V	N.O.	1,000 Hz	A	11, 12, 14, 15, 16	XS4P30NA340D
15 mm	PNP	12–24 V	N.O. + N.C.	1,000 Hz	A	11, 12, 13, 15, 16	XS4P30PC410D
15 mm	NPN	12–24 V	N.O. + N.C.	1,000 Hz	A	11, 12, 14, 15, 16	XS4P30NC410D

★ To order a normally closed (N.C.) version, change the **A** to **B**. Example: XS1N30PA349 to XS1N30PB349.

① See next page under specifications for LED function.

◆ See dimension X below.

Minimum Mounting Clearances, mm (in.)

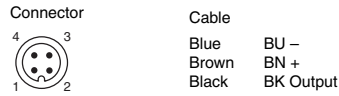
	Side by side	Face to face	Facing a metal object	Mounting in a metal support	Mounting in a metal support
XS1 Shielded	e: 20 (0.79)	e: 120 (4.72)	e: 30 (1.18)	D: 30 (1.18); H: 0	x: 0
XS1 Extended range	e: 40 (1.57)	e: 240 (9.45)	e: 60 (2.36)	—	x: 6 (0.24)
XS2/XS4 Non-shielded	e: 60 (2.36)	e: 180 (7.09)	e: 45 (1.77)	D: 90 (3.54); H: 30 (1.18)	—

Proximity Sensors

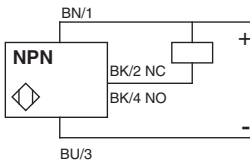
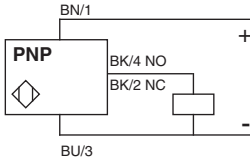
XS Tubular, Inductive Sensors

30 mm Diameter, DC; Economy Short Length

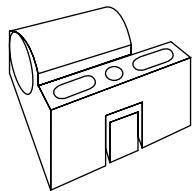
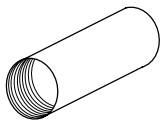
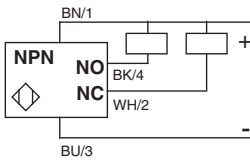
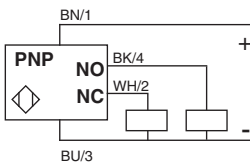
Wiring



Wire color/connector pin
3 wire NO or NC



4 wire NO + NC



Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths...page 626
Accessories...page 284, 280

Specifications

Mechanical

Usable sensing range★	Shielded	Standard sensing range	0 to 8 mm
		Extended sensing range	0 to 16 mm
Temperature range	Standard sensing range	Nickel-plated brass	-25 to +70 °C (-13 to +158 °F)
		Plastic	-25 to +80 °C (-13 to +176 °F)
	Extended sensing range		-25 to 50 °C (-13 to +122 °F)
Enclosure rating—cable (for connector, see page 626)	Nickel-plated brass	NEMA Type	3, 4X, 6P, 12, 13
		IEC	IP67
Enclosure material	Plastic	NEMA Type	3, 4X, 6P, 12, 13
		IEC	IP68
Enclosure material	Nickel-plated brass	Case	Nickel-plated brass
		Sensing face	PBT
	Plastic	Case	PBT
		Sensing face	PBT
Tightening torque (maximum)	Nickel-plated brass		40 N•m (29.5 lb-ft)
	Plastic		20 N•m (15 lb-ft)
Vibration resistance	(IEC 60068.2.6)		25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)		50 G, 11 ms duration
Standard target size (steel)	Shielded	Standard sensing range	30 x 30 mm (1.18 x 1.18 in.)
		Extended sensing range	48 x 48 mm (1.88 x 1.88 in.)
	Non-shielded		36 x 36 mm (1.41 x 1.41 in.)
Differential (% of Sr)			15%
Repeatability (% of Sr)			3%
LED indicator type	A	360° ring LED shows output status	
	B	One LED visible from 4 quadrants shows output status	
Cable	3 or 4-wire		22 AWG (0.34 mm ²), PvR

Electrical

Voltage range	12–24 Vdc		
Voltage limit (including ripple)	10–38 Vdc		
Voltage drop (across switch), closed state	2 V		
Maximum load current	200 mA		
Current consumption (no load)	10 mA		
On delay (maximum)	Shielded	Standard sensing range	0.3 ms
		Extended sensing range	0.6 ms
	Non-shielded		0.3 ms
Off delay (maximum)	Shielded	Standard sensing range	0.7 ms
		Extended sensing range	1.4 ms
	Non-shielded		0.7 ms
Power-up delay	5 ms		
Protective circuitry	Short circuit protection	Yes	
	Overload	Yes	
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3	
	Electrostatic; transients; impulse (L—indicates level number)	3-wire: IEC 61000-4-2 L3; IEC 61000-4-4L3; 60947.5.2 L3 Extended sensing range: IEC 61000-4-4 L3	
	Reverse polarity protection	Yes	
Agency listings	E 164869 CCN NRKH	CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range (cable type and standard sensing distance only)	Down to -40° C (-40° F) TF
Extended cable length	5 m (16.4 ft) cable L1
	10 m (32.8 ft) cable L2

Accessories

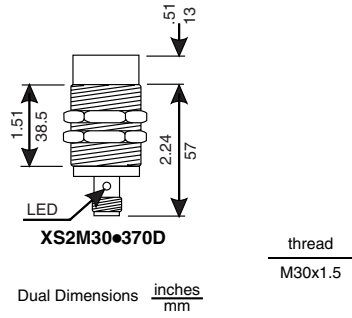
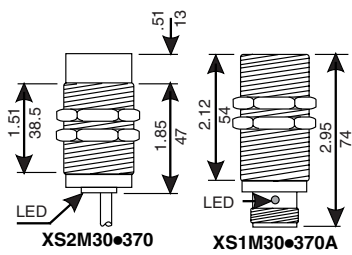
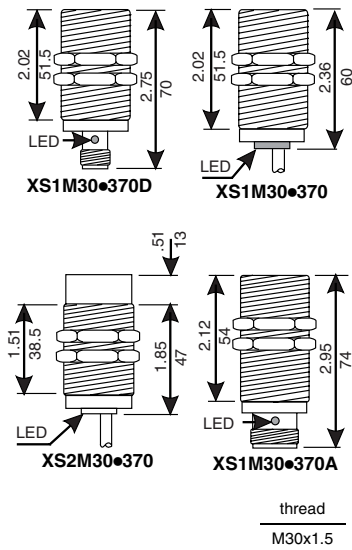
Description	Catalog Number
Plastic mounting nuts	XSZE230
Metal mounting nuts and locknuts	XSZE130
Steel mounting bracket, 90°	9006PA30
Plastic mounting bracket, long length	XSZB130
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum 7427

★ Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

30 mm Diameter, DC; Universal Standard Length



Features

- Faster troubleshooting aided by high-visibility, 360° indicators
- Rugged case designed for aggressive industrial environments
- Worry free replacement: standard length, extended temperature and supply voltage range, improved enclosure ratings (IP68), 3-wire complementary PNP + NPN with selectable N.O./N.C. output circuit
- Pigtail connector version (0.8 m / 2.6 ft cable) provides cutting oil ratings (IP68) and connection for aggressive environments.
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Trouble free operation ensured by extensive protective circuitry
- Works with unfiltered rectified power supply
- Metal mounting locknuts included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Maximum Load	Operating Frequency	Indicator LED ①	Mating Connector Style (see page 626)	Catalog Number
--------------------------	--------------	---------------	-------------	--------------	---------------------	-----------------	---------------------------------------	----------------

Nickel-plated brass case

Shielded, 2 m (6.6 ft) cable

10 mm	PNP	12–48 V	N.O.★	200 mA	1,000 Hz	A	—	XS1M30PA370
10 mm	NPN	12–48 V	N.O.★	200 mA	1,000 Hz	A	—	XS1M30NA370
10 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	1,000 Hz	A	—	XS1M30KP340

Shielded, micro-style connector DC

10 mm	PNP	12–48 V	N.O.★	200 mA	1,000 Hz	B	11, 12, 13, 15, 16	XS1M30PA370D
10 mm	NPN	12–48 V	N.O.★	200 mA	1,000 Hz	B	11, 12, 14, 15, 16	XS1M30NA370D
10 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	1,000 Hz	B	11, 12, 15, 16	XS1M30KP340D

Shielded, mini-style connector

10 mm	PNP	12–48 V	N.O.	200 mA	1,000 Hz	B	21, 22	XS1M30PA370A
10 mm	NPN	12–48 V	N.O.	200 mA	1,000 Hz	B	21, 22	XS1M30NA370A

Shielded, connector—screw terminal connection

10 mm	PNP	12–48 V	N.O.★	200 mA	1,000 Hz	B	—	XS1M30PA370B
10 mm	NPN	12–48 V	N.O.★	200 mA	1,000 Hz	B	—	XS1M30NA370B

Non-shielded, 2 m (6.6 ft) cable

15 mm	PNP	12–48 V	N.O.★	200 mA	1,000 Hz	A	—	XS2M30PA370
15 mm	NPN	12–48 V	N.O.★	200 mA	1,000 Hz	A	—	XS2M30NA370
15 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	1,000 Hz	A	—	XS2M30KP340

Non-shielded, micro-style connector

15 mm	PNP	12–48 V	N.O.★	200 mA	1,000 Hz	B	11, 12, 13, 15, 16	XS2M30PA370D
15 mm	NPN	12–48 V	N.O.★	200 mA	1,000 Hz	B	11, 12, 14, 15, 16	XS2M30NA370D
15 mm	PNP + NPN	12–24 V	N.O./N.C.	200 mA	1,000 Hz	B	11, 12, 15, 16	XS2M30KP340D

★ To order a normally closed (N.C.) version, change the A to B. Example: XS1M12PA370 to XS1M12PB370.

① See next page under specifications for LED function.

Minimum Mounting Clearances, mm (in.)

	Side by side	Face to face	Facing a metal object	Mounting in a metal support
XS1 Shielded	e: 20 (0.79)	e: 120 (4.72)	e: 30 (1.18)	D: 30 (1.18); H: 0
XS2 Non-shielded	e: 60 (2.36)	e: 180 (7.09)	e: 45 (1.77)	D: 90 (3.54); H: 30 (1.18)

Proximity Sensors

XS Tubular, Inductive Sensors

30 mm Diameter, DC; Universal Standard Length

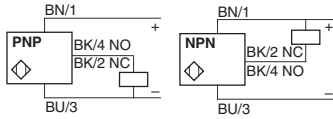
Wiring



Connector
 4 3
 1 2

Cable
 Blue BU -
 Brown BN +
 Black BK Output

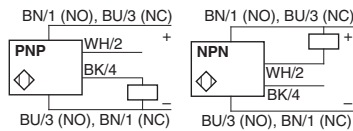
Wire color/connector pin 3 wire NO or NC



Connector
 3 1
 2

Cable
 Blue BU -
 Brown BN +
 Black BK Output

4 wire, programmable, NO or NC output



Specifications

Mechanical		
Usable sensing range★	Shielded	0 to 8 mm
	Non-shielded	0 to 12 mm
Standard temperature range	-25 to +80 °C (-13 to +176 °F)	
Enclosure rating—cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP68—cutting oil proof, IP67 for B screw terminals
Enclosure material	Nickel-plated brass	Case: Nickel-plated brass Sensing face: PBT
Tightening torque (maximum)	Nickel-plated brass	50 N•m (37 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)	Shielded	30 x 30 mm (1.18 x 1.18 in.)
	Non-shielded	36 x 36 mm (1.41 x 1.41 in.)
Differential (% of Sr)	15%	
Repeatability (% of Sr)	3%	
LED indicator type	A	360° ring LED shows output status
	B	One LED visible from 4 quadrants shows output status
Cable	3-wire	22 AWG (0.34 mm ²), PvR
Electrical		Standard
Voltage range—nominal		12–48 Vdc
Voltage limit (including ripple)		10–58 Vdc
Voltage drop (across switch), closed state	3-wire	2 V
Maximum load current	3-wire	200 mA
Current consumption (no load)	3-wire	10 mA
On delay (maximum)	3-wire	0.3 ms
Off delay (maximum)	3-wire	0.7 ms
Power-up delay (maximum)		5 ms
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse (L—indicates level number)	3-wire IEC 61000-4-2 L3; IEC 61000-4-4 L2; 60947.5.2 L3
	Reverse polarity protection	Yes
Agency listings	E 164869 CCN NRKH	CR 44087 Class 3211 03

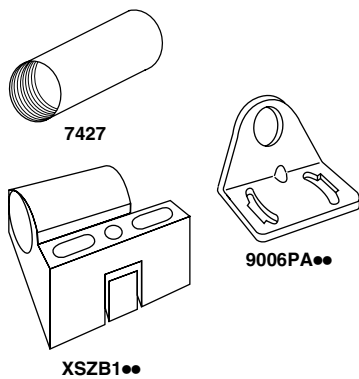
Options

Description	Suffix
Extended temperature range (cable type only)	Down to -40°+ C (-40°+ F)
Extended cable length	5 m (16.4 ft) cable
	10 m (32.8 ft) cable

Accessories

Description	Catalog Number
Metal mounting locknuts	XSZE130
Steel mounting bracket, 90°, and lockwashers	9006PA30
Plastic mounting bracket	XSZB130
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum 7427

★ Refer to page 327 for target material correction coefficient Km.



Connector Cables (M12 or D suffix; U78 or A suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCA101Y	Micro-style, 3-pin, 2 m, straight
XSZCA111Y	Micro-style, 3-pin, 2 m, 90°

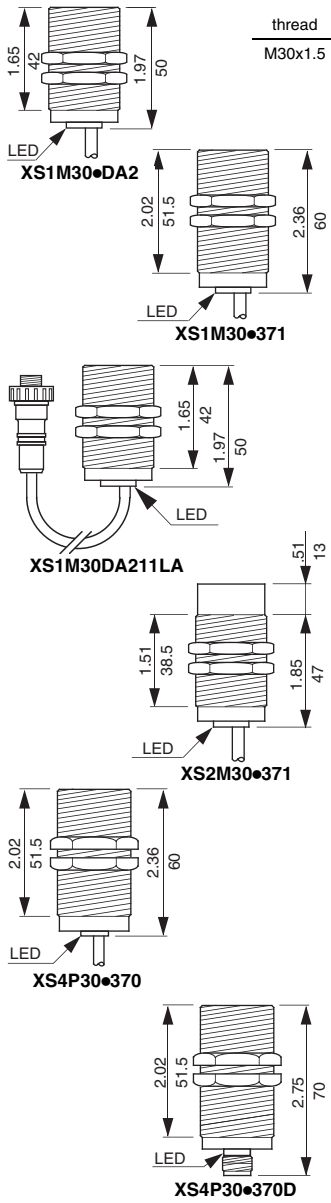
Additional cable options and lengths . . . page 626
 Accessories page 284, 280

Proximity

Proximity Sensors

XS Tubular, Inductive Sensors

30 mm Diameter, DC; Universal Standard Length, Non-Corrosive



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

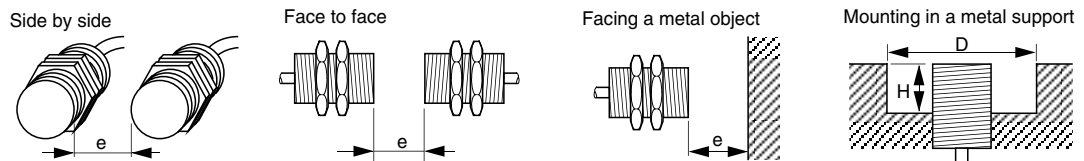
- Faster troubleshooting aided by high-visibility, 360° indicators
- 2-wire versions simplify wiring
- High-impact stainless steel and plastic cases for aggressive environments—cutting oils, grease, solvents, etc.
- Worry free replacement: standard length, extended temperature and supply voltage range, improved enclosure ratings (IP68), 3-wire complementary PNP + NPN with selectable N.O./N.C. output circuit
- Significant savings in replacement time using the patented plastic mounting bracket (no gauging) or connectors
- Pigtail connector version (0.8 m / 2.6 ft cable) provides cutting oil ratings (IP68) and connection for aggressive environments.
- Trouble free operation ensured by extensive protective circuitry
- Works with unfiltered rectified power supply
- Stainless steel or plastic mounting nuts included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	Circuit Type	Voltage Range	Output Mode	Maximum Load	Operating Frequency	Indicator LED ①	Mating Connector Style (see page 626)	Catalog Number
Stainless steel case								
Shielded, 2 m (6.6 ft) cable								
10 mm	2-wire	12–48 V	N.O. ★	1.5–100 mA	2,000 Hz	A	—	XS1M30DA211
10 mm	PNP	12–48 V	N.O.	200 mA	1,000 Hz	A	—	XS1M30PA371
10 mm	NPN	12–48 V	N.O.	200 mA	1,000 Hz	A	—	XS1M30NA371
Shielded, micro-style connector—0.8 m (2.6 ft) pigtail								
10 mm	2-wire	12–48 V	N.O. ★	1.5–100 mA	2,000 Hz	A	11, 12, 15, 16	XS1M30DA211LD
Shielded, mini-style connector—0.8 m (2.6 ft) pigtail								
10 mm	2-wire	12–48 V	N.O. ★	1.5–100 mA	2,000 Hz	A	21, 22	XS1M30DA211LA
Non-shielded, 2 m (6.6 ft) cable								
15 mm	PNP	12–48 V	N.O.	200 mA	1,000 Hz	A	—	XS2M30PA371
15 mm	NPN	12–48 V	N.O.	200 mA	1,000 Hz	A	—	XS2M30NA371
Plastic case								
Non-shielded, 2 m (6.6 ft) cable								
15 mm	PNP	12–48 V	N.O. ★	200 mA	1,000 Hz	A	—	XS4P30PA370
15 mm	NPN	12–48 V	N.O. ★	200 mA	1,000 Hz	A	—	XS4P30NA370
15 mm	PNP/NPN	12–24 V	N.O./N.C.	200 mA	1,000 Hz	A	—	XS4P30KP340
Non-shielded, micro-style connector DC								
15 mm	PNP	12–48 V	N.O. ★	200 mA	1,000 Hz	A	11, 12, 13, 15, 16	XS4P30PA370D
15 mm	NPN	12–48 V	N.O. ★	200 mA	1,000 Hz	A	11, 12, 14, 15, 16	XS4P30NA370D
15 mm	PNP/NPN	12–24 V	N.O./N.C.	200 mA	1,000 Hz	A	11, 12, 15, 16	XS4P30KP340D

★ To order a normally closed (N.C.) version, change the **A** to **B**. Example: XS1M12PA371 to XS1M12PB371.

① See next page under specifications for LED function.

Minimum Mounting Clearances, mm (in.)



XS1 Shielded	e: 20 (0.79)	e: 120 (4.72)	e: 30 (1.18)	D: 30 (1.18); H: 0
XS2/XS4 Non-shielded	e: 60 (2.36)	e: 180 (7.09)	e: 45 (1.77)	D: 90 (3.54); H: 30 (1.18)

Proximity Sensors

XS Tubular, Inductive Sensors

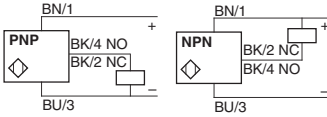
30 mm Diameter, DC; Universal Standard Length, Non-Corrosive

Wiring



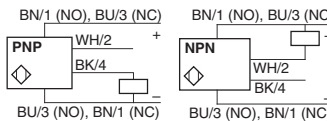
Cable
 Blue BU -
 Brown BN +
 Black BK Output

Wire color/connector pin 3 wire NO or NC

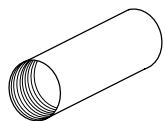
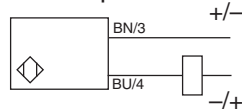


Cable
 Blue BU -
 Brown BN +
 Black BK Output

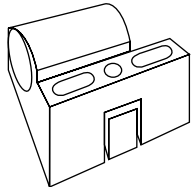
4 wire, programmable, NO or NC output



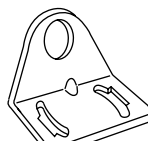
2 wire non-polarized



7427



XSZB1●●



9006PA●●

Connector Cables (M12 or D suffix; U78 or A suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCA101Y	Micro-style, 3-pin, 2 m, straight
XSZCA111Y	Micro-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
 Accessories page 284, 280

Specifications

Mechanical

Usable sensing range ★	Shielded	0 to 8 mm
	Non-shielded	0 to 12 mm
Standard temperature range	-25 to +80 °C (-13 to +176 °F)	
Enclosure rating cable (for connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP68
Enclosure material	Stainless steel	#303 stainless steel
	Plastic	PBT
Tightening torque (maximum)	Stainless steel	100 N•m (74 lb-ft)
	Plastic	20 N•m (15 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)	Shielded	30 x 30 mm (1.18 x 1.18 in.)
	Non-shielded	36 x 36 mm (1.41 x 1.41 in.)
Differential (% of Sr)	15%	
Repeatability (% of Sr)	3%	
LED indicator type	A	360° ring LED shows output status
Cable	2-wire	20 AWG (0.5 mm ²), PvR
	3-wire	22 AWG (0.34 mm ²), PvR

Electrical

	Standard	KP Models
Voltage range—nominal	12–48 Vdc	12–24 Vdc
Voltage limit (including ripple)	10–58 Vdc	10–38 Vdc
Voltage drop (across switch), closed state	2-wire	4 V
	3-wire	2 V
	4-wire	—
Minimum load current	2-wire	1.5 mA
	3-wire	2.6 V
Maximum load current	2-wire	100 mA
	3-wire	200 mA
Current consumption (on load)	3-wire	10 mA
Residual (leakage) current, open state	2-wire	0.5 mA
On delay (maximum)	2-wire	0.2 ms
	3-wire	0.3 ms
Off delay (maximum)	2-wire	0.3 ms
	3-wire	0.7 ms
Power-up delay (maximum)	5 ms	
Protective circuitry	Short circuit protection	Yes
	Overload	Yes
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse (L—indicates level number)	2-wire: IEC 61000-4-2 L3; IEC 61000-4-4 L3; 60947.5.2 L3 3-wire: IEC 61000-4-2 L2; IEC 61000-4-4 L3; 60947.5.2 L4
	Reverse polarity protection	Yes
Agency listings	E 164869 CCN NRKH CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range, cable type only	Down to -40° C (-40° F) TF
Extended cable length	5 m (16.4 ft) cable L1
	10 m (32.8 ft) cable L2

Accessories

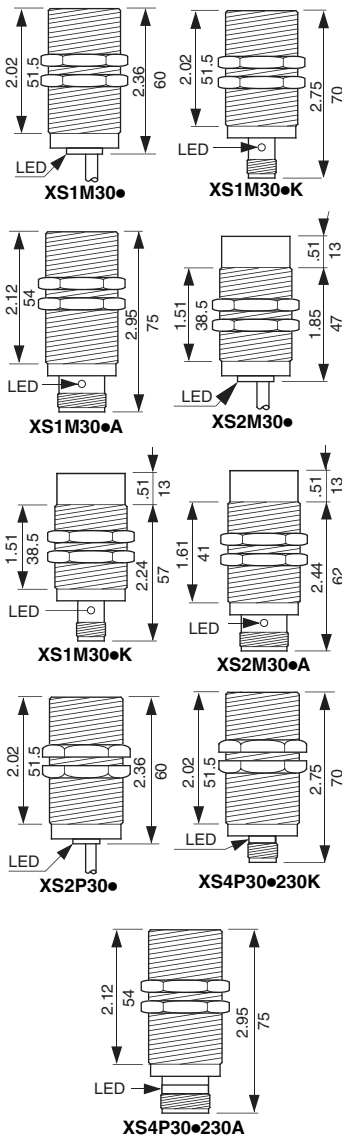
Description	Catalog Number
Plastic mounting nuts	XSZE230
Stainless steel mounting nuts	XSZE330
Stainless steel locknut washers	XSZE930
Steel mounting bracket, 90°	9006PA30
Plastic mounting bracket	XSZB130
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum 7427

★ Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XS Tubular, Inductive Sensors

30 mm Diameter, AC/DC; Universal Standard Length



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$ thread M30x1.5

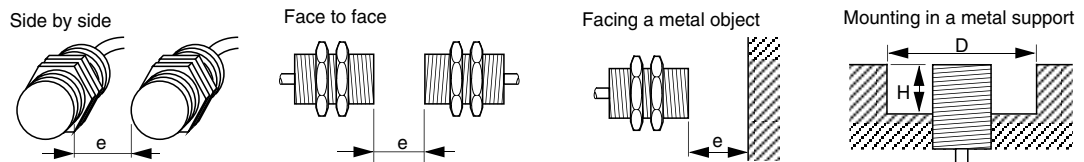
Features

- 360° LED indicators
- Extended temperature range
- Extended supply voltage range
- IP68 rating
- AC/DC power supply
- Patented plastic mounting bracket
- Connector options
- Extensive protective circuitry
- Metal locknuts for metal or plastic mounting nuts for plastic housing and lockwashers included
- Normally closed (N.C.) output available on versions marked ★
- UL Listed, CSA Certified, and CE Marked

Nominal Sensing Distance	AC or AC/DC	Output Mode★	Voltage Range		Operating Frequency		SCP	Indicator LED ①	Mating Connector Style (see page 626)	Catalog Number
			AC	DC	AC	DC				
Nickel-plated brass case										
Shielded, 2 m (6.6 ft) cable										
10 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	A	—	XS1M30MA230
10 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	2,000 Hz	yes	C	—	XS1M30MA250
Shielded, micro-style connector AC										
10 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	B	13, 14	XS1M30MA230K
10 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	2,000 Hz	yes	B	13, 14	XS1M30MA250K
Shielded, mini-style connector										
10 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	B	17, 20	XS1M30MA230A
10 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	2,000 Hz	yes	C	18, 20	XS1M30MA250A
Shielded, screw terminal connection										
10 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	2,000 Hz	no	B	—	XS1M30MA230B
Non-shielded, 2 m (6.6 ft) cable										
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	no	A	—	XS2M30MA230
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	yes	C	—	XS2M30MA250
Non-shielded, micro-style connector AC										
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	no	B	13, 14	XS2M30MA230K
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	yes	B	13, 14	XS2M30MA250K
Non-shielded, mini-style connector										
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	no	B	18, 19	XS2M30MA230A
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	yes	C	18, 19	XS2M30MA250A
Plastic case										
Non-shielded, 2 m (6.6 ft) cable										
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	no	A	—	XS4P30MA230
Non-shielded, micro-style connector										
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	no	A	13, 14	XS4P30MA230K
Non-shielded, mini-style connector										
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	no	A	18, 20	XS4P30MA230A
Non-shielded, screw terminal connector										
15 mm	AC/DC	N.O.★	24–240 V	24–210 V	25 Hz	1,000 Hz	no	B	—	XS4P30MA230B

★ To order a normally closed (N.C.) version, change the **A** to **B**. Example: XS1M30PA260 to XS1M12PB260.
 ① See next page under specifications for LED function.

Minimum Mounting Clearances, mm (in.)



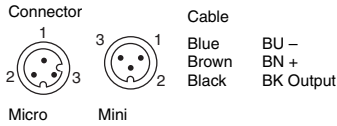
Model	Side by side (e)	Face to face (e)	Facing a metal object (e)	Mounting in a metal support (D, H)
XS1 Shielded	e: 20 (0.79)	e: 120 (4.72)	e: 30 (1.18)	D: 30 (1.18); H: 0
XS2/XS4 Non-shielded	e: 60 (2.36)	e: 180 (7.09)	e: 45 (1.77)	D: 90 (3.54); H: 30 (1.18)

Proximity Sensors

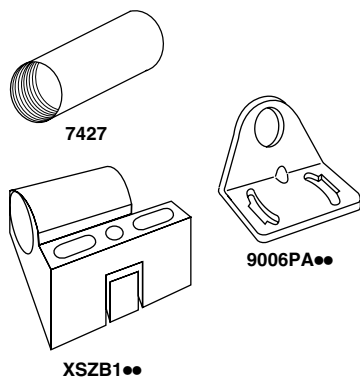
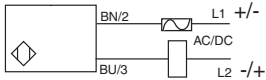
XS Tubular, Inductive Sensors

30 mm Diameter, AC/DC; Universal Standard Length

Wiring



Wire color/connector pin
2 wire, AC/DC or AC



Connector Cables (U20 or K suffix; U78 or A suffix)

XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°
XSZCA101Y	Mini-style, 3-pin, 2 m, straight
XSZCA111Y	Mini-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
Accessories page 284, 280

Specifications

Mechanical		
Usable sensing range ★	Shielded	0 to 8 mm
	Non-shielded	0 to 12 mm
Standard temperature range		-25 to +80 °C (-13 to +176 °F)
Enclosure rating—cable (connector, see page 626)	NEMA Type	3, 4X, 6P, 12, 13
	IEC	IP68; IP67 for B screw terminals
Enclosure material	Nickel-plated brass	Case: Nickel-plated brass Sensing face: PBT
	Plastic	PBT
Tightening torque (maximum)	Nickel-plated brass	50 N•m (37 lb-ft)
	Plastic	20 N•m (15 lb-ft)
Vibration resistance	(IEC 60068.2.6)	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	(IEC 60068.2.27)	50 G, 11 ms duration
Standard target size (steel)	Shielded	30 x 30 mm (1.18 x 1.18 in.)
	Non-shielded	36 x 36 mm (1.41 x 1.41 in.)
Differential (% of Sr)		15%
Repeatability (% of Sr)		3%
LED indicator type	A	360° ring LED shows output status
	B	One LED visible from 4 quadrants shows output status
	C	2 LED indicators: red shows output status; green shows normal operation (SCP only)
Cable	2-wire	22 AWG (0.5 mm ²), PvR
Electrical		
Voltage range—nominal		24 to 240 Vac (50/60 Hz), 24 to 210 Vdc
Voltage limit (including ripple)		20 to 264 Vac/Vdc
Voltage drop (across switch), closed state		5.5 V
Inrush current		2 A
Minimum load current		5 mA
Maximum load current	AC	300 mA
	DC	200 mA 20 ≤ Vdc ≤ 58 IEC 60947-5-2 Utilization category DC-13 Vdc > 58 IEC 60947-5-2 Utilization category DC-12
Residual (leakage) current, open state	Without SCP	0.6 mA
	With SCP	1.5 mA
On delay (maximum)	Without SCP	0.2 ms
	With SCP	2 ms
Off delay (maximum)	Without SCP	0.3 ms
	With SCP	5 ms
	Without SCP	40 ms
	With SCP	70 ms
Power-up delay (maximum)	Without SCP	40 ms
	With SCP	70 ms
Protective circuitry	Short circuit protection	Optional▲
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic; transients; impulse	IEC 61000-4-2 L4; IEC 61000-4-4 L4; 60947.5.2 L3
Agency listings	E 164869 CCN NRRKH CR 44087 Class 3211 03	

Options

Description	Suffix
Extended temperature range, cable type only	Down to -40° C (-40° F) TF
Extended cable length	5 m (16.4 ft) cable L1
	10 m (32.8 ft) cable L2

Accessories

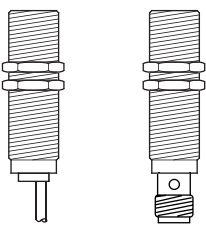
Description	Catalog Number
Plastic mounting nuts	XSZE230
Metal mounting nuts and lockwashers	XSZE130
Steel mounting bracket, 90°	9006PA30
Plastic mounting bracket	XSZB130
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm) Aluminum	7427

★ Refer to page 327 for target material correction coefficient Km.
▲ For devices without SCP, see page 284 for protective fuses.

Proximity Sensors

XS Tubular, Inductive Sensors

Economy D Series—DC, AC



thread
M8 x 1

thread
M12x1

thread
M18x1

thread
M30x1.5

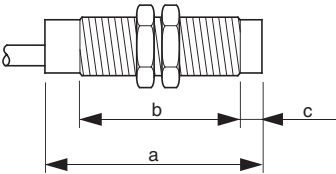
Features

Entire family of proximity sensors dedicated to OEMs and “just enough” applications.

- DC tubular body style ranging from 6.5 mm to 30 mm diameter, in 3-wire, N.O. output
- AC tubular body style ranging from 12 mm to 30 mm diameter, in 2-wire, N.O. output
- Brass metal case with either 2 m cable or connector options
- Shielded and non-shielded versions available
- Mounting nuts included
- Sold in multiples of ten easy-open bags

Circuit Type	Output Mode	Voltage Range	Voltage Drop Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
6.5 mm, Shielded, DC—2 m (6.6 ft) Cable—Nominal Sensing Distance—1.5 mm						
PNP	N.O.	12–24 Vdc	3 V	50 mA	3,000 Hz	XS1L06PA140
NPN	N.O.	12–24 Vdc	3 V	50 mA	3,000 Hz	XS1L06NA140
Agency Listings			E 164869 CCN NRKH	CR 44087 Class 3211 03		

a = Overall Length (mm)
b = Threaded Section (mm)
c = for Non-shielded Sensors (mm)



Dimensions

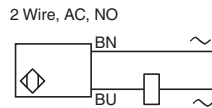
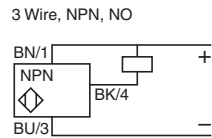
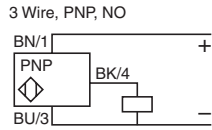
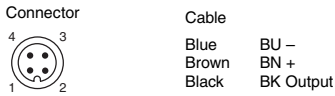
		a		b		c	
		in.	mm	in.	mm	in.	mm
6.5 mm	Cable	1.65	42.0	—	—	—	—
	Connector	—	—	—	—	—	—

Proximity Sensors

XS Tubular, Inductive Sensors

Economy D Series—DC, AC

Wiring



Specifications

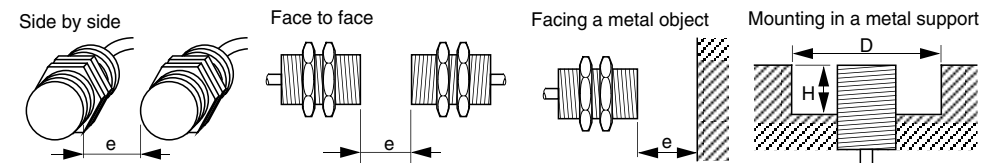
Mechanical		DC
Diameter		6.5 mm (0.26 in.)
Usable Sensing Range ★	Shielded	1.2 mm (0.04 in.)
	Non-Shielded	—
Temperature Range		-13 to +158° F (-25 to +70° C)
Enclosure Rating	NEMA Type	1
	CENELEC	IP66 (connector style is IP65)
Vibration		25 G, ±2 mm amplitude, 10–55 Hz
Shock Resistance		50 G for 11 ms
Maximum Differential (% of Sr)		15%
Maximum Repeatability (% of Sr)		3%
LED Indicator Type		One, mounted at rear (connector style is 4 viewing ports at 90°)
Enclosure Material		Brass
Wiring		3 x 0.34 mm ² (8 mm = 3 x 0.11 mm ²)
Electrical		
Voltage Range		12–24 Vdc
Voltage Limit (Including Ripple)		10–30 Vdc
Current Consumption (Maximum) (No Load)		10 mA
Maximum Leakage (Residual) Current—Open State		—
Voltage Drop (Closed State)		3 V
Power-up Delay (Maximum)		5 ms
On Delay (Maximum)		0.5 ms
Off Delay (Maximum)		1 ms
Protective Circuitry	Short Circuit Protection	Yes
	Overload Protection	Yes
Agency Listings		E 164869 CCN NRRK CR 44087 Class 3211 03

★ Refer to page 327 for target material correction coefficient Km.

Accessories

Description	For Sensor Diameter	Catalog Number
Mounting Brackets, Plastic	6.5 mm (0.25 in.)	XSZB165

Minimum Mounting Clearances



	e		e		e		d		h	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
XS1L06	0.12	3	0.71	18	0.18	4.5	0.31	8	0	0
XS1D08	0.12	3	0.71	18	0.18	4.5	0.31	8	0	0
XS1D/M12	0.16	4	0.94	24	0.24	6.0	0.47	12	0	0
XS2D12	0.63	16	1.89	48	0.47	12.0	1.42	36	0.31	8
XS1D/M18	0.39	10	2.36	60	0.59	15.0	0.59	15	0	0
XS1D/M30	0.79	20	4.72	120	1.18	30.0	1.18	30	0	0

Connector Cables (M12 or D suffix)

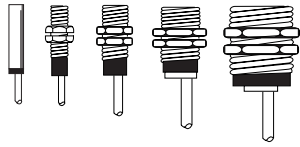
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths... page 626
 Accessories... page 284, 280

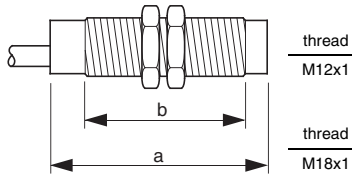
Proximity Sensors

XS Tubular, Inductive Sensors

Extended Range—AC/DC, DC



a = Overall Length (mm) thread
 b = Threaded Section (mm) M8 x 1



a		AC/DC		DC	
		mm	in.	mm	in.
6.5 mm	Cabled version	—	—	33	1.29
	Nano-connector	—	—	42	1.65
	Micro-connector	—	—	45	1.77
8 mm	Cabled version	—	—	33	1.29
	Nano-connector	—	—	42	1.65
	Micro-connector	—	—	45	1.77
12 mm	Cabled version	50	1.96	33	1.29
	Micro-connector	61	2.40	48	1.88
	Micro-connector	60	2.36	33.5	1.31
18 mm	Micro-connector	70	2.75	48	1.88
	Mini-Connector	—	—	—	—
30 mm	Cabled version	60	2.36	40.5	1.59
	Micro-connector	70	2.75	50	1.96

b ♦		AC/DC		DC	
		mm	in.	mm	in.
6.5 mm	Cabled version	—	—	30	1.18
	Nano-connector	—	—	34	1.33
	Micro-connector	—	—	24	0.94
8 mm	Cabled version	—	—	26	1.02
	Nano-connector	—	—	26	1.02
	Micro-connector	—	—	24	0.94
12 mm	Cabled version	42	1.65	26	1.02
	Micro-connector	40	1.57	25	0.98
18 mm	Cabled version	51.5	2.02	26	1.02
	Micro-connector	51.5	2.02	26	1.02
30 mm	Cabled version	51.5	2.02	32	1.25
	Micro-connector	51.5	2.02	32	1.25

♦ For 6.5 mm diameter, b = smooth length

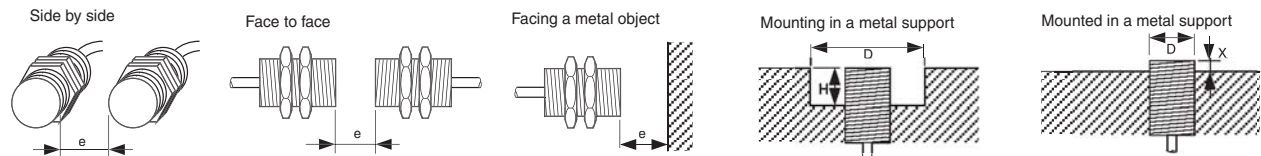
Features

- Extended range feature available in Universal AC/DC, or DC only sensors, where previously only available in DC
- AC/DC has same extended sensing range as in DC only sensors
- Available in molded cable or connector versions
- Rugged IP68 nickel-plated brass casing
- 360° LED for complete visibility
- Metal locknuts included in carton

Circuit Type	Output Mode	Voltage Range	Voltage Drop Maximum	Load Current Maximum	Operating Frequency Maximum	Connection ★	Catalog Number
6.5 mm Diameter, DC, Shielded—Nominal Sensing Distance—2 mm							
PNP	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	2 m (6.6 ft) cable	XS1L06PA349
NPN	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	2 m (6.6 ft) cable	XS1L06NA349
PNP	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	Nano-style connector	XS1L06PA349S
NPN	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	Nano-style connector	XS1L06NA349S
PNP	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	Micro-style connector	XS1L06PA349D
NPN	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	Micro-style connector	XS1L06NA349D
8 mm Diameter, DC, Shielded—Nominal Sensing Distance—2.5 mm							
PNP	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	2 m (6.6 ft) cable	XS1N08PA349
NPN	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	2 m (6.6 ft) cable	XS1N08NA349
PNP	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	Nano-style connector	XS1N08PA349S
NPN	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	Nano-style connector	XS1N08NA349S
PNP	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	Micro-style connector	XS1N08PA349D
NPN	N.O.	12–24 Vdc	2.6 V	200 mA	2,500 Hz	Micro-style connector	XS1N08NA349D
12 mm Diameter, DC, Shielded—Nominal Sensing Distance—4 mm							
PNP	N.O.	12–24 Vdc	2 V	200 mA	2,500 Hz	2 m (6.6 ft) cable	XS1N12PA349
NPN	N.O.	12–24 Vdc	2 V	200 mA	2,500 Hz	2 m (6.6 ft) cable	XS1N12NA349
PNP	N.O.	12–24 Vdc	2 V	200 mA	2,500 Hz	Micro-style connector	XS1N12PA349D
NPN	N.O.	12–24 Vdc	2 V	200 mA	2,500 Hz	Micro-style connector	XS1N12NA349D
12 mm Diameter, Universal AC/DC, Shielded—Nominal Sensing Distance—4 mm							
2-wire	N.O.	12–24 Vdc	5.5 V	200 mA	25 Hz /1,000 Hz	2 m (6.6 ft) cable	XS1M12MA239
2-wire	N.O.	12–24 Vdc	5.5 V	200 mA	25 Hz /1,000 Hz	Micro-style connector	XS1M12MA239K
18 mm Diameter, DC, Shielded—Nominal Sensing Distance—10 mm							
PNP	N.O.	12–24 Vdc	2 V	200 mA	1,000 Hz	2 m (6.6 ft) cable	XS1N18PA349
NPN	N.O.	12–24 Vdc	2 V	200 mA	1,000 Hz	2 m (6.6 ft) cable	XS1N18NA349
PNP	N.O.	12–24 Vdc	2 V	200 mA	1,000 Hz	Micro-style connector	XS1N18PA349D
NPN	N.O.	12–24 Vdc	2 V	200 mA	1,000 Hz	Micro-style connector	XS1N18NA349D
18 mm Diameter, Universal AC/DC, Shielded—Nominal Sensing Distance—10 mm							
2-wire	N.O.	12–24 Vdc	5.5 V	200 mA	25 Hz /1,000 Hz	2 m (6.6 ft) cable	XS1M18MA239
2-wire	N.O.	12–24 Vdc	5.5 V	200 mA	25 Hz /1,000 Hz	Micro-style connector	XS1M18MA239K
30 mm Diameter, DC, Shielded—Nominal Sensing Distance—20 mm							
PNP	N.O.	12–24 Vdc	2 V	200 mA	500 Hz	2 m (6.6 ft) cable	XS1N30PA349
NPN	N.O.	12–24 Vdc	2 V	200 mA	500 Hz	2 m (6.6 ft) cable	XS1N30NA349
PNP	N.O.	12–24 Vdc	2 V	200 mA	500 Hz	Micro-style connector	XS1N30PA349D
NPN	N.O.	12–24 Vdc	2 V	200 mA	500 Hz	Micro-style connector	XS1N30NA349D
30 mm Diameter, Universal AC/DC, Shielded—Nominal Sensing Distance—20 mm							
2-wire	N.O.	24 to 240 V	5.5 V	200 mA	25 Hz /1,000 Hz	2 m (6.6 ft) cable	XS1M30MA239

★ See page 626 for matching connector cables.

Minimum Mounting Clearances, mm (in.)



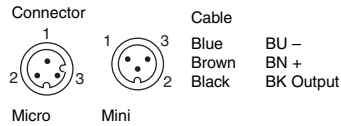
6.5 mm	5 (0.196)	30 (1.18)	7.5 (0.29)	d = 10 (0.393)	h = 1.6 (0.062)	d = 6.5 (0.255)	x = 1.3 (0.051)
8 mm	5 (0.196)	30 (1.19)	7.5 (0.29)	d = 10 (0.393)	h = 1.6 (0.062)	d = 8 (0.314)	x = 1.6 (0.062)
12 mm	8 (0.314)	48 (1.88)	12 (0.47)	d = 14 (0.551)	h = 2.4 (0.094)	d = 12 (0.472)	x = 1.6 (0.062)
12 mm (AC/DC)	8 (0.314)	48 (1.88)	12 (0.47)	d = 14 (0.551)	h = 1.2 (0.047)	d = 12 (0.472)	x = 1.6 (0.062)
18 mm	20 (0.787)	96 (3.77)	30 (1.18)	d = 28 (1.10)	h = 3.6 (0.141)	d = 18 (0.708)	x = 3.6 (0.141)
18 mm (AC/DC)	20 (0.787)	96 (3.77)	30 (1.18)	d = 28 (1.10)	h = 1.8 (0.070)	d = 18 (0.708)	x = 1.8 (0.070)
30 mm	40 (1.57)	240 (9.44)	60 (2.36)	d = 50 (1.96)	h = 6 (0.236)	d = 30 (1.18)	x = 6 (0.236)

Proximity Sensors

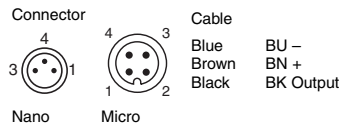
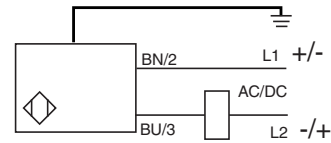
XS Tubular, Inductive Sensors

Extended Range—AC/DC, DC

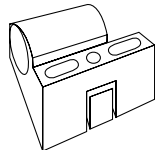
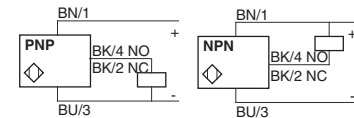
Wiring



wire color/connector pin
2 wire, AC/DC for connector version only



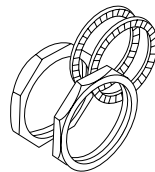
3 wire, DC, NO or NC



XSZB1●●



9006PA●●



XSZE●●●

Connector Cables (M8 or S suffix; M12 or D suffix; U20 or K suffix; U78 or A suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°
XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°
XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°
XSZCA901Y	Mini-style, 3-pin, 2 m, straight
XSZCA911Y	Mini-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
Accessories page 284, 280

Specifications

Mechanical	6.5 mm	8 mm	12 mm	18 mm	30 mm
Usable sensing range ★	0 to 2 mm (0 to 0.08 in.)	0 to 2 mm (0 to 0.08 in.)	0 to 3.2 mm (0 to 0.12 in.)	0 to 8 mm (0 to 0.31 in.)	0 to 16 mm (0 to 0.62 in.)
Temperature range	-13 to +25 °F (-25 to +70 °C)				
Enclosure rating	NEMA Type	3, 4X, 6P, 12, 13			
	IEC	IP68 (except connectors)			
Maximum tightening torque	—	5 N•m (3.7 lb-ft)	6 N•m (4.4 lb-ft)	15 N•m (11 lb-ft)	40 N•m (29.5 lb-ft)
Vibration	25 G, ±2 mm amplitude, 10–55 Hz				
Shock resistance	50 G, 11 ms duration				
Standard target size (steel) (mm)	6.5 x 6.5 x 1	8 x 8 x 1	12 x 12 x 1	18 x 18 x 1	30 x 30 x 1
Maximum differential (% of Sr)	15%				
Maximum repeatability (% of Sr)	3%				
LED indicator type	Cable	360° ring LED, visible from all quadrants			
	Connector	One LED, visible from 4 quadrants			
Enclosure material	Nickel-plated brass				
Wiring	27 AWG	27 AWG	22 AWG	22 AWG	22 AWG
Cable material	PvR	PvR	PvR	PvR	PvR
Electrical	DC	DC	AC / DC	AC / DC	AC / DC
Voltage range	24–240 Vac/Vdc, 12–24 Vdc				
Voltage limit (including ripple)	20–264 Vac/Vdc, 10–38 Vdc				
Voltage drop (maximum)	2.6 V	2.6 V	5.5 V / 2.6 V	5.5 V / 2 V	5.5 V / 2 V
Maximum leakage (residual) current—open state, AC	—	—	0.8 mA	0.8 mA	0.8 mA
Current consumption (no load)	10 mA				
Power-up delay (maximum)	5 ms	5 ms	20 ms / 5 ms	25 ms / 5 ms	25 ms / 5 ms
On delay (maximum)	0.2 ms	0.2 ms	0.5 ms / 0.2 ms	0.5 ms / 0.3 ms	0.5 ms / 0.6 ms
Off delay (maximum)	0.2 ms	0.2 ms	0.2 ms	0.5 ms / 0.7 ms	2 ms / 1.4 ms
Protective circuitry	Short circuit protection	yes			
	Overload protection	yes			
	Reverse polarity protection	yes			
	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3			
	Electrostatic, Transients, Impulse	IEC 61000-4-2 Level 3; IEC 61000-4-4 Level 3; 60947.5.2 Level 3			
Agency listings	UL		CE		

★ Refer to page 327 for target material correction coefficient Km.

Options

Description	Suffix
5 m (16.4 ft) cable	L2
10 m (32.8 ft) cable	L5

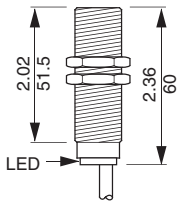
Accessories

Description	For Sensor Diameter	Catalog Number
Mounting Brackets, Plastic	6.5 mm (0.25 in.)	XSZB165
	8 mm (0.31 in.)	XSZB108
	12 mm (0.47 in.)	XSZB112
	18 mm (0.71 in.)	XSZB118
	30 mm (1.18 in.)	XSZB130
Mounting Brackets, Metal	12 mm (0.47 in.)	9006PA12
	18 mm (0.71 in.)	9006PA18
	30 mm (1.18 in.)	9006PA30
Mounting Nuts	8 mm (0.31 in.)	XSZE108
	12 mm (0.47 in.)	XSZE112
	18 mm (0.71 in.)	XSZE118
	30 mm (1.18 in.)	XSZE130

Proximity Sensors

XS Inductive Sensors

18 mm, Ferrous Only—DC



thread
M18x1

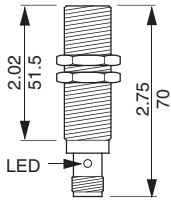
XS1M18PAS40

Features

- Ideal for machining, sorting applications
- Responds only to ferrous metals, ignoring non-ferrous metals such as aluminum
- Stainless steel body
- Cable and micro-style connector versions offered *

Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Shielded—2 m (6.6 ft) cable—Nominal Sensing Distance—5 mm					
PNP	N.O.	12–24 Vdc	200 mA	1,000 Hz	XS1M18PAS40
Shielded—micro-style connector *—Nominal Sensing Distance—5 mm					
PNP	N.O.	12–24 Vdc	200 mA	1,000 Hz	XS1M18PAS40D

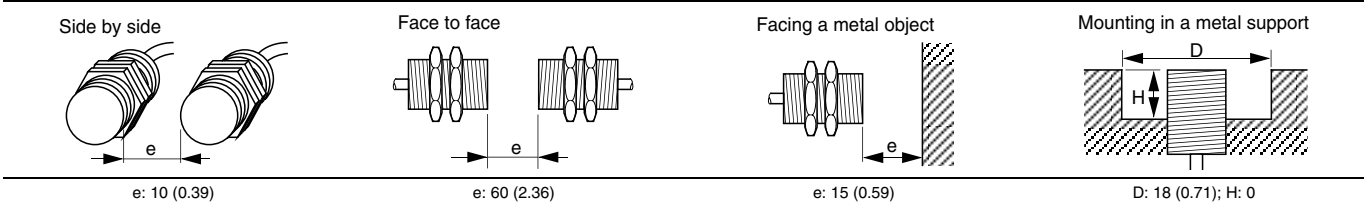
* See page 626 for matching connector cables



XS1M18PAS40D

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Minimum Mounting Clearances, mm (in.)

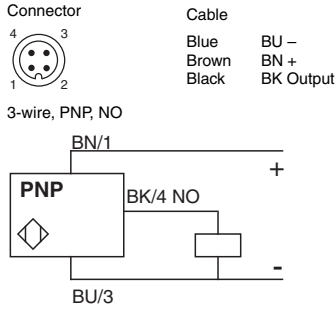


Proximity Sensors

XS Inductive Sensors

18 mm, Ferrous Only—DC

Wiring



Specifications

Mechanical		
Usable sensing range ★	0–4 mm (0–0.16 in.)	
Temperature range	-13° to 158° F (-25° to 70° C)	
Enclosure rating	IEC	IP68 (except connector version)
Tightening torque (maximum)	50 N•m (37 lb-ft)	
Standard target size (steel)	18 x 18 x 1	
Differential (% of Sr)	15%	
Repeatability (% of Sr)	3%	
LED indicator type	Cable version	360° ring LED
	Connector version	4 LED windows at 90°
Enclosure material	Stainless steel	
Wiring	22 AWG (0.34 mm ²), PvR cable	
Electrical		
Voltage range	12–24 Vdc	
Voltage limit (including ripple)	10–38 Vdc	
Voltage drop (across switch, closed state)	2.6 V	
Current consumption (no load)	15 mA	
Maximum load current	200 mA	
Power-up delay (maximum)	5 ms	
On delay (maximum)	0.3 ms	
Off delay (maximum)	0.7 ms	
Protective circuitry	Short circuit protection	Yes
	Overload protection	Yes
	Reverse polarity protection	Yes
	Radio frequency immunity (RFI)	Yes
	Electrostatic discharges	Yes
	Fast transients (motor start/stop interference)	Yes
	Impulse voltages (lightning, etc.)	Yes
Agency listings	E 164869 CCN NRKH CR 44087 Class 3211 03	

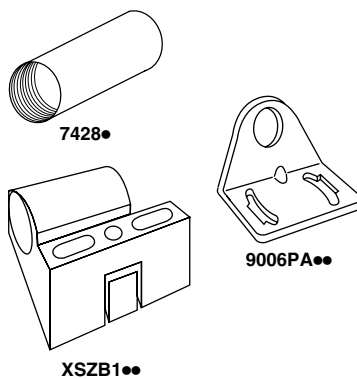
Options

Description		Suffix
Extended temperature range (cable type only)	Down to -40+ C (-40+ F)	TF
Extended cable length	5 m (16.4 ft) cable	L1
	10 m (32.8 ft) cable	L2

Accessories

Description		Catalog Number
Stainless steel mounting nuts		XSZE318
Steel mounting bracket, 90°		9006PA18
Plastic mounting bracket		XSZB118
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum	7428
	Stainless	74282

★ Refer to page 327 for target material correction coefficient Km



Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

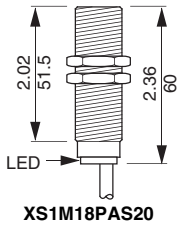
Additional cable options and lengths... page 626
 Accessories... page 284, 280

Proximity

Proximity Sensors

XS Inductive Sensors

18 mm, Non-Ferrous Only—DC



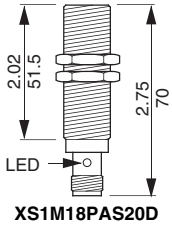
thread
M18x1

Features

- Response to non-ferrous metals only, such as aluminum, ignoring ferrous material such as steel
- Ideal for mounting in areas where metal is close
- Stainless steel body
- Cable and micro-style connector versions offered *

Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Shielded—2 m (6.6 ft) Cable—Nominal Sensing Distance—5 mm					
PNP	N.O.	12–24 Vdc	200 mA	1,000 Hz	XS1M18PAS20
Shielded—Micro-style Connector *—Nominal Sensing Distance—5 mm					
PNP	N.O.	12–24 Vdc	200 mA	1,000 Hz	XS1M18PAS20D

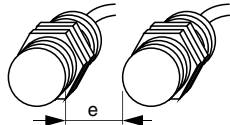
* See p.626 for matching connector cables



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

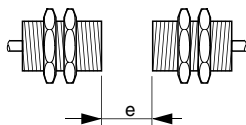
Minimum Mounting Clearances mm (in.)

Side by side



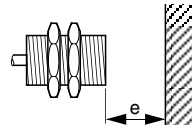
e: 10 (0.39)

Face to face



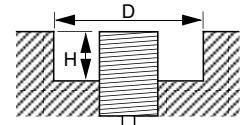
e: 60 (2.36)

Facing a metal object



e: 15 (0.59)

Mounting in a metal support



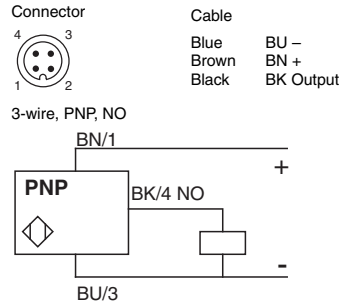
D: 18 (0.71); H: 0

Proximity Sensors

XS Inductive Sensors

18 mm, Non-Ferrous Only—DC

Wiring



Specifications

Mechanical		
Usable sensing range *	0–4 mm (0.16 in.)	
Temperature range	-13° to 158° F (-25° to 70° C)	
Enclosure rating	IEC	IP68 (except connector version)
Tightening torque (maximum)	50 N•m (37 lb-ft)	
Standard target size (aluminum)	18 x 18 x 1	
Differential (% of Sr)	15%	
Repeatability (% of Sr)	3%	
LED indicator type	Cable version	360° ring LED
	Connector version	4 LED windows at 90°
Enclosure material	Metal	
Wiring	22 AWG (0.34 mm ²), PvR cable	
Electrical		
Voltage range	12–24 Vdc	
Voltage limit (including ripple)	10–38 Vdc	
Voltage drop (across switch, closed state)	2.6 V	
Current consumption (no load)	15 mA	
Maximum load current	200 mA	
Power-up delay (maximum)	5 ms	
On delay (maximum)	0.3 ms	
Off delay (maximum)	0.7 ms	
Protective circuitry	Short circuit protection	Yes
	Overload protection	Yes
	Reverse polarity protection	Yes
	Radio frequency immunity (RFI)	Yes
	Electrostatic discharges	Yes
	Fast transients (motor start/stop interference)	Yes
	Impulse voltages (lightning, etc.)	Yes
Agency listings	E 164869 CCN NRKH CR 44087 Class 3211 03	

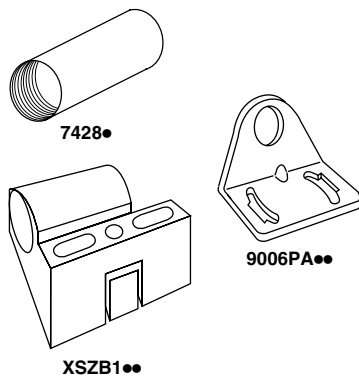
Options

Description	Suffix	
Extended temperature range (cable type only)	Down to -40° C (-40° F)	TF
Extended cable length	5 m (16.4 ft) cable	L1
	10 m (32.8 ft) cable	L2

Accessories

Description	Catalog Number	
Stainless steel mounting nuts	XSZE318	
Steel mounting bracket, 90°	9006PA18	
Plastic mounting bracket	XSZB118	
0.5 in. (12.7 mm) NPT conduit adapter, length 2 in. (50.8 mm)	Aluminum	7428
	Stainless	74282

* Refer to page 327 for target material correction coefficient Km



Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

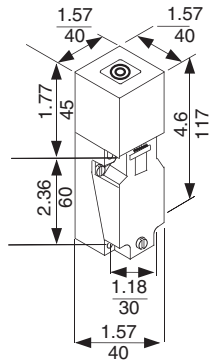
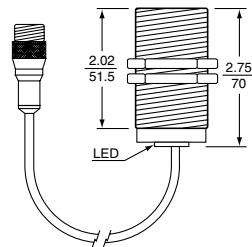
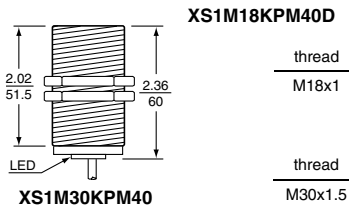
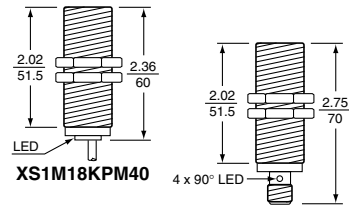
Additional cable options and lengths . . . page 626
Accessories page 284, 280

Proximity Sensors

XS Inductive Sensors

Ferrous/Non-Ferrous; Universal, DC

Proximity



- (1) Output LED (Yellow)
- (2) 0.5 in. (12.7 mm) NPT conduit opening
- (3) Oblong mounting hole: 0.21 x 0.28 in. (5.3 x 7 mm)

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

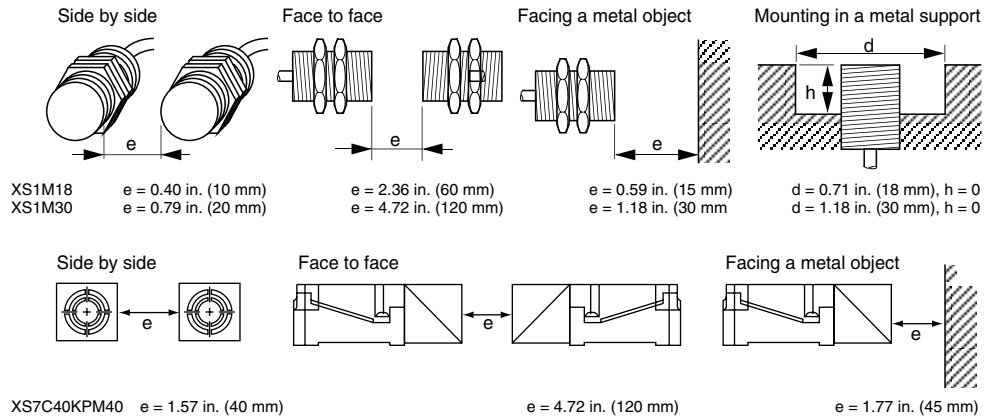
Features

- Detects all types of metals at the same sensing distance, whereas metals such as aluminum and copper require a standard sensor to be closer (see chart on next page).
- Body types include 18 mm nickel-plated brass housing, 30 mm stainless steel housing, and limit switch style in plastic housing.
- All are suitable for flush mounting in metal.
- Ideal for drop-in replacements for tubular and limit switch style standard sensors.
- Universal selectable output: PNP, NPN, N.O. and N.C.
- Available with 2 m cable, micro-style connector or 2.6 ft pigtail with micro-connector for very aggressive chemical environments.
- Tubular bodies have 360° visibility LED (four LED windows at 90° for connector version).
- Metal mounting nuts included with tubular versions.
- UL Listed, CSA Certified, and CE Marked.

Sensing Distance	Circuit Type	Output Mode	Voltage Range	Connection	Load Current Maximum	Operating Frequency	Catalog Number
Shielded, 18 mm Diameter							
5 mm	PNP/NPN	N.O./N.C.	12–24 Vdc	2 m (6.6 ft) cable	200 mA	1,000 Hz	XS1M18KPM40
5 mm	PNP/NPN	N.O./N.C.	12–24 Vdc	Micro-style DC connector *	200 mA	1,000 Hz	XS1M18KPM40D
Shielded, 30 mm Diameter							
10 mm	PNP/NPN	N.O./N.C.	12–24 Vdc	2 m (6.6 ft) cable	200 mA	1,000 Hz	XS1M30KPM40
10 mm	PNP/NPN	N.O./N.C.	12–24 Vdc	Micro-style DC connector, 0.8 m (2.6 ft) pigtail *	200 mA	1,000 Hz	XS1M30KPM40LD
Shielded, Limit Switch Style Body							
15 mm	PNP/NPN	N.O./N.C.	12–24 Vdc	Screw Terminal	200 mA	1,000 Hz	XS7C40KPM40

* See page 626 for matching connector cables

Minimum Mounting Clearances

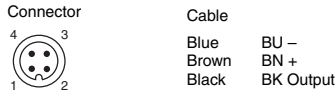


Proximity Sensors

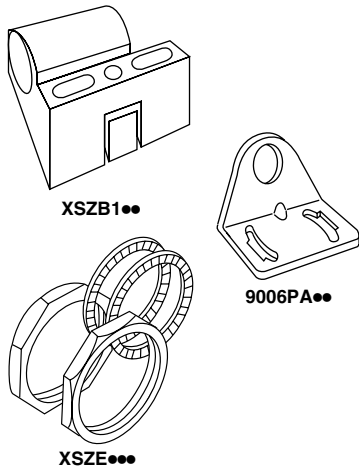
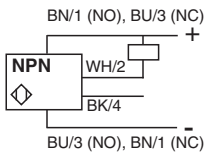
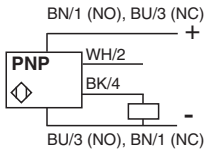
XS Inductive Sensors

Ferrous/Non-Ferrous; Universal, DC

Wiring



4 wire programmable NO or NC selectable output



Specifications

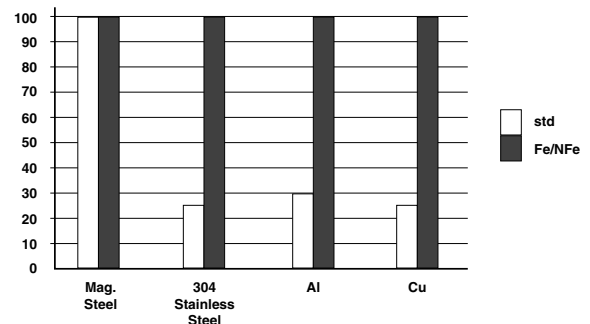
Mechanical			
Standard temperature range		32° to 122° F (0° to 50° C)	
Enclosure rating	NEMA Type	Tubular, cable Tubular, connector Limit switch body	3, 4X, 6P, 12, 13 See connector rating 4, 6P, 12
	IEC	Tubular, cable Tubular, connector Limit switch body	IP68 See connector rating IP67
Enclosure material	Case	XS1M18 XS1M30 XS7	Nickel-plated brass Stainless steel ABS plastic
Tightening torque (maximum)		XS1M18 XS1M30	35 N*m 50 N*m
Vibration resistance	(IEC 60068-2-6)	7 gn, amplitude ±1 mm (10 Hz to 42 Hz)	
Shock resistance	(IEC 60068-2-27)	30 gn, 11 ms duration	
Standard target size		18 mm (0.71 in.) 30 mm (1.18 in.) Limit switch	18 x 18 mm (0.71 x 0.71 in.) 30 x 30 mm (1.18 x 1.18 in.) 45 x 45 mm (1.77 x 1.77 in.)
Differential (maximum)	(% of Sr.)	15%	
Repeatability (maximum)	(% of Sr.)	3%	
LED indicator type		Tubular, cable Tubular, connector Tubular, pigtail Limit switch body	360° ring LED 4 LED windows at 90° 360° ring LED LED power On
Connection		18 mm (0.71 in.), cable 18 mm (0.71 in.), connector 30 mm (1.18 in.), cable 30 mm (1.18 in.), pigtail Limit switch body	4-wire #22 AWG (0.34 mm ²), PvR 4-pin micro-style DC 4-wire #22 AWG (0.34 mm ²), PvR 4-pin micro-style DC, 0.8 m (2.6 ft) pigtail, PvR #14 AWG screw terminals

Electrical			
Voltage range		12–24 Vdc	
Voltage limit (including ripple)		10–38 Vdc	
Voltage drop (across switch) closed state (maximum)		2.6 V	
Current consumption (no load) (maximum)		15 mA	
Load current (maximum)		200 mA	
Operating frequency (maximum)		1,000 Hz	
On delay (maximum)		0.3 ms	
Off delay (maximum)		0.7 ms	
Power-up delay (maximum)		5 ms	
Short circuit protection		Yes	
Overload protection		Yes	
Reverse polarity protection		Yes	
Protective circuitry	Radio frequency immunity (RFI) Electrostatic, transients, impulse	IEC 60947-5-2 and NEMA ICS 5, Part 4	
Agency listings	UL E 164869 CCN NRKH	SP CR 44087 Class 3211 03	CE

Accessories

Size	Description	Catalog Number
18 mm	Metal mounting nuts	XSZE118
	Metal mounting bracket	9006PA18
	Plastic mounting bracket	XSZB118
30 mm	Stainless steel mounting nuts	XSZE330
	Metal mounting bracket	9006PA30
	Plastic mounting bracket	XSZB130

Standard vs. Ferrous/NonFerrous Proximity Sensing Range (%)



Standard sensor technology requires an adjustment of up to 70% of the sensing distance to detect various metals. Because the ferrous/non-ferrous sensor detects all metals at the same distance, compensation is no longer needed. A smaller device can now perform at a range comparable to a larger sized or non-shielded device.

Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

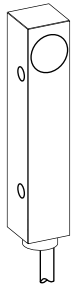
Additional cable options and lengths . . . page 626
Accessories page 284, 280

Proximity Sensors

XS5L8 Inductive Sensors

Miniature, Rectangular, DC

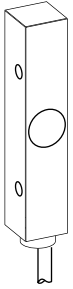
Proximity



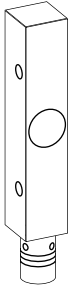
XS5L81



XS5L81***S



XS5L82



XS5L82***S

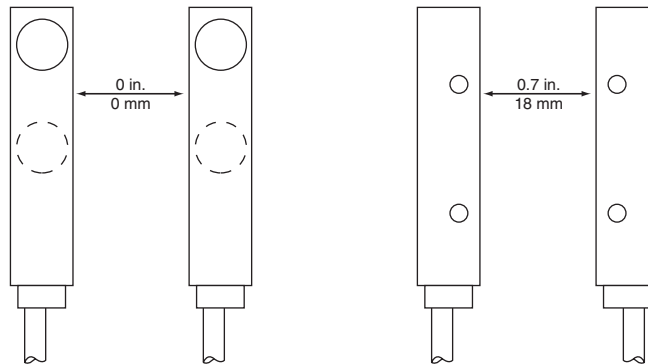
Features

- 90° sensing for mounting in restricted spaces with face at end or center
- PNP/NPN, N.O. Output
- 360° ring or LED indicator visible from 4 quadrants
- Small, 8 x 8 x 43 mm (0.13 x 0.13 x 1.7 in.) square metal housing
- Mount side by side with no interference
- UL Listed and CSA Certified

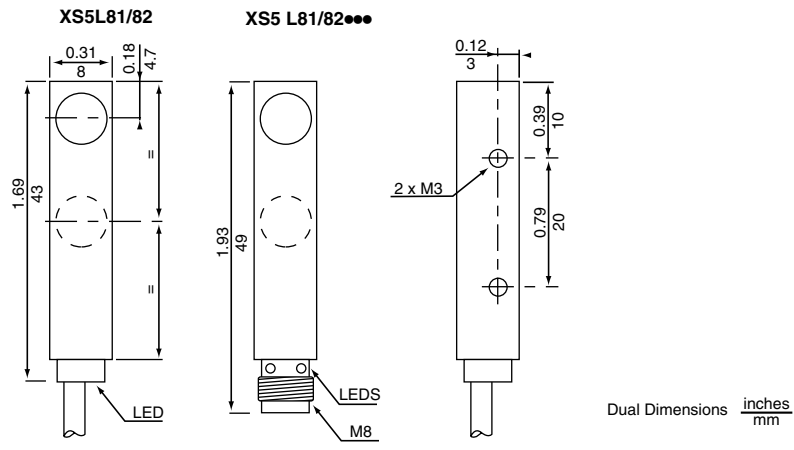
Sensing Face	Circuit Type	Output Mode	Voltage Range Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
1.5 mm Nominal Sensing Distance, 2 m (6.6 ft) cable						
Top	PNP	N.O.	10–30 Vdc	100 mA	2,500 Hz	XS5L81PA140
Top	NPN	N.O.	10–30 Vdc	100 mA	2,500 Hz	XS5L81NA140
1.5 mm Sensing Distance, Nano-Style Connector *						
Top	PNP	N.O.	10–30 Vdc	100 mA	2,500 Hz	XS5L81PA140S
Top	NPN	N.O.	10–30 Vdc	100 mA	2,500 Hz	XS5L81NA140S
1.5 mm Nominal Sensing Distance, 2 m (6.6 ft) cable						
Center	PNP	N.O.	10–30 Vdc	100 mA	2,500 Hz	XS5L82PA140
Center	NPN	N.O.	10–30 Vdc	100 mA	2,500 Hz	XS5L82NA140
1.5 mm Sensing Distance, Nano-Style Connector *						
Center	PNP	N.O.	10–30 Vdc	100 mA	2,500 Hz	XS5L82PA140S
Center	NPN	N.O.	10–30 Vdc	100 mA	2,500 Hz	XS5L82NA140S

* See page 626 for matching connector cables

Minimum Mounting Clearances



Dimensions



Proximity Sensors

XS5L8 Inductive Sensors

Miniature, Rectangular, DC

Wiring

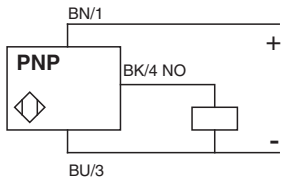
Connector



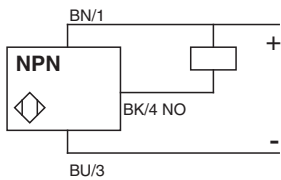
Cable

Blue BU -
Brown BN +
Black BK Output

3 Wire, PNP, NO



3 Wire, NPN, NO



Specifications

Mechanical		
Usable sensing range ★	1.2 mm	
Temperature range	-13° to 158° F (-25° to 70° C)	
Enclosure rating	IEC	IP67 (connector version depends on connector)
Differential (% of Sr)	20%	
Repeatability (% of Sr)	3%	
LED indicator	Cable Type	360° ring
	Connector type	90°, or visible from 4 quadrants
Enclosure material	Metal	
Wiring	27 AWG (0.11 mm ²), PvR cable	
Electrical		
Voltage range	12–24 Vdc	
Voltage limit (including ripple)	10–30 Vdc	
Voltage drop (across switch, closed state)	2.6 V	
Maximum load current	100 mA	
Current consumption (maximum) (no load)	10 mA	
Residual (leakage) current, open state	0.1 mA	
Power-up delay (maximum)	5 ms	
On delay (maximum)	0.5 ms	
Off delay (maximum)	1 ms	
Physical characteristics		
Protective circuitry	Short circuit protection	yes
	Overload protection	yes
	Reverse polarity protection	yes
Agency listings	E 164869 CCN NRRH CR 44087 Class 3211 03	

Options

Description	Suffix
5 m (16.4 ft) cable	L1
10 m (32.8 ft) cable	L2

★ Refer to page 327 for target material correction coefficient Km

Connector Cables (M8 or S suffix)

XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°

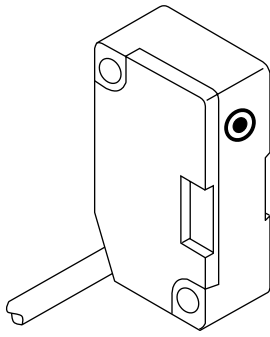
Additional cable options and lengths ... page 626

Proximity Sensors

XS7H, XS8H Miniature Inductive Sensor

Subcompact Block Style, DC

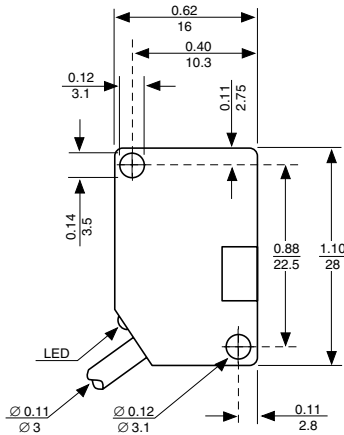
Proximity



Miniature microswitch type inductive proximity sensor for industrial applications.

Features

- Very fast response time
- Rugged plastic housing
- Extremely small for mounting in difficult-to-access locations
- Easy replacement of mechanical microswitches with matching footprint (V3)
- Longer life and substantially faster speed than mechanical switches
- High levels of radio frequency immunity (RFI): electrostatic discharge, fast transients and impulse voltage protected
- UL Listed, CSA Certified, and CE Marked



Front View

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Circuit type	Output mode	Voltage range	Load current (maximum)	Operating frequency	Catalog Number
2 mm (0.078 in.) Sensing Range—Shielded					
DC models, 3-wire 2 m (6.6 ft) cable					
PNP	N.O.	10–30 Vdc	200 mA	5,000 Hz	XS7H10PA340
NPN	N.O.	10–30 Vdc	200 mA	5,000 Hz	XS7H10NA340
3 mm (0.118 in.) Sensing Range—Non-Shielded					
DC models, 3-wire 2 m (6.6 ft) cable					
PNP	N.O.	10–30 Vdc	200 mA	5,000 Hz	XS8H10PA340
NPN	N.O.	10–30 Vdc	200 mA	5,000 Hz	XS8H10NA340

Minimum Mounting Clearances, mm (in.)

Mounting Method	XS7 Shielded	XS8 Non-shielded
Side by side	e: 7 (0.27)	e: 10 (0.39)
Face to face	e: 30 (1.18)	e: 40 (1.57)
Facing a metal object	e: 7 (0.27)	e: 10 (0.39)
Mounting in a metal support	e: 0	e: 5 (0.19)

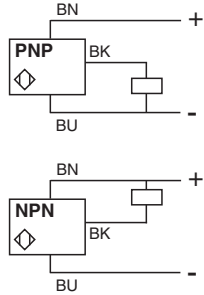
Proximity Sensors

XS7H, XS8H Miniature Inductive Sensor

Subcompact Block Style, DC

Wiring

3 wire, N.O.



Specifications

Mechanical		
Usable sensing range	Shielded	0–1.6 mm (0.06 in.)
	Non-shielded	0–2.4 mm (0.19 in.)
Standard temperature range	Shielded	-13 to +158 °F (-25 to +70 °C)
	Non-shielded	+14 to +122 °F (-10 to +50 °C)
Enclosure rating	IEC	IP67
Vibration resistance		25 G, ±2 mm amplitude, 10–55 Hz
Standard target size (steel)	Shielded	2 x 2 x 1 mm (0.08 x 0.08 x 0.04 in.)
	Non-shielded	3 x 3 x 1 mm (0.12 x 0.12 x 0.04 in.)
Repeatability (% of Sr)		3%
Cable		22 AWG, PvR
Electrical		
Differential (% of Sr)		Maximum 15%
Voltage drop (across switch)		2 V
Current consumption (no load)		10 mA
On and off delay (maximum)		0.1 ms
Power-up delay		5 ms
Reverse polarity protection		Standard
Protective circuitry	Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
	Electrostatic: transients: impulse	IEC 61000-4-2 Level 2; IEC 61000-4-4 Level 4; IEC 60947.5.2
Agency listings	E 164869 CCN NRKH CR 44087 Class 3211 03	

Note: Refer to page 327 for target material correction coefficient Km.

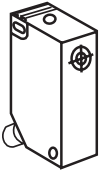
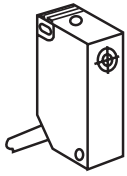
Options

Description	Suffix
5 m (16.4 ft) cable	L1
10 m (32.8 ft) cable	L2

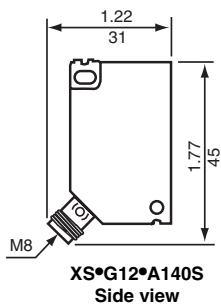
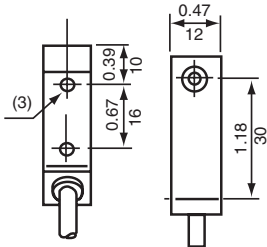
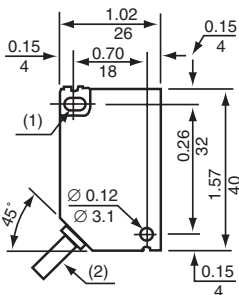
Proximity Sensors

XS7G/XS8G Inductive Sensors

Compact Block Style



Proximity



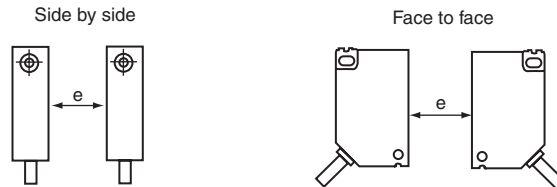
Features

- Universal AC/DC and DC only models available
- Selectable PNP/NPN, N.O. and N.C. output
- Compact 12 x 26 x 40 mm (0.47 x 1.02 x 1.57 in.) body style, for tight mounting spaces
- PLC compatible
- Rugged plastic housing
- Very high radio frequency immunity
- Cable or nano-style connector versions offered *
- UL Listed, CSA Certified, and CE Marked

Circuit Type	Output Mode	Voltage Range Maximum	Voltage Drop Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
Universal AC/DC, Shielded—2 m (6.6 ft) cable, Nominal Sensing Distance—2 mm						
2-wire	N.O.	20–264 Vac/Vdc	5.5 V	5 to 200 mA ■	25 Hz AC/350 Hz DC	XS7G12MA230
2-wire	N.C.	20–264 Vac/Vdc	5.5 V	5 to 200 mA ■	25 Hz AC/350 Hz DC	XS7G12MB230
DC, Shielded—2 m (6.6 ft) cable, Nominal Sensing Distance—2 mm						
PNP	N.O.	10–30 Vdc	1.8 V	100 mA	2,000 Hz	XS7G12PA140
NPN	N.O.	10–30 Vdc	1.8 V	100 mA	2,000 Hz	XS7G12NA140
PNP	N.O.+N.C.	10–58 Vdc	2.6 V	200 mA	2,000 Hz	XS7G12PC440
NPN	N.O.+N.C.	10–58 Vdc	2.6 V	200 mA	2,000 Hz	XS7G12NC440
DC, Shielded—Nano-Connector, Nominal Sensing Distance—2 mm *						
PNP	N.O.	10–30 Vdc	1.8 V	100 mA	2,000 Hz	XS7G12PA140S
NPN	N.O.	10–30 Vdc	1.8 V	100 mA	2,000 Hz	XS7G12NA140S
Universal AC/DC, Non-shielded—2 m (6.6 ft) cable, Nominal Sensing Distance—4 mm						
2-wire	N.O.	20–264 Vac/Vdc	5.5 V	5 to 200 mA ■	25 Hz AC/350 Hz DC	XS8G12MA230
2-wire	N.C.	20–264 Vac/Vdc	5.5 V	5 to 200 mA ■	25 Hz AC/350 Hz DC	XS8G12MB230
DC, Non-shielded—2 m (6.6 ft) cable, Nominal Sensing Distance—4 mm						
PNP	N.O.	10–30 Vdc	1.8 V	100 mA	1,000 Hz	XS8G12PA140
NPN	N.O.	10–30 Vdc	1.8 V	100 mA	1,000 Hz	XS8G12NA140
PNP	N.O.+N.C.	10–58 Vdc	2.6 V	200 mA	1,000 Hz	XS8G12PC440
NPN	N.O.+N.C.	10–58 Vdc	2.6 V	200 mA	1,000 Hz	XS8G12NC440
DC, Shielded—Nano-Connector, Nominal Sensing Distance—4 mm *						
PNP	N.O.	10–30 Vdc	1.8 V	100 mA	1,000 Hz	XS8G12PA140S
NPN	N.O.	10–30 Vdc	1.8 V	100 mA	1,000 Hz	XS8G12NA140S

■ 0.6 A fuse is recommended for devices without short circuit protection. See accessories on page 284.
* See page 626 for matching connector cables

Minimum Mounting Clearances



XS7G Shielded	e: 0 mm (0 in.)	e: 15 mm (0.6 in.)
XS8G Non-shielded	e: 10 mm (0.4 in.)	e: 60 mm (2.4 in.)

- (1) 1 elongated hole, 3.1 x 5.1 mm (0.12 x 0.20 in.)
 (2) Cable, 2 m (6.6 ft)
 (3) 2 holes, 3 x 5 mm (0.12 x 0.20 in.)

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Proximity Sensors

XS7G/XS8G Inductive Sensors

Compact Block Style

Wiring

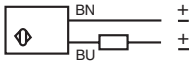
Connector



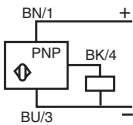
Cable

Blue BU -
Brown BN +
Black BK Output

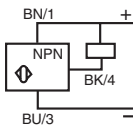
2-wire AC or DC NO or NC
XS*G12M*230



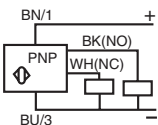
3-wire DC NO
XS*G12PA140
XS*G12PA140S



XS*G12NA140
XS*G12NA140S



4-wire DC NO + NC
XS*G12PC440



XS*G12NC440



Specifications

Mechanical		
Usable sensing range ★	Shielded	0–1.6 mm (0.06 in.)
	Non-shielded	0–3.2 mm (0.13 in.)
Temperature range	-13° to 158° F (-25° to 70° C)	
Enclosure rating	IEC	IP67 (except connector style)
Vibration (conforming to IED 68-2-6)	25 G, ±2 mm amplitude, 10–55 Hz	
Shock resistance	50 G for 11 ms (conforming to IEC 60068-2-7)	
Standard target size (steel)	12 x 12 mm (0.47 x 0.47 in.)	
Differential (% of Sr)	20%	
Repeatability (% of Sr)	10%	
LED indicator	Located on top of sensor	
Enclosure material	Plastic	
Wiring	22 AWG (0.34 mm ²), PvR cable	
Electrical	AC/DC models	DC models
Voltage range	24 to 240 Vac	12–24 Vdc
Voltage limit (including ripple)	24 to 210 Vdc	—
Current consumption (maximum) (no load)	—	10 mA
Maximum leakage (residual) current—open state	0.8 mA at 24 V, 1.5 mA at 120 V	0.1 mA
Power-up delay (maximum)	40 ms	4 ms
On delay (maximum)	1 ms	0.5 ms
Off delay (maximum)	2 ms	1 ms
Protective circuitry	Short circuit protection	No
	Overload protection	No
Agency listings	E 164869 CCN NRKH	CR 44087 Class 3211 03

Options

Description	Suffix
Extended temperature range	to +185° F (+85° C)
	to -40° F (-40° C)
5 m (16.4 ft) cable length	L1
10 m (32.8) cable length	L2

★ Refer to page 327 for target material correction coefficient Km.

Connector Cables (M8 or S suffix)

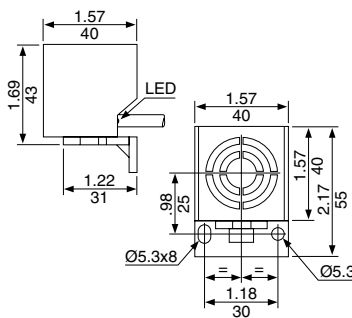
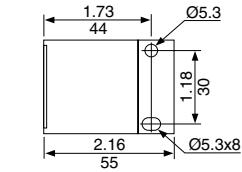
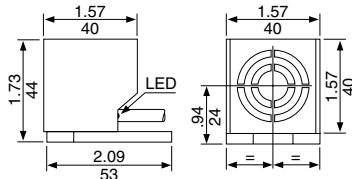
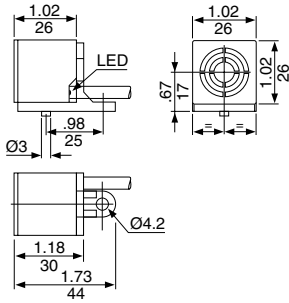
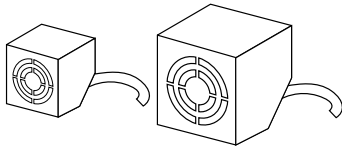
XSZCS101	Nano-style, 3-pin, 2 m, straight
XSZCS111	Nano-style, 3-pin, 2 m, 90°

Additional cable options and lengths... page 626

Proximity Sensors

XS7T/XS8T Inductive Sensors, Cubic Block Style

26 x 26 mm and 40 x 40 mm Square, DC



Features

- Compact cubic body style in rugged PBT plastic
- Flush and non-flush mountable
- Comparable sensing distance to limit switch style in half the body size
- Mounting bracket included with each sensor
- Elbow bracket provides interchangeability with limit switch style sensor, and enables multiple positioning of sensing face
- Molded cable, or molded cable with micro-connector pigtail 0.8 or 0.15 m (31.5 or 5.9 in.)

Circuit Type	Output Mode	Voltage Range	Voltage Drop Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
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26 mm x 26 mm

DC, Flush Mountable, Nominal Sensing Distance—10 mm

2 m (6.6 ft) Cable ▲

2-wire	N.O.	12–48 Vdc	5.2 V	100 mA	100 Hz	XS7T2DA210
PNP	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS7T2PC440
NPN	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS7T2NC440

0.8 m (31.5 in.) Pigtail with 4-Pin Micro-Connector ▲

2-wire	N.O.	12–48 Vdc	5.2 V	100 mA	100 Hz	XS7T2DA214LD
PNP	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS7T2PC440LD
NPN	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS7T2NC440LD

0.15 m (5.9 in.) Pigtail with 4-Pin Micro-Connector ▲

2-wire	N.O.	12–48 Vdc	5.2 V	100 mA	100 Hz	XS7T2DA214LD01
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DC, Non-Flush Mountable, Nominal Sensing Distance—15 mm

2 m (6.6 ft) Cable ▲

PNP	N.O. + N.C.	12–48 Vdc	2 V	200 mA	500 Hz	XS8T2PC440
NPN	N.O. + N.C.	12–48 Vdc	2 V	200 mA	500 Hz	XS8T2NC440

0.8 m (2.6 ft) Pigtail with 4-Pin Micro-Connector ▲

PNP	N.O. + N.C.	12–48 Vdc	2 V	200 mA	500 Hz	XS8T2PC440LD
NPN	N.O. + N.C.	12–48 Vdc	2 V	200 mA	500 Hz	XS8T2NC440LD

40 mm x 40 mm

DC, Flush Mountable, Nominal Sensing Distance—15 mm

2 m (6.6 ft) Cable ▲

2-wire	N.O.	12–48 Vdc	5.2 V	100 mA	150 Hz	XS7T4DA210
PNP	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS7T4PC440
NPN	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS7T4NC440

0.8 m (31.5 in.) Pigtail with 4-Pin Micro-Connector ▲

2-wire	N.O.	12–48 Vdc	5.2 V	100 mA	150 Hz	XS7T4DA214LD
PNP	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS7T4PC440LD
NPN	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS7T4NC440LD

0.15 m (5.9 in.) Pigtail with 4-Pin Micro-Connector ▲

2-wire	N.O.	12–48 Vdc	5.2 V	100 mA	150 Hz	XS7T4DA214LD01
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DC, Non-Flush Mountable, Nominal Sensing Distance—20 mm

2 m (6.6 ft) Cable ▲

PNP	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS8T4PC440
NPN	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS8T4NC440

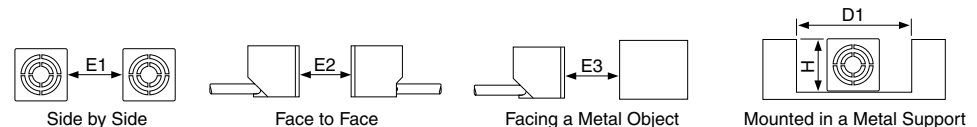
0.8 m (31.5 in.) Pigtail with 4-Pin Micro-Connector ▲

PNP	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS8T4PC440LD
NPN	N.O. + N.C.	12–48 Vdc	2 V	200 mA	1,000 Hz	XS8T4NC440LD

▲ See page 626 for matching connector cables

Minimum Mounting Clearances

	E1		E2		E3		D1		H	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
XS7T2 Shielded	0.98	25	4.32	110	1.18	30	1.02	26	0	0
XS7T4 Non-shielded	1.57	40	4.71	120	1.77	45	1.57	40	0	0
XS7T4 Shielded	1.49	38	4.72	120	1.77	45	3.07	78	1.02	26
XS8T4 Non-shielded	2.36	60	6.29	160	2.36	60	4.72	120	1.57	40



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Proximity Sensors

XS Inductive Sensors, Cubic Block Style

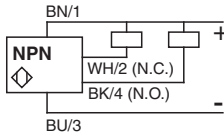
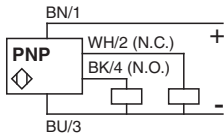
26 x 26 mm and 40 x 40 mm Square, DC

Wiring

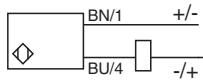


Connector
Cable
Blue BU -
Brown BN +
Black BK Output

4 Wire



2 Wire



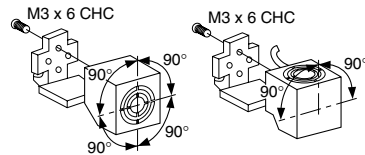
Specifications

Mechanical			
Usable Sensing Range ★	XS7T2	0–8 mm (0.32 in.)	
	XS8T2	0–12 mm (0.47 in.)	
Temperature Range	-13° to 158° F (-25° to 70° C)		
Enclosure Rating	NEMA Type	1, 4X, 12	
	IEC	IP67 (connector version: depends on connector)	
Vibration	25 G, ±2 mm amplitude, 10–55 Hz		
Shock Resistance	50 G for 11 ms		
Differential (% of Sr)	20%		
Repeatability (% of Sr)	3%		
LED Indicator Type	Yes, located at cable		
Enclosure Material	Plastic		
Wiring	20 AWG (0.5 mm ²), PvR cable		
Electrical			
Voltage Range	2-wire	3-wire	4-wire
Voltage Limit (Including Ripple)	12–48 Vdc	12–48 Vdc	12–48 Vdc
Voltage Drop	10–58 Vdc	10–58 Vdc	10–58 Vdc
Maximum Leakage (Residual) Current—Open State	5.2 V	2 V	5.2 V
Current Consumption	0.7 mA	0.1 mA	0.1 mA
Power-up Delay (maximum)	10 mA	10 mA	10 mA
On Delay (maximum)	5 ms	5 ms	7 ms
Off Delay (maximum)	2 ms	0.3 ms	0.3 ms
Protective Circuitry	5 ms	0.7 ms	0.7 ms
Short Circuit Protection	Yes	Yes	Yes
	Overload Protection	Yes	Yes
Agency Listings	UL E 164869 CCN NRKH	SP CR 44087 Class 3211 03	CE

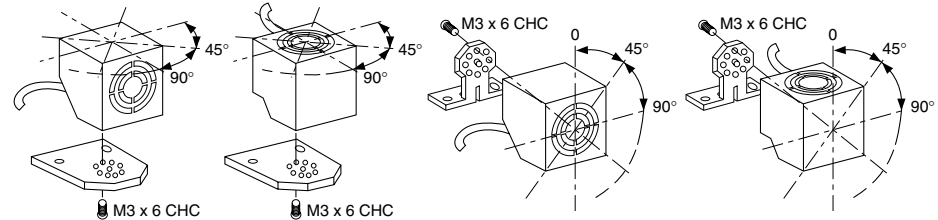
★ Refer to page 327 for target material correction coefficient Km.

Mounting options

XS7/8T2



XS7/8T4



Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

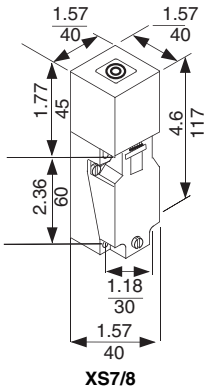
Additional cable options and lengths... page 626

Proximity Sensors

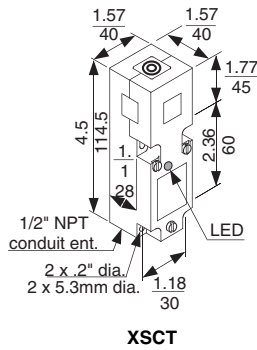
XS7C/XS8C Limit Switch Type, Inductive Sensors

5-Position Turret Head, Plastic AC/DC, DC or AC

Sensing head turns to accommodate 5 different sensing positions



XS7/8



XSCT

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Standard limit switch housing inductive proximity sensors for industrial applications

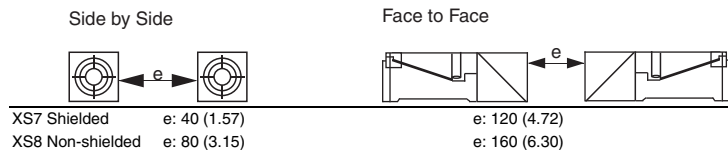
Features

- PBT plastic body with stainless steel screws for corrosive environments
- Plug-in design for ease in replacement
- 5-position turret head for reduced inventory
- 0.5 in. (12.7 mm) NPT conduit entrance with many wiring and connecting options
- Radio frequency immunity (RFI) standard
- PLC compatible
- 2-LED system on selected models indicates on/off, power on
- DC versions work with unfiltered power supply
- Noise and transient protection
- Reverse polarity protection (DC models)
- Excellent resistance to aggressive environments (dripping corrosive fluids, submersion in water)
- Universal AC/DC 2-wire
- Longest extended range using the standard dimensions
- UL Listed, CSA Certified, and CE Marked

Circuit Type	Output Mode	Voltage Range		Maximum Load Current ■	Residual (leakage) current	Operating Frequency	LED	SCP★	Catalog Number
		AC	DC						
Shielded									
15 mm (0.59 in.) sensing range universal, AC/DC									
2-wire	N.O./N.C.	24–240 V	24–210 V	300 mA/200 mA	0.5 mA at 24 V 1.5 mA at 120 V	25/50 Hz	Yes	No	XS7C40MP230
15 mm (0.59 in.) sensing range, DC									
2-wire	N.O.	—	12–48 V	100 mA	0.5 mA	1,500 Hz	Yes	Yes	XS7C40DA210
2-wire	N.O./N.C.	—	12–48 V	100 mA	0.5 mA	1,500 Hz	Yes	Yes	XS7C40DP210
PNP	N.O. + N.C.	—	12–48 V	200 mA	—	1,000 Hz	2	Yes	XS7C40PC440
NPN	N.O. + N.C.	—	12–48 V	200 mA	—	1,000 Hz	2	Yes	XS7C40NC440
20 mm (0.79 in.) extended range, DC 3-wire									
PNP	N.O. + N.C.	—	12–48 V	200 mA	—	1,000 Hz	2	Yes	XS7C40PC449
NPN	N.O. + N.C.	—	12–48 V	200 mA	—	1,000 Hz	2	Yes	XS7C40NC449
15 mm (0.59 in.) sensing range, AC									
2-wire	N.O./N.C.	24–240 V	—	500 mA	1.5 mA	25 Hz	Yes	No	XS7C40FP260
Non-Shielded									
20 mm (0.79 in.) sensing range universal, AC/DC									
2-wire	N.O./N.C.	24–240 V	24–210 V	300 mA/200 mA	0.5 mA at 24 V 1.5 mA at 120 V	25/50 Hz	Yes	No	XS8C40MP230
20 mm (0.79 in.) sensing range, DC									
2-wire	N.O.	—	12–48 V	100 mA	0.6 mA	150 Hz	Yes	No	XS8C40DA210
2-wire	N.O./N.C.	—	12–48 V	100 mA	0.6 mA	150 Hz	Yes	No	XS8C40DP210
PNP	N.O. + N.C.	—	12–48 V	200 mA	—	1,000 Hz	2	Yes	XS8C40PC440
NPN	N.O. + N.C.	—	12–48 V	200 mA	—	1,000 Hz	2	Yes	XS8C40NC440
40 mm (1.6 in.) extended range, DC 3-wire									
PNP	N.O. + N.C.	—	12–48 V	200 mA	—	500 Hz	2	Yes	XS8C40PC449
NPN	N.O. + N.C.	—	12–48 V	200 mA	—	500 Hz	2	Yes	XS8C40NC449
20 mm (0.79 in.) sensing range, AC									
2-wire	N.O./N.C.	24–240 V	—	500 mA	1.5 mA	25 Hz	Yes	No	XS8C40FP260
20 mm (0.79 in.) sensing range, AC Model with Timer (1–20s)									
2-wire	N.O./N.C.	24–240 V	—	350 mA	2.0 mA (R)	13 Hz	Yes	No	XSCT023319

★ For devices without SCP, a 0.8 A quick-blow fuse wired in series is recommended. See page 284 for protective fuses.
 ■ 20 ≤ Vdc 58 IEC 60947-5-2 Utilization category DC-13; Vdc > IEC 60947-5-2 Utilization category DC-12

Minimum Mounting Clearances, mm (in.)

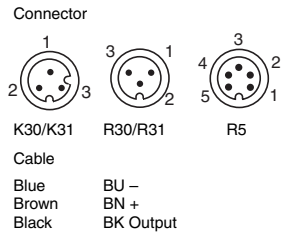


Proximity Sensors

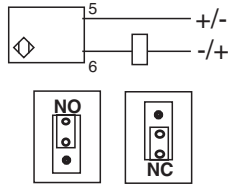
XS7C/XS8C Limit Switch Type, Inductive Sensors

5-Position Turret Head, Plastic AC/DC, DC or AC

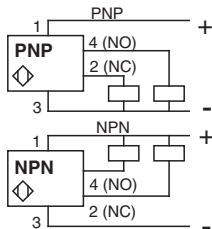
Wiring



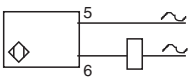
2 wire DC Non Polarized



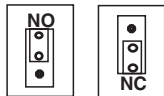
4 wire DC NO/NC



2 wire AC



NO/NC Selector Jumper



Connector Cables (R3, R5, or K suffix)

XSZCK101Y	Micro-style, 3-pin, 2 m, straight
XSZCK111Y	Micro-style, 3-pin, 2 m, 90°
XSZCA901Y	Mini-style, 3-pin, 2 m, straight
XSZCA911Y	Mini-style, 3-pin, 2 m, 90°
XSZCA1501Y	Mini-style, 5-pin, 2 m, straight
XSZCA1511Y	Mini-style, 5-pin, 2 m, 90°

Additional cable options and lengths... page 626

Specifications

Mechanical		
Usable sensing range *	Shielded	0–12 mm (0.47 in.)
	Non-shielded	0–16 mm (0.63 in.)
Standard temperature range	-13 to +158 °F (-25 to +70 °C)	
Enclosure rating	NEMA Type	4, 6P, 12 (UL test pending)
	CENELEC	IP67
Enclosure material	Body and sensing face	PBT
	Screws	Stainless steel
Vibration resistance	IEC 60068.2.6	25 G, amplitude at 55 Hz, frequency = 10–55 Hz
Shock resistance	IEC 60068.2.27	50 G, 11 ms duration
Standard target size (steel)	Shielded	45 x 45 mm (1.8 x 1.8 in.)
	Non-shielded	60 x 60 mm (2.4 x 2.4 in.)
Differential	Maximum 20%	
Repeatability	Maximum 3%	
Radio frequency immunity (RFI)	Standard	
Cable	Screw terminals	

Electrical	AC Models	DC Models		AC/DC Models
		2-wire	4-wire	
Voltage range	24–240 V 50/60 Hz	12–48 V	12–48 V	24–240 Vac 50/60 Hz 24–210 Vdc
Voltage limit (including ripple)	20–264 V 50/60 Hz	10–58 V	10–58 V	20–264 Vac/Vdc
Voltage drop (across switch) closed state	5.5 V	4 V	2 V	5.5 V
Minimum load current	5 mA	1.5 mA	—	5 mA
Maximum load current	500 mA	100 mA	100 mA	300 mA/200 mA
Inrush	2 A★	—	—	2 A★
Current consumption (no load)	—	—	10 mA	—
On delay (maximum)	30 ms	2 ms	0.3 ms	30 ms
Offdelay(maximum)	Shielded	20 ms	5 ms	0.7 ms
	Non-shielded	20 ms	7 ms	0.7 ms
Power-up delay (maximum)	120 ms	5 ms	5 ms	120 ms

Protective circuitry	
Short circuit protection	Optional ★
Overload protection	Yes
Radio frequency immunity (RFI)	IEC 61000-4-3 Level 3
Electrostatic; transients; impulse	IEC 61000-4-2 Level 4; IEC 61000-4-3 Level 3; IEC 60947.5.2 Level 3
Reverse polarity protection DC Versions	Yes
Agency listings	E 164869 CCN NRKH CR 44087 Class 3211 03

* See page 327 for target material corrective coefficient km.

★ Without overload or SCP, a 0.8 A quick-blow fuse wired in series is recommended. See page 284 for protective fuses.

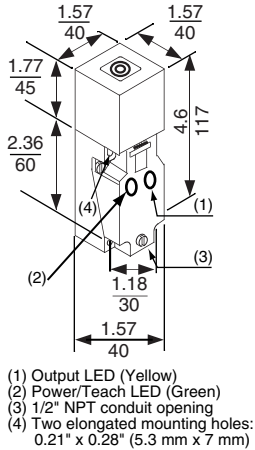
Options

Description	Suffix	
Extended temperature range	+185° F (+85 °C)	TT
	-40° F (-40 °C)	TF
3-pin mini-style connector	Normally open	R30
	Normally closed	R31
5-pin mini-style connector		R5
3-pin micro-style connector	AC only, wired normally open	K30
	AC only, wired normally closed	K31

Proximity Sensors

XS Inductive Sensors, Limit Switch Body

5-Position Turret Head, DC IQ Prox™



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

Microprocessor based, self-teaching proximity switch adjusts to its environment on command, suppressing any metal background, then detecting the target it was taught to identify (see illustration).

- Can be recess mounted in metal without interfering with the sensing field
- Long range sensing 0.98 in. (25 mm)
- Plastic limit switch plug-in body style with 5-position turret head
- Two LEDs: (1) power supply and terminal mode (flashes in learning mode when sensor is learning its environment), (2) output
- 24 Vdc, complementary PNP- and NPN-type output
- UL Listed, CSA Certified, CE Marked

Illustrations:

1. The sensor can be flush mounted, non-flush mounted, or recess mounted. A metal background can be placed in immediate proximity to the sensor.

2. For setup, the teach mode is activated. When no target is present, the sensor learns the environment. Then, the target is passed in front of the sensor in the usual way.

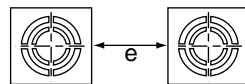
3. The green LED flashes while the sensor is learning its environment and target, then becomes steady when the sensor is set.

4. The newly programmed sensor recognizes the target and provides output.

Sensing Distance	Circuit Type	Output Mode	Connection	Catalog Number
25 mm	PNP	N.O.	Screw Terminal	XS8C40PAA40
25 mm	NPN	N.O.	Screw Terminal	XS8C40NAA40

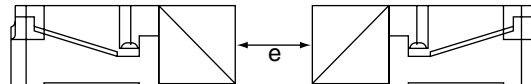
Minimum Mounting Clearances, mm (in.)

Side by side



XSC8C40•AA40 e: 80 (3.15)

Face to face



e: 9.45 (240)

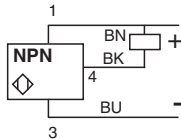
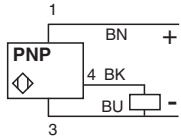
Proximity Sensors

XS Inductive Sensors, Limit Switch Body

5-Position Turret Head, DC IQ Prox™

Wiring

3-wire DC, NO output



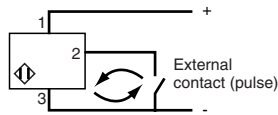
XS8C40•AA40

Specifications

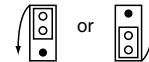
Mechanical		
Temperature range	Operating Storage	-13 to 158 °F (-25 to 70 °C) -13 to 158 °F (-25 to 70 °C)
Enclosure rating	NEMA Type	4, 4X, 6, 6P, 12,
	IEC	IEC IP67 per IEC 60529
Enclosure material	Case	PBT
Vibration resistance	(IEC 60068-2-6)	25 G, amplitude at 55 Hz, 10–55 Hz
Shock resistance	(IEC 60068-2-27)	50 G, 11 ms duration
Differential (maximum)	(% of Sr.)	15%
Repeatability (maximum)	(% of Sr.)	3%
LED indicator type		Power/Teach (green)
		Output (yellow)
Connection		Screw Terminal
Electrical		
Voltage limit (including ripple)		19–30 Vdc
Voltage drop (across switch) closed state (maximum)		2 V
Current consumption (no load) (maximum)		20 mA
Load current (maximum)		200 mA
Operating frequency (maximum)		600 Hz
On delay (maximum)		1 ms
Off delay (maximum)		1 ms
Power-up delay (maximum)		250 ms
Short circuit protection		Yes
Overload protection		Yes
Reverse polarity protection		Yes
Agency listings	E 164869 CCN NRKH	CR 44087 Class 3211 03

Activating self-teaching mode

Option 1
by external contact



Option 2
internally (repositioning of jumper)



When in the self-teaching mode, the green LED (status) flashes rapidly.

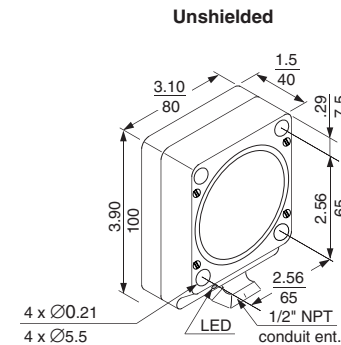
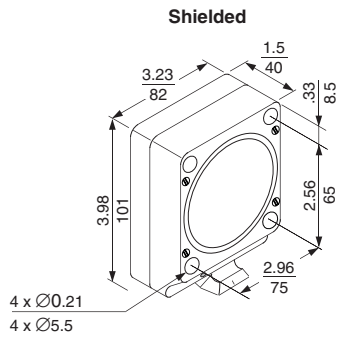
As objects pass through the detection zone, the sensor memorizes the two opposing thresholds in relation to its environment. When the self-teaching setup is complete, the green LED ceases to flash and maintains a steady light. The yellow LED indicates output.

Proximity Sensors

XSD Rectangular, Inductive Sensors

Long Range Block, AC and DC—Plug-in

Proximity



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

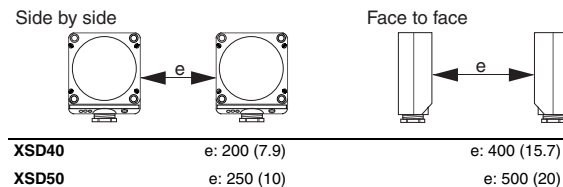
Rectangular low-profile switch, 3.5 in. square by 1.63 in. high (88.4 x 41.4 mm) designed for very demanding industrial applications.

- Housings: Plastic (thermoplastic polyester)
- LED indicators: target sensed, power on and short circuit (selected models)
- Timer model available for jamming applications
- Plug-in modular design
- Radio frequency immunity (RFI)
- Short circuit protection (SCP) (selected models)
- Alternate frequency models for side by side mounting (selected models)
- DC models: complementary outputs (PNP or NPN)
- AC models: selectable normally open (N.O.) or normally closed (N.C.)
- UL Listed, CSA Certified, and CE marked

Circuit Type	Output Mode	Voltage Range ▲	Maximum Load	Residual (Leakage) Current	Operating Frequency Maximum	LED	SCP★	Catalog Number
40 mm (1.57 in.) Sensing Range, Shielded								
DC Model, Screw Terminals								
2-wire	N.O.	12–48 V	100 mA	0.5 mA	180 Hz	Yes	Yes	XSDC407138
40 mm (1.57 in.) Sensing Range, Non-Shielded								
DC Model, Screw Terminals								
2-wire	N.O.	12–48 V	100 mA	0.5 mA	180 Hz	Yes	Yes	XSDC407139
2-wire	N.O. + N.C.	12–48 V	200 mA	—	50 Hz	Yes	Yes	XSDH407339†
2-wire	NPN	12–48 V	200 mA	—	50 Hz	Yes	Yes	XSDJ407339†
AC Model, Screw Terminals								
2-wire	N.O./N.C.	24–240 V	500 mA	1.5 mA (P) ■	10 Hz	Yes	No	XSDA400519†
2-wire	N.O./N.C.	24–240 V	500 mA	1.5 mA (P) ■	10 Hz	3 ♦	Yes	XSDA405539†
AC Model Mini-Style Connector, 3-Pin ○								
2-wire	N.O./N.C.	24–240 V	500 mA	1.5 mA (P) ■	10 Hz	Yes	No	XSDA400519R3†
2-wire	N.O./N.C.	24–240 V	500 mA	1.5 mA (P) ■	10 Hz	3 ♦	Yes	XSDA405539R3†
AC Model with Timer								
2-wire	N.O./N.C.	24–240 V	500 mA	3.5 mA (R) ■	10 Hz	Yes	No	XSDT023319
50 mm (2 in.) Sensing Range, Shielded								
AC/DC Model, Screw Terminals								
2-wire	N.O./N.C.	24–240 V	5–100 mA DC 5–500 mA AC	1.7 mA at 120 V 3 mA at 240 V ●	10 Hz	3 ♦	Yes	XSDM500538
50 mm (2 in.) Sensing Range, Non-Shielded								
DC Model, Screw Terminals								
2-wire	N.O.	12–48 V	100 mA	0.5 mA	180 Hz	Yes	Yes	XSDC507139
AC Model, Screw Terminals								
2-wire	N.O./N.C.	24–240 V	500 mA	1.5 mA	10 Hz	Yes	No	XSDA500519
2-wire	N.O./N.C.	24–240 V	500 mA	1.5 mA	10 Hz	3 ♦	Yes	XSDA505539
AC Model Mini-Style Connector, 3-Pin ○								
2-wire	N.O./N.C.	24–240 V	500 mA	1.5 mA	10 Hz	Yes	No	XSDA500519R†
2-wire	N.O./N.C.	24–240 V	500 mA	1.5 mA	10 Hz	3 ♦	Yes	XSDA505539R†

- 100 mA for DC.
- PLC applications: P= PLC compatible. R= Bleeder resistor needed.
- † Also available with alternate frequency. Add F to catalog number. No additional charge.
- ♦ 1 LED for Power On, 1 LED for Output On, 1 LED for SCP triggered.
- Mating connector, see page 626.
- ★ For devices without SCP, see page 284 for protective fuses.

Minimum Mounting Clearances (Except XSDM500538), mm (in.)

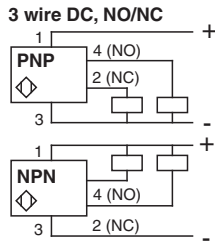
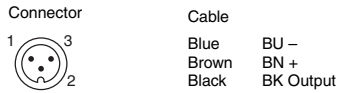


Proximity Sensors

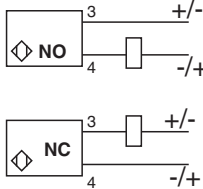
XSD Rectangular, Inductive Sensors

Long Range Block, AC and DC—Plug-in

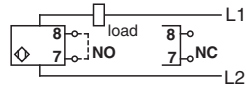
Wiring



2 wire DC, non polarized



2 wire AC and AC/DC, programmable NO/NC



Connector Cables (A or R3 suffix)

XSZCA901Y	Mini-style, 3-pin, 2 m, straight
XSZCA911Y	Mini-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626

Specifications

Mechanical		
Usable Sensing Range★	24–48 mm (0.94–1.89 in.)	
Standard Temperature Range	-13 to +158 °F (-25 to +70 °C)	
Enclosure Rating	NEMA Type	3, 4X (indoor), 12, 13
	IEC	IP67
Vibration Resistance	25 G, ±2 mm amplitude, 10–55 Hz	
Shock Resistance	50 G for 11 ms	
Standard Target Size (Mild Steel)	120 x 120 mm (4.7 x 4.7 in.)	
Differential	Maximum 20%	
Repeatability	Maximum 5%	
Cable, PVC	Screw terminals, #16 AWG	

Electrical	AC Models	DC Models		AC/DC Models
		2-wire	4-wire	
Voltage Range, Maximum (Including Ripple)	20–264 V	10–58 V	10–58 V	20–264 V
Voltage Drop (Across Switch)	5.5 V★	4 V	1.8 V	6 V
Inrush Current (Inductive @ 20 ms)	2 A	—	—	2 A
Minimum Load Current	5 mA	1.5 mA	—	5 mA
Current Consumption (No Load)	—	—	10 mA	—
On Delay (Maximum)	30 ms	0.2 ms	10 ms	40 ms
Off Delay (Maximum)	20 ms	3 ms	10 ms	60 ms
Power-up Delay (Maximum)	120 ms	5 ms	10 ms	100 ms
Reverse Polarity Protection	—	Standard	Standard	—
Radio Frequency Immunity (RFI)	4 cm (1.6 in.) minimum from antenna			
Agency Listings	E 164353 ■ CCN NRKH	LR 44087 ★ Class 3211 03	FM: J.I. OROH9.AX (3610, 3611)	

★ Timer model voltage drop is 4.5 V.

Options

Description	Suffix
Extended Temperature Range	to +185 °F (85 °C) (▼ Not Available on AC Models with SCP) TT to -40 °F (-40 °C) TF

Ex: XSD605539 TTR3

Replacement Modules

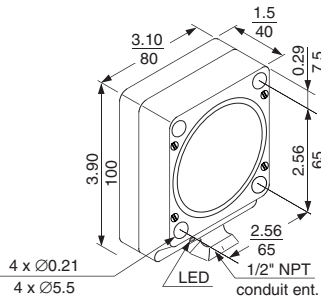
Description	Catalog Number
DC 2-Wire	
Base Receptacle, N.O. Contact	ZSDZ03
N.O. Contact Switch	ZSDC607139
Base Receptacle, N.O./N.C.	ZSDZ02
N.O./N.C. Contact Switch	ZSDC607319
DC 3-Wire	
Base Receptacle	ZSDZ02
PNP Switch	ZSDH607339
NPN Switch	ZSDJ607339
AC 2-Wire	
Base Receptacle	ZSDZ01
1 LED, N.O. SCP Switch	ZSDA600519
3 LED, SCP Switch	ZSDA605539
AC/DC	ZSDM600539

▼ Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

XSD Rectangular, Inductive Sensors

Long Range Block, AC and DC; Adjustable Sensing Range



Proximity

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

Rectangular, low-profile switch 3.5 in. square by 1.63 in. high (88.4 x 41.4 mm) designed for very demanding industrial applications. Especially recommended for long-sensing-range applications with metal in the background.

- Housings: plastic (thermoplastic polyester)
- Adjustable sensing range (30 to 60 mm); sensitivity can be decreased below the maximum usable sensing distance (48 mm) to cancel the metal background influence (20-turn potentiometer under the front plastic cap). For fixed long sensing distance, see page 258.
- LED indicators: target sensed, power on and short circuit (selected models)
- Plug-in modular design
- AC/DC model available
- Radio frequency immunity (RFI)
- Short circuit protection (SCP) (selected models)
- 1/2 in. NPT conduit entrance
- Protected, captive saddle-clamp terminals in ready-to-wire position
- DC models: complementary outputs PNP or NPN
- AC models: programmable output N.O./N.C.
- UL Listed and CSA Certified

NOTE: Sensors are factory adjusted for the maximum sensing distance.

Do not attempt to increase the sensing distance above the factory setting; sensor behavior becomes unpredictable.

30–60 mm (2.36 in.) Sensing Range, Non-Shielded

Circuit Type	Output Mode	Voltage Range	Maximum Load	Residual (Leakage) Current Maximum	Operating Frequency Maximum	LED	SCP★	Catalog Number
DC model, 2- and 3-wire screw terminals								
2-wire	N.O.	12–48 V	100 mA	0.8 mA	20 Hz	Yes	Yes	XSDC607139
2-wire	N.O., N.C.	12–48 V	100 mA	0.8 mA	20 Hz	Yes	No	XSDC607319
PNP	N.O., N.C.	12–48 V	200 mA	—	50 Hz	Yes	Yes	XSDH607339
NPN	N.O., N.C.	12–48 V	200 mA	—	50 Hz	Yes	Yes	XSDJ607339
AC model, screw terminals								
2-wire	N.O./N.C.	24–240 V	500 mA	1.7 mA ②	10 Hz	Yes	No	XSDA600519
2-wire	N.O./N.C.	43–132 V	500 mA	1.7 mA ②	10 Hz	3③	Yes	XSDA605539
AC and DC models, screw terminals								
2-wire	N.O./N.C.	24–240 Vac	500 mA	1.7 mA @ 120 V ② ■	—	—	—	—
		24–210 Vdc	100 mA	115 V	10 Hz	3③	Yes	XSDM600539
AC and AC/DC models, mini-style receptacle, 3-pins								
2-wire	N.O./N.C.	24–240 V	500 mA	1.7 mA ②	10 Hz	Yes	No	XSDA600519R3
2-wire	N.O./N.C.	93–132 V	500 mA	1.7 mA ②	10 Hz	3③	Yes	XSDA605539R3
2-wire	N.O./N.C.	24–240 Vac	500 mA	1.7 mA ②	—	—	—	—
		24–210 Vdc	100 mA	1.7 mA @ 120 V ② ■	10 Hz	3③	Yes	XSDM600539R3

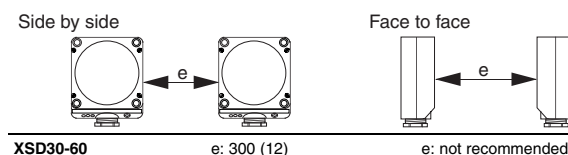
② PLC compatible.

③ 1 LED for Power Out and 1 LED for Output On, 1 LED for SCP triggered.

■ < 1 mA @ 24 V, < 3 mA @ 240 V

★ For devices without SCP, see page 284 for protective fuses.

Minimum Mounting Clearances, mm (in.)

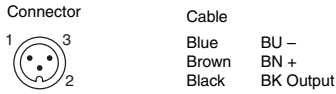


Proximity Sensors

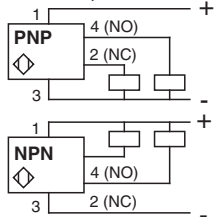
XSD Rectangular, Inductive Sensors

Long Range Block, AC and DC; Adjustable Sensing Range

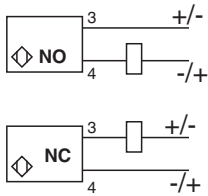
Wiring



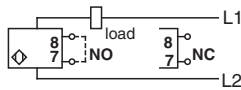
3 wire DC, NO/NC



2 wire DC, non polarized



2 wire AC, programmable NO/NC



Specifications

Mechanical					
Usable sensing range ★	24–48 mm (0.94–1.89 in.)				
Standard temperature range	-13 to +158° F (-25 to +70° C)				
Enclosure rating	NEMA Type	3, 4, 6, 12, 13			
	IEC	IP67			
Vibration resistance	25 G, ±2 mm amplitude, 10–55 Hz				
Shock resistance	50 G for 11 ms				
Standard target size (mild steel)	120 x 120 mm (4.7 x 4.7 in.)				
Differential	Maximum 20%				
Repeatability	Maximum 5%				
Cable, PVC	Screw terminals, #16 AWG				
Electrical	AC Models	2-wire, N.O.	DC Models 2-wire, N.O./N.C.	4-wire	AC/DC Models
Voltage range (including ripple)	20–264 V	10–58 V	10–58 V	10–58 V	20–264 V
Voltage drop (across switch)	4.5 V	4 V	7 V	1.8 V	6 V
Inrush current (inductive @ 20 ms)	2 A	—	—	—	2 A
Minimum load current	5 mA	—	1.5 V	—	5 mA
Current consumption (no load)	—	10 mA	—	10 mA	—
On delay (maximum)	30 ms	5 ms	5 ms	10 ms	40 ms
Off delay (maximum)	20 ms	40 ms	25 ms	10 ms	60 ms
Power-up delay (maximum)	120 ms	75 ms	30 ms	10 ms	100 ms
Reverse polarity protection	—	Standard	Standard	Standard	—
Radio frequency immunity (RFI)	40 mm (1.6 in.) minimum from antenna				
Agency listings	E 164353 ■ CCN NRKH		LR 44087 ★ Class 3211 03		FM: J.I. OROH9.AX (3610, 3611)

Options

Extended temperature range (Not available on AC models with SCP)	Suffix
to +185° F (85° C)	TT
to -40° F (-40° C)	TF

Ex: XSD605539 TTR3

Replacement modules

Description	Catalog Number
DC 2-wire	
Base receptacle, N.O. contact	ZSDZ03
N.O. contact switch	ZSDC607139
Base receptacle, N.O./N.C.	ZSDZ02
N.O./N.C. contact switch	ZSDC607319
DC 3-wire	
Base receptacle	ZSDZ02
PNP switch	ZSDH607339
NPN switch	ZSDJ607339
AC 2-wire	
Base receptacle	ZSDZ01
1 LED, N.O. SCP switch	ZSDA600519
3 LED, SCP switch	ZSDA605539
AC/DC	ZSDM600539

★ Refer to page 327 for target material correction coefficient Km.

Connector Cables (A or R3 suffix)

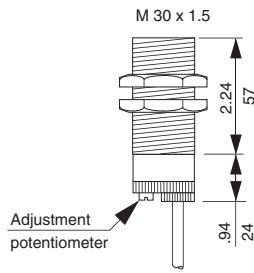
XSZCA901Y	Mini-style, 3-pin, 2 m, straight
XSZCA911Y	Mini-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626

Proximity Sensors

XSAV Tubular, Inductive Sensors

30 mm Diameter, Motion Detection, DC or AC/DC



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

The XSAV is a self-contained device used to detect and send output alarms for machinery underspeed or zero-speed conditions, as well as early jamming detection. Early detection of an underspeed condition helps reduce downtime due to jamming or transmission failure, especially for medium and large motors.

The zero speed condition is used extensively for safety interlocking applications, including: conveyors, pumps, mixers, centrifugal separators, elevators, saws, and crushers.

As long as the speed (pulses/minute) is above the threshold level—adjustable via a 25-turn potentiometer within the threshold range—the output circuit assumes its closed state. When the actual speed falls below the threshold level, the output circuit assumes its open state. To preserve the startup delay, the switch should be reset by recycling power.

When the line voltage is initially applied, the output automatically assumes its closed state for the duration of the startup delay. This allows the mechanical assembly to overcome inertia and reach its nominal speed, greatly simplifying the interlocking circuit. After the startup delay, the switch performs as described above.

Take care to avoid exceeding the maximum frequency rating. Above this level, the sensor cannot detect the target and assumes zero-speed condition.

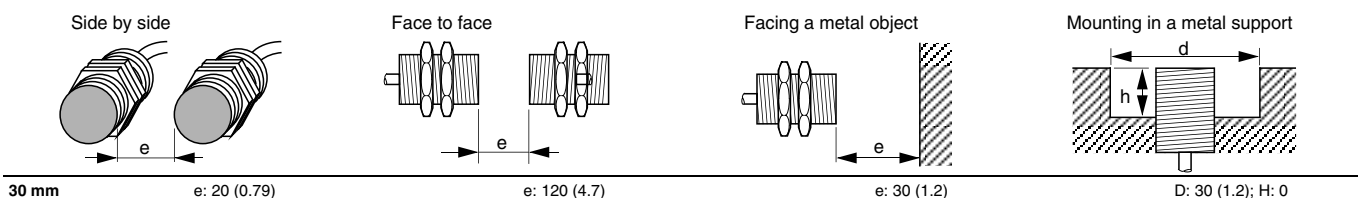
Features

- Universal AC/DC versions
- AC/DC models are PLC compatible
- Linear speed threshold adjustment
- Two adjustment ranges: 6–150 pulses/minute for zero-speed, 120–3000 pulses/minute for jamming detection
- Built-in fixed power-up delay to overcome startup inertia
- Radio frequency immunity (RFI)
- Reverse polarity protection on DC models
- Noise and transient protection
- Overload and short circuit protection (SCP) on DC models
- LED indicators for switch in closed state
- 25-turn potentiometer provides fine adjustment of the underspeed threshold

Circuit Type	Maximum Load	Residual (Leakage) Current	Threshold Range (Pulse/Min.)	Maximum Frequency (Pulse/Min.)	Startup Delay ^③	LED	SCP [▲]	Catalog Number
30 mm Diameter, 10 mm Sensing Range, Shielded, 2 m (6.6 ft) Cable								
DC models, 10–58 Vdc (including ripple)								
PNP	200 mA	0	6–150	6,000	9 s	Yes	Yes	XSAV11373
PNP	200 mA	0	6–150	6,000	3 s	Yes	Yes	XSAV31373
PNP	200 mA	0	120–3,000	48,000	9 s	Yes	Yes	XSAV12373
PNP	200 mA	0	120–3,000	48,000	3 s	Yes	Yes	XSAV32373
AC/DC models, 20–264 Vac/Vdc								
2-wire	0.35 A Vac/0.2 A Vdc	1.5 mA (P)★	6–150	6,000	9 s	Yes	No	XSAV11801
2-wire	0.35 A Vac/0.2 A Vdc	1.5 mA (P)★	6–150	6,000	0 s	Yes	No	XSAV01801
2-wire	0.35 A Vac/0.2 A Vdc	1.5 mA (P)★	120–3,000	48,000	9 s	Yes	No	XSAV12801
2-wire	0.35 A Vac/0.2 A Vdc	1.5 mA (P)★	120–3,000	48,000	0 s	Yes	No	XSAV02801

★ (P)—PLC Compatible, (R)—Bleeder resistor required for PLC applications
 ▲ For devices without SCP, see page 284 for protective fuses.

Minimum Mounting Clearances, mm (in.)

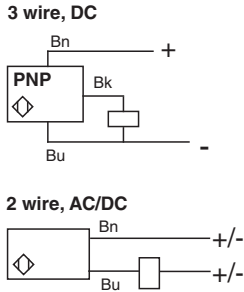


Proximity Sensors

XSAV Tubular, Inductive Sensors

30 mm Diameter, Motion Detection, DC or AC/DC

Wiring



Specifications

Mechanical		
Usable sensing range ★	0.71 in. (18 mm)	0–0.15 in. (0–4 mm)
	1.18 in. (30 mm)	0–0.31 in. (0–8 mm)
Standard temperature range	-13 to +158 °C (-25 to +70 °F)	
Enclosure rating	NEMA Type	1, 3, 4, 6, 12, 13
	IEC	IP67
Vibration resistance	25 G, ±2 mm amplitude, 10–55 Hz	
Shock resistance	50 G, 11 ms duration	
Standard target size (steel)	0.71 in. (18 mm) diameter	18 x 18 mm (0.71 x 0.71 in.)
	1.18 in. (30 mm) diameter	30 x 30 mm (1.18 x 1.18 in.)
Repeatability (% of Sr)	3%	
Differential (hysteresis)	5–15% of pre-set frequency	
Cable	PvR	20 AWG
Electrical		
Voltage drop (across switch) maximum	AC/DC	5.7 V
	DC	1.8 Vdc
Inrush current (inductive @ 20 ms)	2 A	
Minimum load current	5 mA	
Current consumption (no load)	—	
Startup delay (maximum)	XSAV1 models	9 s ±20% + 1/Fr ①
	XSAV3 models	3 s ±20% + 1/Fr ①
	XSAV0 models	0 s
Agency listings	CE	

① 1/Fr in the startup delay formula is the actual preset frequency adjusted via potentiometer. (1/Fr is not significant if threshold is above 60 pulses/minute).

★ Refer to page 327 for target material correction coefficient Km.

Options

Description	Suffix	
Extended temperature range (only one option per device)	to +185° F (+85° C)	TT
	to -40° F (-40° C)	TF
5 m (16.4 ft) cable length	L05	
10 m (32.8 ft) cable length	L10	

Ex: XSAV11373 TT L05

Accessories

Description	Catalog Number
Metal locknuts (1 pair included)	XSZE130
Steel mounting bracket, 90°	9006PA30
Plastic mounting bracket	XSZB130
0.5 in. (12.7 mm) NPT conduit adapter	7427

Application Notes:

The number of targets is determined knowing that the actual number of pulses per minute n , is $n=mN$ where m is the number of targets and N the speed in rpm.

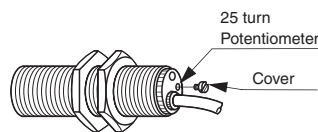
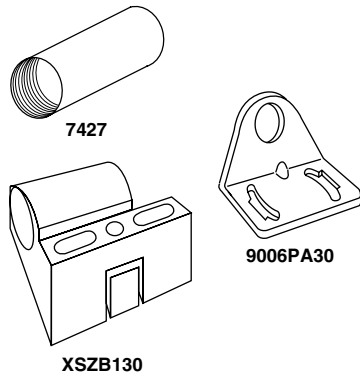
This number (n) should be within the operating frequency range given in the selection table. For reasons of mechanical balance, even numbers are recommended (2, 4, 6 etc.).

Frequency threshold adjustment:

As long as the speed (number of pulses/minute) is above the threshold level—adjustable within the threshold range via the 25-turn potentiometer—the output circuit assumes its closed state. When the actual speed falls below the threshold level, the output circuit assumes its open state. To preserve the startup delay, the switch should be reset by removing and reapplying the power supply.

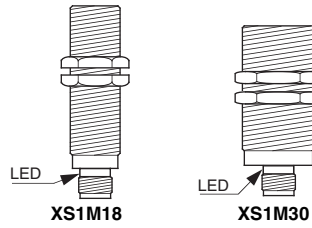
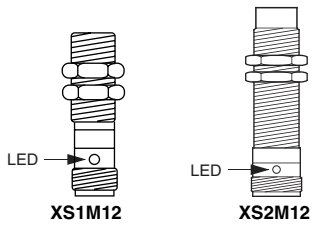
When the line voltage is initially applied, the output automatically assumes its closed state for the duration of the startup delay. This allows the mechanical assembly to overcome inertia and reach its nominal speed, greatly simplifying the interlocking circuit. After the startup delay, the switch will perform as described above.

Care should be taken not to exceed the maximum frequency rating above which the sensor cannot detect the target, therefore, assuming zero speed condition.



Proximity Sensors

XS Inductive Sensors, Weld Field Immune, DC Tubular



Features

Industrial welding processes create fields of electromagnetic noise that can interfere with the magnetic fields of inductive proximity sensors. Standard proximity sensors can be falsely triggered when near to these fields. WFI sensors allow uninterrupted performance when placed extremely close to the conductor carrying the welding current.

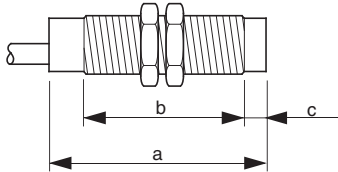
- The body styles are tubular in 12, 18, and 30 mm (0.47, 0.71, and 1.18 in.) diameters.
- Enclosure material is brass, coated in Teflon® to prevent slag (molten bits of metal) from sticking to the sensing face, reducing the possibility of false triggering.
- Micro-connector versions are available.*
- Mounting nuts are included.

Circuit Type	Output Mode	Voltage Range	Voltage Drop Maximum	Load Current Maximum	Operating Frequency Maximum	Catalog Number
12 mm Shielded, DC with Micro-Connector ★, Nominal Sensing Distance—2 mm						
PNP	N.O.	10–36 Vdc	2.5 V	250 mA	1,000 Hz	XS1M12PAW01D
12 mm Non-Shielded, DC with Micro-Connector ★, Nominal Sensing Distance—4 mm						
PNP	N.O.	10–36 Vdc	2.5 V	250 mA	1,000 Hz	XS2M12PAW01D
18 mm Shielded, DC with Micro-Connector ★, Nominal Sensing Distance—5 mm						
PNP	N.O.	10–36 Vdc	2.5 V	250 mA	500 Hz	XS1M18PAW01D
30 mm Shielded, DC with Micro-Connector ★, Nominal Sensing Distance—10 mm						
PNP	N.O.	10–36 Vdc	2.5 V	250 mA	250 Hz	XS1M30PAW01D

* See page 626 for matching connector cables.

Dimensions

- a = Overall Length (mm)
- b = Threaded Section (mm)
- c = for Non-shielded Sensors (mm)

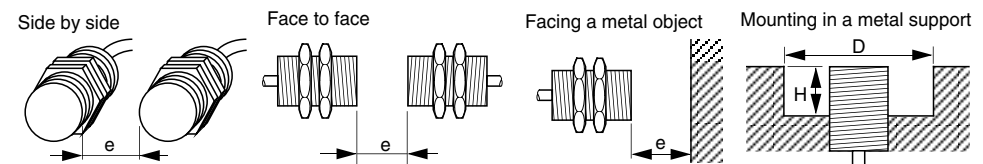


The formula below shows the relationship between distance (r [mm]) and electromagnetic flux density (B [mT]).

$$B [mT] = \frac{0.2 \times I [A]}{r [mm]}$$

$B [mT]$ = Electromagnetic Flux Density
 $I [A]$ = Welding Current
 $r [mm]$ = Distance

Minimum Mounting Clearances

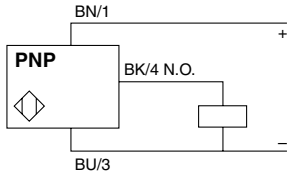


	Side by Side		Face to Face		Facing a Metal Object		Mounted in Metal			
	e		e		e		d		h	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
XS1M12	0	0	0.27	7	0.24	6	0.47	12	0	0
XS2M12	0.59	15	0.27	7	0.43	11	1.42	36	0.31	8
XS1M18	0	0	0.63	16	0.35	9	0.71	18	0	0
XS1M30	0	0	0.79	20	0.79	20	1.18	30	0	0

Proximity Sensors

XS Inductive Sensors, Weld Field Immune, DC Tubular

Wiring



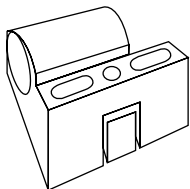
Specifications

Mechanical		XS1M12	XS2M12	XS1M18	XS1M30
Usable Sensing Range ★		1.6 mm	3.2 mm	4 mm	8 mm
Temperature Range		13 to +158 °F (-25 to +70 °C)			
Enclosure Rating	NEMA Type	3, 4, 6, 12, 13, 4X Indoor			
	IEC	IP67 (or depending on connector)			
Tightening torque (maximum)		15 N•m (11.1 lb-ft)	15 N•m (11.1 lb-ft)	35 N•m (26 lb-ft)	50 N•m (37 lb-ft)
Vibration		25 G, ±2 mm amplitude, 10–55 Hz			
Shock Resistance		50 G for 11 ms			
Differential (% of Sr)		20%			
Repeatability (% of Sr)		3%			
LED Indicator Type		4 LED windows at 90°			
Enclosure Material		Brass with Teflon® coating			
Electrical					
Voltage Range		12–24 Vdc			
Voltage Limit (Including Ripple)		10–36 Vdc			
Current Consumption (Maximum) (No Load)		15 mA			
Maximum Leakage (Residual) Current—Open State		—			
Power-up Delay (Maximum)		10 ms	10 ms	10 ms	10 ms
On Delay (Maximum)		0.1 ms	0.2 ms	0.2 ms	0.7 ms
Off Delay (Maximum)		0.4 ms	0.4 ms	0.6 ms	5 ms
Protective Circuitry	Short Circuit Protection	Yes			
	Overload Protection	Yes			
	Reverse Polarity Protection	Yes			
Agency Listings	E 164869 CCN NRKH	LR 702985 Class 3211 03			

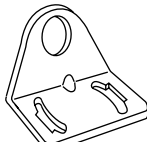
★ Refer to page 327 for target material correction coefficient Km.

Accessories

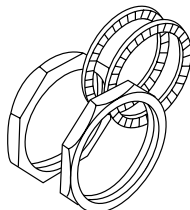
Description	For Sensor Diameter	Catalog Number
Mounting Bracket, Plastic	12 mm (0.47 in.)	XSZB112
	18 mm (0.71 in.)	XSZB118
	30 mm (1.18 in.)	XSZB130
Mounting Bracket, Metal	12 mm (0.47 in.)	9006PA12
	18 mm (0.71 in.)	9006PA18
	30 mm (1.18 in.)	9006PA30
Mounting Nuts	12 mm (0.47 in.)	XSZE112
	18 mm (0.71 in.)	XSZE118
	30 mm (1.18 in.)	XSZE130



XSZB1



9006PA



XSZE

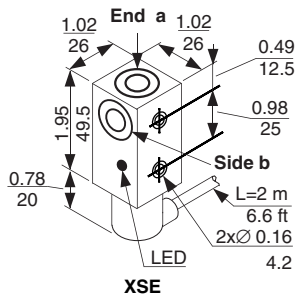
Connector Cables (M12 or D suffix)

XSZCD101Y	Micro-style, 4-pin, 2 m, straight
XSZCD111Y	Micro-style, 4-pin, 2 m, 90°

Additional cable options and lengths . . . page 626
 Accessories page 284, 280

Proximity Sensors

XS Inductive Sensors, Weld Field Immune, DC Rectangular



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

Compact rectangular inductive proximity sensors for demanding applications including welding and machine tools.

- **Housings—XSE: Plastic (fiberglass-reinforced polyamide)**; screw terminal models are also offered in slag-resistant thermoset plastic
- XSE models can be flush mounted in metal • Screw terminals, PVC cable, mini-style receptacle connections depending on the model • **Weld Field Immunity (WFI) on most models** • Radio frequency immunity (RFI)
- Noise and transient protection • Reverse polarity protection (DC models) • Selected models are offered with **short circuit protection (SCP)** and overload protection • **UL Recognized and CSA Certified** • **Factory Mutual approved for non-incendive application**

Output Mode/ Sensing Face (XSE)	Voltage Range	Maximum Load Current	Residual (leakage) Current	Operating Frequency	Housing	LED	SCP★	WFI	Catalog Number
XSE 10 mm (0.393 in.) sensing range, Shielded, DC models, 2-wire, N.O.									
2 m (6.6 ft) cable									
End	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC1071300
Side	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC1071330
Screw terminals									
End	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC107130
Side	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC107133
Sealed cable, 0.8 m (2.6 ft), with pig-tailed mini-style connector									
End	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC1071302
Side	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC1071332
End	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC1072301
Side	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC1072331
Sealed cable, 0.8 m (2.6 ft), with pig-tailed micro-style connector									
End	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC1071301
Side	12–48 V	100 mA	0.5 mA	1,000 Hz	Polyamide	Yes	Yes	Yes	XSEC1071331

* For side sensing, change last numeric digit as follows; Front: 1; Right: 3; Left: 4. Ex: XSB A105114C for left sensing.

① PLC Applications:

R = Bleeder resistor needed.

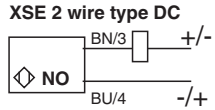
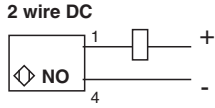
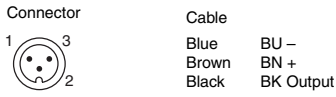
P = PLC compatible.

★ For devices without SCP, see page 284 for protective fuses.

Proximity Sensors

XS Inductive Sensors, Weld Field Immune, DC Rectangular

Wiring



Specifications

Mechanical	
Usable sensing range *	0–8 mm (0.31 in.) for XSE
Standard temperature range	-13 to +158 °F (-25 to +70 °C)
Enclosure rating	NEMA Type
	IEC
Vibration resistance	25 G, ±2 mm amplitude, 10–55 Hz
Shock resistance	50 G for 11 ms
Standard target size (steel)	30 x 30 mm (1.18 x 1.18 in.) for XSE
Differential	Maximum 20%
Repeatability	Maximum 5%
Radio frequency immunity (RFI)	Standard
Cable	Screw terminals, #16 AWG
	PvR, #20 AWG
Electrical	
DC Models—XSE	
Voltage drop (across switch)	4 V
Minimum load current	1.5 mA
On delay (maximum)	12 ms
Off delay (maximum)	3 ms
Power-up delay (maximum)	16 ms
Reverse polarity protection	Standard
Agency listings	E 164353 ■ CCN NRKH LR 44087 Class 3211 03 FM: J.I. OROH9.AX (3610, 3611)

* Refer to page 327 for target material correction coefficient Km.

Options

Description	Suffix
Extended temperature range	to +185° F(+85° C)
	to -40° F(-40° C)
5 m (16.4 ft) cable length	L05

Accessories

XSE mounting brackets	Catalog Number
Flat	XSEZ01
90°	XSEZ02

Minimum Mounting Clearances, mm (in.)

	Side by side	Face to face
XSE.15	e: 38 (1.5)	e: 97 (3.8)
XSB.20	e: 80 (3.1)	e: 160 (6.3)

Connector Cables (A or R3 suffix)

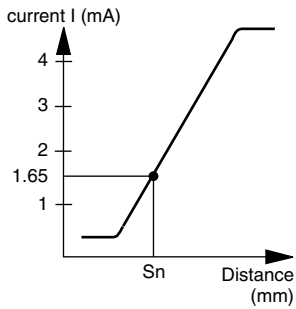
XSZCA901Y	Mini-style, 3-pin, 2 m, straight
XSZCA911Y	Mini-style, 3-pin, 2 m, 90°

Additional cable options and lengths . . . page 626

Proximity Sensors

Inductive Sensors for Use in Hazardous Locations

Factory Mutual, 2 Wire DC



Principle of operation

2-wire Factory Mutual proximity sensors are characterized by a change in current consumption when a metal object is present within the sensing zone.

They differ from standard sensors by the absence of an output circuit. All processing is carried out by the associated amplifier or solid-state system to which they are connected.

The mode of operation is analogous to an N.C. contact:

- no object present: sensor is in the conducting state
- object present: sensor is in the non-conducting state

Factory Mutual System

Approved for Div I, II hazardous location with NY2 safe barrier relay.

Tubular type

Barrel Diameter	Barrel Type	Nominal Sensing Distance *	Operating Zone	Operating Frequency	Catalog Number
Nickel-plated brass case					
Shielded, 2 m (6.6 ft) cable					
4 mm	smooth	0.03 in. (0.8 mm)	0–0.02 in. (0–0.6 mm)	1,500 Hz	XSLN08122
5 mm	threaded	0.03 in. (0.8 mm)	0–0.02 in. (0–0.6 mm)	1,500 Hz	XSMN08122
6.5 mm	smooth	0.04 in. (1 mm)	0–0.03 in. (0–0.8 mm)	1,500 Hz	XSLN01122
8 mm	threaded	0.06 in. (1.5 mm)	0–0.03 in. (0–0.8 mm)	1,500 Hz	XSAN01122
Plastic case					
Shielded, 2 m (6.6 ft) cable					
8 mm	threaded	0.06 in. (1.5 mm)	0–0.05 in. (0–1.2 mm)	1,000 Hz	XSPN01122
12 mm	threaded	0.08 in. (2 mm)	0–0.06 in. (0–1.6 mm)	800 Hz	XSPN02122
18 mm	threaded	0.2 in. (5 mm)	0–0.16 in. (0–4.0 mm)	500 Hz	XSPN05122
30 mm	threaded	0.4 in. (10 mm)	0–0.31 in. (0–8.0 mm)	300 Hz	XSPN10122
Non-shielded, 2 m (6.6 ft) cable					
12 mm	threaded	0.16 in. (4 mm)	0–0.12 in. (0–3.2 mm)	400 Hz	XSPN04122
18 mm	threaded	0.31 in. (8 mm)	0–0.25 in. (0–6.4 mm)	300 Hz	XSPN08122
30 mm	threaded	0.6 in. (15 mm)	0–0.47 in. (0–12.0 mm)	200 Hz	XSPN15122

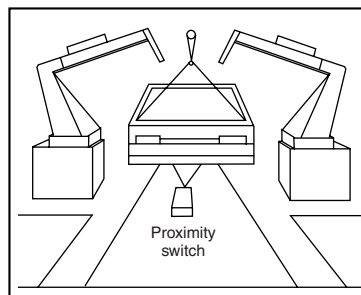
Plastic block type

Enclosure Style	Nominal Sensing Distance *	Operating Zone	Operating Frequency	Catalog Number
Shielded, terminal connections				
Limit switch style	0.6 in. (15 mm)	0–0.47 in. (0–12.0 mm)	100 Hz	XSCN151229

Applications

Intrinsically safe applications (hazardous area).

When used in these applications, it is imperative that (Factory Mutual) sensors be used only with an NY2 intrinsically safe relay/amplifier, or a suitably approved, compatible solid-state system. Example: Painting line in car assembly plant.





* Refer to page 327 for target material correction coefficient Km.

Proximity Sensors

Inductive Sensors for Use in Hazardous Locations

Factory Mutual, 2 Wire DC

Specifications

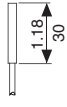
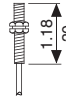
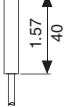
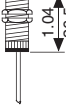
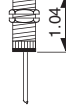


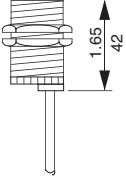
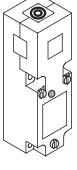
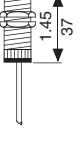
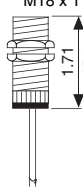
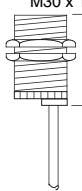
Mechanical			
Standard temperature range	Operation	-25 to +70 °C (-13 to +158 °F)	
	Storage	-40 to +80 °C (-40 to +176 °F)	
Enclosure rating	NEMA Types	4 mm and 5 mm	1, 3, 4, 13
		All others	3, 4, 6, 12, 13
	IEC	4 mm and 5 mm	IP64
		All others	IP67
Repeatability (% of Sr)	5% or less		
Cable	2-wire	22 AWG (0.11 mm ²), PvR	
Electrical			
Voltage range	7–12 Vdc		
Current consumption from supply 8.2 V (internal resistance: about 1 KΩ)	Sensor activated (target present) = 1 mA or less; Sensor not activated (target absent) = 3 mA or more; Switching point defined for usable sensing distance and standard metal target: 1.65 mA		
Maximum line resistance	Between sensor and amplifier: 50 ohms		
Apparent sensing capacitance *	280 nF maximum		
Apparent sensing inductance *	220 μH maximum		
Agency listings	  LR 15996 Class 3218 06	FM: J.I. OROH9.AX (3610, 3611)	

* Consider for intrinsically safe systems.

Factory Mutual Sensors

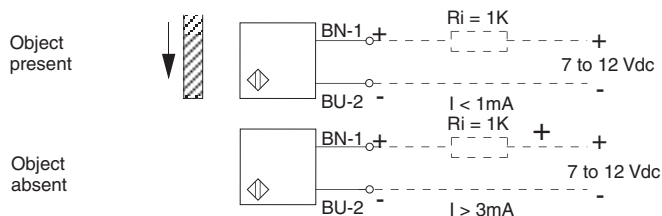
DC 2-wire, N.C.

M: Metal case; P: Plastic case

4 mm unthreaded	M5 x 0.5	6.5 mm unthreaded	M8 x 1	M8 x 1	M12 x 1	M18 x 1
						
Metal	Metal	Metal	Metal	Plastic	Plastic	Plastic
XSLN08122	XSMN08122	XSLN01122	XSAN01122	XSPN01122	XSPN02122	XSPN05122
M30 x 1.5	Dimensions page 270	M12 x 1	Sensors not suitable for flush mounting in metal		M18 x 1	M30 x 1.5
						
Plastic	Plastic	Plastic			Plastic	Plastic
XSPN10122	XSCN151229	XSPN04122			XSPN08122	XSPN15122

Non-intrinsically safe applications (normal safe zone).

connected to a solid state input (e.g.: TSX PLC input card, TSX DET 466)



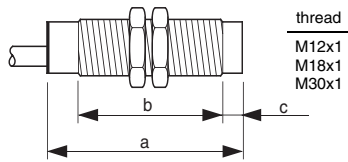
Proximity Sensors

XS Inductive Sensors

Analog Output, DC

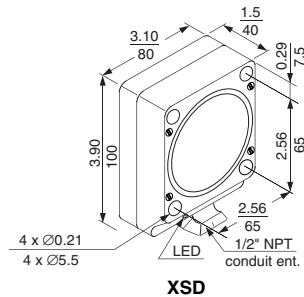
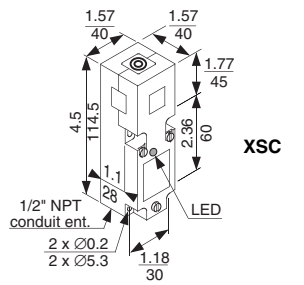
Dimensions:

- a = overall length (mm)
- b = threaded section (mm)
- c = for non-shielded sensors (mm)



Tubular Style dimensions, in. (mm)

		a	b	c
12 mm	Metal	1.9 (50)	1.6 (42)	0
	Plastic	1.9 (50)	1.6 (42)	0
18 mm	Metal	1.9 (50)	1.6 (42)	0
	Plastic	1.6 (40.6)	1.0 (26)	0.3 (8)
30 mm	Metal	1.9 (50)	1.6 (42)	0
	Plastic	2.07 (52.6)	1.2 (32)	0.5 (13)



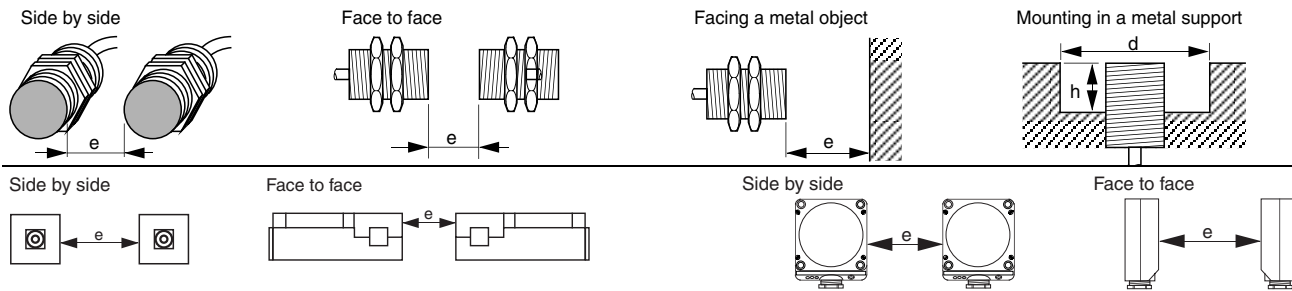
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Features

- DC output current directly proportional to the target distance
- Three body styles: tubular, limit switch style (with 5-position turret head), block style
- Both metal and plastic enclosures available
- Two types of output: 3-wire: 0–10 mA, 0–16 mA
2-wire: 4–20 mA, 4–14 mA

Nominal Sensing Distance	Enclosure Style	Enclosure Material	Voltage Range Max.	Circuit Type	Output Current	Operating Frequency Max.	Catalog Number
12 mm Diameter—2 m cable							
0.2–2 mm	Shielded	Metal	24 Vdc	2-wire	4–20 mA	1,500 Hz	XS1M12AB120
				3-wire	0–16 mA		
0.4–4 mm	Non-Shielded	Plastic	24 Vdc	2-wire	4–20 mA	1,500 Hz	XS4P12AB120
				3-wire	0–16 mA		
0.4–4 mm	Non-Shielded	Plastic	24–48 Vdc	2-wire	4–14 mA	1,500 Hz	XS4P12AB110
				3-wire	0–10 mA		
18 mm Diameter—2 m (6.6 ft) cable							
0.5–5 mm	Shielded	Metal	24 Vdc	2-wire	4–20 mA	500 Hz	XS1M18AB120
				3-wire	0–16 mA		
0.8–8 mm	Non-Shielded	Plastic	24 Vdc	2-wire	4–20 mA	500 Hz	XS4P18AB120
				3-wire	0–16 mA		
0.8–8 mm	Non-Shielded	Plastic	24–48 Vdc	2-wire	4–14 mA	500 Hz	XS4P18AB110
				3-wire	0–10 mA		
30 mm Diameter—2 m (6.6 ft) cable							
1–10 mm	Shielded	Metal	24 Vdc	2-wire	4–20 mA	300 Hz	XS1M30AB120
				3-wire	0–16 mA		
1.5–15 mm	Non-Shielded	Plastic	24 Vdc	2-wire	4–20 mA	300 Hz	XS4P30AB120
				3-wire	0–16 mA		
1.5–15 mm	Non-Shielded	Plastic	24–48 Vdc	2-wire	4–14 mA	300 Hz	XS4P30AB110
				3-wire	0–10 mA		
Limit Switch Style—2 m (6.6 ft) cable							
2–20 mm	Non-Shielded	Plastic	24–48 Vdc	2-wire	4–14 mA	60 Hz	XSCH207629
				3-wire	0–10 mA		
2–20 mm	Non-Shielded	Plastic	24 Vdc	2-wire	4–20 mA	60 Hz	XSCH203629
				3-wire	0–16 mA		
Block Style—2 m (6.6 ft) cable							
6–60 mm	Non-Shielded	Plastic	24–48 Vdc	2-wire	4–14 mA	50 Hz	XSDH607629
				3-wire	0–10 mA		
6–60 mm	Non-Shielded	Plastic	24 Vdc	2-wire	4–20 mA	50 Hz	XSDH603629
				3-wire	0–16 mA		

Minimum Mounting Clearances, mm (in.)



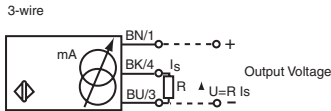
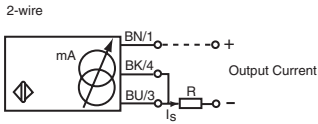
	Side by side	Face to face	Facing a metal object	Mounted in metal
12 mm Shielded	e: 4 mm (0.16 in.)	e: 24 mm (0.94 in.)	e: 6 mm (0.24 in.)	d: 12 mm (0.47 in.)
12 mm Non-shielded, 24 V	e: 16 mm (0.63 in.)	e: 48 mm (1.89 in.)	e: 12 mm (0.47 in.)	d: 36 mm (1.42 in.)
12 mm Non-shielded, 48 V	e: 16 mm (0.63 in.)	e: 48 mm (1.89 in.)	e: 12 mm (0.47 in.)	d: 36 mm (1.42 in.)
18 mm Shielded	e: 10 mm (0.39 in.)	e: 60 mm (2.36 in.)	e: 15 mm (0.59 in.)	d: 18 mm (0.71 in.)
18 mm Non-shielded, 24 V	e: 32 mm (1.26 in.)	e: 96 mm (3.78 in.)	e: 24 mm (0.94 in.)	d: 54 mm (2.12 in.)
18 mm Non-shielded, 48 V	e: 32 mm (1.26 in.)	e: 96 mm (3.78 in.)	e: 24 mm (0.94 in.)	d: 54 mm (2.12 in.)
30 mm Shielded	e: 20 mm (0.79 in.)	e: 120 mm (4.72 in.)	e: 30 mm (1.18 in.)	d: 30 mm (1.18 in.)
30 mm Non-shielded, 24 V	e: 60 mm (2.36 in.)	e: 180 mm (7.08 in.)	e: 45 mm (1.77 in.)	d: 90 mm (3.54 in.)
30 mm Non-shielded, 48 V	e: 60 mm (2.36 in.)	e: 180 mm (7.08 in.)	e: 45 mm (1.77 in.)	d: 90 mm (3.54 in.)
Limit switch style	e: 80 mm (3.15 in.)	e: 160 mm (6.30 in.)	—	—
Block style	e: 300 mm (11.81 in.)	not recommended	—	—

Proximity Sensors

XS Inductive Sensors

Analog Output, DC

Wiring



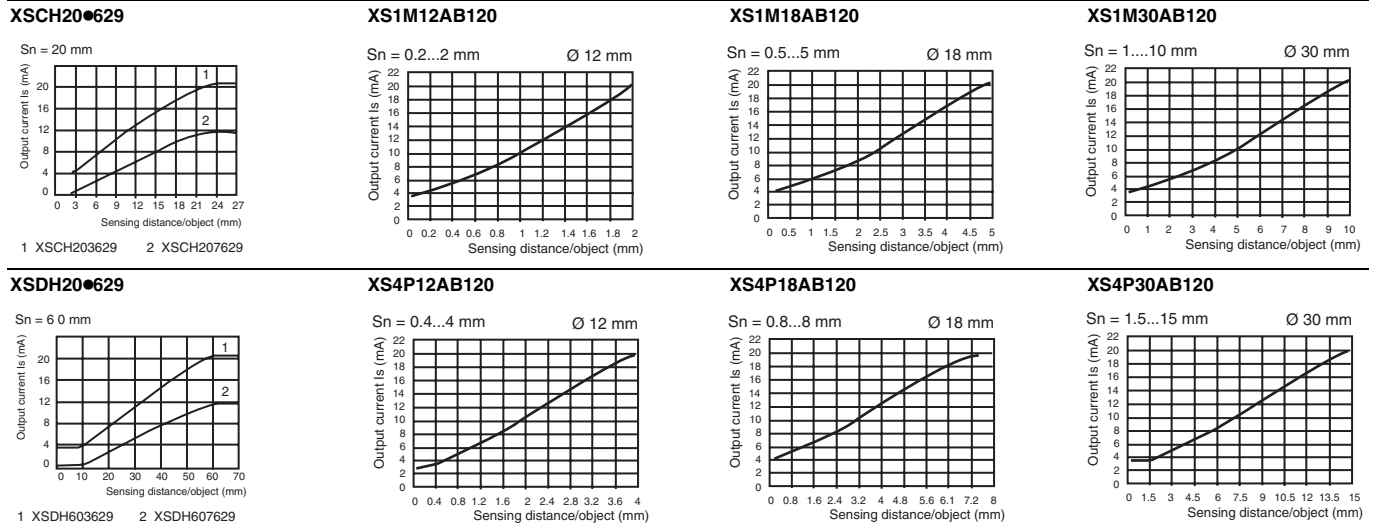
Output current	Value of R (R = load impedance)
24 V	0 to 10 mA $\leq 1800 \Omega$
	0 to 16 mA $\leq 1125 \Omega$
48 V	0 to 10 mA $\leq 4200 \Omega$

Ensure a minimum of 5 V between the + and sensor output

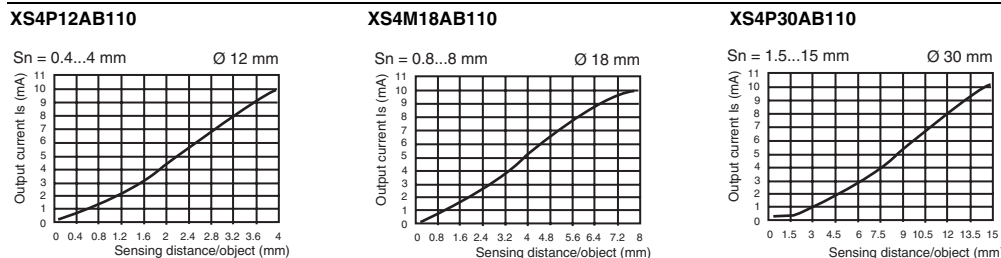
Specifications

Mechanical			
Temperature range	-13 to +158 °F (-25 to +70 °C)		
Enclosure rating	IEC		
Enclosure material	Type IP67		
Tightening torque (maximum)	Metal	Plastic	
	12 mm	6 N•m (4.5 lb-ft)	2 N•m (1.5 lb-ft)
	18 mm	15 N•m (11.1 lb-ft)	5 N•m (3.7 lb-ft)
30 mm	40 N•m (29.5 lb-ft)	20 N•m (14.7 lb-ft)	
Wiring	Tubular	22 AWG (0.34 mm ²), PvR	
	Limit Switch/Block style	Screw term. 16 AWG (1.5 mm ²)	
Electrical			
Voltage limit (including ripple)	XS1••••120, XS4••••120: 15–38 Vdc XS1••••110, XS4••••110: 15–58 Vdc XSCH207•••, XSDH607•••: 19–58 Vdc XSCH203•••, XSDH603•••: 19–30 Vdc		
Current consumption (no load)	4 mA		
Maximum output current drift with the rated operating temperature	10%		
Power supply current (no load)	4 mA		
Repeat accuracy	±1%		
Linearity error	±4%		
Protective circuitry	Short circuit protection	yes	
	Overload protection	yes	
	Reverse polarity protection	yes	
Agency listings	UL (XS1, XS4) E 164869 CCN NRKH (XSC, XSD) E 164353 CCN NKCR	LR 44087 Class 3211 03	

Output Curves 4 to 20 mA, 2-wire connection (tubular models)



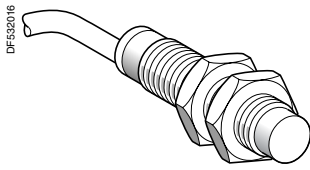
Output Curves 0 to 10 mA, 3-wire connection, (tubular models)



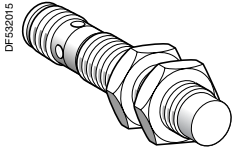
Proximity Sensors

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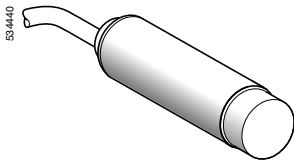
Cylindrical, Stainless Steel, Non-Flush-Mountable, Three-Wire DC, Solid-State Output



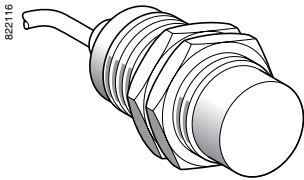
XS2**SA**L2



XS2**SA**M12



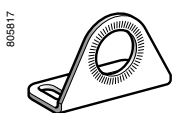
XS2L2SA**L2



XS230SA**L2



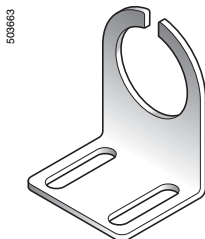
XSZBS12



XUZA118



XUZB2005



XSZBS30

Ø 12, threaded M12 x 1

Sensing distance (Sn), mm (in.)	Function	Output	Connection	Catalog Number	Weight kg (lb)
7 (0.28)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS212SAPAL2	0.075 (0.165)
			M12 connector	XS212SAPAM12	0.035 (0.077)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS212SANAL2	0.075 (0.165)
			M12 connector	XS212SANAM12	0.035 (0.077)

Ø 18, threaded M18 x 1

Sensing distance (Sn), mm (in.)	Function	Output	Connection	Catalog Number	Weight kg (lb)
12 (0.47)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS218SAPAL2	0.120 (0.265)
			M12 connector	XS218SAPAM12	0.060 (0.132)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS218SANAL2	0.120 (0.265)
			M12 connector	XS218SANAM12	0.060 (0.132)

Ø 18, plain

Sensing distance (Sn), mm (in.)	Function	Output	Connection	Catalog Number	Weight kg (lb)
12 (0.47)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS2L2SAPAL2	0.120 (0.265)
			M12 connector	XS2L2SAPAM12	0.060 (0.132)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS2L2SANAL2	0.120 (0.265)
			M12 connector	XS2L2SANAM12	0.060 (0.132)

Ø 30, threaded M30 x 1.5

Sensing distance (Sn), mm (in.)	Function	Output	Connection	Catalog Number	Weight kg (lb)
22 (0.87)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS230SAPAL2	0.205 (0.452)
			M12 connector	XS230SAPAM12	0.145 (0.320)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS230SANAL2	0.205 (0.452)
			M12 connector	XS230SANAM12	0.145 (0.320)

Accessories (2)

Description	For use with	Catalog Number	Weight kg (lb)
Plastic fixing clamp, 24.1 mm (0.95 in.) centers, with locking screw	Ø 18 sensor, plain case	XUZB2005	0.007 (0.015)
	Ø 12 sensor	XSZBS12	0.060 (0.132)
Stainless steel fixing bracket	Ø 18 sensor	XUZA118	0.045 (0.099)
	Ø 30 sensor	XSZBS30	0.080 (0.176)

Connecting cables

Description	Type	Cable length, m (ft)	Catalog Number	Weight kg (lb)
Pre-wired M12 connectors Female, 4-pin, stainless steel clamping ring	Straight	2 (6.6)	XZCPA1141L2	0.090 (0.198)
		5 (16.4)	XZCPA1141L5	0.210 (0.463)
		10 (32.8)	XZCPA1141L10	0.410 (0.904)
	Elbowed	2 (6.6)	XZCPA1241L2	0.090 (0.198)
		5 (16.4)	XZCPA1241L5	0.210 (0.463)
		10 (32.8)	XZCPA1241L10	0.410 (0.904)
M12 jumper cable Male, 3-pin, stainless steel clamping ring	Straight	2 (6.6)	XZCRA151140A2	0.095 (0.209)
		5 (16.4)	XZCRA151140A5	0.200 (0.441)

- For a 5 m (16.4) cable replace L2 with L5; for a 10 m (32.8) cable replace L2 with L10.
Example: XS212SAPAL2 becomes XS212SAPAL5 with a 5 m cable.
- For further information, see page 284.

Proximity Sensors

XS Inductive Sensors, Osiprox® Food and Beverage Processing

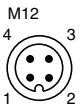
Cylindrical, Stainless Steel, Non-Flush-Mountable, Three-Wire DC, Solid-State Output

Specifications		XS2**SA**M12	XS2**SA**L2
Sensor type		XS2**SA**M12	XS2**SA**L2
Product certifications/approvals		UL, CSA, C€	
Connection	Connector	M12	—
	Pre-cabled	—	Length: 2 m (6.6 ft)
Operating zone	Ø 12	mm (in.)	0–5.6 (0–0.22)
	Ø 18	mm (in.)	0–9.6 (0–0.38)
	Ø 30	mm (in.)	0–17.6 (0–0.69)
Differential travel		%	1–15 of real sensing distance (Sr)
Degree of protection	Conforming to IEC 60529	IP67	IP68, double insulation
	DIN 40050	IP69 K	
Storage temperature		°C (°F)	-40 to +85 (-40 to +185) (1)
Operating temperature		°C (°F)	-25 to +85 (-13 to +185)
Materials	Case	Stainless steel, grade 316 L	
	Cable	—	Non-poisonous PVC, 3 x 0.34 mm ²
Vibration resistance	Conforming to IEC 60068-2-6	25 gn, amplitude ± 2 mm (@10 to 55 Hz)	
Shock resistance	Conforming to IEC 60068-2-27	50 gn, duration 11 ms	
Output state indication		Yellow LED: 4 viewing ports at 90°	Yellow LED: annular
Rated supply voltage		Vdc	12–24 with protection against reverse polarity
Voltage limits (including ripple)		Vdc	10–36
Switching capacity		mA	≤200 with overload and short-circuit protection
Voltage drop, closed state		V	≤2
Current consumption, no-load		mA	≤10
Maximum switching frequency	XS212SA****	Hz	2500
	XS218SA**** and XS2L2****	Hz	1000
	XS230SA****	Hz	500
Delays	First-up	ms	≤10
	Response	ms	≤0.2 for Ø 12, ≤0.3 for Ø 18, ≤0.6 for Ø 30
	Recovery	ms	≤0.2 for Ø 12, ≤0.7 for Ø 18, ≤1.4 for Ø 30

1. + 100 °C (+ 212 °F) for cleaning and sterilization phases while not in service.

Wiring diagrams

Connector

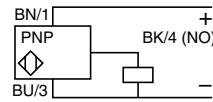


Pre-cabled

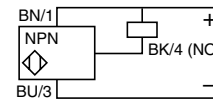
BU: Blue
BN: Brown
BK: Black

For connection information, refer to the Cabling section beginning on page 625.

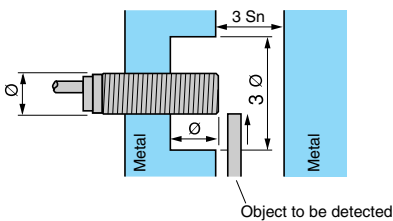
PNP



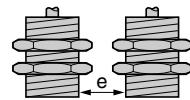
NPN



Setup

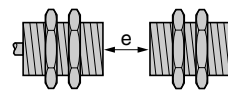


Minimum mounting distances, mm (in.)



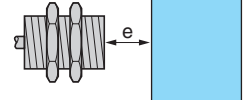
Side by side

Ø 12 e ≥ 48 (1.89)
Ø 18 e ≥ 72 (2.83)
Ø 30 e ≥ 120 (4.72)



Face to face

e ≥ 84 (3.31)
e ≥ 144 (5.67)
e ≥ 264 (10.39)

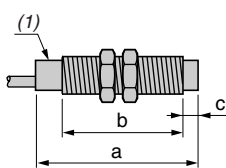


Facing a metal object

e ≥ 21 (0.83)
e ≥ 36 (1.42)
e ≥ 66 (2.60)

Dimensions

XS2

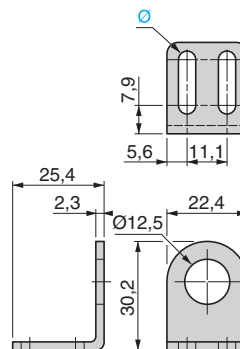


1. LED

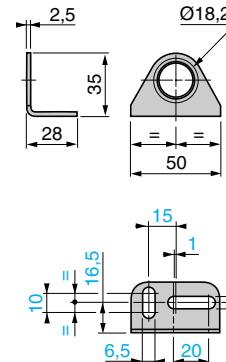
Ø: 2 elongated holes, 7.14 x 29.36 mm (0.28 x 1.16 in.)

Dia.	Pre-cabled, mm (in.)		Connector, mm (in.)		
	a	b	a	b	c
Ø 12	54.5 (2.15)	38 (1.50)	61 (2.40)	37 (1.46)	5 (0.20)
Ø 18	60 (2.36)	40 (1.57)	70 (2.76)	42 (1.65)	8 (0.31)
Ø 30	62.5 (2.46)	41 (1.61)	70 (2.76)	36 (1.42)	13 (0.51)

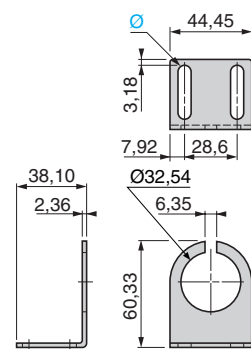
XSZBS12



XUZA118



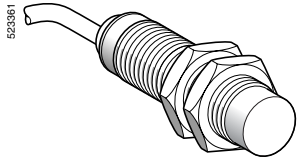
XSZBS30



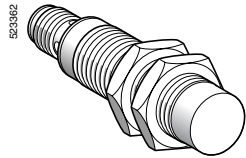
Proximity Sensors

XS Inductive Sensors, Osiprox® Food and Beverage Processing

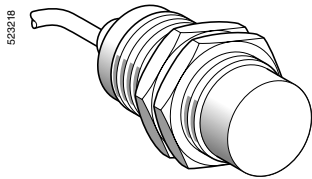
Cylindrical, Stainless Steel, Non-Flush-Mountable, Two-Wire AC or DC



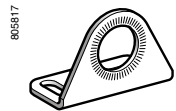
XS218SAM•L2



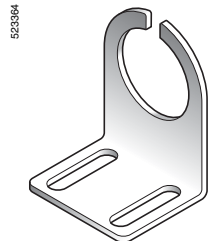
XS218SAM•U20



XS230SAM•L2



XUZA118



XSZBS30

Ø 18, threaded M18 x 1

Sensing distance (Sn), mm (in.)	Function	Connection	Catalog Number	Weight, kg
12 (0.47)	NO	Pre-cabled, 2 m (6.6 ft) (1)	XS218SAMAL2	0.120 (0.265)
		1/2"-20UNF connector	XS218SAMAU20	0.060 (0.132)

Ø 30, threaded M30 x 1.5

Sensing distance (Sn), mm (in.)	Function	Connection	Catalog Number	Weight, kg
22 (0.87)	NO	Pre-cabled, 2 m (6.6 ft) (1)	XS230SAMAL2	0.205 (0.452)
		1/2"-20UNF connector	XS230SAMAU20	0.145 (0.320)

Connecting cables (2)

Description	Type	Cable length, m	Catalog Number	Weight, kg
Pre-wired connectors 1/2"-20UNF 3-pin female, stainless steel clamping ring	Straight	5 (16.4)	XZCPA1865L5	0.210 (0.463)
		10 (32.8)	XZCPA1865L10	0.410 (0.904)
	Elbowed	5 (16.4)	XZCPA1965L5	0.250 (0.551)
		10 (32.8)	XZCPA1965L10	0.485 (1.069)

Accessories

Description	For use with	Catalog Number	Weight, kg
Stainless steel fixing bracket	Ø 18 sensor	XUZA118	0.045 (0.099)
	Ø 30 sensor	XSZBS30	0.080 (0.176)

- For a 5 m (16.4 ft) cable, replace L2 with L5; for a 10 m (32.8 ft) cable, replace L2 with L10.
Example: **XS218SAMAL2** becomes **XS218SAMAL5** with a 5 m cable.
- For further information, see page 284.

Proximity Sensors

XS Inductive Sensors, Osiprox® Food and Beverage Processing

Cylindrical, Stainless Steel, Non-Flush-Mountable, Two-Wire AC or DC

Specifications		XS2••SAM•U20	XS2••SAM•L2
Sensor type			
Product certifications/approvals		UL, CSA, cE	
Connection	Connector	1/2"- 20UNF	—
	Pre-cabled	—	Length: 2 m (6.6 ft)
Operating zone	Ø 18	mm (in.) 0–9.6 (0–0.38)	
	Ø 30	mm (in.) 0–17.6 (0–0.69)	
Differential travel		%	1–15 of real sensing distance (Sr)
Degree of protection	Conforming to IEC 60529	IP67	IP68, double insulation □
	DIN 40050	IP69 K	
Storage temperature		°C (°F)	- 40 to + 85 (-40 to +185) (1)
Operating temperature		°C (°F)	- 25 to + 85 (-13 to +185)
Materials	Case	Stainless steel, grade 316 L	
	Cable	—	Non-poisonous PVC, 2 x 0.34 mm ²
Vibration resistance		Conforming to IEC 60068-2-6	
Shock resistance		Conforming to IEC 60068-2-27	
Output state indication		Yellow LED: 4 viewing ports at 90°	Yellow LED: annular
Rated supply voltage		Vac / Vdc	24–240 (AC: 50/60 Hz)
Voltage limits (including ripple)		Vac / Vdc	20–264
Switching capacity		mA	AC: 5–300; DC: 5–200 (2)
Voltage drop, closed state		V	≤5.5
Residual current, open state		mA	≤0.8
Maximum switching frequency	XS218SAM•••	Hz	AC: 25; DC: 1000
	XS230SAM•••	Hz	AC: 25; DC: 300
Delays	First-up	ms	≤30
	Response	ms	≤0.5
	Recovery	ms	≤0.5 for XS218SAM•••, ≤2 for XS230SAM•••

1. + 100 °C for cleaning and sterilization phases while not in service.

2. It is essential to connect a 0.4 A quick-blow fuse in series with the load.

Wiring diagrams

Connector

1/2"- 20UNF



AC/DC: 2
±: 1
AC/DC: 3

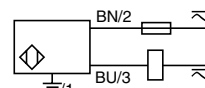
Pre-cabled

BU: Blue
BN: Brown

For connection information, refer to the Cabling section beginning on page 625.

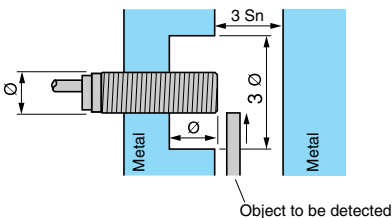
2-wire ~ or =

NO output

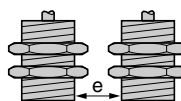


±: on connector models only

Setup

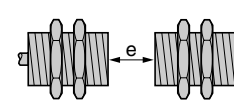


Minimum mounting distances, mm (in.)



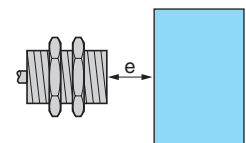
Side by side

Ø 18 e ≥ 72 (2.83)
Ø 30 e ≥ 120 (4.72)



Face to face

e ≥ 144 (5.67)
e ≥ 264 (10.39)

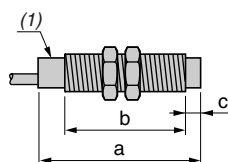


Facing a metal object

e ≥ 36 (1.42)
e ≥ 66 (2.60)

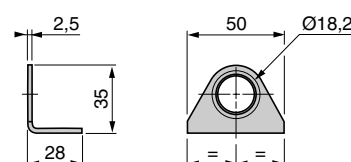
Dimensions

XS2

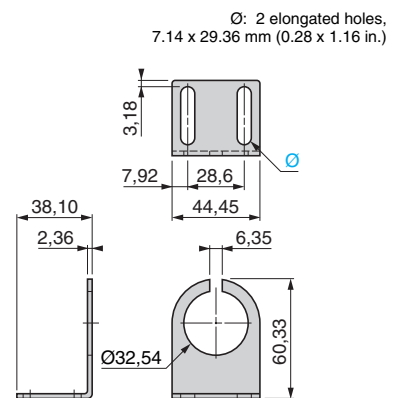


Dia.	Pre-cabled (mm)		Connector (mm)		
	a	b	a	b	c
Ø 18	60 (2.36)	40 (1.57)	72 (2.83)	44 (1.73)	8 (0.31)
Ø 30	62.5 (2.46)	41 (1.61)	74 (2.91)	40 (1.57)	13 (0.51)

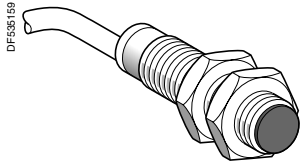
XSZA118



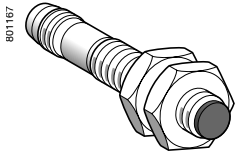
XSZBS30



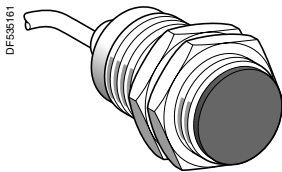
Proximity Sensors
XS Inductive Sensors, Osiprox® Food and Beverage Processing
Cylindrical, Plastic, Non-Flush-Mountable, Three-Wire DC, Solid-State Output



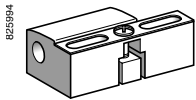
XS212AA**L2



XS218AA**M12



XS230AA**L2



XSZB**

Ø 12, threaded M12 x 1

Sensing distance (Sn), mm (in.)	Function	Output	Connection	Catalog Number	Weight, kg (lb)
7 (0.28)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS212AAPAL2	0.065 (0.143)
			M12 connector	XS212AAPAM12	0.030 (0.066)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS212AANAL2	0.065 (0.143)
			M12 connector	XS212AANAM12	0.030 (0.066)

Ø 18, threaded M18 x 1

Sensing distance (Sn), mm (in.)	Function	Output	Connection	Catalog Number	Weight, kg (lb)
12 (0.47)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS218AAPAL2	0.100 (0.220)
			M12 connector	XS218AAPAM12	0.040 (0.088)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS218AANAL2	0.100 (0.220)
			M12 connector	XS218AANAM12	0.040 (0.088)

Ø 30, threaded M30 x 1.5

Sensing distance (Sn), mm (in.)	Function	Output	Connection	Catalog Number	Weight, kg (lb)
22 (0.87)	NO	PNP	Pre-cabled, 2 m (6.6 ft) (1)	XS230AAPAL2	0.140 (0.309)
			M12 connector	XS230AAPAM12	0.080 (0.176)
		NPN	Pre-cabled, 2 m (6.6 ft) (1)	XS230AANAL2	0.140 (0.309)
			M12 connector	XS230AANAM12	0.080 (0.176)

Accessories (2)

Description	Catalog Number	Weight, kg (lb)	
Fixing clamps	Ø 12	XSZB112	0.006 (0.013)
	Ø 18	XSZB118	0.010 (0.022)
	Ø 30	XSZB130	0.020 (0.044)

Connecting cables

Description	Type	Cable length, m (ft)	Catalog Number	Weight, kg (lb)
Pre-wired M12 connectors Female, 4-pin, stainless steel clamping ring	Straight	2 (6.6)	XZCPA1141L2	0.090 (0.198)
		5 (16.4)	XZCPA1141L5	0.190 (0.419)
		10 (32.8)	XZCPA1141L10	0.370 (0.816)
	Elbowed	2 (6.6)	XZCPA1241L2	0.090 (0.198)
		5 (16.4)	XZCPA1241L5	0.190 (0.419)
		10 (32.8)	XZCPA1241L10	0.370 (0.816)
M12 jumper cable Male, 3-pin, stainless steel clamping ring	Straight	2 (6.6)	XZCRA151140A2	0.090 (0.198)
		5 (16.4)	XZCRA151140A5	0.190 (0.419)

- For a 5 m (16.4 ft) cable, replace L2 with L5; for a 10 m (32.8 ft) cable, replace L2 with L10.
Example: **XS212AAPAL2** becomes **XS212AAPAL5** with a 5 m cable.
- For further information, see page 284.

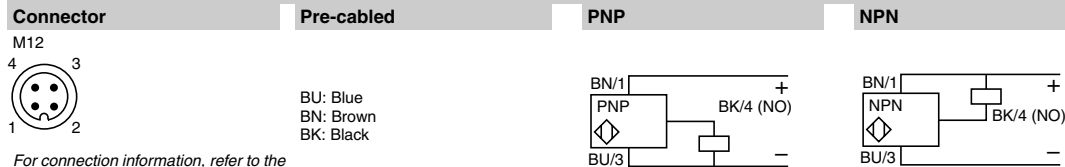
Proximity Sensors

XS Inductive Sensors, Osiprox[®] Food and Beverage Processing

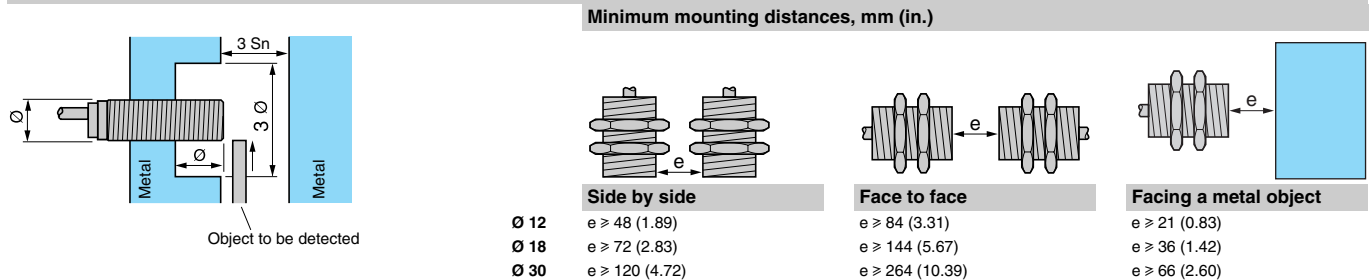
Cylindrical, Plastic, Non-Flush-Mountable, Three-Wire DC, Solid-State Output

Specifications		XS2**AA**M12	XS2**AA**L2
Sensor type			
Product certifications/approvals		UL, CSA, cE	
Connection	Connector	M12	—
	Pre-cabled	—	Length: 2 m (6.6 ft)
Operating zone	Ø 12	mm (in.)	0–5.6 (0–0.22)
	Ø 18	mm (in.)	0–9.6 (0–0.38)
	Ø 30	mm (in.)	0–17.6 (0–0.69)
Differential travel		%	1–15 of real sensing distance (Sr)
Degree of protection	Conforming to IEC 60529	IP67	IP68, double insulation
	DIN 40050	IP69 K	
Storage temperature		°C (°F)	-40 to +85 (-40 to +185)
Operating temperature		°C (°F)	-25 to +85 (-13 to +185)
Materials	Case	PPS	
	Cable	—	PvR and 3 x 0.34 mm ²
Vibration resistance	Conforming to IEC 60068-2-6	25 gn, amplitude ± 2 mm (@ 10 to 55 Hz)	
Shock resistance	Conforming to IEC 60068-2-27	50 gn, duration 11 ms	
Output state indication		Yellow LED: annular	
Rated supply voltage	Vdc	12–48 at -25 to +70 °C (-13 to +158 °F)	
	Vdc	12–24 at +70 to +85 °C (158 to +185 °F)	
Voltage limits (including ripple)	Vdc	10–58 at -25 to +70 °C (-13 to +158 °F)	
	Vdc	10–36 at +70 to +85 °C (158 to +185 °F)	
Switching capacity		mA	≤200 with overload and short-circuit protection
Voltage drop, closed state		V	≤2
Current consumption, no-load		mA	≤10
Maximum switching frequency	XS212AA***	Hz	2500
	XS218AA***	Hz	1000
	XS230AA***	Hz	500
Delays	First-up	ms	≤10
	Response	ms	≤0.2 for Ø 12; ≤0.3 for Ø 18; ≤0.6 for Ø 30
	Recovery	ms	≤0.2 for Ø 12; ≤0.7 for Ø 18; ≤1.4 for Ø 30

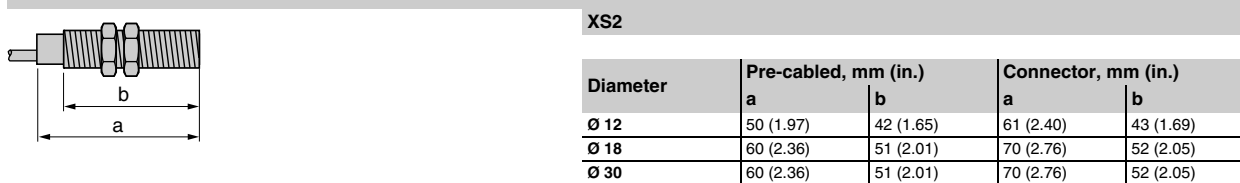
Wiring diagrams



Setup



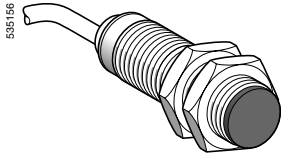
Dimensions



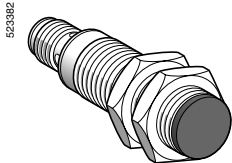
Proximity Sensors

XS Inductive Sensors, Osiprox® Food and Beverage Processing

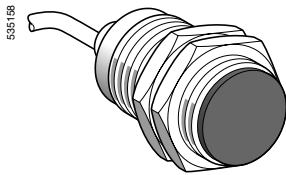
Cylindrical, Plastic, Non-Flush-Mountable, Two-Wire AC or DC



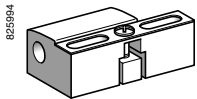
XS218AAM•L2



XS230AAM•L2



XS230AAM•L2



XSZB118

Ø 18, threaded M18 x 1

Sensing distance (Sn), mm (in.)	Function	Connection	Catalog Number	Weight, kg (lb)
12 (0.47)	NO	Pre-cabled, 2 m (6.6 ft) (1)	XS218AAMAL2	0.100 (0.220)
		1/2"-20UNF connector	XS218AAMAU20	0.040 (0.088)

Ø 30, threaded M30 x 1.5

Sensing distance (Sn), mm (in.)	Function	Connection	Catalog Number	Weight, kg (lb)
22 (0.87)	NO	Pre-cabled, 2 m (6.6 ft) (1)	XS230AAMAL2	0.140 (0.309)
		1/2"-20UNF connector	XS230AAMAU20	0.080 (0.176)

Accessories (2)

Description		Catalog Number	Weight, kg (lb)
Fixing clamps	Ø 18	XSZB118	0.010 (0.022)
	Ø 30	XSZB130	0.020 (0.044)

Connecting cables

Description	Type	Cable length, m (ft)	Catalog Number	Weight, kg (lb)
Pre-wired connectors 1/2"-20UNF 3-pin female, stainless steel 316 L clamping ring	Straight	5 (16.4)	XZCPA1865L5	0.180 (0.40)
		10 (32.8)	XZCPA1865L10	0.350 (0.77)
	Elbowed	5 (16.4)	XZCPA1965L5	0.180 (0.40)
		10 (32.8)	XZCPA1965L10	0.350 (0.77)

- For a 5 m (16.4 ft) cable replace, L2 with L5; for a 10 m (32.8 ft) cable, replace L2 with L10.
Example: XS218AAMAL2 becomes XS218AAMAL5 with a 5 m cable.
- For further information, see page 284.

Proximity Sensors

XS Inductive Sensors, Osiprox[®] Food and Beverage Processing

Cylindrical, Plastic, Non-Flush-Mountable, Two-Wire AC or DC

Specifications		XS2**AAM•U20	XS2**AAM•L2
Sensor type			
Product certifications/approvals		UL, CSA, cE	
Connection	Connector	1/2"-20UNF	—
	Pre-cabled	—	Length: 2 m (6.6 ft)
Operating zone	Ø 18	mm 0–9.6	
	Ø 30	mm 0–17.6	
Differential travel		%	1–15 of real sensing distance (Sr)
Degree of protection	Conforming to IEC 60529	IP67	IP68, double insulation □
	DIN 40050	IP69K	
Storage temperature		°C (°F) -40 to +85 (-40 to +185)	
Operating temperature		°C (°F) -25 to +85 (-13 to +185)	
Materials	Case	PPS	
	Cable	—	PvR and 2 x 0.34 mm ²
Vibration resistance		25 gn, amplitude ± 2 mm (@ 10 to 55 Hz)	
Shock resistance		50 gn, duration 11 ms	
Output state indication		Yellow LED: annular	
Rated supply voltage		Vac Vdc	24–240 (AC: 50/60 Hz)
Voltage limits (including ripple)		Vac Vdc	20–264
Switching capacity		mA	AC: 5–300; DC: 5–200 (I)
Voltage drop, closed state		V	≤ 5.5
Residual current, open state		mA	≤ 0.8
Maximum switching frequency	XS218AAM***	Hz	AC: 25; DC: 1000
	XS230AAM***	Hz	AC: 25; DC: 300
Delays	First-up	ms	≤ 30
	Response	ms	≤ 0.5
	Recovery	ms	≤ 0.5 XS218AAM***, ≤ 2 XS230AAM***

1. It is essential to connect a 0.4 A quick-blow fuse in series with the load.

Wiring diagrams

Connector
1/2"-20UNF

Pre-cabled

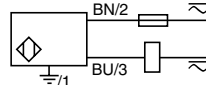


AC/DC: 2
⊥: 1
AC/DC: 3

BU: Blue
BN: Brown

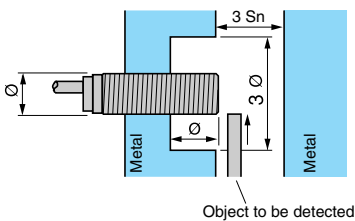
For connection information, refer to the Cabling section beginning on page 625.

2-wire ~ or —
NO output

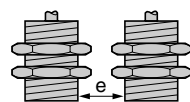


⊥: on connector models only

Setup

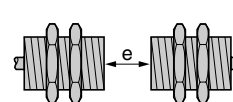


Minimum mounting distances, mm (in.)



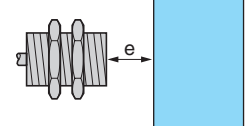
Side by side

Ø 18 e ≥ 72 (2.83)
Ø 30 e ≥ 120 (4.72)



Face to face

e ≥ 144 (5.67)
e ≥ 264 (10.39)

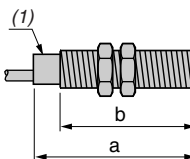


Facing a metal object

e ≥ 36 (1.42)
e ≥ 66 (2.60)

Dimensions

XS2



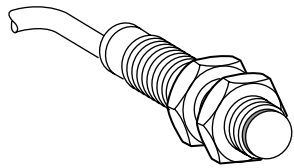
1. LED

Diameter	Pre-cabled, mm (in.)		Connector, mm (in.)	
	a	b	a	b
Ø 18	60 (2.36)	51 (2.01)	70 (2.76)	52 (2.05)
Ø 30	60 (2.36)	51 (2.01)	70 (2.76)	52 (2.05)

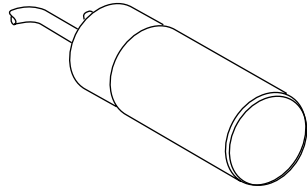
Proximity Sensors

XT Capacitive Sensors

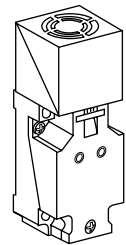
12 mm, 18 mm, 30 mm, 32 mm and Limit Switch Style; AC and DC



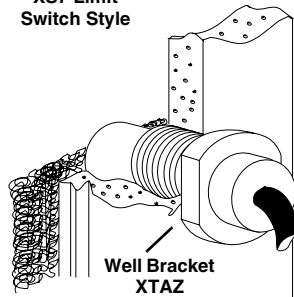
XT1/4 Threaded



XT1/4 Smooth



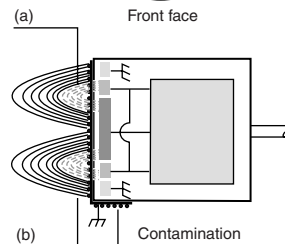
XS7 Limit Switch Style



Well Bracket XTAZ Level Detection



Front face



- Main electrode
 - Earth electrode
 - Compensation electrode
- (a) : compensation field (suppression of external contamination)
 (b) : main electric field

Features

Capacitive proximity sensors are ideal for sensing non-metal objects or for level control of fluids and granular material. A special wall-mounting bracket has been designed to replace thick or metal walls that the sensor cannot penetrate. The actual sensing range varies widely depending on the target material and environmental conditions (humidity, dust, etc.).

An internal compensation electrode is incorporated to suppress the effects of material deposits on the sensor's face. The threshold level is adjustable via a 20-turn potentiometer (except 12 mm) located at the rear of the switch. This adjustment can be used to zero out the presence of a plastic tube allowing the switch to sense through a bulk material or liquid level.

Other features include: metal housing (nickel-plated brass) or plastic housing (PBT); flush mountable in metal (except XT4); LED indication for output in closed state; mounting nuts included for threaded models; mounting bracket included for non-threaded versions, well-mounting brackets optional; sensitivity adjustment tool included; UL and CSA; CE mark.

Nominal Sensing Distance	AC or DC	Output Mode	Circuit Type	Voltage Range	Operating Frequency	Catalog Number
--------------------------	----------	-------------	--------------	---------------	---------------------	----------------

12 mm diameter, 2 m (6.6 ft) cable, Non-Adjustment

Flush Mountable—Threaded Metal Case

2 mm	DC	N.O.	PNP	12–24 V	100 Hz	XT1M12PA372
2 mm	DC	N.C.	PNP	12–24 V	100 Hz	XT1M12PB372
2 mm	DC	N.O.	NPN	12–24 V	100 Hz	XT1M12NA372

18 mm diameter, 2 m (6.6 ft) cable, with Sensitivity Adjustment

Flush Mountable—Threaded Metal Case

5 mm	AC	N.O.	2-wire	24–240 V	25 Hz	XT1M18FA262
5 mm	AC	N.C.	2-wire	24–240 V	25 Hz	XT1M18FB262
5 mm	DC	N.O.	PNP	12–24V	100 Hz	XT1M18PA372
5 mm	DC	N.C.	PNP	12–24V	100 Hz	XT1M18PB372
5 mm	DC	N.O.	NPN	12–24V	100 Hz	XT1M18NA372

Non-Flush Mountable—Threaded Plastic Case

8 mm	AC	N.O.	2-wire	24–240 V	25 Hz	XT4P18FA262
8 mm	DC	N.O.	PNP	12–24V	100 Hz	XT4P18PA372
8 mm	DC	N.O.	NPN	12–24V	100 Hz	XT4P18NA372

30 mm diameter, 2 m (6.6 ft) cable, with Sensitivity Adjustment

Flush Mountable—Threaded Metal Case

10 mm	AC	N.O.	2-wire	24–240 V	25 Hz	XT1M30FA262
10 mm	AC	N.C.	2-wire	24–240 V	25 Hz	XT1M30FB262
10 mm	DC	N.O.	PNP	12–24V	100 Hz	XT1M30PA372
10 mm	DC	N.C.	PNP	12–24V	100 Hz	XT1M30PB372
10 mm	DC	N.O.	NPN	12–24V	100 Hz	XT1M30NA372

Non-Flush Mountable—Threaded Plastic Case

15 mm	AC	N.O.	2-wire	24–240 V	25 Hz	XT4P30FA262
15 mm	AC	N.C.	2-wire	24–240 V	25 Hz	XT4P30FB262
15 mm	DC	N.O.	PNP	12–24V	100 Hz	XT4P30PA372
15 mm	DC	N.O.	NPN	12–24V	100 Hz	XT4P30NA372

32 mm diameter, 2 m (6.6 ft) cable, with Sensitivity Adjustment

Flush Mountable—Smooth Plastic Case

15 mm	AC	N.O.	2-wire	110–220 V	10 Hz	XT1L32FA262
15 mm	AC	N.C.	2-wire	110–220 V	10 Hz	XT1L32FB262

Non-Flush Mountable—Smooth Plastic Case

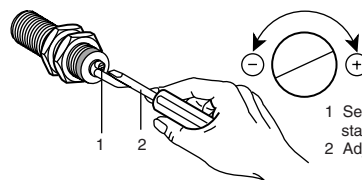
20 mm	AC	N.O.	2-wire	110–220 V	10 Hz	XT4L32FA262
20 mm	AC	N.C.	2-wire	110–220 V	10 Hz	XT4L32FB262

Limit Switch Style, 0.5 in. (12.7 mm) NPT, with Sensitivity Adjustment

Flush Mountable—Plastic Case

15 mm	AC	N.O. or N.C.	2-wire	24–240 V	25 Hz	XT7C40FP262
15 mm	DC	N.O. / N.C.	PNP	12–24V	100 Hz	XT7C40PC440
15 mm	DC	N.O. / N.C.	NPN	12–24V	100 Hz	XT7C40NC440

Sensitivity Adjustment



- 1 Sensitivity adjustment potentiometer and output state indicator (yellow LED)
- 2 Adjustment using screwdriver

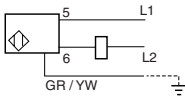
Proximity Sensors

XT Capacitive Sensors

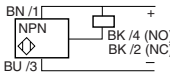
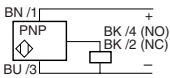
12 mm, 18 mm, 30 mm, 32 mm and Limit Switch Style; AC and DC

Wiring

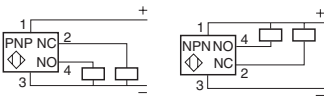
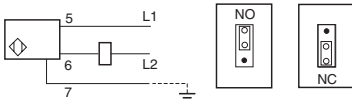
2-wire AC, N.O. or N.C. output
XT1L32F●262, XT4L32F●262



3-wire DC, N.O. or N.C. output
XT1M12F●A372, XT1M12PB372



2-wire AC, programmable
N.O. or N.C. output depending on
position of jumper XT7C40FP262



Specifications

Mechanical				
Standard Temperature Range	-13 to +158 °F (-25 to +70 °C)			
Enclosure Rating	NEMA Type	4, 4X, 6, 6P, 12, 13 (Except Smooth Case 4, 4X, 6, 12)		
	IEC	IP67 (Except Smooth Case—IP63)		
Differential (% of Sr.)	20%			
Repeatability (% of Sr.)	10%			
Electrical		AC Models (All)	Smooth	DC Models
Voltage Range		24–240 V	110–220 V	12–24 V
Voltage Limit		20–264 V	90–250 V	10–38 V
Voltage Drop (Across Switch) Closed State		5.5 V	9 V	2 V
Minimum Load Current		5 mA	15 mA	0 mA
Maximum Load Current	Tubular	300 mA	250 mA (Ue=110 V*)	300 mA
	Limit Switch	350 mA	—	200 mA
Current Consumption (No Load)		—	—	10 mA
Residual Leakage Current		1.5 mA at 120 V	7 mA	—
On Delay Maximum	Tubular	50 ms	50 ms	5 ms
	Limit Switch	20 ms	—	5 ms
Off Delay Maximum	Tubular	50 ms	15 ms	5 ms
	Limit Switch	30 ms	—	5 ms
Power-up Delay Maximum	Tubular	300 ms	300 ms	30 ms
	Limit Switch	150 ms	—	30 ms
Protective Circuitry	Electrostatic Discharges	IEC 60947-5-2 and NEMA ICS 5, Part 4		
	Radio Magnetic Fields			
	Fast Transients			
	Impulse Voltage			
Agency Listings	E 164869 CCN NRKH	LR 44087 Class 3211 03		

* Maximum load current 150 mA when Ue=220 V.

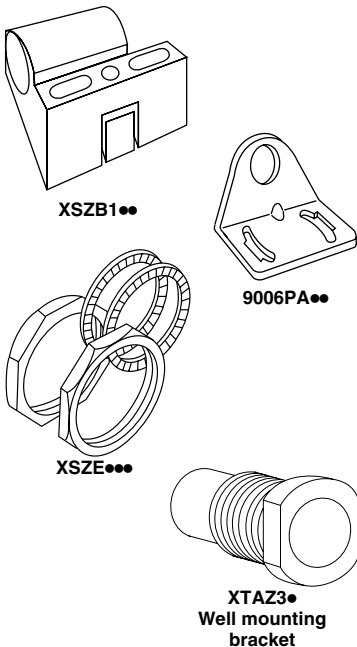
The operating distance of the sensor is related to the dielectric constant ($\epsilon\gamma$) of the object material to be detected. The higher the value of $\epsilon\gamma$, the easier it will be for the object to be detected.

NOTE: Do not use this product in an environment with dew or condensation.

The usable sensing distance depends on the object material: $S_u = S_n \times F_c$

S_u = usable sensing distance; **S_n** = nominal sensing distance; **F_c** = correction coefficient for the object material

Example: Sensor XT1M30PA372 used to detect a rubber object: $S_n = 10 \text{ mm}$, $F_c = 0.3$
 $S_u = 10 \text{ mm} \times 0.3 = 3 \text{ mm}$



Material	$\epsilon\gamma$	F _c	Material	$\epsilon\gamma$	F _c	Material	$\epsilon\gamma$	F _c
Acetone	20	0.8	Glass	3–10	0.3–0.7	Polystyrene	3	0.3
Air	1	0	Marble	6–7	0.5–0.6	Porcelain	5–7	0.4–0.5
Alcohol	24	0.85	Mica	6–7	0.5–0.6	Powered Milk	3.5–4	0.3–0.4
Ammonia	15–25	0.75–0.85	Nylon	4–5	0.3–0.4	Rubber	2.5–3	0.3
Cement (powder)	4	0.35	Oil	2.2	0.2	Salt	6	0.5
Cereals	3–5	0.3–0.4	Paper	2–4	0.2–0.3	Sand	3–5	0.3–0.4
Damp wood	10–30	0.7–0.9	Paraffin	2–2.5	0.2	Sugar	3	0.3
Dry wood	2–7	0.2–0.6	Petrol	2.2	0.2	Teflon®	2	0.2
Ethylene glycol	38	0.95	Plexiglass	3.2	0.3	Vaseline	2–3	0.2–0.3
Epoxy resin	4	0.36	Polyester resin	2.8–8	0.2–0.6	Water	80	1
Flour	2.5–3	0.2–0.3						

Accessories

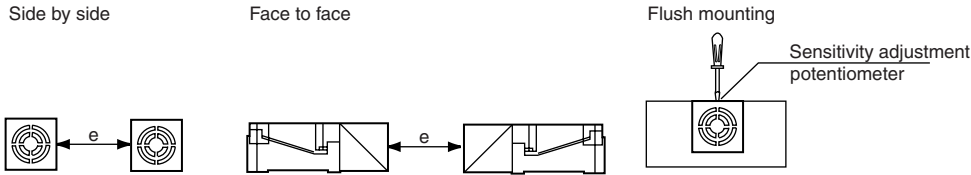
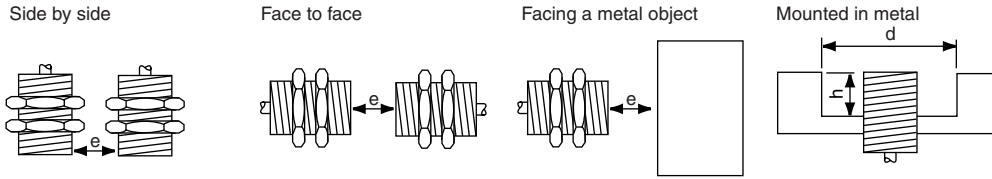
Size	Description	Catalog Number
18 mm	Mounting nuts	Plastic XSZE218
		Metal XSZE118
	Mounting bracket	Plastic XSZB118
		Metal 9006PA18
30 mm	Mounting nuts	Plastic XSZE230
		Metal XSZE130
	Mounting bracket	Plastic XSZB130
		Metal 9006PA30
32 mm	Well	XTAZ30
	Well	XTAZ32
32 mm	Mounting bracket	Surface XUZB32

Proximity Sensors

XT Capacitive Sensors

12 mm, 18 mm, 30 mm, 32 mm and Limit Switch Style; AC and DC

Minimum Mounting Clearances



To avoid influence of the immediate surroundings it may be necessary to reduce the sensitivity when flush mounting the sensor.

Minimum Mounting Clearances		Side by Side mm (in.)	Face to Face mm (in.)	Facing a Metal Object mm (in.)	Mounting in Metal mm (in.)
XT1 Flush Mountable	18 mm	e: 0	e: 30 (1.18)	e: 30 (1.18)	d: 18 (0.71) h: 0
	30 mm	e: 0	e: 60 (2.36)	e: 60 (2.36)	d: 30 (1.18) h: 0
	32 mm	e: 0	e: 100 (3.94)	e: 100 (3.94)	d: 32 (1.26) h: 0 x: 2 (0.07)
XT4 Non-Flush Mountable	18 mm	e: 40 (1.57)	e: 50 (1.97)	e: 80 (3.15)	d: 18 (0.71) h: 0
	30 mm	e: 60 (2.36)	e: 80 (3.15)	e: 100 (3.94)	d: 90 (3.54) h: 20 (0.79)
	32 mm	e: 60 (2.36)	e: 100 (3.94)	e: 100 (3.94)	d: 96 (3.78) h: 25 (0.98)
XT7 Limit Switch Style	e: 40 (1.57)	e: 120 (4.72)			

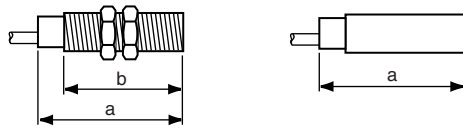
Proximity Sensors

XT Capacitive Sensors

12 mm, 18 mm, 30 mm and Limit Switch Style; AC and DC

Dimensions, mm (in.)

XT1/4

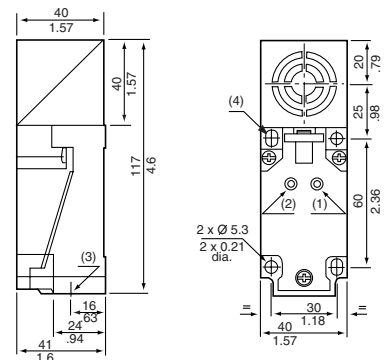


Dimensions, mm (in.)	a	b
XT●M18	60 (2.36)	51 (2.03)
XT●M30	60 (2.36)	51 (2.03)
XT●M32	80 (3.15)	n/a

a = Overall
b = Threaded Section

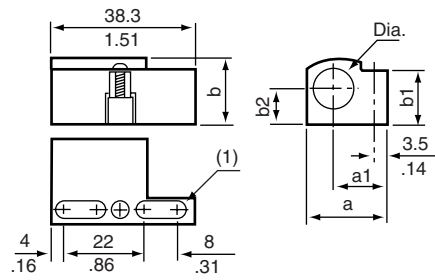
- (1) Output LED
- (2) Supply LED (depending on model)
- (3) 1 entry threaded for 0.5 NPT
- (4) 2 elongated holes 5.3 x 7 mm (0.21 x 0.28 in.)

XT7



Accessories Dimensions (mm/in.)

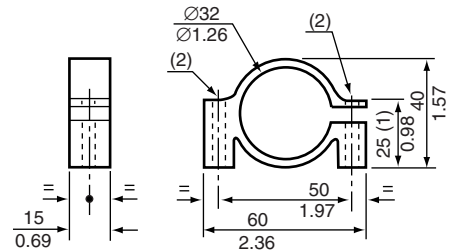
XSZB112, B118, B130



XSZ	a	a1	b	b1	b2	Dia.
B112	21.9 0.86	14.5 0.57	.16 0.63	15.5 0.61	8.5 0.33	12
B118	26 1.02	15.7 0.62	.22 0.87	20.1 0.80	11.5 0.45	18
B130	39 1.53	21.7 0.85	35.5 1.40	.31 1.22	18.5 0.73	30

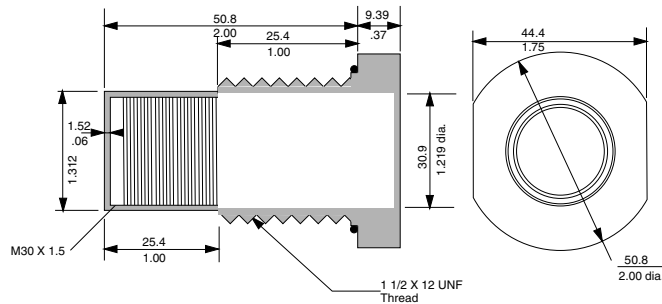
(1) 2 elongated holes 4 x 8 mm (0.16 x 0.31 in)

XUZB32

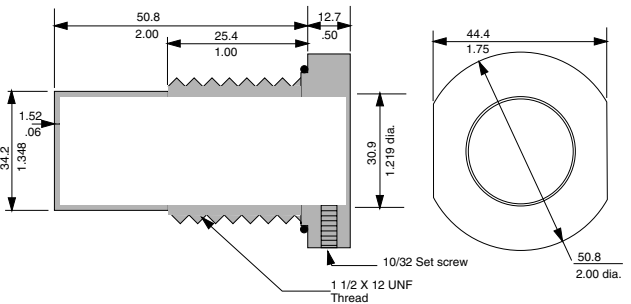


- (1) maximum value
 - (2) 2 holes \varnothing 5.5 mm (0.22 in)
- Clamp supplied with two M5 screws, HM head

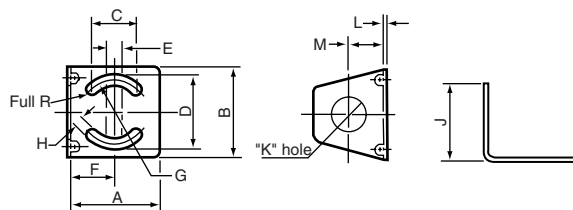
XTAZ30



XTAZ32

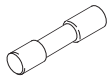


9006PA**

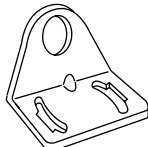


Type	A		B		C		D		E		F		G		H		J		K		L		M	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
PA30	2.54	67	2.56	65	1.39	35	1.99	51	0.39	10	1.28	33	1.97	50	0.21	5	2.05	52	1.20	31	0.08	2	0.98	25
PA18	2.05	52	1.97	50	0.98	25	1.60	41	0.39	10	0.98	25	1.38	35	0.21	5	1.65	42	0.73	19	0.08	2	0.79	20
PA12	1.38	35	1.57	40	0.69	18	1.20	31	0.39	10	0.69	18	0.98	25	0.21	5	1.28	33	0.49	13	0.08	2	0.71	18

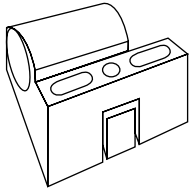
Proximity Sensors XS Inductive Sensors Mounting Accessories



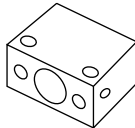
XUZE08



9006PA●●



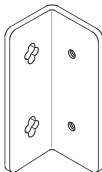
XSZB1●●



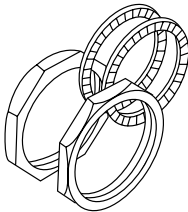
8316●●



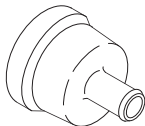
XSEZ01



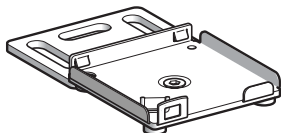
XSEZ02



XSZE●●●



XSZP1●●



XSZB00

Protective fuses

For AC and AC/DC proximity sensors that do not incorporate overload and short circuit protection, using a quick-blow fuse connected in series with the sensor is recommended.

Description	Quantity	Catalog Number
0.6 A quick-blow cartridge fuse (5 x 20) (XSB proximity sensors) (Use with Class 9080 Type FB, IEC 5 x 20 fuseholder—see Digest)	Sold in lots of 10	XUZE06
0.8 A quick-blow cartridge fuse (5 x 20) (XS dia. 8, 12, 18, 30, and XSD proximity sensors) (Use with Class 9080 Type FB, IEC 5 x 20 fuseholder—see Digest)	Sold in lots of 10	XUZE08

Mounting brackets

Description	Sensor Diameter	For use with	Catalog Number
Plastic mounting bracket for tubular inductive proximity sensors	4 unthreaded	XS1L04	XSZB104
	5 (M5 x 0.5)	XS1N05	XSZB105
	6.5 unthreaded	XS1L06, XS2L06	XSZB165
	8 (M8 x 1)	XS1, XS2, XS4	XSZB108
	12 (M12 x 1)	XS1, XS2, XS4	XSZB112
	18 (M18 x 1)	XS1, XS2, XS4	XSZB118
Steel mounting bracket, 90° for tubular inductive proximity sensors	30 (M30 x 1.5)	XS1, XS2, XS4	XSZB130
	12 (M12 x 1)	XS1, XS2, XS4	9006PA12
	18 (M18 x 1)	XS1, XS2, XS4	9006PA18
Diecast zinc mounting bracket for tubular sensors, 4–12 mm dia.	30 (M30 x 1.5)	XS1, XS2, XS4	9006PA30
	4 mm	XS1L04	831604
	5 mm	XS1L05	831605
	6 mm	XS1L06, XS2L06	831606
	8 mm	XS1, XS2, XS4	831608
Metal plate bracket for XSE sensors	12 mm	XS1, XS2, XS4	831612
	Straight	XSE	XSEZ01
	Right angled	XSE	XSEZ02

Mounting nuts

Description	Sensor Diameter	For use with	Catalog Number
2 Zamac nuts, nickel and chromium plated, with 2 lockwashers	5 (M5 x 0.5)	XS1N05	XSZE105
	8 (M8 x 1)	XS1, XS2	XSZE108
	12 (M12 x 1)	XS1, XS2	XSZE112
	18 (M18 x 1)	XS1, XS2	XSZE118
	30 (M30 x 1.5)	XS1, XS2	XSZE130
2 plastic nuts	8 (M8 x 1)	XS4	XSZE208
	12 (M12 x 1)	XS4	XSZE212
	18 (M18 x 1)	XS4	XSZE218
	30 (M30 x 1.5)	XS4	XSZE230
Stainless steel mounting nuts	12 (M12 x 1)	XS1, XS2	XSZE312
	18 (M18 x 1)	XS1, XS2	XSZE318
	30 (M30 x 1.5)	XS1, XS2	XSZE330
Stainless steel locknut washers	8 (M8 x 1)	XS1, XS2	XSZE908
	12 (M12 x 1)	XS1, XS2	XSZE912
	18 (M18 x 1)	XS1, XS2	XSZE918
	30 (M30 x 1.5)	XS1, XS2	XSZE930
Protective cable end, (CNOMO type)	12	XS1, XS2, XS4	XSZP112
	18	XS1, XS2, XS4	XSZP118
	30	XS1, XS2, XS4	XSZP130
Flat mounting plate	—	XS•J	XSZBJ00
	—	XS•F	XSZBF00
	—	XS•E	XSZBE00
	—	XS•C	XSZBC00
	—	XS•D	XSZBD00
	—	XS•J	XSZBJ90
	—	XS•F	XSZBF90
	—	XS•E	XSZBE90
90° angle flat mounting plate	—	XS•C	XSZBC90
	—	XS•D	XSZBD90
	—	XS•E	XSZBE10
	—	XS•C	XSZBC10
Substitution mounting bracket	—	XS•D	XSZBD10
	—	XS•E	XSZBE10
	—	XS•C	XSZBC10
Protective cover	—	XS•D	XSZED10
	—	XS•C	XSZEC10
	—	XS•E	XSZEE10

Proximity Sensors

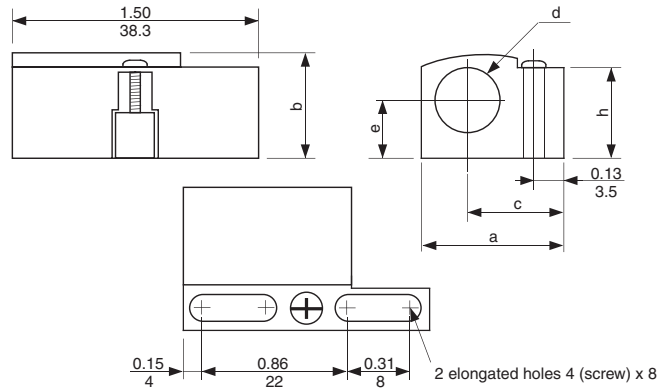
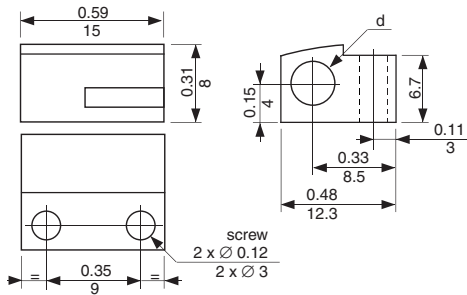
XS Inductive Sensors

Dimensions

Mounting brackets

XSZB104/105

XSZB165/108/112/118/130

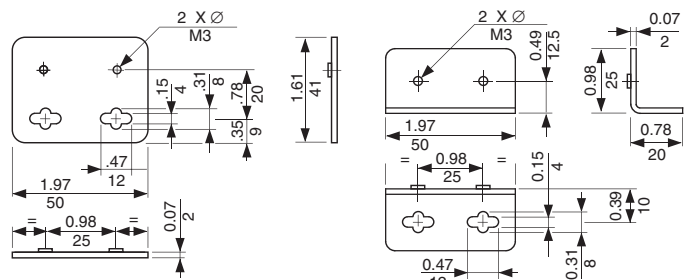


See the table below for additional dimensions.

Sensors	Brackets	a		b		c		d		e		h	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
4 mm Unthreaded	XSZB104	—	—	—	—	—	—	0.15	4.0	—	—	—	
5 mm	XSZB105	—	—	—	—	—	—	0.19	5.0	—	—	—	
6.5 mm Unthreaded	XSZB165	0.78	19.9	0.55	14.0	0.57	14.5	0.25	6.5	0.29	7.5	0.49	12.5
8 mm	XSZB108	0.78	19.9	0.55	14.0	0.57	14.5	0.31	8.0	0.29	7.5	0.49	12.5
12 mm	XSZB112	0.86	21.9	0.63	16.0	0.57	14.5	0.47	12.0	0.33	8.5	0.21	15.5
18 mm	XSZB118	1.00	26.0	0.86	22.0	0.61	15.7	0.70	18.0	0.45	11.5	0.79	20.1
30 mm	XSZB130	1.53	39.0	1.40	35.5	0.85	21.7	1.18	30.0	0.72	18.5	1.20	31.0

XSEZ01

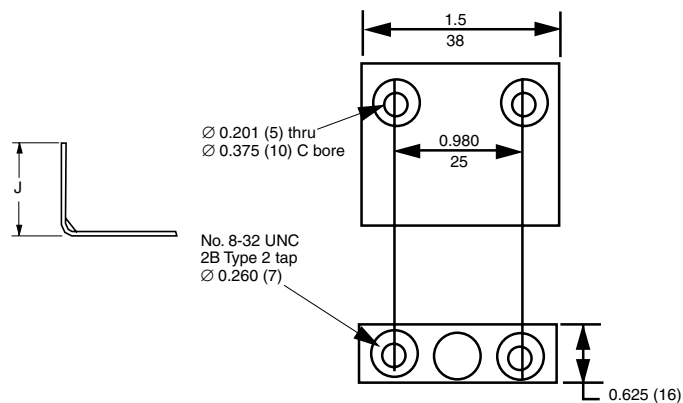
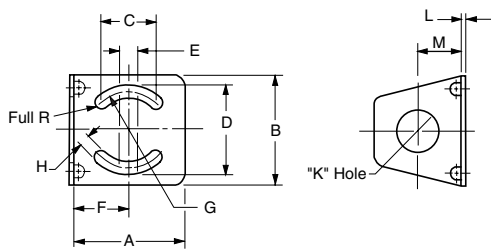
XSEZ02



Approximate Dimensions

9006PA**

8316 Bracket



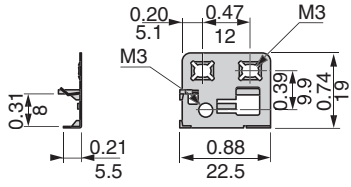
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Type	A		B		C		D		E		F		G		H		J		K		L		M	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
PA30	2.64	67	2.56	65	1.39	35	1.99	51	0.39	10	1.28	33	1.97	50	0.21	5	2.05	52	1.20	31	0.08	2	0.98	25
PA18	2.05	52	1.97	50	0.97	25	1.60	41	0.39	10	0.98	25	1.38	35	0.21	5	1.65	42	0.73	19	0.08	2	0.79	20
PA12	1.38	35	1.57	40	0.69	18	1.20	31	0.39	10	0.69	18	0.98	25	0.21	5	1.28	33	0.49	13	0.08	3	0.71	18

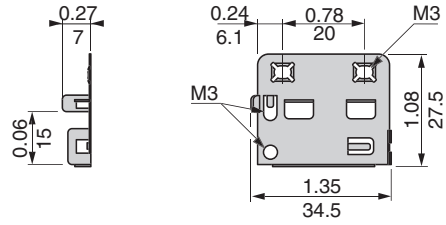
Proximity Sensors
XS Inductive Sensors
Dimensions

Proximity

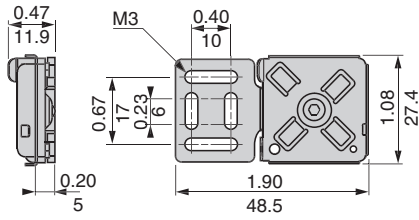
XSZBJ00



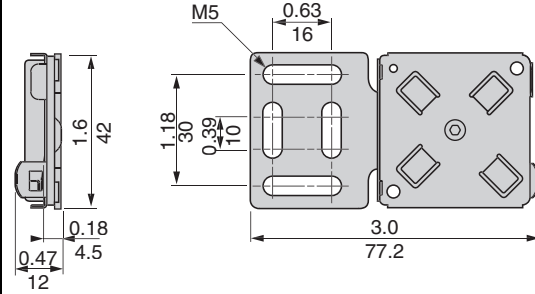
XSZBF00



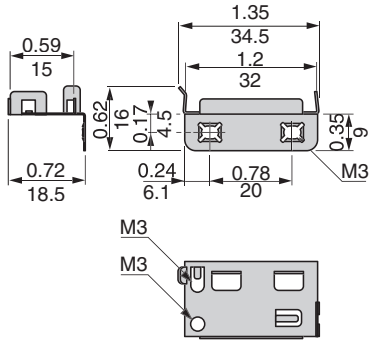
XSZBE00



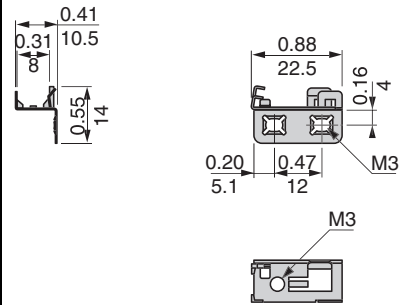
XSZBC00



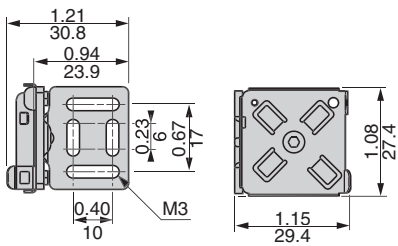
XSZBF90



XSZBJ90



XSZBE90



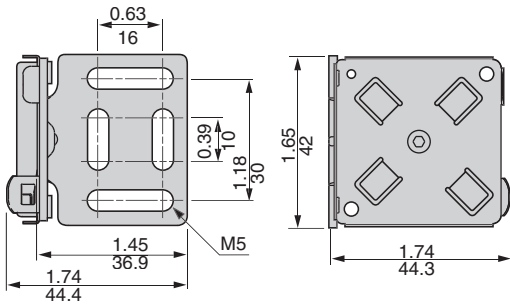
Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Proximity Sensors

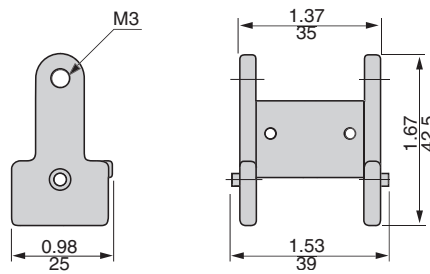
XS Inductive Sensors

Dimensions

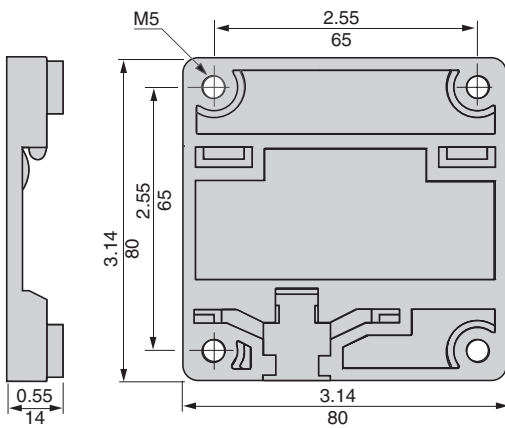
XSZBC90



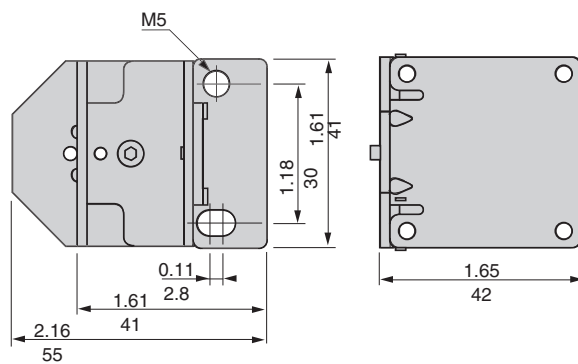
XSZBE10



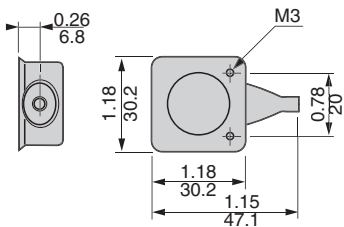
XSZBD10



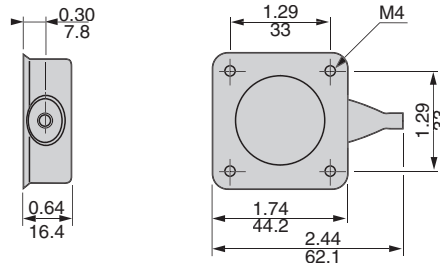
XSZBC10



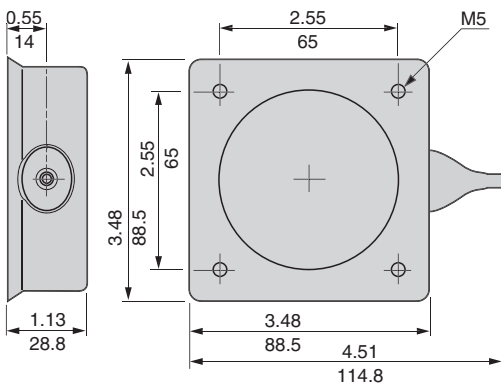
XSZEE10



XSZEC10



XSZED10



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Proximity Sensors

SG Magnet Actuated Sensors

Surface Mounted Style



Proximity

Surface-mounted, magnet-actuated sensors for industrial applications

- Sensing is independent of magnet polarity.
- Typical applications: security systems (gate interlocks), high-speed rotational counting, identification of metal bins with magnet-coded labels, sensing through non-magnetic walls.

Features

- Housing: aluminum; plastic (PBT) for SG08168 and SG28195
- Completely encapsulated in epoxy
- Very fast response time (reed output only)
- PLC-compatible AC models (triac output)
- High transients protection (AC models)
- No bouncing

Magnet-actuated proximity sensors

Circuit Type	AC ratings			DC ratings			Leakage (mA)	Dim. Figure	Wiring Figure	Catalog Number
	VA (max.)	Voltage †	Current (max.)	VA (max.)	Voltage (max.)	Current (max.)				
Reed output—DC only										
N.O.	—	—	—	10	200	0.5 A	0	1	A	SGA8016
N.O.	—	—	—	10	200	0.5 A	0	2	A	SGA8031
Reed output—DC only—Built-in resistor protection										
N.O.	—	—	—	10	200	0.5 A	0	1	A	SGA8182
Reed output—DC only—High temperature -40 to 300 °F										
N.O.	—	—	—	10	200	0.5 A	0	1	A	SGA8053
Reed output—AC and DC—Built-in RC protection										
N.C.	3	130	0.25 A	3	100	0.25 A	6 (R) ①	2	B	SGB8175
N.O.	10	130	0.5 A	10	200	0.5 A	6 (R) ①	2	A	SGA8176
N.O.	10	130	0.5 A	10	200	0.5 A	6 (R) ①	1	A	SGA8177
Triac output—AC only (inductive PLC)										
N.O.	240	120	2.0 A	—	—	—	1.7 (P) ①	3	A	SG08168 ★
N.O./N.C.	50	240	0.5 A	—	—	—	1.7 (P) ①	3	C	SG28195 ★
N.O.	50	130	0.5 A	—	—	—	1.7 (P) ①	1	A	SG08239

① PLC applications:

P = PLC compatible.

R = Bleeder resistor required.

† For reed output: maximum voltage. For triac output: nominal voltage.

★ UL Recognized

Magnet actuators

Description	Sensing distance		Catalog Number
	All ③	SG2 8195	
Tubular	1.3 in. (33 mm)	1 in. (25.4 mm)	7046
Flat bracket, center	South pole	0.7 in. (17.7 mm)	7093
Flat bracket, side	South pole	0.5 in. (12.7 mm)	7063
90° bracket	South pole	0.5 in. (12.7 mm)	7062
Block type		0.5 in. (12.7 mm)	7099
Flexible tape, 1 ft (305 mm) long		0.3 in. (7.6 mm)	7096

③ All block sensors except SG28195.

Proximity Sensors

SG Magnet Actuated Sensors

Surface Mounted Style

Wiring

Figure A (N/O)

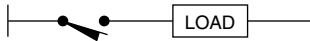


Figure B (N/C)

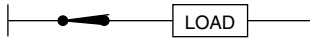
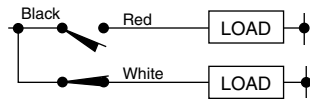


Figure C (N/O or N/C)



Specifications

Mechanical		
Standard temperature range	-40 to +140 °F (-40 to +60 °C); to 300 °F (149 °C) for SGA8053	
Enclosure ratings	NEMA Types 1, 4, 13	
Vibration resistance	20 G (10 to 2,000 Hz)	
Shock resistance	50 G for 11 ms	
Differential	Maximum 75%	
Repeatability	0.003 in.	
Electrical		
	AC (triac)	DC
Voltage drop (across switch)	2 V	0 V (IR for SGA8182) ①
Minimum load current	15 mA	—
On delay (ms)	1 ms	0.75 ms
Off delay (ms)	8 ms	0.75 ms
Cable, 3 ft (0.9 m)	#22 AWG vinyl, except: #16 AWG SJTO for SGO8168; 2 individual Teflon® #22 AWG for SGA8053	
Agency listings	E 42259 CCN NKCR2 (SGO8168 and SG28195 only)	

① Voltage drop = IR, where I = load current, R = 150 Ω

Options

Description	Cable Type	Suffix
2 m (6.6 ft) of individual wires	Teflon (SGA8053)	L02
5 m (16.4 ft) of individual wires	Teflon (SGA8053)	L05
5 m (16.4 ft) of cable	Vinyl	L05
	SJTO (SGO8168)	L05
10 m (32.8 ft) of cable for triac and models with built-in resistor	Vinyl	L10
	SJTO (SGO8168)	L10

Ex: SGO8168L05

Dimensions

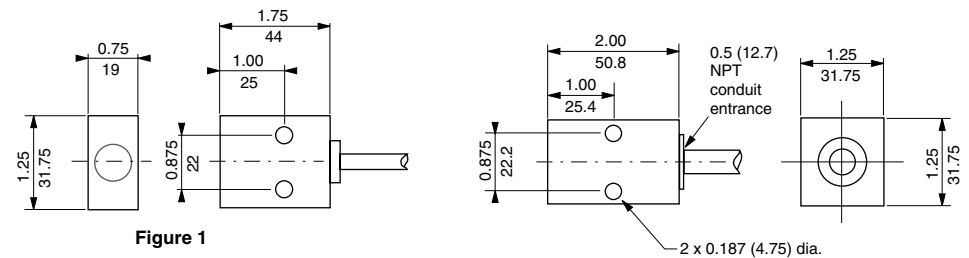


Figure 1

SGA8016
SGA8177
SGA8182
SGA8053
SGO8239

Figure 2

SGA8031
SGA8175
SGA8176

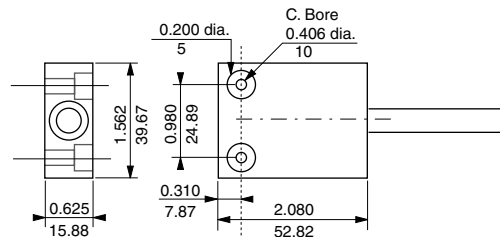


Figure 3

SGO8168
SG28195

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Proximity Sensors

SG Magnet Actuated Sensors

Limit Switch Style



Non-plug-in

Proximity

Limit-switch style, magnet-actuated proximity sensors for heavy-duty industrial applications

- Sensing independent of magnet polarity
- Typical applications: security systems (gate interlocks), high-speed rotational countings, identification

Features

- Diecast zinc housing
- Completely encapsulated in epoxy
- Plug-in models for fast replacement
- Very fast response time (reed output only)
- PLC-compatible AC models
- High transient protection
- Overload and short protection (transistor models)
- No bouncing
- 0.5 in. (12.7 mm) NPT conduit entrance
- UL recognized (except where indicated)

Circuit Type	AC ratings (inductive or resistive)			VA (max.)	DC ratings (resistive only)		Leakage (mA)	Dim. Figure	Wiring Figure	Catalog Number
	VA (max.)	Voltage (nom.)	Current (max.)		Voltage (max.)	Current (max.)				
AC triac output, non-plug-in										
N.O.	360	120	3.0 A	—	—	—	1.7 (P) ▲	1	A	SG08003
N.C.	360	120	3.0 A	—	—	—	1.7 (P) ▲	1	B	SG18004
Non-plug-in with light indicator										
N.O.	360	120	3.0 A	—	—	—	1.7 (P) ▲	1	A	SG0L8003
N.C.	360	120	3.0 A	—	—	—	1.7 (P) ▲	1	B	SG1L8004
DC, transistor output, non-plug-in										
N.O.	—	—	—	7.5	30	0.25 A	0	1	D	SG08079
N.C.	—	—	—	7.5	30	0.25 A	0	1	E	SG18056
Reed output, non-plug-in (AC model has built-in surge RC protection)										
N.O.	—	—	—	10	200	0.5 A	0	1	A	SGA8005
N.O.	15	120	1.0 A	15	250	1.0 A	6 (R) ▲	1	A	SGA8040
N.O./N.C.	—	—	—	3	200	0.25 A	0	1	C	SGC8027
N.O./N.C.	—	—	—	20	500	1.5 A	0	3	C	SGC8025

▲ (P)=PLC compatible. (R) Bleeder resistor required for PLC compatibility.

Magnet actuators, in. (mm)

Description		Sensing distance					Catalog Number
		8079	8040	8027	8025	All others	
Tubular		1.2 (30.5)	0.8 (20.3)	0.9 (23)	1.0 (25.4)	1.3 (33)	7046
Flat bracket, center	South pole	0.5 (12.7)	0.4 (10.1)	0.4 (10.1)	0.4 (10.1)	0.7 (17.7)	7093
Flat bracket, side	South pole	0.4 (10.0)	0.2 (5.1)	0.2 (5.1)	0.2 (5.1)	0.5 (12.7)	7063
90° bracket	South pole	0.4 (10.1)	0.2 (5.1)	0.2 (5.1)	0.2 (5.1)	0.5 (12.7)	7062
Block type		0.2 (5.1)	0.2 (5.1)	0.3 (7.6)	0.2 (5.1)	0.5 (12.7)	7099
Flexible type—1 ft (305 mm) long		0.1 (2.5)	—	0.2 (5.1)	0.1 (2.5)	0.3 (7.6)	7096

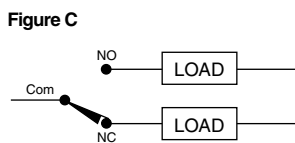
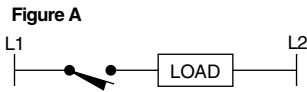
For more information, see page 276.

Proximity Sensors

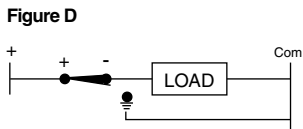
SG Magnet Actuated Sensors

Limit Switch Style

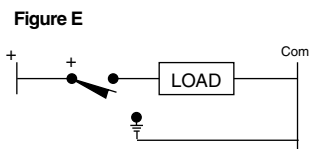
Wiring



Terminal strip marked: NO-COM-NC



SG18056 is normally closed. Connect the red terminal (+) to the power source. Connect the minus terminal (-) to the load. The housing must be connected to minus.



Specifications

General characteristics						
Temperature range	-40 to 140 °F (-40 to 60 °C)					
	-40 to 125 °F (-40 to 52 °C) for transistor models					
Enclosure ratings	NEMA Types 1, 4, 13					
Vibration resistance	20 G (10 to 2,000 Hz)					
Shock resistance	50 G for 11 ms					
Differential	Maximum 75%					
Repeatability	0.003 in.					
	AC triac	Transistor	Reed			
Voltage drop (across switch)	2 V	—	—			
Minimum load current (maximum)	15 mA	—	—			
			SGA8005 SGA8040 SGS8027 SGC8025			
On delay (maximum)	1 ms	0.75 ms	0.75	2 ms	1 ms N.O./ 1.5 ms N.C.	2 ms N.O./ 4 ms N.C.
Off delay (maximum)	—	0.75 ms	0.75	2 ms	11 ms N.O./ 1.5 ms N.C.	2 ms N.O./ 4 ms N.C.
Cable—screw terminals	#16 AWG	—				
Agency listings except where noted	E 42259 CCN NKCR2					

Options—triac models only

Description	Figure	Suffix adder
3 ft (0.9 m) 16-3 SJTO vinyl cable, epoxy sealed	A, B	320
3 ft (0.9 m) 16-3 SJTO vinyl cable, cord connector	A, B	321
3 ft (0.9 m) 16-4 SJTO vinyl cable, epoxy sealed	C, D, E	420
3-pin mini-style receptacle ①	—	347

① See page 626 for matching connector cables.

Dimensions

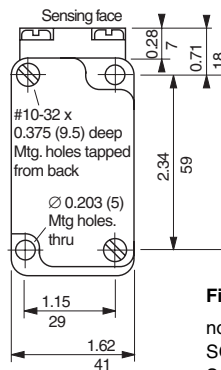


Figure 1
non-plug-in
SGA8005
SGO8003
SGC8027
SGI8056
SGO8056
SGI8004
SGO8040
SGO8079

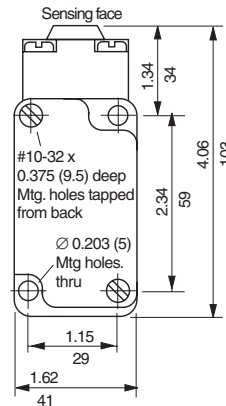
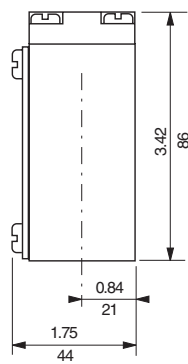
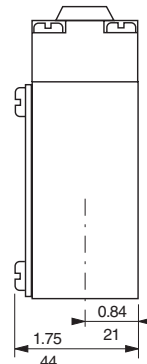


Figure 2
Style C
SGC8025



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$



Proximity Sensors

SG Magnet Actuated Sensors

Tubular Style

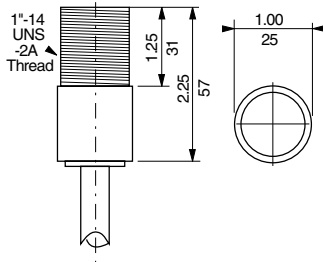


Figure 1
SGA8057
(Aluminum)
SGC8058 (PVC)
SGA8072 (PVC)
SGA8189 (Brass)

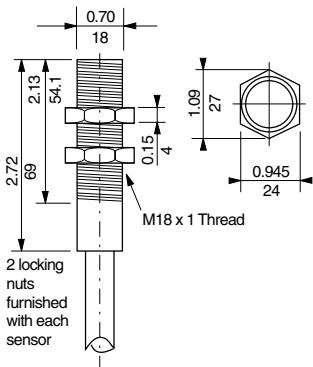


Figure 2
SGA8179
SGA8180
SGC8181

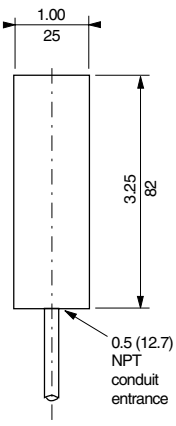


Figure 3
SGA8038

Tubular, magnet-actuated proximity sensors for heavy-duty applications such as:

- High-speed rotational counting
- Identification of metal bins with magnet-coded labels
- Sensing through non-magnetic walls

Sensing is independent of magnet polarity.

Features

- Housings: aluminum for SGA8057; plastic (PVC) for SGC8058, SGA8072, SGA8039; polyimide for SGA8179, SGA8180, SGA8181
- Completely encapsulated in epoxy
- High transient protection
- Threaded and smooth housings
- High voltage versions
- SPST and SPDT models
- No bouncing
- UL recognized (except where noted with ★).

Circuit type	AC ratings (inductive or resistive)			DC ratings (resistive only)			Leakage (mA)	Dim. Figure	Wiring Figure	Catalog Number
	VA (max.)	Voltage nominal	Current (max.)	VA (max.)	Voltage (max.)	Current (max.)				
Reed output AC and DC switching (built-in RC protection), threaded										
N.O.	15	120	1.0 A	12	48	0.25 A	6 ②	1	A	SGA8057
N.O./N.C.	15	120	1.0 A	15	100	1.0 A	6 ②	1	C	SGC8058
N.O.	15	120	1.0 A	15	250	1.0 A	6 ②	1	A	SGA8072
N.O.	25	480	1.0 A	25	480	1.0 A	.16	2	A	SGA8179 ★
Reed output—DC, threaded, resistor built-in for long cable runs ③										
N.O.	—	—	—	10	200	0.5 A	0	2	A	SGA8180 ★
N.O./N.C.	—	—	—	3	100	0.25 A	0	2	C	SGC8181 ★
Reed output—AC and DC (built-in RC protection), smooth										
1 N.O.	15	120	1.0 A	15	250	1.0 A	6 ②	3	A	SGA8038 ★

② Bleeder resistor required for PLC AC switching compatibility.

③ 150 Ω for SGA8180 and 470 Ω for SGC8181.

★ Not UL

Magnet actuators, in. (mm)

Description	Sensing distance		Catalog Number
	SGA8180	All Others	
Tubular	1.3 (33)	0.8 (20.3)	7046
Flat bracket, center	South pole	0.7 (17.8)	7093
Flat bracket, side	South pole	0.2 (5.1)	7063
90° bracket	South pole	0.2 (5.1)	7062
Block type		0.2 (5.1)	7099
Flexible tape—1 ft (305 mm) long		0.1 (2.5)	7096

For more information, see page 276.

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Proximity Sensors

SG Magnet Actuated Sensors

Tubular Style

Wiring

Figure A

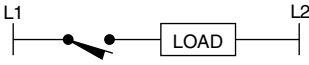
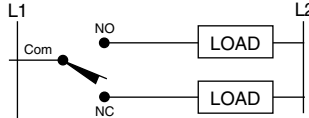



Figure C

SGC8058 and SGC8181
 Black—Com
 Blue—N.O.
 Brown—N.C.



Specifications

General characteristics			
Temperature range	-40 to 140 °F (-40 to 60 °C)		
Enclosure ratings	NEMA Types 1, 4, 13		
Vibration resistance	20 G (10 to 1000 Hz)		
Shock resistance	50 G for 11 ms		
Differential	Maximum 75% (except SGA8179 = 1.06 in. maximum)		
Repeatability	Maximum 0.003 in.		
	Reed AC and DC	SGA8180 Built-in resistor (DC)	SGC8181 Built-in resistor (DC)
Voltage drop ①	25 mV	IR	IR
On delay (maximum)	2 ms	0.75 ms	2.5 ms N.O. 3.5 ms N.C.
Cable, 3 ft (0.9 m)	22-2 vinyl: SGA8038, 8180; 23-2 vinyl SGC 8181; 16-2 SJTO: SGA8057, 8072. SO cable for SGA8179		
Agency listings except where noted	 E 42259 CCN NKCR2		

① Voltage drop = IR, where I is the load current and R the built-in resistor.

Options

Description		Suffix
5 m (16.4 ft) of cable	Vinyl	L05
	SJTO (8057, 8072, 8179)	L05
10 m (32.8 ft) of cable (for models with built-in resistor)	Vinyl	L10
	SJTO (8057, 8072, 8179)	L10

Proximity Sensors

SG Magnet Actuated Sensors

Maintained Contact

Proximity

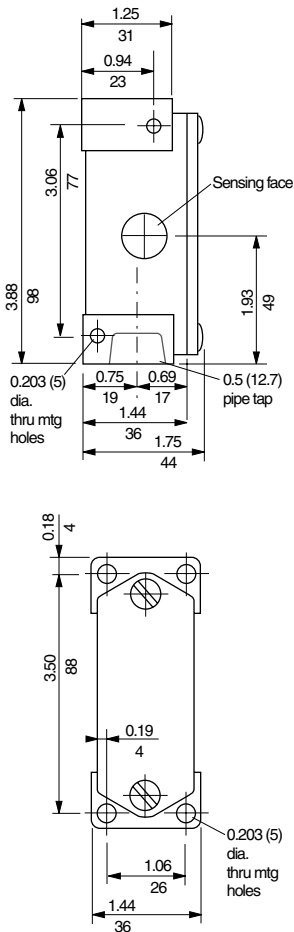


Figure 1
SGA8018
SGO8026
SGO8110
SGO8141

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Maintained contact model—A highly reliable, magnet-actuated proximity limit switch designed to maintain contact for high-speed stacker cranes, slow-down, and memory applications. Eliminates the camming required for mechanically operated limit switches.
Maintains the information even if power is down.

Features

- Diecast zinc housing
- PLC compatibility
- High transient protection
- No bouncing
- 0.5 in. (12.7 mm) NPT conduit entrance
- UL recognized and CSA certified

When the north or south pole of a magnet actuator moves past the blue-dot sensitive area within the specified range along the switch, the contact position changes from open to closed. Once latched, the movement of the same magnetic pole in the opposite direction—or the movement of the opposite magnetic pole in the same direction—unlatches the switch.

NOTE: If during this procedure the switch closes and then opens again (pulses), reverse the polarity of the magnet and repeat the above procedure. If the desired direction of operation is opposite to that established above, reverse the polarity of the magnet.

Circuit Type	AC ratings (inductive or resistive)			DC ratings (resistive only)			Leakage (mA)	Wiring Figure	Catalog Number
	VA (max.)	Voltage (nom.)	Current (max.)	VA (max.)	Voltage (max.)	Current (max.)			
Reed, DC									
1 N.O.	—	—	—	15	250	1.0 A	0	A	SGA8018
Triac, AC									
1 N.O.	360	120	3.0 A	—	—	—	1.7	A	SGO8026
Triac, AC low temperature: -30 to 85° F									
1 N.O.	360	120	3.0 A	—	—	—	1.7	B	SGO8110

Magnet actuators, in. (mm)

Description	Sensing Distance	Catalog Number
Tubular	1.3 (33)	7046
Flat bracket, center	South pole	7093
	North pole	7547
Flat bracket, side	South pole	7063
	North pole	70631
90° bracket	South pole	7062
	North pole	70621
Block type	0.5 (13)	7099
Flexible tape—1 ft (305 mm) long	0.5 (13)	7096

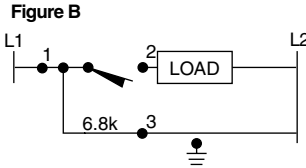
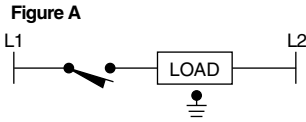
For more information, see page 276.

Proximity Sensors

SG Magnet Actuated Sensors

Maintained Contact

Wiring



Connect terminal 3 (heater) to line (L2) for operation below +32 °F.

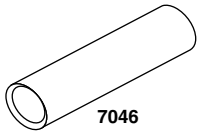
Specifications

Mechanical		
Temperature range	+32 to 140 °F (0 to 60 °C)	
	+30 to 85 °F (-35 to 30 °C) for SGO8110	
Enclosure ratings	NEMA Types 1, 4, 13	
Vibration resistance	20 G (10 to 2,000 Hz)	
Shock resistance	50 G @ 11 ms	
Differential	Maximum 50%	
Repeatability	Maximum 0.003 in.	
Electrical		
	Reed	Triac
Voltage drop	—	3 V
Minimum load current	—	15 mA
On delay	2 ms	2 ms
Off delay	2 ms	2 ms
Cable—screw terminals	—	#16 AWG
Agency Listings	E 42259 CCN NKCR2	LR 25490 Class 3211 03

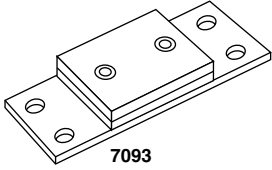
Proximity Sensors

SG Magnet Actuated Sensors

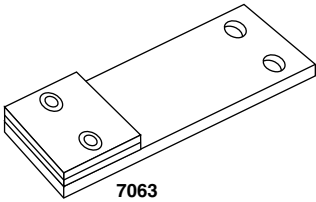
Magnet Actuators



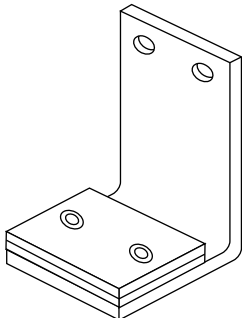
7046



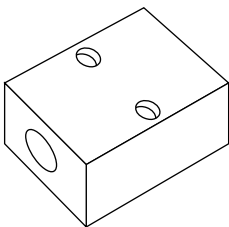
7093



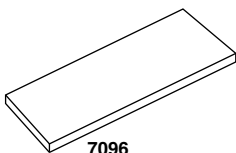
7063



7062



7099



7096

Features

- Industrial grade magnet is recommended for magnet-actuated proximity sensors.
- Alnico is used as magnet material for all rigid models.
- Kevlar is used for the flexible magnetic tape.
- The rigid models come mounted on one of several types of standard brackets for convenience (except the tubular high-power version).
- Both south and north poles are accessible and marked. *The south pole version is the standard.* North pole versions may be required in conjunction with the maintained magnetic switch (see page 294).
- For comparison, an average magnetic strength rating is listed below. Measurements were made with a Gaussmeter at 0.13 in. from the sensing surface.

Description		Magnetic Strength	Catalog Number
Tubular		700 Gauss	7046
Flat bracket, center	South pole	330 Gauss	7093
	North pole	330 Gauss	7547
Flat bracket, side	South pole	240 Gauss	7063
	North pole	240 Gauss	70631
90° bracket	South pole	260 Gauss	7062
	North pole	260 Gauss	70621
Block type		340 Gauss	7099
Flexible tape	1 ft long	180 Gauss	7096 *

* For longer tape, specify the total length in feet. Example: 70966 = 6 ft.

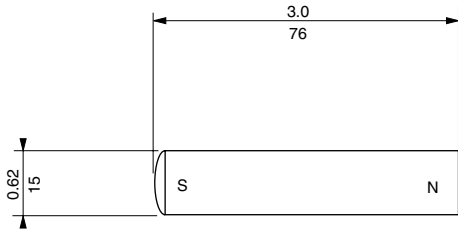
Proximity Sensors

SG Magnet Actuated Sensors

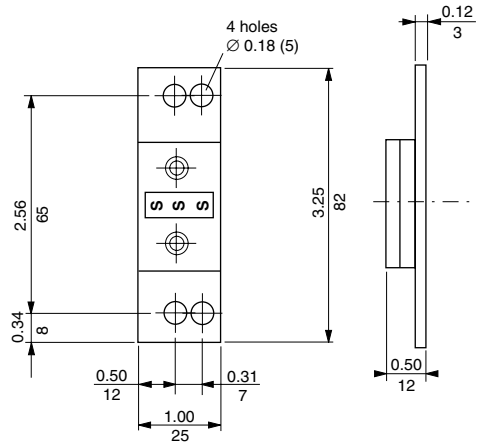
Magnet Actuators

Magnet actuator dimensions

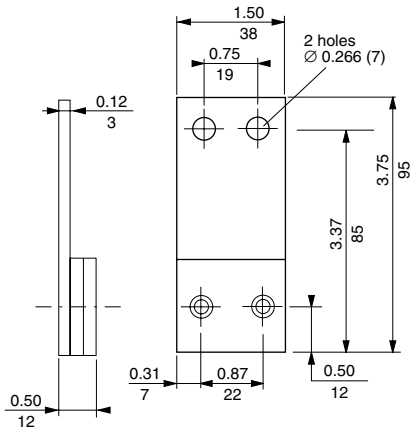
Tubular magnet actuator 7046



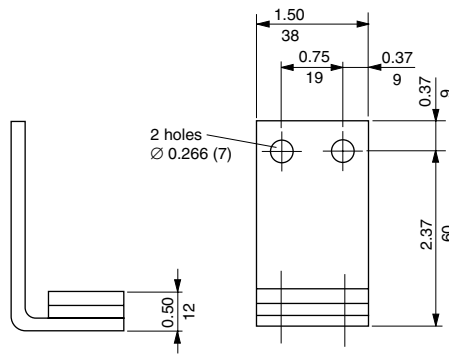
Magnet actuator 7093 (south pole)
Magnet actuator 7597 (north pole)



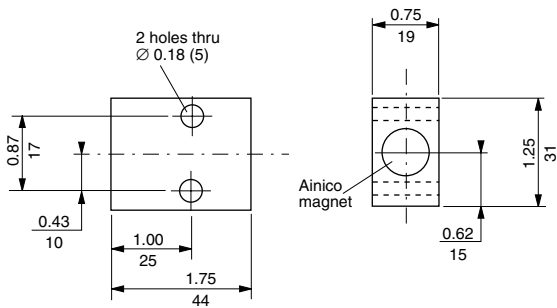
Magnetic actuator 7063 (south pole)
Magnet actuator 70631 (north pole)



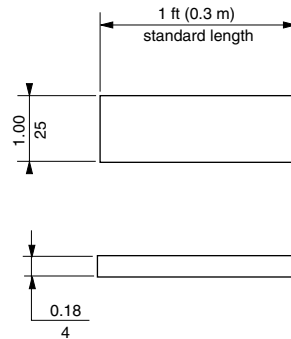
Magnet actuator 7062 (south pole)
Magnet actuator 70621 (north pole)



Block type magnet actuator 7099



Flexible magnetic tape 7096 1 foot



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Proximity

Proximity Sensors

ST Grounded Probe Switch

The touch switch is a highly reliable AC solid-state presence sensor designed for precise conductivity sensing. Applications include high temperature, light conductive, aggressive mechanical, and chemical environments that target positive end-point sensing. All models have a visible neon pilot light to indicate operation of the switch.

Features

- Diecast zinc housing
- Solid state—no moving parts
- 115 Vac, completely self-contained
- Probes up to 10 ft (3 m) long
- High current output—no relay required for most applications
- Fast response—no warm-up time
- 0.5 in. (12.7 mm) NPT conduit entrance
- UL Recognized

Operation

The switch is actuated when a conductive path is established between the probe terminal and ground (1 MΩ or less). The electrical contact to ground operates the switching thyristor. Internal RC snubber and varistor provide effective protection from typical transients. Normal open models have a 10 ms (maximum) turn on time. Different off-delay times are offered to permit compensation for relay chatter when the probe is subjected to bounce from irregular contact with the grounded metal point of contact.

NOTE: For isolated circuits where the ground is not common, the ground terminal of the switch should be connected to the neutral. The metal target to be detected by the probe should also then be wired to the neutral.

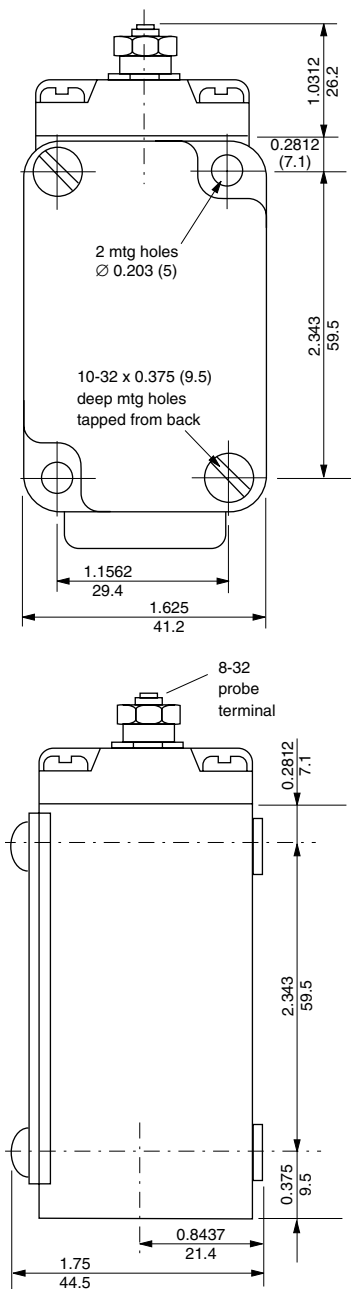
Probe characteristics

The probe terminal is an 8-32 stud protruding from the center of the head. *Extensions may be any electrically conductive wire or material suitably insulated from grounded surface and limited in length to 10 ft (3 m) or less.*

- Open voltage: 12 Vdc
- Peak current: 1 mA

Switch models

Circuit type	Voltage (nominal)	Current load (maximum)	Leakage current (maximum)	On delay	Off delay	Catalog Number
Terminal screws						
N.O.	120 Vac	3 A	1.7 mA	10 ms	100 ms	STO8164
N.C.	120 Vac	3 A	1.7 mA	100 ms	30 m s	ST18165
N.O.	120 Vac	3 A	1.7 mA	10 ms	400 ms	STO8166
N.O.	120 Vac	3 A	1.7 mA	10 ms	20 ms	STO8167
Pre-wired with 3 ft (0.9 m) of cable						
N.O.	120 Vac	3 A	1.7 mA	10 ms	100 ms	STO8001
N.C.	120 Vac	3 A	1.7 mA	100 ms	30 ms	ST18002
N.O.	120 Vac	3 A	1.7 mA	10 ms	400 ms	STO8036
N.O.	120 Vac	3 A	1.7 mA	10 ms	20 ms	STO8042

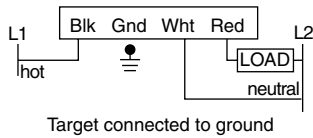


Proximity Sensors

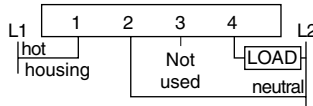
ST Grounded Probe Switch

Wiring

Cable wiring



Terminal strip wiring



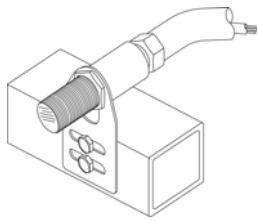
Target connected to ground.
Housing must be grounded for proper operation.

Model ST switches may be wired in series or parallel. Connect the red lead to the black lead of other switch (terminal 4 to terminal 1 of the other switch) for series operation. The voltage drop across each switch (in the closed state) does not exceed 2 Vac.

Specifications

General characteristics	
Temperature range	-40 to 158 °F (-40 to 70 °C)
Enclosure ratings	NEMA Types 1, 4, 13
Voltage drop	2 V
Maximum inrush current	10 A
Minimum load current	15 mA
Power supply current (no load)	30 mA
Cable	3 ft (0.9 m) 16-4 SJTO or terminal screws #16 AWG

Proximity Sensors
Inductive Sensor Accessories
Conduit Adapters for Tubular Sensors



XSZCAR**

Features

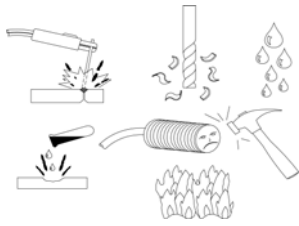
- Available for 12, 18, and 30 mm tubular sensors
- 1/2 in.—14 NPT inside thread
- Nickel-plated brass

Tube Diameter	Tube Thread Size	Dimensions, mm (in.)	Catalog Number
12 mm (0.47 in.)	M12 x 1		XSZCAR12
18 mm (0.71 in.)	M18 x 1		XSZCAR18
30 mm (1.18 in.)	M30 x 1.5		XSZCAR30

Proximity Sensors

Inductive Sensor Accessories

Face Caps for Tubular Proximity Sensors

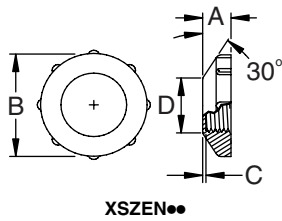


Features

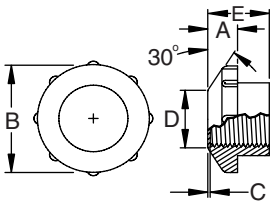
- Shielded and non-shielded caps available
- Different versions available (beveled or non-beveled)
- Provides sensor face protection with no effect on operation

Description

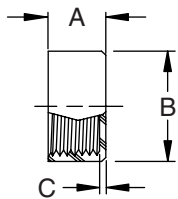
Protection in harsh applications, helps to prevent abrasions, cracks, and other possible damage to the sensor face. Available in several different materials: Ceramic, Delrin® acetal resin, and Teflon® material. Provides the sensor with protection and a longer life without the additional charge of a stainless steel face option.



XSZEN●●



XSZEN●●



XSZSC●●●●

Beveled caps (30° chamfer), mm (in.)

A	B	C	D	E	Catalog Number
8 mm diameter shielded					
5.1 (0.20)	15.1 (0.59)	0.38 (0.15)	7.00 (0.28)	—	XSZEN08
12 mm diameter shielded					
6.2 (0.26)	24.1 (0.95)	0.76 (0.03)	12.2 (0.48)	—	XSZEN12
18 mm diameter shielded					
8.2 (0.32)	31.2 (1.23)	0.76 (0.03)	17.0 (0.67)	—	XSZEN18
30 mm diameter shielded					
7.6 (0.30)	44.5 (1.75)	1.01 (0.04)	29.0 (1.19)	—	XSZEN30
8 mm diameter non-shielded					
5.1 (0.20)	14.1 (0.56)	0.38 (0.15)	7.00 (2.76)	9.60 (0.37)	XSZENN08
12 mm diameter non-shielded					
6.5 (0.26)	22.9 (0.90)	0.76 (0.03)	12.9 (0.51)	17.3 (0.68)	XSZENN12
18 mm diameter non-shielded					
8.2 (0.32)	34.0 (1.34)	0.76 (0.03)	16.6 (0.65)	17.8 (0.70)	XSZENN18
30 mm diameter non-shielded					
7.5 (0.30)	44.5 (1.75)	1.01 (0.04)	30.0 (1.18)	22.8 (0.90)	XSZENN30

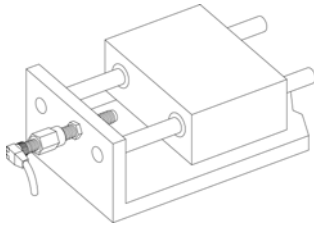
Non-beveled caps, mm (in.)

A	B	C	Catalog Number
12 mm diameter shielded			
8.90 (0.35)	16.1 (0.63)	1.26 (0.05)	XSZSC12C
8.90 (0.35)	16.1 (0.63)	0.76 (0.03)	XSZSC12D
8.90 (0.35)	16.1 (0.63)	0.76 (0.03)	XSZSC12T
18 mm diameter shielded			
8.80 (0.35)	24.4 (0.96)	1.27 (0.05)	XSZSC18D
8.80 (0.35)	24.4 (0.96)	1.27 (0.05)	XSZSC18T
12 mm diameter non-shielded			
15.2 (0.60)	16.1 (0.63)	0.76 (0.03)	XSZSC12ND
15.2 (0.60)	16.1 (0.63)	0.76 (0.03)	XSZSC12NT
18 mm diameter non-shielded			
18.0 (0.59)	24.4 (0.96)	1.27 (0.05)	XSZSC18ND
18.0 (0.59)	24.4 (0.96)	1.27 (0.05)	XSZSC18NT

Proximity Sensors

Inductive Sensor Accessories

Plunger Screw Adapters



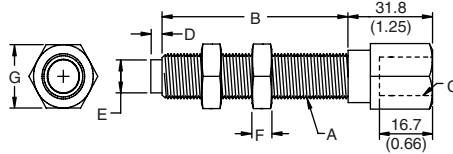
Features

- Accepts 8, 12, or 18 mm shielded sensor
- Heat-treated alloy steel construction
- Rugged stop with solid-state output

Description

Plunger screw adapters allow a shielded inductive proximity sensor to be used as a mechanical stop switch in applications requiring a precise end-of-travel signal or a hard stop. The spring requires a force of 252 g (9 oz) to actuate the sensor.

A	B	C	D	E (dia.)	F	G	Impact Force (Maximum)	Catalog Number
8 mm diameter shielded sensors								
M8x1	25 (1)	M8x1	3.16 (0.12)	5.84 (0.23)	6.26 (0.24)	11.0 (0.43)	2,000 N (450 lbf)	XSZB0825
M8x1	50 (2)	M8x1	3.16 (0.12)	5.84 (0.23)	6.26 (0.24)	11.0 (0.43)	2,000 N (450 lbf)	XSZB0850
12 mm diameter shielded sensors								
M12x1	25 (1)	M12x1	4.32 (0.17)	9.40 (0.37)	4.22 (0.17)	15.7 (0.62)	20,500 N (4,609 lbf)	XSZB1225
M12x1	50 (2)	M12x1	4.32 (0.17)	9.40 (0.37)	4.22 (0.17)	15.7 (0.62)	20,500 N (4,609 lbf)	XSZB1250
M12x1	75 (3)	M12x1	4.32 (0.17)	9.40 (0.37)	4.22 (0.17)	15.7 (0.62)	20,500 N (4,609 lbf)	XSZB1275
M12x1	100 (4)	M12x1	4.32 (0.17)	9.40 (0.37)	4.22 (0.17)	15.7 (0.62)	20,500 N (4,609 lbf)	XSZB1210
18 mm diameter shielded sensors								
M18x1	25 (1)	M18x1	4.32 (0.17)	14.2 (0.56)	4.22 (0.17)	22.1 (0.87)	45,000 N (10,116 lbf)	XSZB1825
M18x1	50 (2)	M18x1	4.32 (0.17)	14.2 (0.56)	4.22 (0.17)	22.1 (0.87)	45,000 N (10,116 lbf)	XSZB1850
M18x1	75 (3)	M18x1	4.32 (0.17)	14.2 (0.56)	4.22 (0.17)	22.1 (0.87)	45,000 N (10,116 lbf)	XSZB1875
M18x1	100 (4)	M18x1	4.32 (0.17)	14.2 (0.56)	4.22 (0.17)	22.1 (0.87)	45,000 N (10,116 lbf)	XSZB1810

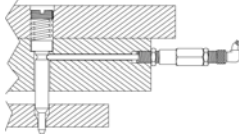


XSZB●●●●

Proximity Sensors

Inductive Sensor Accessories

Proximity Probe Adapters



Features

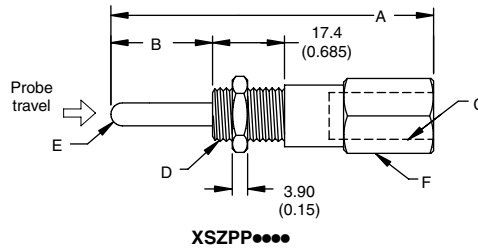
- Accepts any 8 or 12 mm shielded sensor
- Accurate and compact switching in confined areas
- Large variety of stand probe lengths and diameters

Description

Proximity probes are spring-loaded actuators designed to work with 8 mm or 12 mm tubular inductive proximity sensors. The probe and sensor combination offers increased flexibility in applications that require tight positioning.

Dimensions: mm (in.)

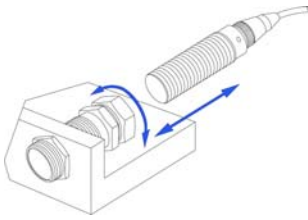
A	B	C	D	E (Dia.)	F	Catalog Number
8 mm Diameter Shielded Sensor						
75.6 (2.98)	25.0 (1.00)	M8 x 1 to depth of 21.8 (0.86)	M8 x 1	3.18 (0.125)	11.1 (0.436)	XSZPP0825
99.6 (3.92)	50.0 (2.00)	M8 x 1 to depth of 21.8 (0.86)	M8 x 1	3.18 (0.125)	11.1 (0.436)	XSZPP0850
126 (4.96)	75.0 (3.00)	M8 x 1 to depth of 21.8 (0.86)	M8 x 1	3.18 (0.125)	11.1 (0.436)	XSZPP0875
150 (5.91)	100 (4.00)	M8 x 1 to depth of 21.8 (0.86)	M8 x 1	3.18 (0.125)	11.1 (0.436)	XSZPP0810
12 mm Diameter Shielded Sensor						
75.6 (2.98)	25.0(1.00)	M12 x 1 to depth of 18.0 (0.71)	M12 x 1	6.35 (0.25)	15.8 (0.623)	XSZPP1225
99.6 (3.92)	50.0 (2.00)	M12 x 1 to depth of 18.0 (0.71)	M12 x 1	6.35 (0.25)	15.8 (0.623)	XSZPP1250
126 (4.96)	75.0 (3.00)	M12 x 1 to depth of 18.0 (0.71)	M12 x 1	6.35 (0.25)	15.8 (0.623)	XSZPP1275
150 (5.91)	100 (4.00)	M12 x 1 to depth of 18.0 (0.71)	M12 x 1	6.35 (0.25)	15.8 (0.623)	XSZPP1210



Proximity Sensors

Inductive Sensor Accessories

Quick Change Mounting Tube

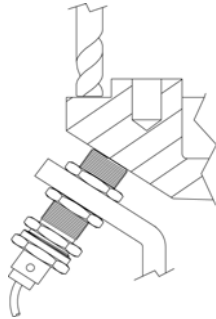


Features

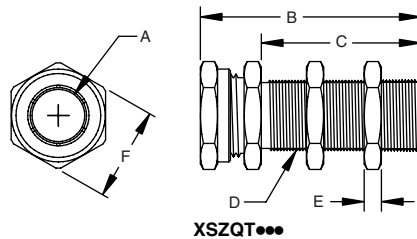
- Quick change mounting available for 8, 12, 18, and 30 mm sensors
- Short and long barrel lengths available
- One-time adjustment simplifies sensor replacement
- Protection to sensor from impact and damage
- Teflon® caps available for quick change mounts (shown below)

Description

The quick change mounting tube reduces sensor maintenance and helps prevent downtime. An internal shoulder stop and collet-style locknut precisely hold the sensor in place—helping maintain a precise sensing distance and simplifying sensor installation.



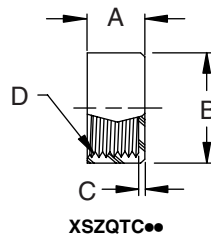
A	B	C	D	E	F	Catalog Number
8 mm diameter shielded sensors						
8.18 (0.32)	32.4 (1.28)	17.5 (0.69)	M12x1	3.85 (0.15)	16.9 (0.67)	XSZQT08
8.18 (0.32)	48.0 (1.90)	34.0 (1.34)	M12x1	3.85 (0.15)	16.9 (0.67)	XSZQTL08
12 mm diameter shielded sensors						
12.1 (0.48)	33.7 (1.34)	19.5 (0.77)	M16.5x1.5	4.01 (0.16)	21.8 (0.86)	XSZQT12
12.1 (0.48)	44.8 (1.76)	30.0 (1.18)	M16.5x1.5	4.01 (0.16)	21.8 (0.86)	XSZQTL12
18 mm diameter shielded sensor						
18.1 (0.71)	38.5 (1.52)	20.0 (0.79)	M24 x 1.5	4.95 (0.19)	30.0 (1.18)	XSZQT18
18.1 (0.71)	58.0 (2.28)	40.0 (1.57)	M24 x 1.5	4.95 (0.19)	30.0 (1.18)	XSZQTL18
30 mm diameter shielded sensors						
30.1 (1.19)	35.0 (1.50)	20.0 (0.79)	M36 x 1.5	6.13 (0.24)	41.0 (1.61)	XSZQT30
30.1 (1.19)	58.0 (2.28)	40.0 (1.57)	M36 x 1.5	6.13 (0.24)	41.0 (1.61)	XSZQTL30



Teflon caps for quick change mounting tubes

A	B	C	D	Catalog Number
8.84 (0.35)	14.8 (0.59)	0.76 (0.03)	M12x1	XSZQTC08
7.24 (0.29)	19.9 (0.75)	0.76 (0.03)	M16x1	XSZQTC12
9.00 (0.35)	28.7 (1.13)	0.76 (0.03)	M24x1.5	XSZQTC18
9.00 (0.35)	41.4 (1.63)	1.26 (0.05)	M36x1.5	XSZQTC30

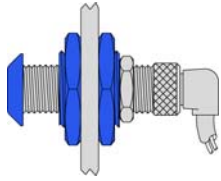
Dimensions: mm (in.)



Proximity Sensors

Inductive Sensor Accessories

Spring-loaded Tubular Sensor Mount



Dimensions: mm (in.)

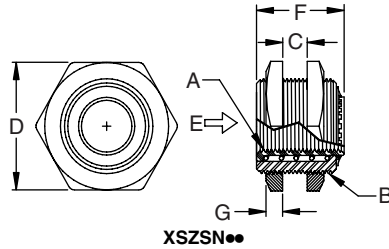
Features

- Accepts 8, 12, 18, and 30 mm shielded or non-shielded sensors
- Sensors become unaffected by accidental impact
- Shielded and non-shielded caps available (see page 301)

Description

Spring-loaded sensor mount for tubular body styles provides impact protection for the sensor against target overtravel. The mount is designed to be threaded onto a tubular sensor and held in place with one of the mounting nuts provided with the sensor. Caps are available to help protect the face of the sensor from lateral and axial impacts (see page 301).

A Inside Thread	B Outside Thread	C Maximum	D Across Flats	E Maximum Overtravel	F	G	Catalog Number
8 mm Diameter Sensors							
M8 x 1	M16 x 1.5	12.2 (0.481)	22.2 (0.875)	9.22 (0.363)	22.0 (0.867)	3.10 (0.155)	XSZSN08
12 mm Diameter Sensors							
M12 x 1	M18 x 1	10.0 (0.394)	23.9 (0.943)	12.1 (0.476)	21.3 (0.840)	3.94 (0.156)	XSZSN12LP
M12 x 1	M22 x 1.5	11.5 (0.454)	28.4 (1.12)	10.5 (0.413)	22.1 (0.871)	3.88 (0.153)	XSZSN12
18 mm Diameter Sensors							
M18 x 1	M30 x 1.5	16.1 (0.634)	34.8 (1.37)	13.3 (0.523)	29.7 (1.17)	5.08 (0.20)	XSZSN18
30 mm Diameter Sensors							
M30 x 1.5	M47 x 1.5	24.6 (0.972)	50.8 (2.00)	15.6 (0.615)	37.0 (1.37)	4.98 (0.196)	XSZSN30

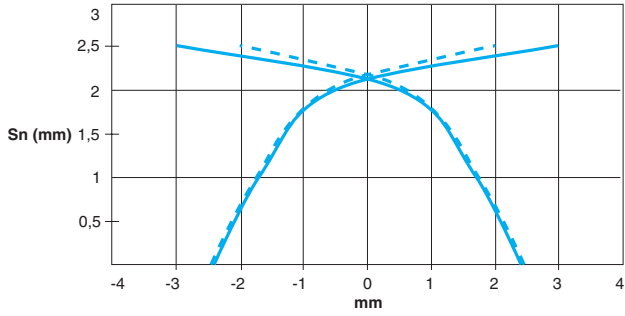


Proximity Sensors

Sensing Curves

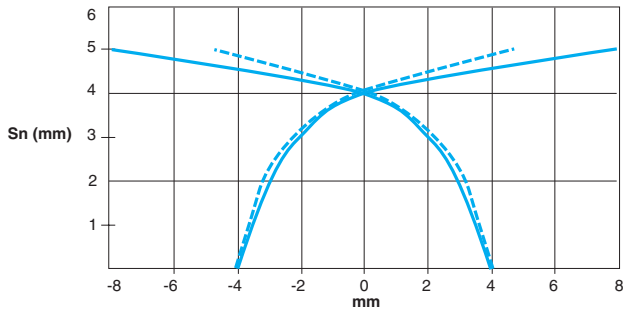
Flat Inductive

Shielded



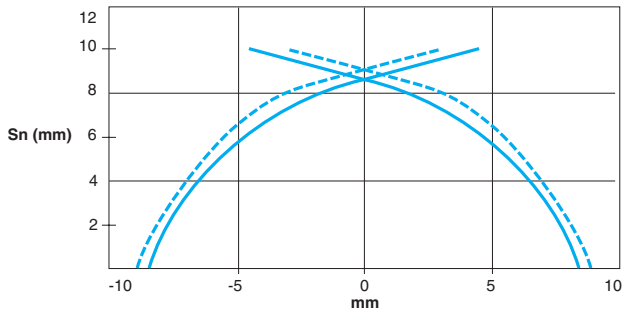
	Target size (mm)	Usable range (mm)
XS7J1A1D	5 x 5 x 1	0-2

———— pick up points
 - - - - - drop out points



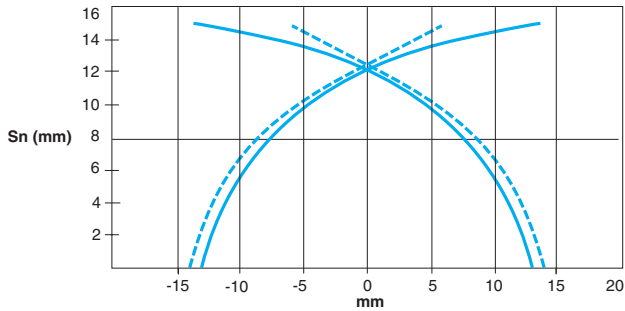
	Target size (mm)	Usable range (mm)
XS7F1A1D	5 x 5 x 1	0-4

———— pick up points
 - - - - - drop out points



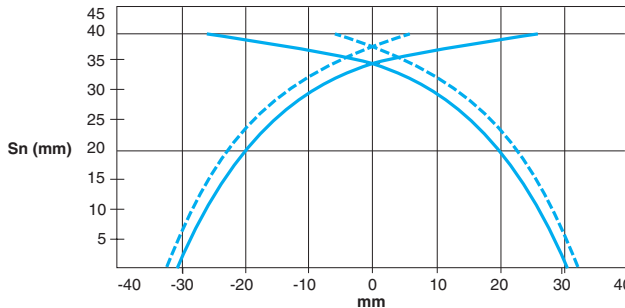
	Target size (mm)	Usable range (mm)
XS7E1A1D	8 x 8 x 1	0-8
XS7E1A1C	8 x 8 x 1	0-8

———— pick up points
 - - - - - drop out points



	Target size (mm)	Usable range (mm)
XS7C1A1D	18 x 18 x 1	0-12
XS7C1A1C	18 x 18 x 1	0-12

———— pick up points
 - - - - - drop out points



	Target size (mm)	Usable range (mm)
XS7D1A1D	30 x 30 x 1	0-32
XS7D1A1C	30 x 30 x 1	0-32

———— pick up points
 - - - - - drop out points

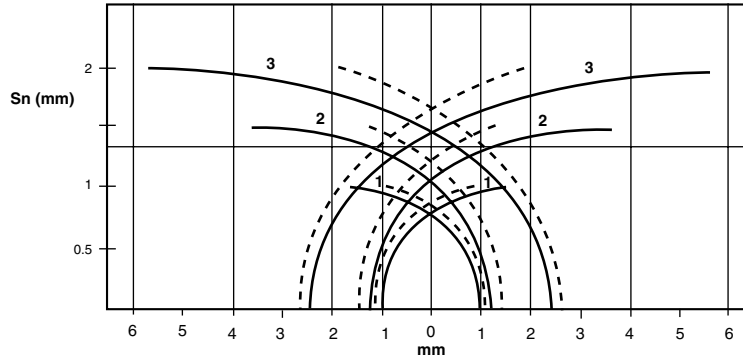
Proximity Sensors

Sensing Curves

Tubular Inductive

Shielded

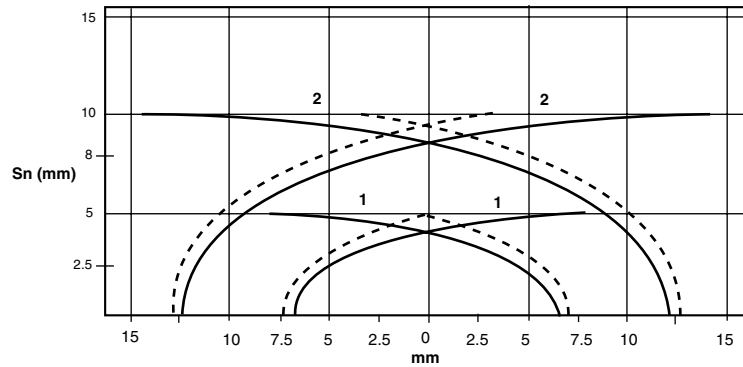
- 1 \varnothing 4 XS1
 \varnothing 5 (M5x0.5) XS1
- 2 \varnothing 6.5 XS1
 \varnothing 8 (M8x1) XS1, XS3
- 3 \varnothing 12 (M12x1)
XS1, XS3



Standard targets	Size (mm)	Usable range (mm)
4	5 x 5 x 1	0-0.8
5	5 x 5 x 1	0-0.8
6.5	8 x 8 x 1	0-1.2
8	8 x 8 x 1	0-1.2
12	12 x 12 x 1	0-1.6

———— pick up points
- - - - - drop out points

- 1 \varnothing 18 (M18x1)
XS1, XS3
- 2 \varnothing 30 (M30x1.5)
XS1, XS3

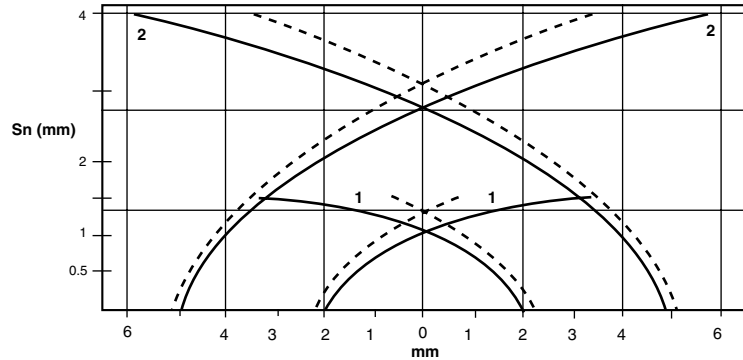


Standard targets	Size (mm)	Usable range (mm)
18	18 x 18 x 1	0-4
30	30 x 30 x 1	0-8

———— pick up points
- - - - - drop out points

Non-Shielded and Extended Range

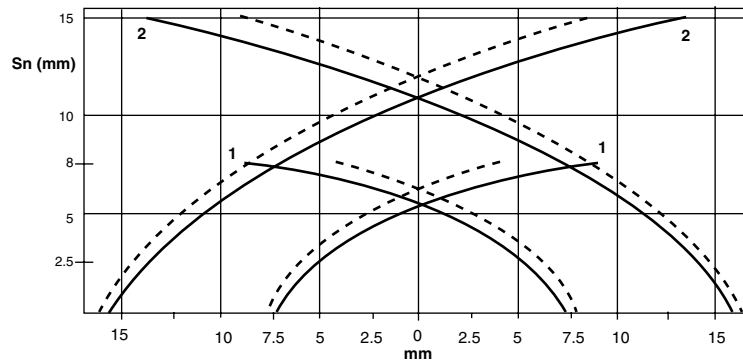
- 1 \varnothing 8 (M8x1)
XS1, XS2, XS4
- 2 \varnothing 12 (M12x1)
XS1, XS2, XS4



Standard targets	Size (mm)	Usable range (mm)
8	8 x 8 x 1	0-2
12	12 x 12 x 1	0-3.2

———— pick up points
- - - - - drop out points

- 1 \varnothing 18 (M18x1) XS1,
XS2, XS4
- 2 \varnothing 30 (M30x1.5) XS1,
XS2, XS4



Standard targets	Size (mm)	Usable range (mm)
18	24 x 24 x 1	0-6.4
30	45 x 45 x 1	0-12

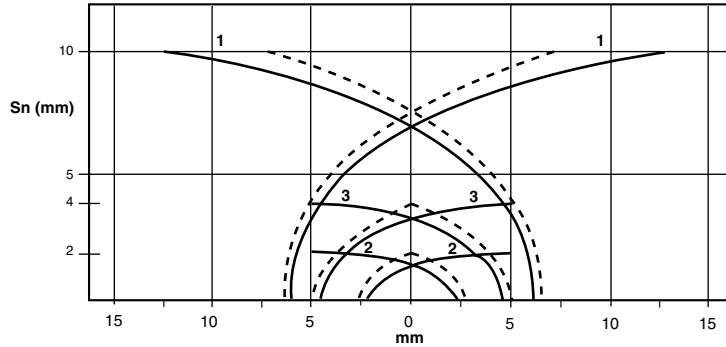
———— pick up points
- - - - - drop out points

Proximity Sensors

Sensing Curves

Block Type Inductive

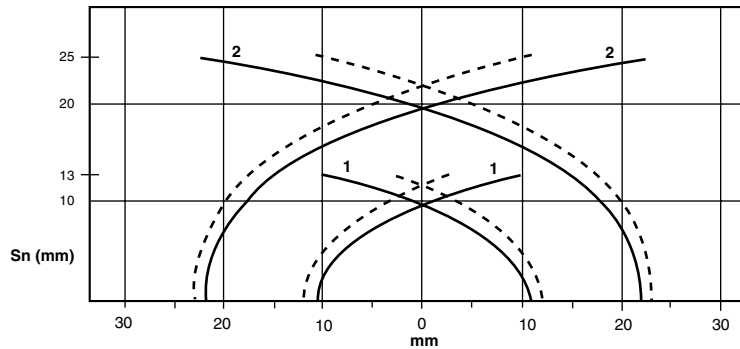
- 1 shielded, XSEC10
- 2 shielded, XSG•02
- 3 non-shielded, XSG•04



Standard targets	Size (mm)	Usable range (mm)
XSEC10	30 x 30 x 1	0-8
XSG•02	12 x 12 x 1	0-1.6
XSG•04	12 x 12 x 1	0-3.2

———— pick up points
 - - - - - drop out points

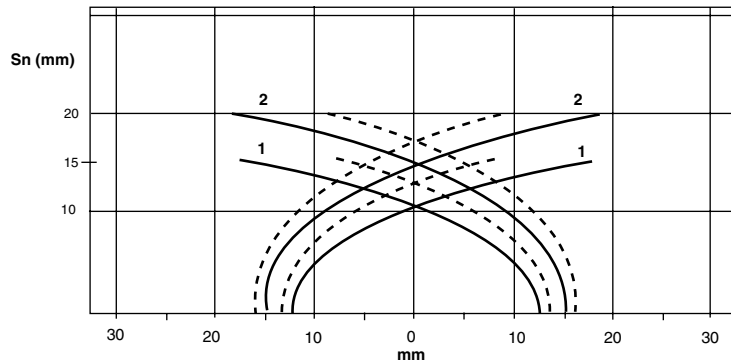
- 1 XSB•10
- 2 XSB•25



Standard targets	Size (mm)	Usable range (mm)
XSB•10	40 x 40 x 1	0-9
XSB•25	75 x 75 x 1	0-20

———— pick up points
 - - - - - drop out points

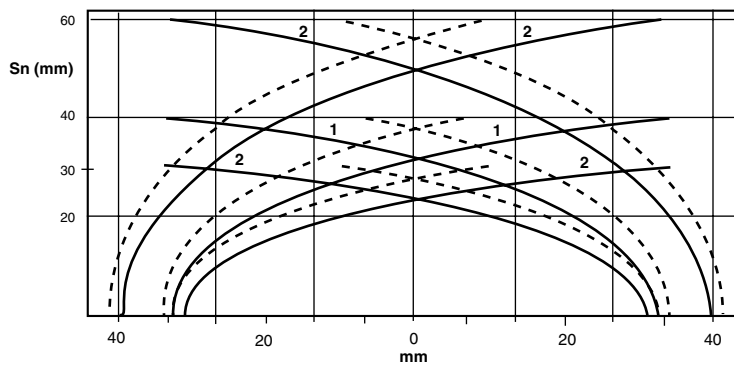
- 1 shielded, XS7
- 2 non-shielded, XS8



Standard targets	Size (mm)	Usable range (mm)
XSC/XS7	45 x 45 x 1	0-12
XSC/XS8	60 x 60 x 1	0-16

———— pick up points
 - - - - - drop out points

- 1 fixed sensing distance, XSD•40
- 2 adjustable sensing distance, XSD•60



Standard targets	Size (mm)	Usable range (mm)
XSD•40	120 x 120 x 1	0-32
XSD•60	180 x 180 x 1	0-48

———— pick up points
 - - - - - drop out points

Proximity Sensors

Product Overview

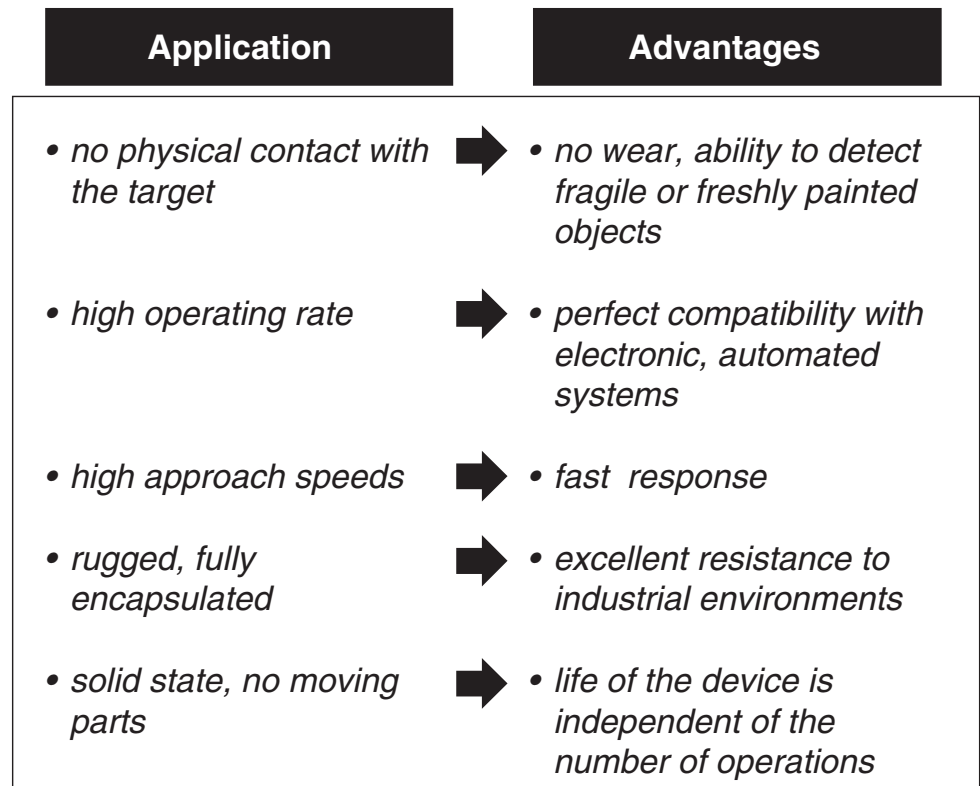
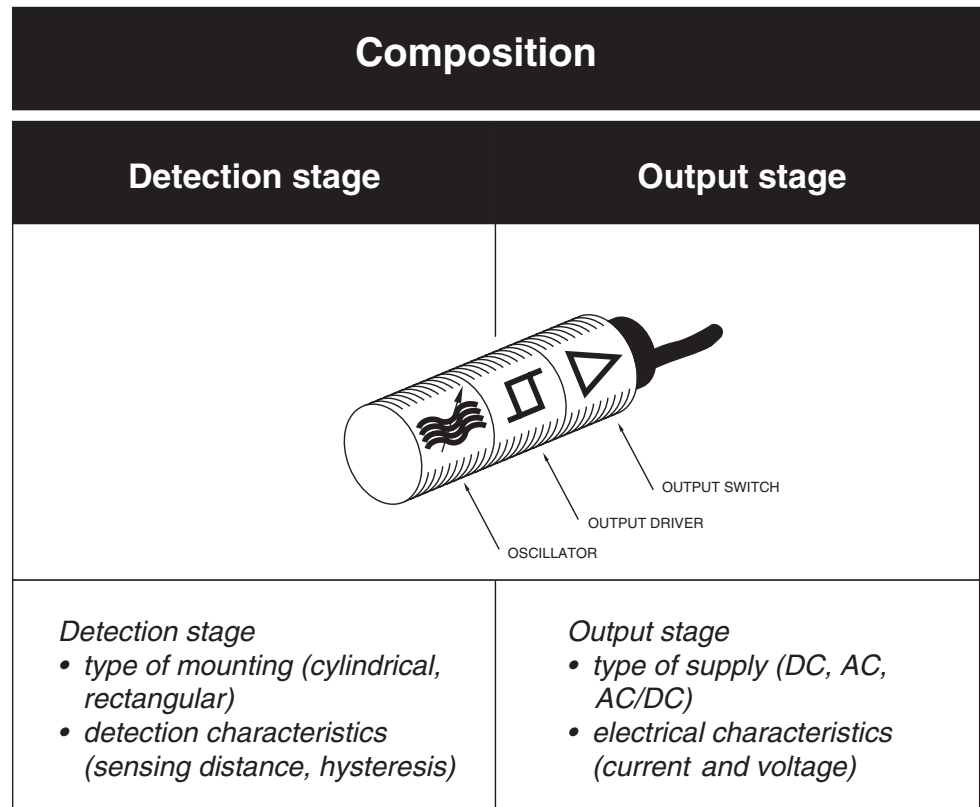
What is a Proximity Sensor?

A proximity sensor is an important component in an automation control system.

It transmits information to the logic processing system about the operating conditions of a machine:

- Presence, passage, flow of parts
- End of travel
- Rotation and counting

Essentially, it is a **non-contact part presence** sensor.



Proximity Sensors

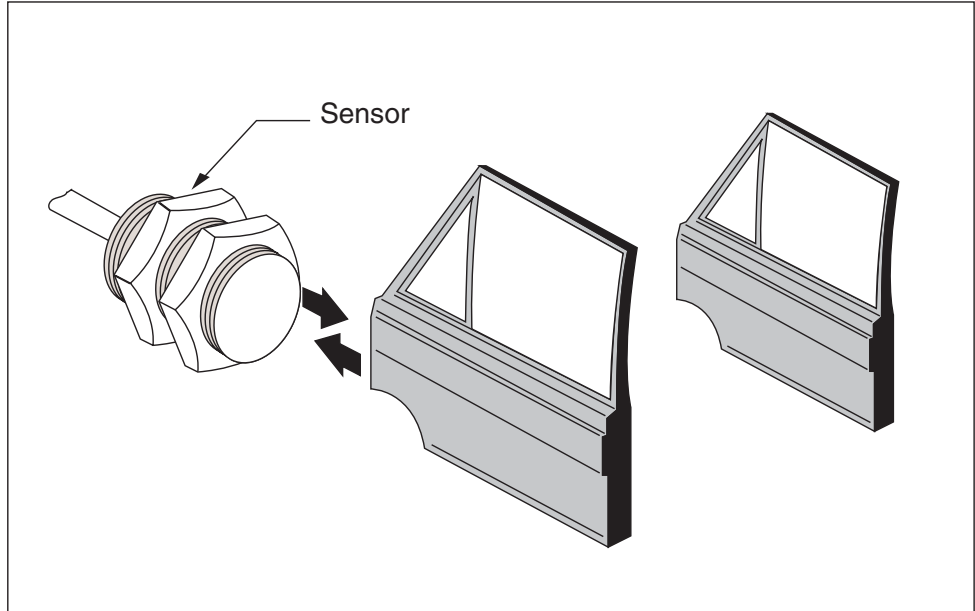
Product Overview

Why the Different Types of Sensors?

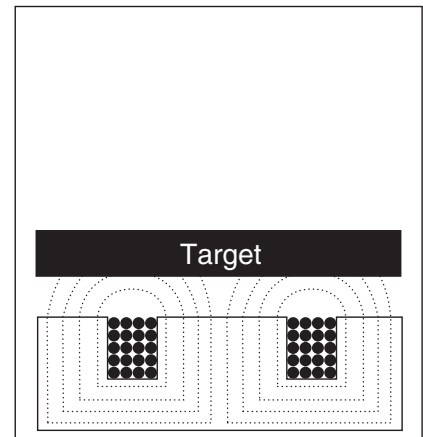
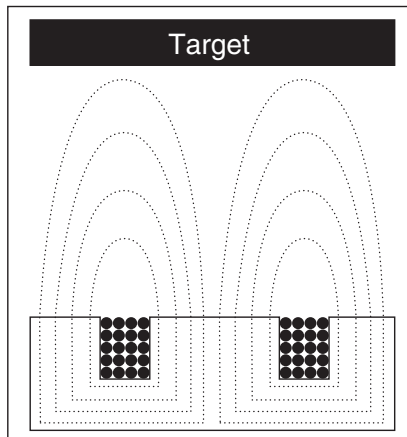
Inductive

Suitable for the detection of metal objects

- **Identifies** only **metal** targets
- **Predictable** sensing technology—few variables
- **Reliable** industrial technology



Principle of operation



An inductive proximity sensor essentially comprises an oscillator whose windings constitute the sensing face. An electromagnetic field is generated in front of these windings.

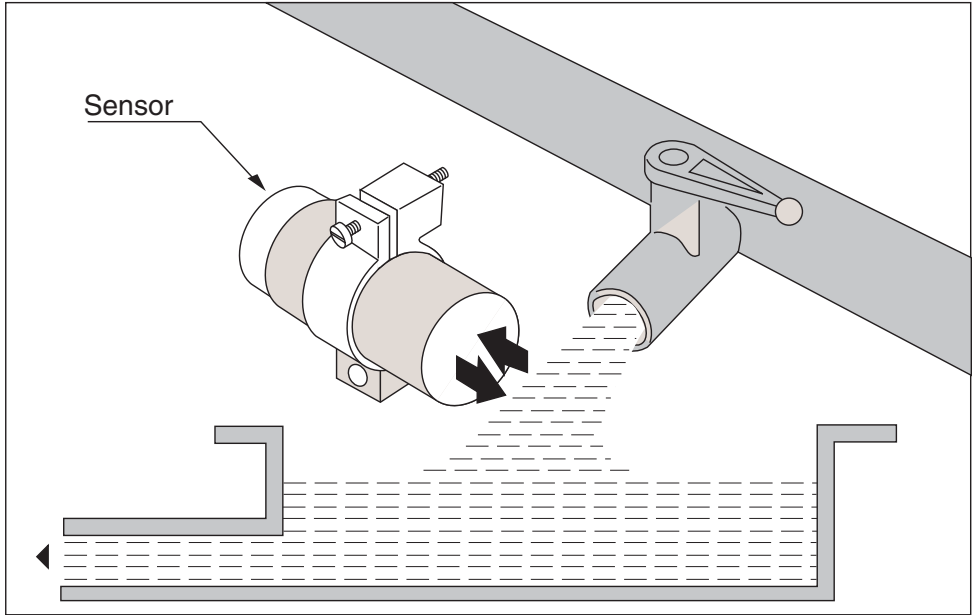
When a metal object is placed within this field, the resulting currents induced into the target form an additional load, and the oscillations cease.

This causes the output driver to operate, producing an On or Off output signal.

Capacitive

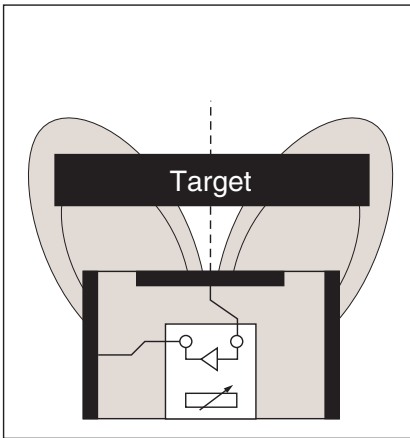
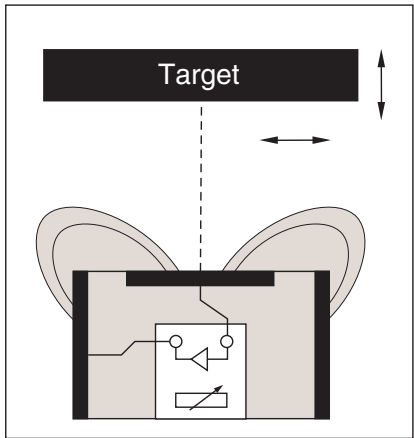
- Detects **any material**
- Affected by environment: humidity, dust, etc.
- Best for:
 - bulk material
 - liquids
 - targets behind a separation wall

Suitable for the detection of non-conductive targets, liquids and powders



Proximity

Principle of operation



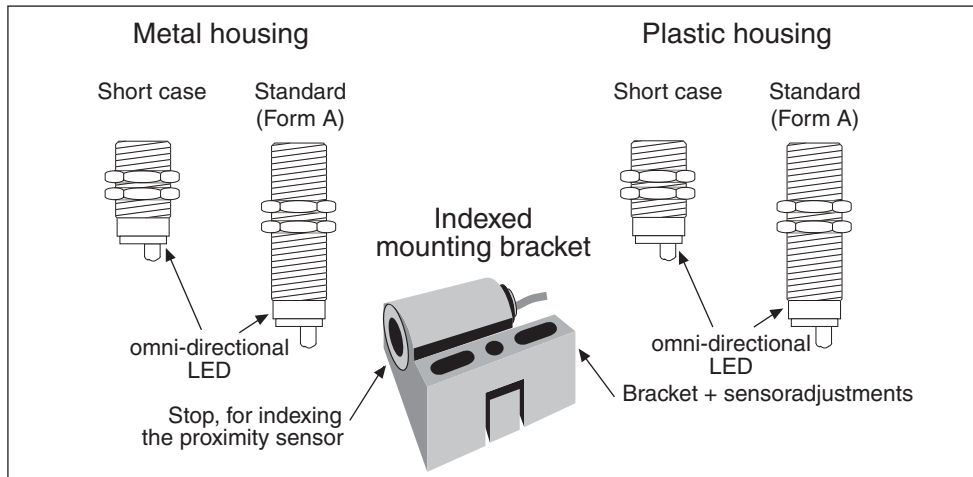
A capacitive proximity sensor basically comprises an oscillator whose capacitors constitute the sensing face.

When a conducting or insulating material with a permittivity greater than air is placed within this field, it modifies the coupling capacitance and causes oscillations.

This actuates the output driver, and depending on the model, an On or Off output signal is produced.

Housing types

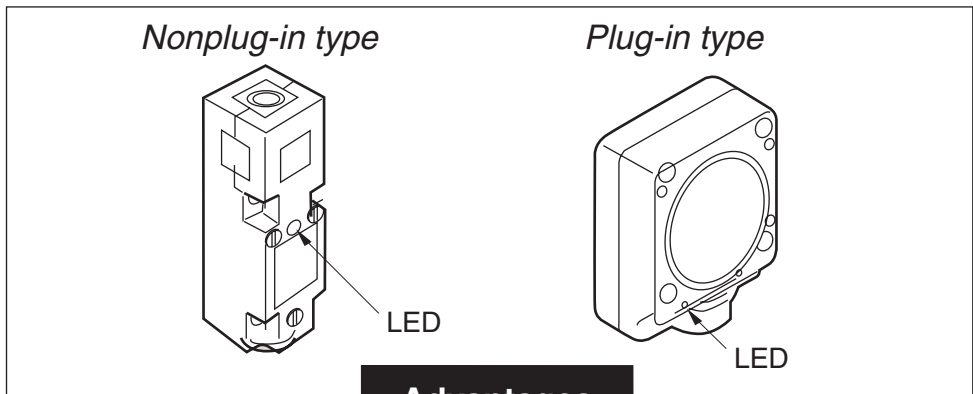
Tubular type



Advantages

- Simple installation and set-up: pre-wired or connector models
- Excellent environmental protection:
 - encapsulated
 - metal housing (plated brass)
 - plastic or stainless steel housing (food, pharmaceuticals)
- Two choices:
 - very short for restricted access areas
 - standard length (form A) for ease of replacement
- No-adjustment replacement using a patented indexing mounting bracket

Block type

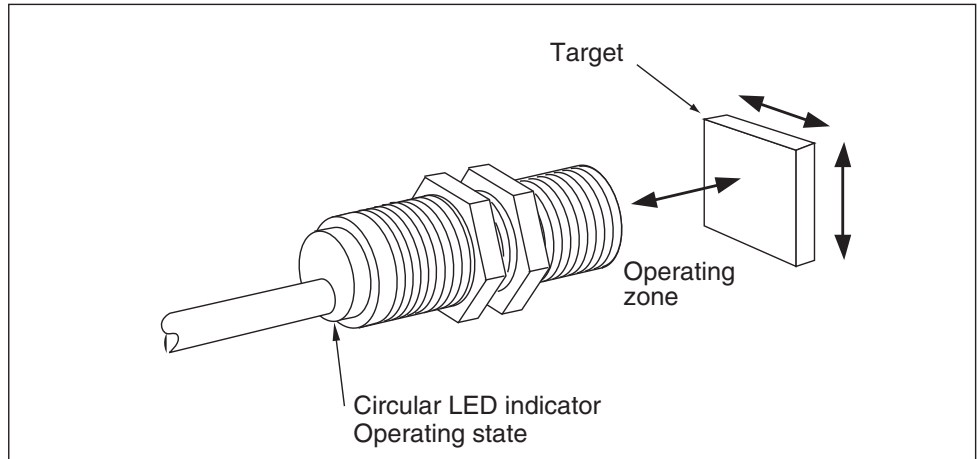


Advantages

- Direct interchangeability, no need for readjustment
- Flexibility of connections: screw terminals or connector
- Long sensing distance

Proximity Sensors
Product Overview
Sensing Parameters

Operating zone



The targets are generally of steel, and of a size equivalent to the sensing face of the sensor. To ensure detection, the target should pass at a distance less than or equal to the usable sensing distance given in the data sheet of the sensor selected.

Suitability for flush mounting in metal

Suitable (shielded)	Not suitable (unshielded)
Advantages	Advantages
<ul style="list-style-type: none"> • No lateral effect 	<ul style="list-style-type: none"> • Sensing distance + 50 to + 100%
But	But
<ul style="list-style-type: none"> • Reduced sensing distance 	<ul style="list-style-type: none"> • Space required around the device to eliminate the effects of the surrounding metal

Power supply

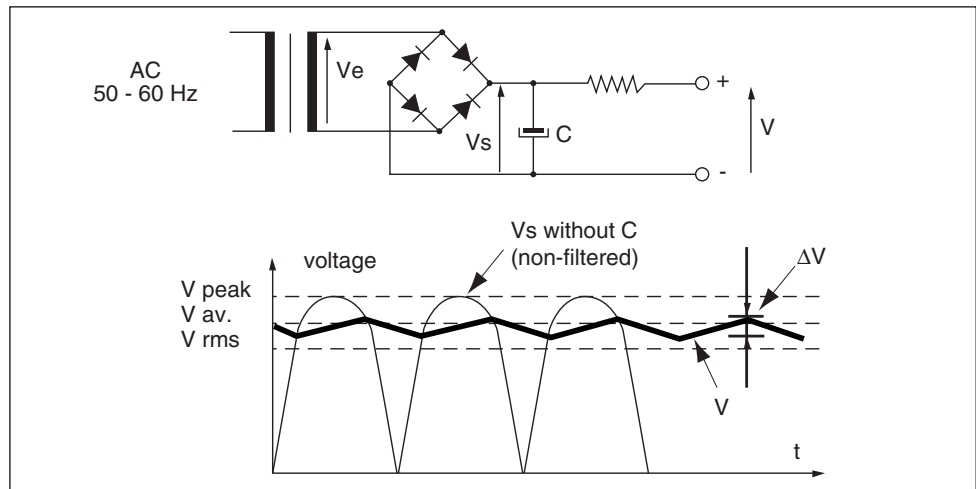
AC or AC/DC sensors
for AC circuits

Check that the power supply range limits of the proximity sensor are compatible with the nominal voltage of the AC supply used.

Sensors for DC circuits

Where a DC supply is available, check that the voltage limits of the sensor, including ripple, are compatible with the supply used.

If an AC supply is available, a suitable DC power supply must be selected. A simple one has a transformer, a rectifier, and a smoothing capacitor.



Where voltage is derived from a single-phase AC supply, *it must be rectified and filtered* to ensure that:

- The peak voltage of the DC supply is lower than the maximum operating voltage of the sensor, **peak voltage = rated voltage $V_e \times \sqrt{2}$** .
- The minimum voltage of the DC supply is greater than the minimum voltage rating of the sensor, given that $\Delta V = (I \times t)^3 C$, where:
 ΔV = maximum ripple: 10% (V)
 I = anticipated load current (mA)
 t = period of 1 cycle (8.8 ms full wave rectified, 60 Hz frequency voltage)
 C = capacitance (μF)

As a *general rule*, use a transformer with a lower secondary voltage (U_e) than the required DC voltage (U).

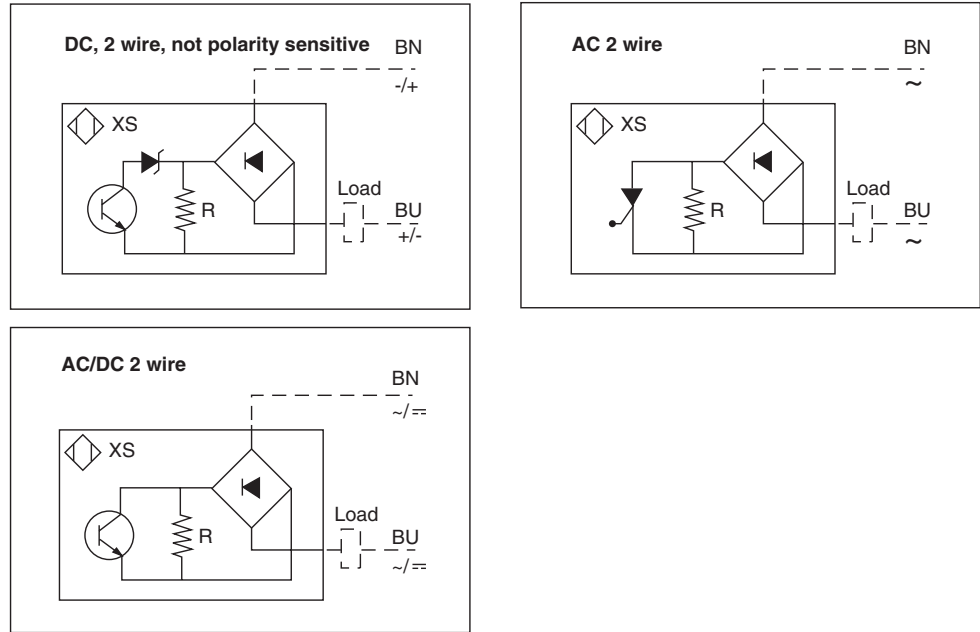
Example: 18 Vac to obtain 24 Vdc
35 Vac to obtain 48 Vdc

Mount a filtering capacitor of minimum 400 μF per sensor or 2,000 μF for each ampere of load current required.

NOTE: Tubular 3-wire DC universal models (10–58 V), 3-wire DC XSF models, and all AC/DC models can be supplied from full-wave rectified non-filtered power supplies (no capacitor C in the diagram above).

Output signal

2 Wire type



2-wire sensors are wired in series with the load to be switched.

They are subject to:

- a residual current (leakage current)—in the open state
- a voltage drop—in the closed state

For the AC and AC/DC versions, certain models are protected against short-circuits. Refer to the product characteristics.

Advantages

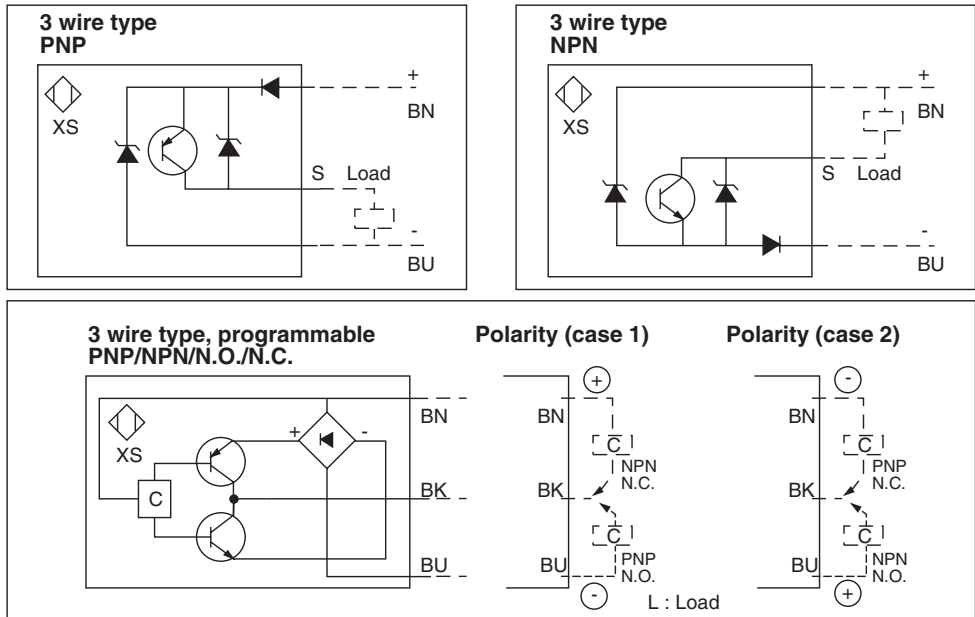
- They can be wired in the same way as mechanical limit switches.
- For the DC and AC/DC versions, they can be connected to either positive (PNP) or negative (NPN) logic inputs.
- Polarity insensitive versions, no risk of incorrect connection.
- AC/DC versions, reduces stock requirements

But

Check the possible effects of residual current and voltage drop on the input device controlled (pick-up and drop-out thresholds).

Output signal

3 Wire type



The sensors in this category have:

- 2 wires for the power supply
- 1 wire for the output signal

NOTE: Some models include an additional wire for a complementary output 4-wire type, N.O. + N.C. The technology is still 3 wire.

They are protected against reverse supply polarity and against overloads and short-circuit of the load. For the DC version, there are two types of sensor:

- Basic sensor
 - PNP model, switching the positive side to the load (sourcing)
 - NPN model, switching the negative side to the load (sinking)
- Universal DC sensors

A single universal sensor, depending on the wiring connections can perform any of the following 4 functions: PNP/N.O., PNP/N.C., NPN/N.O., NPN/N.C.

Advantages

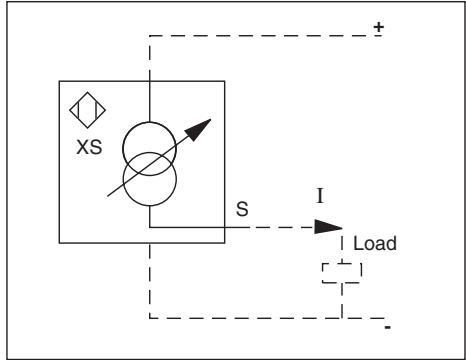
- *Best switching characteristics: no residual current, low voltage drop, fast*
- *N.O. + N.C. versions*
- *Universal versions, reduces stock requirements*

But

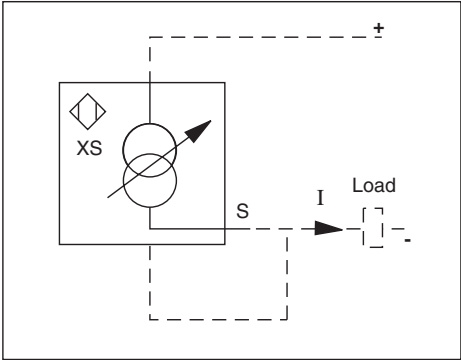
Requires the use of a specialized sensor (PNP or NPN, function of the load connection to negative or positive, respectively) or a selectable universal type.

Output signal

Analog type



3-wire type



2-wire type

Proximity

These proximity sensors convert the approach of a metal target towards the sensing face into a current output signal that is proportional to the distance between the target and the sensing face.

Two models:

Dual Voltage: 24/48 Vdc
Output: 0–10 mA with 3-wire connection
4–14 mA with 2-wire connection

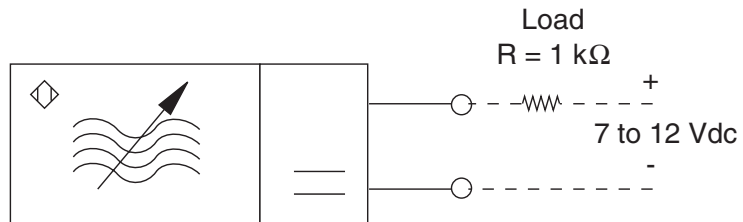
Single Voltage: 24 Vdc
Output: 0–16 mA with 3-wire connection
4–20 mA with 2-wire connection

Advantages

- Output signal proportional to the distance.
- Two- or three-wire connection using the same device.

Output signal

Namur type



Namur type proximity sensors (DIN 19234) are electronic sensors in which the current consumption varies when a metal object approaches.

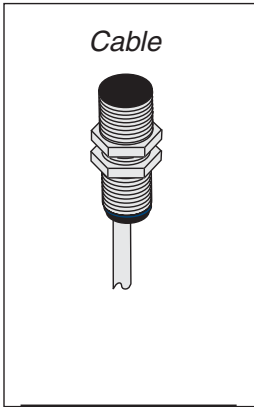
Their operating principle and compact size make them suitable for a large number of applications:

- Intrinsically safe (for hazardous environments, i.e. explosive). Sensors are used with an NY2 intrinsically safe relay/amplifier, or an equivalent, approved intrinsically safe solid-state input.
- Non-intrinsically safe (for a normal, safe zone). NAMUR sensors associated with a power supply and amplifier unit, or an equivalent solid-state input.

Advantages

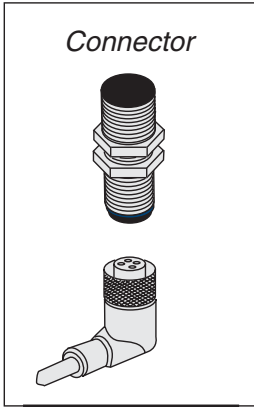
- *Can work in hazardous environments.*
- *Basic product, without amplifier.*
- *Compact size.*

**Connection
method**



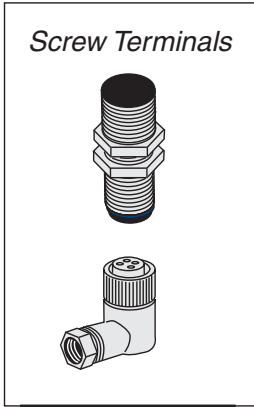
Features

Pre-wired sealed cable, excellent resistance to splashing liquid (IP67) or cutting oils (IP68).



Features

Ease of installation and replacement.



Features

Flexibility: user selects type and length of cable.

Proximity

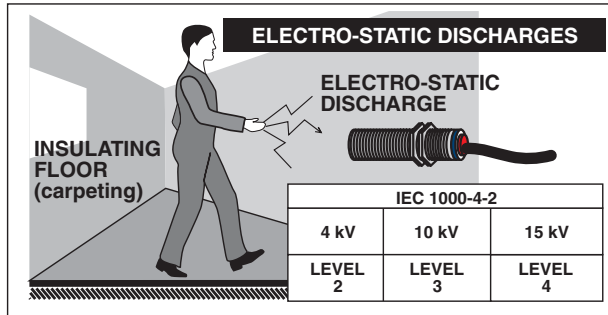
Note

In practice, the preceding information facilitates the selection and installation of a proximity sensor for applications having normal operating conditions. The following pages contain details for applications needing more specific information.

The XS sensors are tested according to IEC 60947.5.2 standard (similar to the proposed new NEMA ICS 5-4-2005x standard).

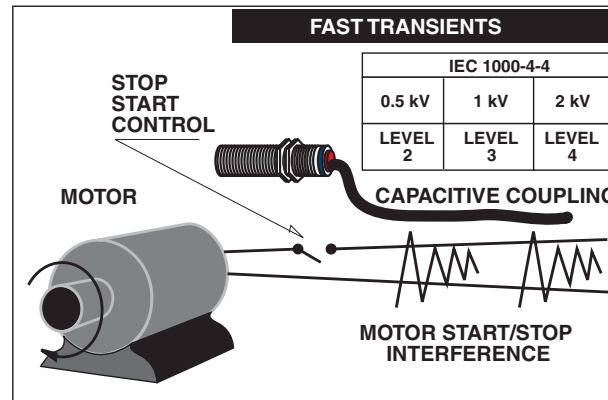
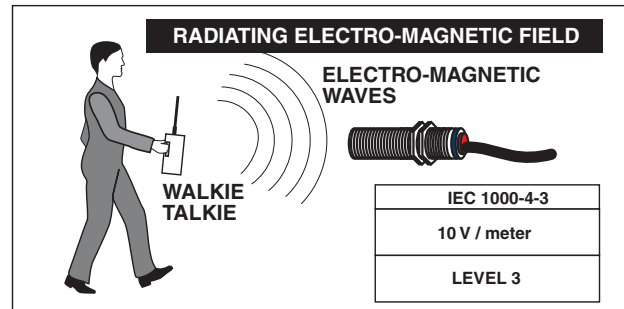
Electromagnetic interference

Proximity



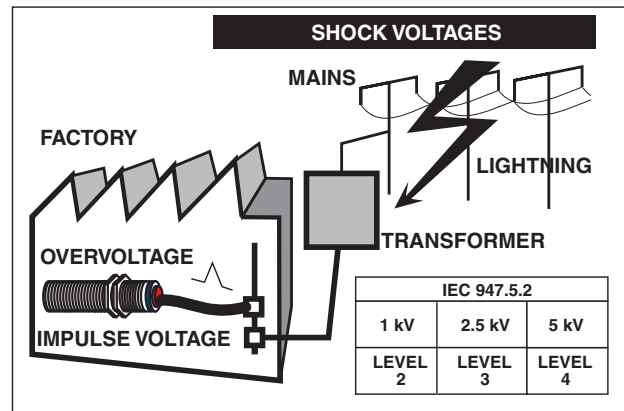
- DC versions
- level 2 immunity (3-wire type)
 - level 3 immunity (2-wire type)
- AC/DC versions
- level 4 immunity

- DC and AC/DC versions
- level 3 immunity (RFI: radio frequency immunity)



- DC versions
- level 3 immunity
- AC/DC versions
- level 4 immunity
- Extended range DC
- level 3 immunity

- DC and AC/DC versions
- level 3 immunity (over 8 mm diameter)
 - level 2 immunity (tubular 8 mm and smaller)



Temperature and Chemicals

Temperature: where sensors are used outside the ranges shown, reliable operation cannot be assured and permanent damage could result.

Standard length tubular sensors have a very large temperature range: -25 to 80 °C (-13 to 176 °F).

NOTE: For extended temperature range, consult the factory.

Chemicals: Due to the very wide range of chemicals found in modern industry, it is very difficult to give general guidelines on sensor applications.

To ensure lasting efficient operation, it is essential that the chemicals coming in contact with the sensors will not affect their housings and, in doing so, prevent their reliable operation.

The XS1/XS2 M series is particularly well adapted to severe environments, such as machine tool applications.

NOTE: The cables used conform to standard NFC 32 206 and to recommendations CNOMO E03-40-150 N. They are UL Listed and CSA Certified.

The series XS4P plastic tubular proximity sensors and the stainless steel XS1/XS2 sensors exhibit excellent overall resistance to:

- **Chemical products** such as salts, halophytic and aromatic oils, petrols, acids, and diluted bases. For acids, ketones, and phenols, preliminary test should be made according to the nature and concentration of the liquid.
- **Agriculture and food industry products** such as animal- and vegetable-based food products (vegetable oils, animal fat, fruit juice, dairy proteins, etc.).

NOTE: For specific details, please consult the factory. Have the following information available when making the inquiry:

- *type of substance*
- *concentration*
- *maximum temperature*
- *specific sensor part numbers considered for the application*

Shock – Vibration

Shock

- The sensors are tested according to IEC 60068.2.27, 50 g, 11 ms duration.

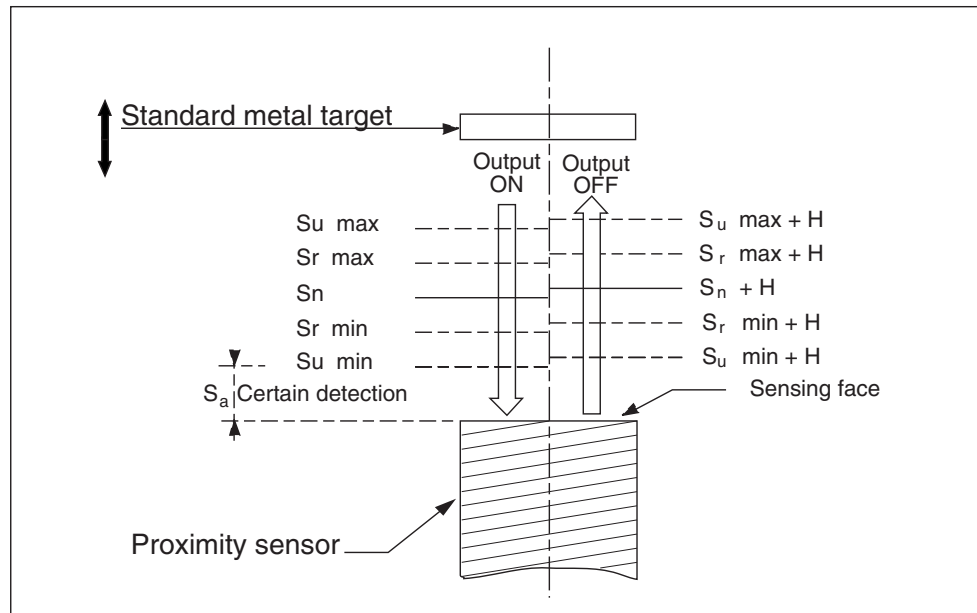
Vibration

- The sensors are tested according to IEC 60068.2.6, ± 2 mm amplitude, 10–55 Hz, 25 g to 55 Hz.

Degrees of protection

- IP67: protection against the effects of immersion, tested according to IEC 60529. Sensor immersed for 30 minutes in 1 m of water.
- UL Listed: typical NEMA Types 4X, 6P, 12. No deterioration in either operating or insulation characteristics.
- IP68: protection against effects of prolonged immersion: the test conditions are subject to agreement between the manufacturer and user.
Telemecanique® brand selected machine tool applications or other machines frequently drenched in cutting fluids. **IP68 means**, in this case, **cutting oil proof**, a degree of protection requiring a superior encapsulation technology. Extensive testing is performed—1,500 hours immersion in fluid at 70 °C.

Definition of sensing distances



Nominal (or rated) sensing distance S_n :

The rated operating distance for which the sensor is designed. It does not account for manufacturing tolerances, or any change in supply voltage, temperature, etc. during operation. Used for selection and the base for exact calculations.

Real sensing distance S_r :

The real sensing distance is measured at rated voltage (U_n) and at the rated ambient temperature (T_n). It must be between 90% and 110% of the nominal sensing distance: $0.9S_n \leq S_r \leq 1.1S_n$.

Usable sensing distance S_u :

The usable sensing distance is measured at the limits of the permissible variations of the ambient temperature (T_a) and the supply voltage (U_b). It must be between 90% and 110% of the real sensing distance: $0.9S_r \leq S_u \leq 1.1S_r$.

Operating zone S_a (usable sensing range):

The operating zone is between **0 and 81%** of the nominal sensing distance S_n :

$$0 \leq S_a \leq 0.81S_n$$

This is the operating zone of the sensor and corresponds to the area within which detection of the *standard metal target is certain* whatever the variations in voltage or temperature.

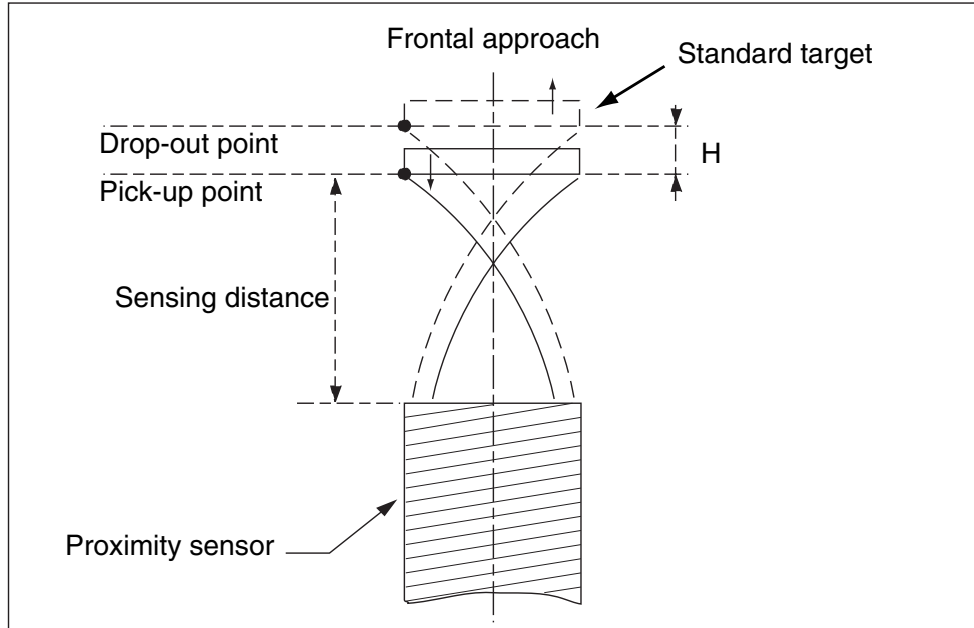
This is the *maximum sensing distance that the designer should consider* for all applications. Correction factors should be considered only when conditions preclude using the standard target in the operating temperature and voltage range.

Proximity Sensors
Product Overview
Definition of Terms

Standard metal target

Standard metal target:

1 mm thick, square mild cold rolled steel, type FE 360. The side of the square is either equal to the diameter of the sensor or of the circle engraved on the active face of the sensing face or is 3 times the nominal sensing distance (S_n). The higher of these values is used.



Differential travel

Differential travel: (hysteresis) H:

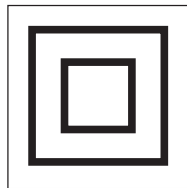
The distance between the pick-up point as the standard metal target frontally approaches the sensor, and the drop-out point as it moves away. Expressed as a percentage of the real sensing distance S_r .

Repeat accuracy (Repeatability)

Repeat accuracy (repeatability) R:

The repeatability of the sensing distance between successive operations. Readings are taken over a period of time while the sensor is subjected to environmental extremes, e.g., an 8-hour cycle between 10 and 30 °C, with supply voltage variation $\pm 5\%$ of nominal. Expressed as a percentage of the real sensing distance S_r . Important parameter for positioning applications.

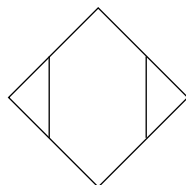
Class 2 material Double isolation



Class 2 material—Double isolation

The symbol represents electrical insulation conforming to IEC 60536 class 2. It means that all live parts are isolated inside the housing and touching any exterior exposed metal is harmless. No groundings required.

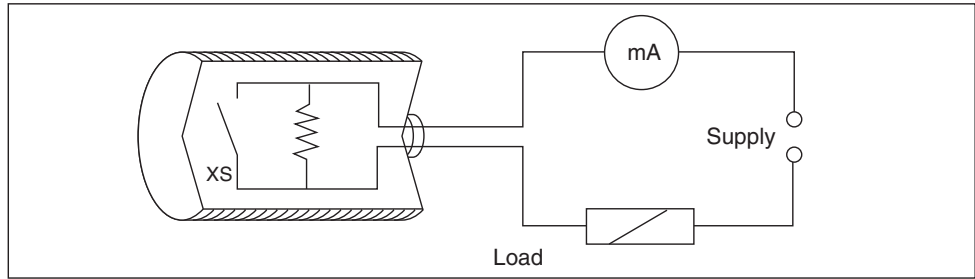
Symbol



International symbol for proximity switches.

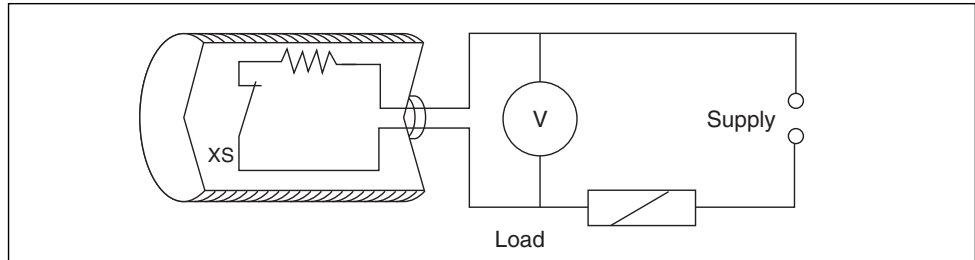
Proximity Sensors
Product Overview
Definition of Terms

Leakage or Residual current (Ir)



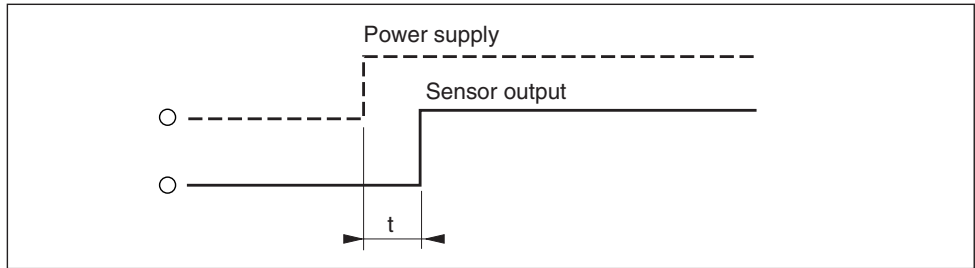
The leakage or residual current corresponds to the current flowing through the sensor in the off or open state. Important for 2-wire proximity sensors.

Voltage drop (Ud)



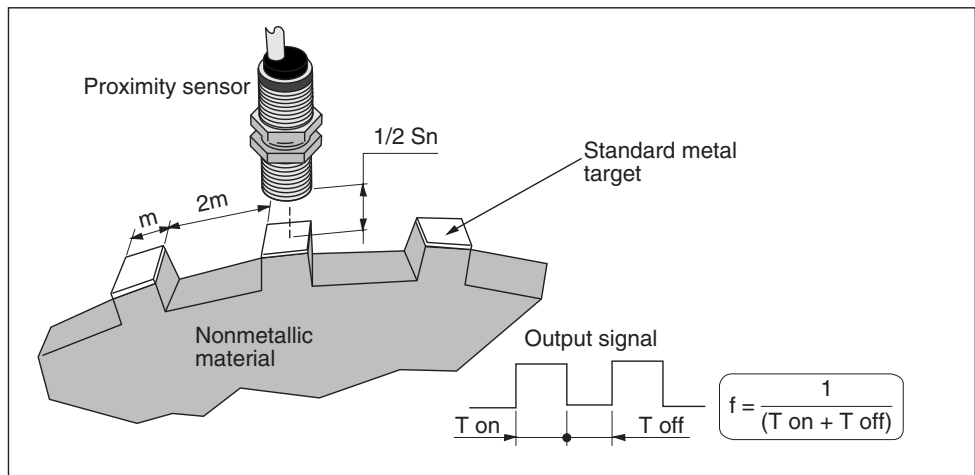
The voltage drop corresponds to the voltage at the proximity sensor's terminals in the on or closed state. Especially important for 2-wire proximity sensors.

Response Time power-up delay



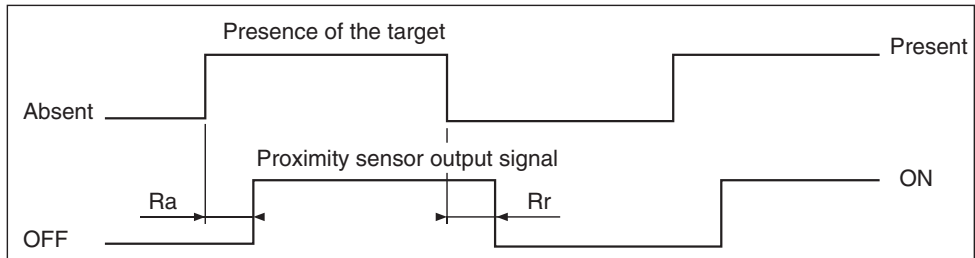
The period of time between energizing the sensor and its fully operational condition. Also known as warm-up or first-up delay.

Maximum operating frequency



The maximum number of targets a proximity sensor can detect in a second, under standard test conditions (standard EN50018, IEC 60947.5.2). Do not use for selection or design purposes unless the geometry of the application is identical with the one in the picture.

Response time



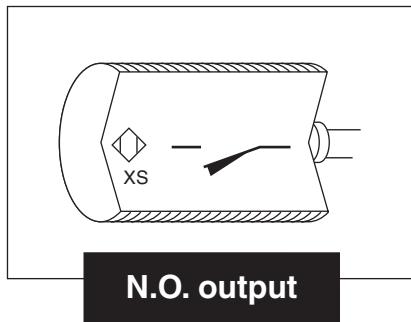
On delay Ra:

The period between the detection of the target and the subsequent change in its output state. This design parameter determines the relationship between the speed of travel and the size of the target.

Off delay Rr:

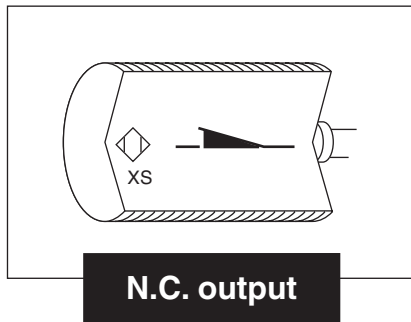
The period between the exit of the target from the sensor's operating zone and the subsequent change in its output state. This design parameter limits the interval between successive targets.

Output signal



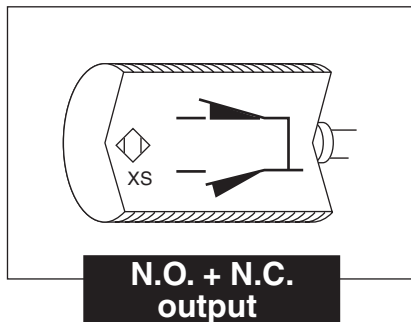
N.O. (Normally open)

The output circuit turns **on** the output current when a target is present.



N.C. (Normally closed)

The output circuit turns **off** the output current when a target is present.

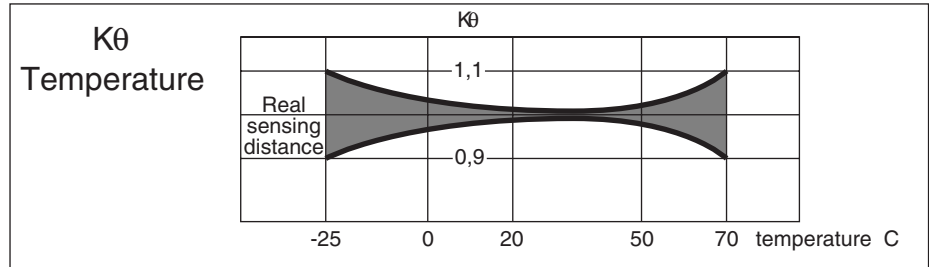


N.O. + N.C.

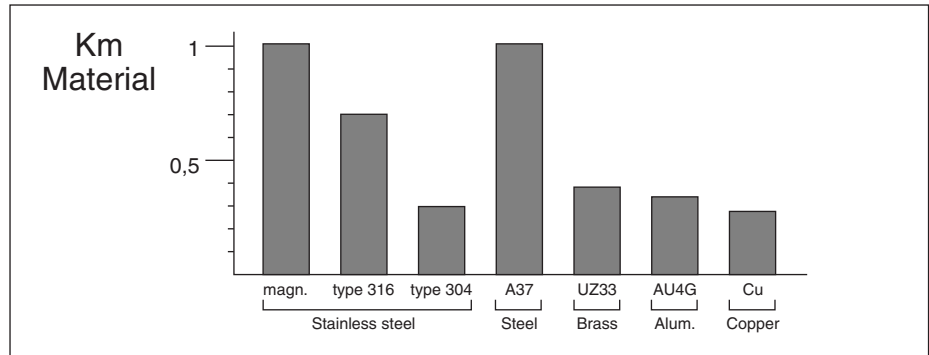
Complementary outputs: proximity sensor with two outputs—one opens, the other closes when a target is present.

Theoretical calculation

In practice, most targets are made of steel and are of a size equal to or greater than the sensing face of the sensor. Where this is the case, use the sensing distance values given in the characteristics for the particular sensor. To calculate the precise sensing distance for specific applications, consider the following parameters, which affect the sensing distance.



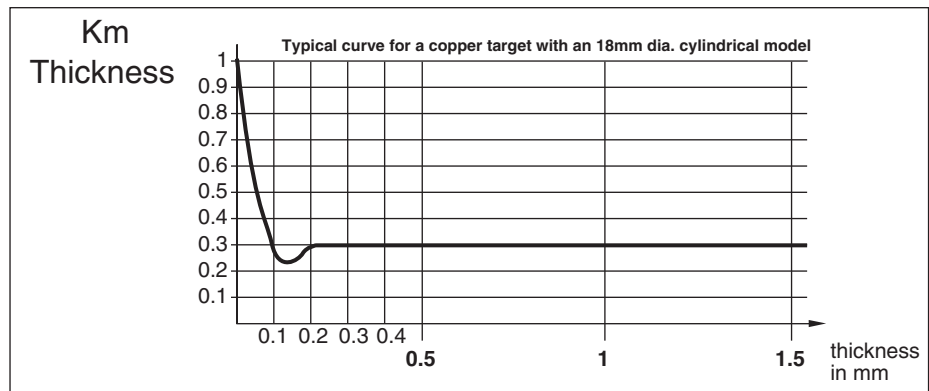
Apply a correction factor K_{θ} to be determined using the curve above.



Target material correction coefficient K_m

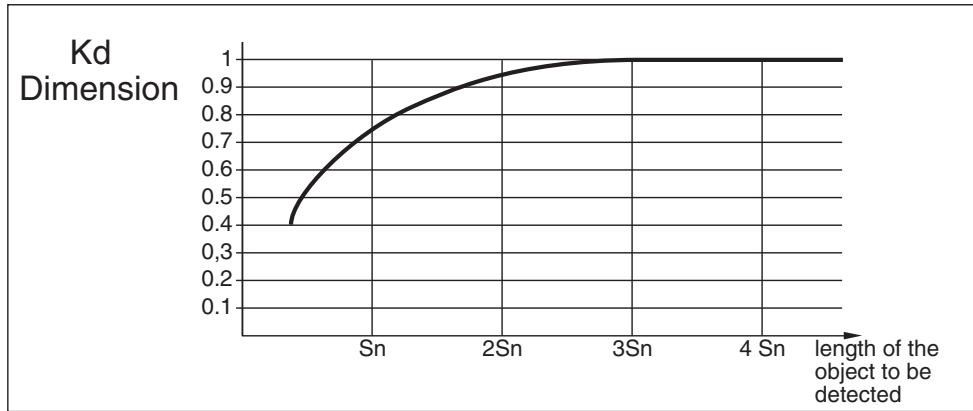
Target Material	Stainless Steel			Mild Steel	Brass	Aluminum	Copper
	Magn.	Type 316	Type 304	A37	UZ33	AU4G	CU
K_m	1.00	0.70	0.30	1.00	0.37	0.35	0.30

Apply a correction factor K_m to be determined using the graph above.



Special case of a very thin target object made of non-ferrous material.
 Application tip: Aluminum foil on a nonmetallic surface makes an excellent target.

Proximity Sensors
Product Overview
Sensing Distance Correction Factors



Apply a correction factor Kd to be determined using the curve above.

Usable sensing distance

For all situations, use the general correction factor $K_t = 0.9$ for power supply variations within the entire voltage range.

$S_a = S_n \times K_{\theta} \times K_m \times K_d \times K_t$
 Where S_a = usable sensing distance
 S_n = nominal sensing distance

Calculation example

Proximity sensor XS7C40MP230 with nominal sensing distance $S_n = 15$ mm.
 Ambient temperature variation 0 to + 20 °C.
 Target characteristics:
 material: Steel
 dimensions: 45 mm x 45 mm x 1 mm

The operating zone, S_a can be found using the formula:
 $S_a = S_n \times K_{\theta} \times K_m \times K_d \times K_t$
 $S_a = 15 \times 0.98 \times 1 \times 0.95 \times 0.9$
 $S_a = 12.5$ mm

General rule

For standard targets, the general rule is:
 $S_a = 0.8 S_n$

Note

Always test!

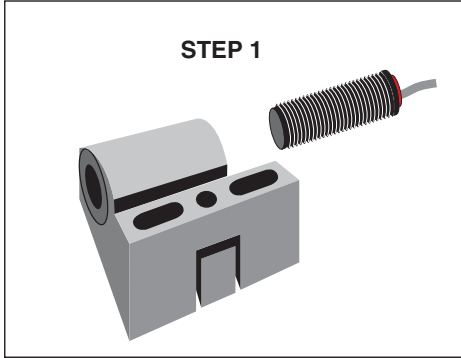
The above curves are typical curves only. They are given as a guide to the approximate usable sensing distance of a proximity sensor for a given application

Proximity Sensors Product Overview Mechanical Installation

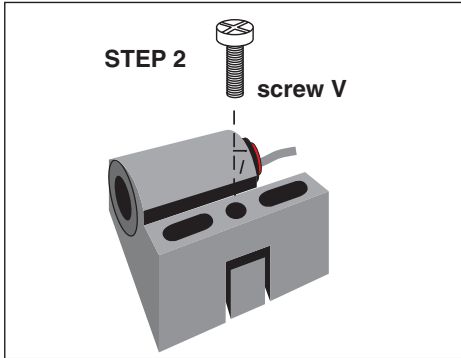
- Patented design
- Replacement without re-adjustment

Mounting

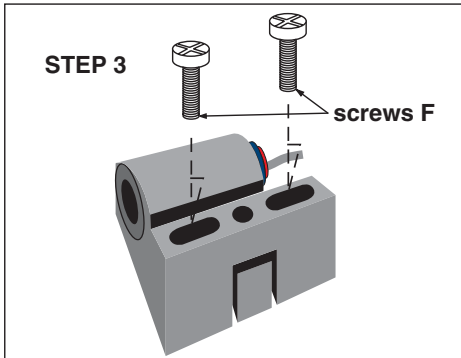
Indexed mounting bracket XSZB



- Insert the sensor in the bracket until it butts against the stop.



- Secure the sensor using screw (V).



- Adjust the sensor/bracket combination to ensure detection.
- Secure the combination using two screws (F).

If for any reason adjustment or replacement is necessary:

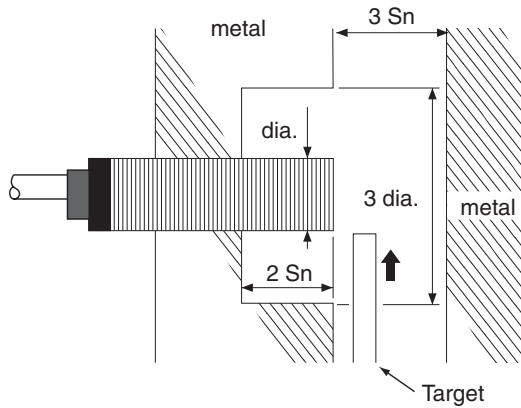
- Unscrew screw V.
- Butt the new sensor against the stop. Once screw V has been tightened, the new sensor will be indexed in the same position as the old one. No adjustment is necessary.

Note: these functions are similar to those of a block type sensor.

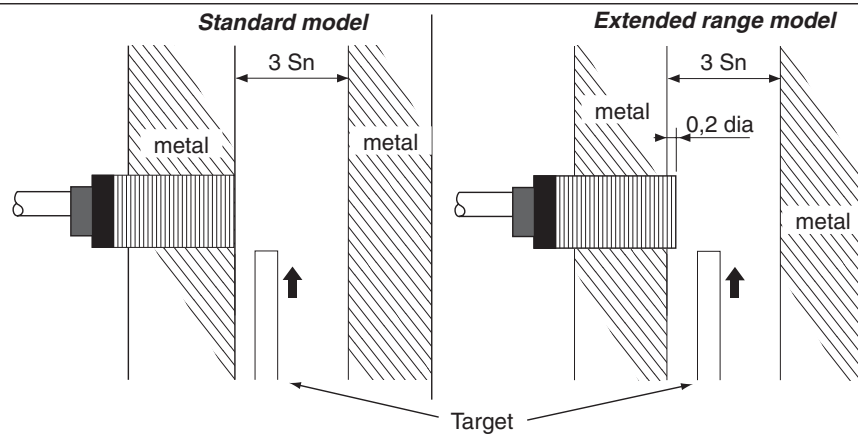
Proximity

Clearing distances

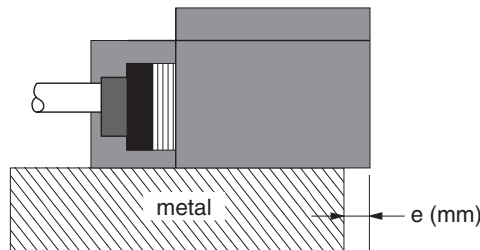
Tubular proximity sensor



Versions not suitable for flush mounting in metal (non-shielded)



Versions suitable for flush mounting in metal (shielded)



- Versions suitable for flush mounting in metal
e (min): 0
- Versions not suitable for flush mounting in metal
M8: e (min) = 5 mm
M12: e (min) = 8 mm
M18: e (min) = 16 mm
M30: e (min) = 30 mm

Mounting with XSZB mounting bracket

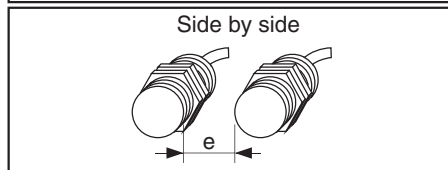
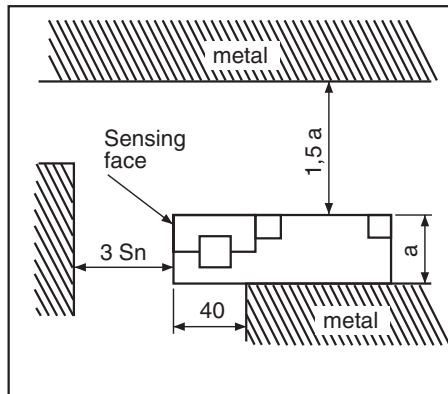
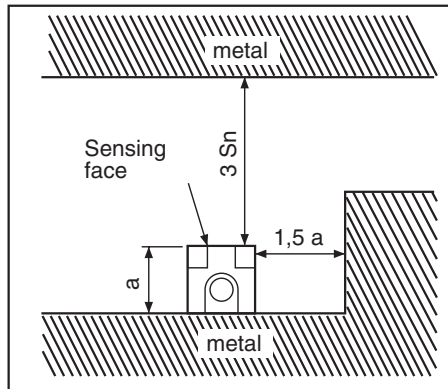
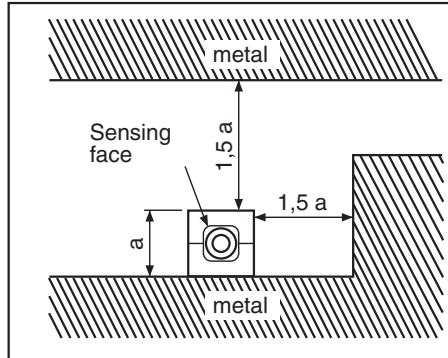
Clearing distances

Side by side
Face to face

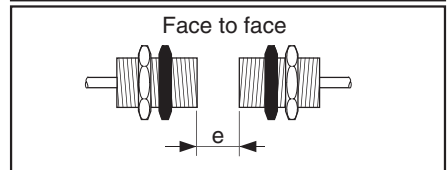
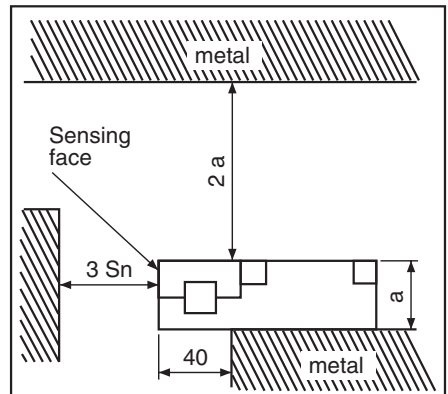
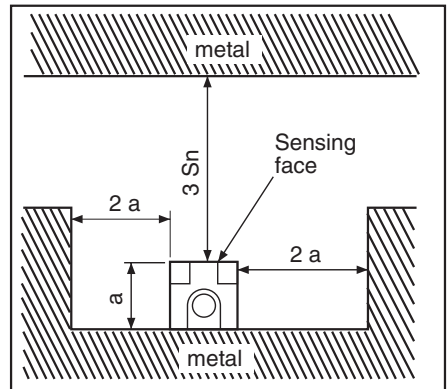
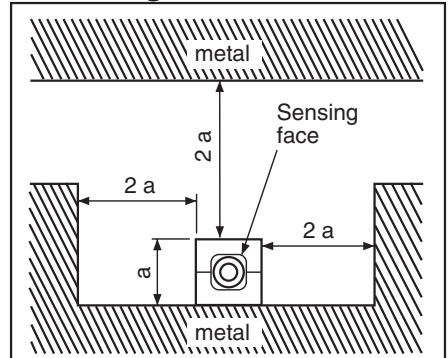
**Block type proximity sensors
not suitable for mounting in metal**

Non-shielded

Mounting into a T section



Mounting into a U section

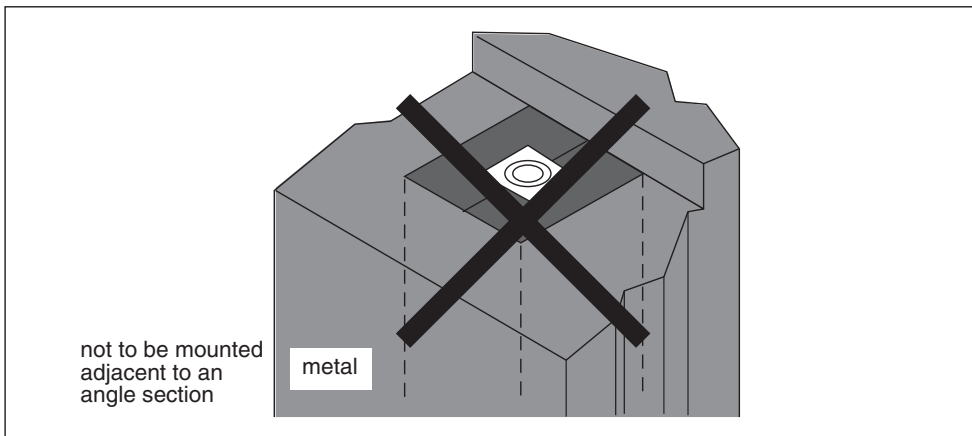
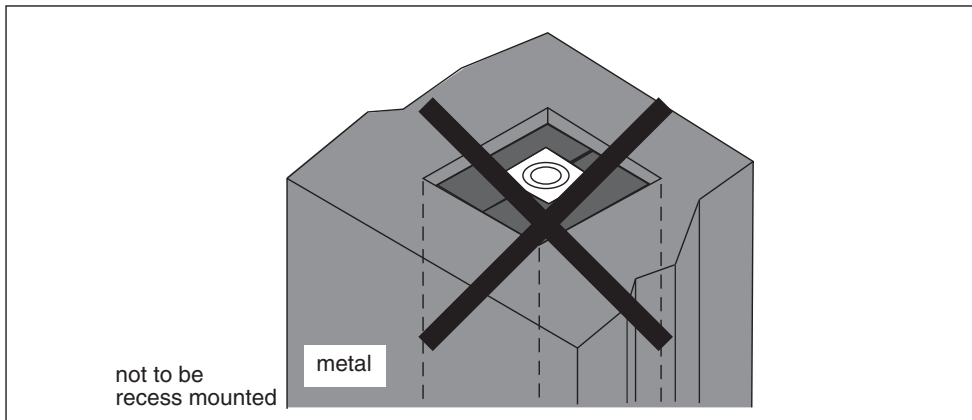
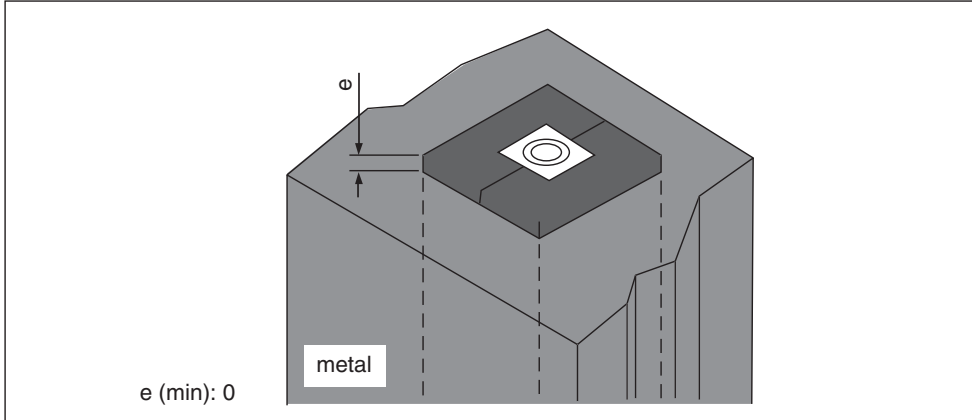


Proximity

NOTE: For shorter distances, **alternate frequency** models are required. Consult the factory for availability.

Suitable for flush mounting in metal

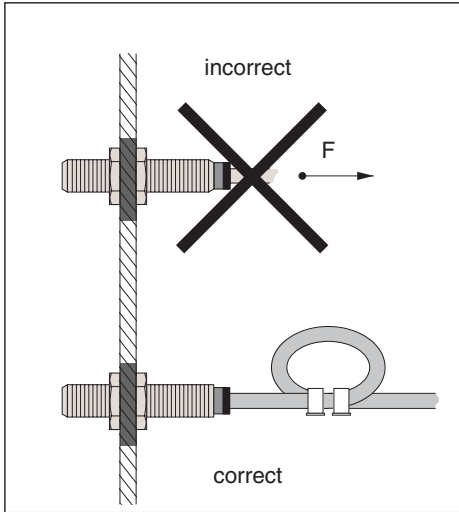
Shielded
Mounting with metal on one or more sides simultaneously



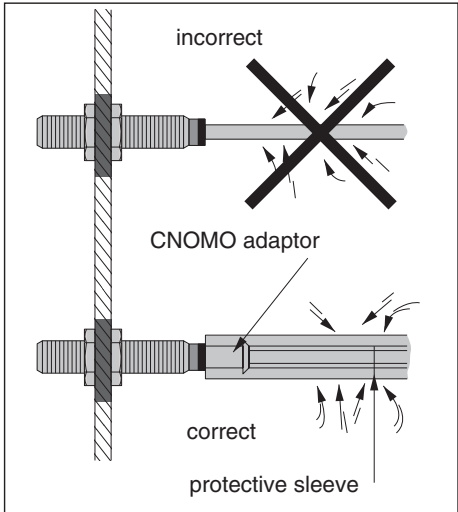
Any metal within the immediate vicinity of a proximity sensor distorts the magnetic field around the sensing face. The clearance distances shown above are given for a simplified installation arrangement and would result in the increase of the sensing distance of less than 5%.

Cable Protection

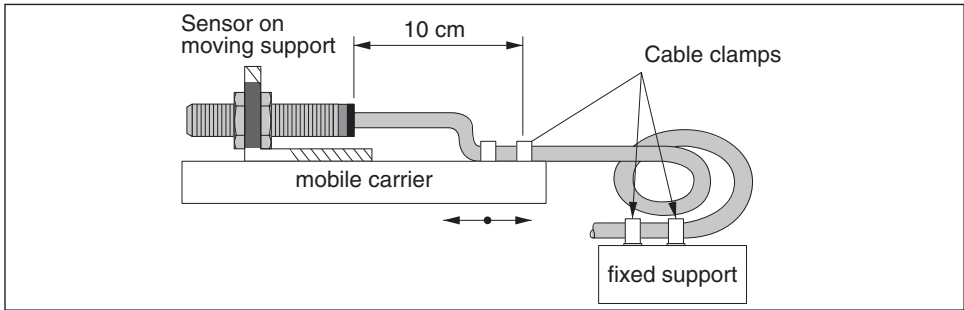
Protection of the cable



Do not exert a pulling force of over 4.4 lb on the sensor cable.

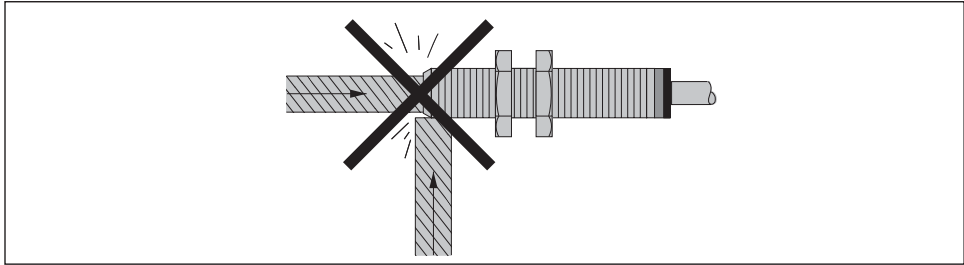


Consider using a protective sleeve or rigid conduit, where necessary.



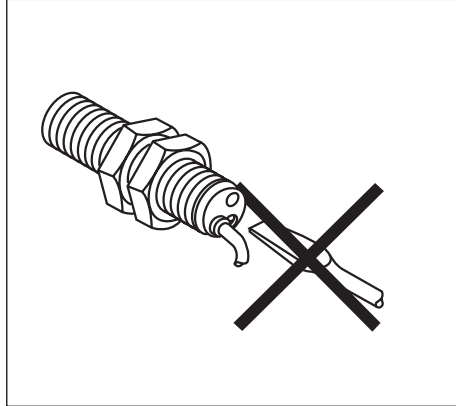
Avoid repetitive flexing movement between the cable and the sensor.

Protection of the sensing face

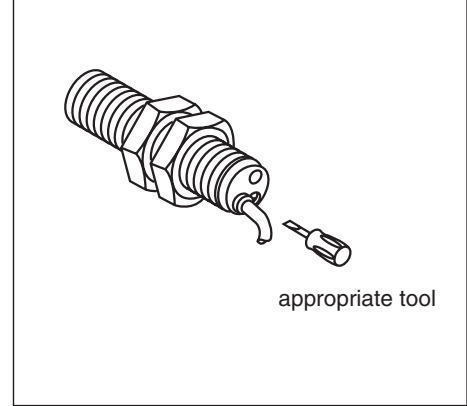


The sensor must never be used as a mechanical stop as this may cause irreparable damage.

Use of tools for adjustment of the proximity sensor



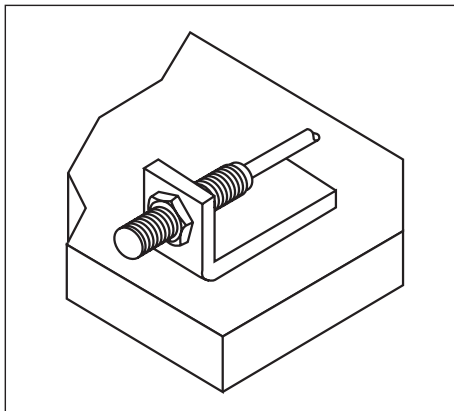
Incorrect



Correct

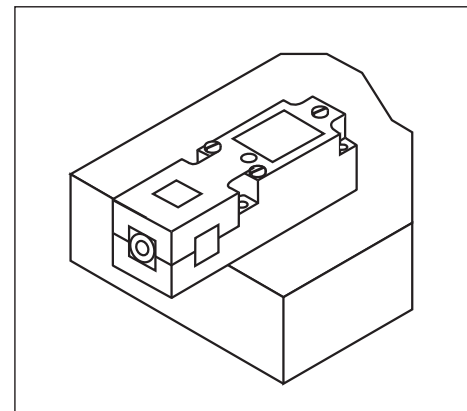
Mounting

Tubular sensor



Ensure a rigid mounting
the mounting must be sufficiently rigid and thick to resist shock and vibrations

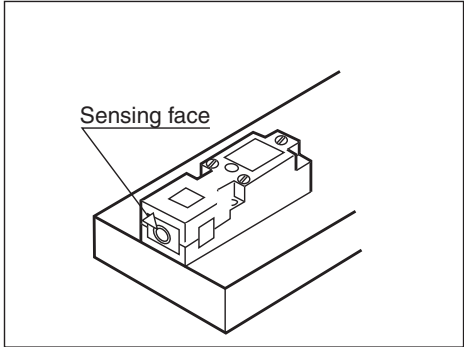
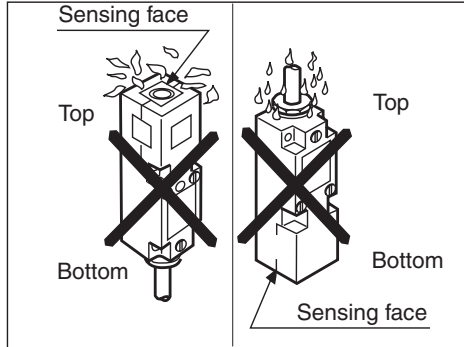
Block type sensor



Ensure a rigid mounting
the mounting area must be large enough to support the sensor correctly

Sensor
Positioning

Positioning

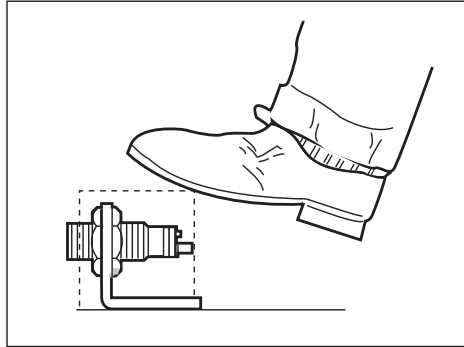
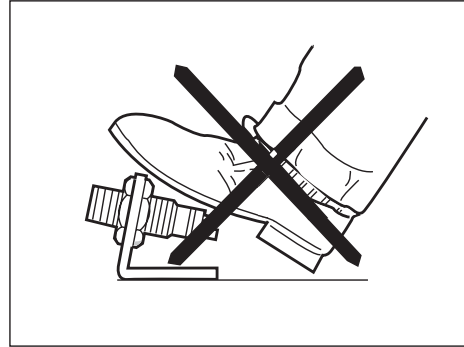


Incorrect

- possibility of debris collecting on the sensor sensing face
- possibility of liquid entry if the cable gland is mounted improperly

Correct

Mechanical protection



A proximity sensor should never be used as a footrest.

Where the possibility of this type of misuse exists, a protective cover should be fitted over the sensor.

Remember: For proper installation, the sensor must be mounted solidly to its support.

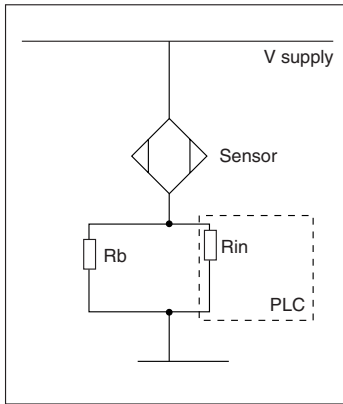
Depending on the application, the operating distance is adjusted by either:

- moving the mounting bracket
- adjusting the target

Proximity Sensors

Product Overview

PLC Compatibility



For a solid-state, 2-wire, AC sensor to be directly compatible with a PLC, two conditions must be met:

1. Leakage current: (I off) less than 1.7 mA (Off state)

2. Load current: greater than the sensor minimum load current (On state). Typical PLC input currents (load current, I load) are 12–16 mA. Typical values for PLC input resistance (Rin) are 7.5–10 kΩ.

If the sensor does not meet both requirements, a bleeder resistor (Rb) must be wired in parallel with the load. Calculate the bleeder resistor parameters as shown below. **The smaller value should be selected for the application.**

$$1. R_b = \frac{R_{in} \times V_o \text{ max.}}{I_{off} (R_{in}) - V_o \text{ max.}} \quad * \quad P_b = \frac{V_s^2}{R_b}$$

Where: $V_o \text{ max.}$ = PLC input maximum Off voltage (20–40 Vac)

R_{in} = PLC input resistance

V_s = Line voltage

P_b = Minimum bleeder resistor power rating

Example:

I_{off} = 3.5 mA

$V_o \text{ max.}$ = 20 V

R_{in} = 6.5 kΩ

Typical examples for Telemecanique® TSX DET input modules:

	TSX DET 1604	TSX DET 0804
For I_{off} = 3.5 mA	47 kΩ/0.5 W	—
For I_{off} = 7 mA	4.7 kΩ/3 W	12 kΩ/1.5 W

$$2. R_b = \frac{R_{in} \times V_o \text{ max.}}{I_{off} (R_{in}) - V_o \text{ max.}} \quad * \quad P_b = \frac{V_s^2}{R_b}$$

Example:

I_{min} = 30 mA

V_s = 120 V

R_{in} = 7 kΩ

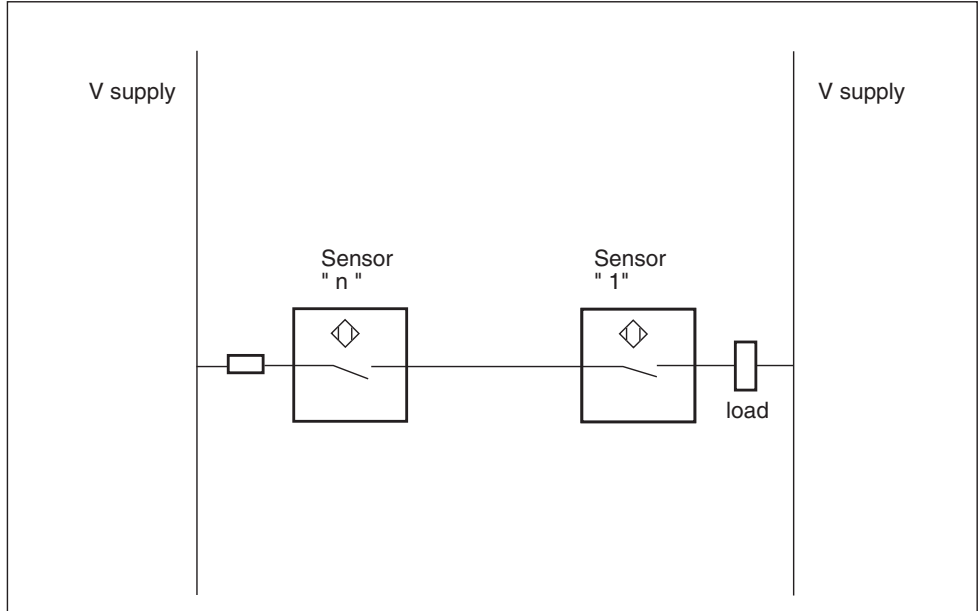
Typical examples using TSX programmable controllers:

	TSX DET 1604	TSX DET 0804
For I_{min} = 20 mA	64 kΩ/0.5 W	24 kΩ/1 W
For I_{min} = 30 mA	8.7 kΩ/2 W	8.7 kΩ/2 W

NOTE: All DC 3-wire sensors are PLC compatible.

Wiring
in series

Wiring two or more sensors in series
2 wire type



Proximity

Consider the following points:

1. When in the open state, each sensor will share the supply voltage:

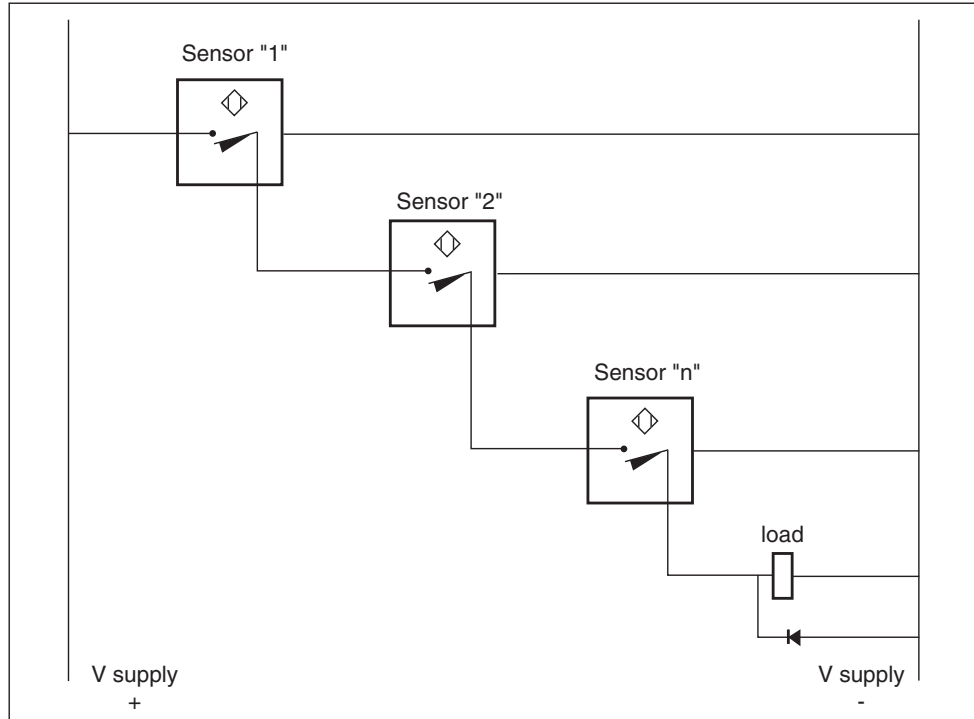
$$\text{Voltage across the sensor} = \frac{V_{\text{supply}}}{\text{number of proximity sensors}}$$

V_{sensor} and V_{supply} must fall within the sensor's voltage range.

2. If a sensor is off, it will be supplied with nearly all the supply voltage.
3. When all sensors are on, a small voltage drop is present across each sensor; the resultant loss of voltage at the load will be the sum of the individual voltage drops. Select the load voltage accordingly.
4. Series connection is only possible for sensors with a wide voltage range.

Example: Four sensors rated at 24–240 Vac can be wired in series at 120 V because even at 90%, $V_{\text{supply}} = 108 \text{ V}$. When all sensors are off, each will see $108/4 = 27 \text{ V}$, which is higher than the minimum voltage rating of the switch (24 V).

Wiring two or more sensors in series 3 wire type

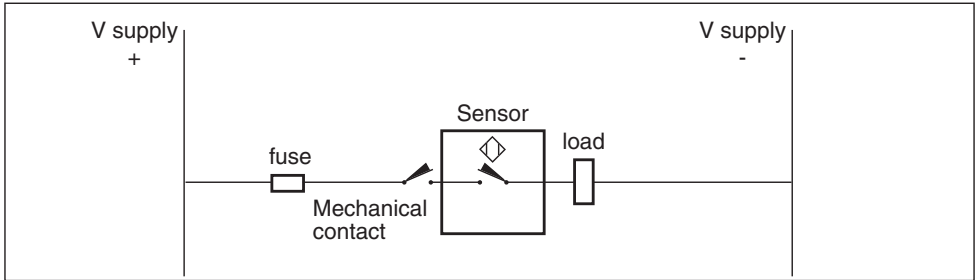


Consider the following points:

1. Sensor 1, when conducting its load current, also carries the leakage currents of all other sensors.
2. Each sensor, when conducting, produces a voltage drop of 2.6 V maximum. Select the load voltage accordingly.
3. Sensor 2 is powered only when Sensor 1 turns on. Only after its power-up delay can Sensor 2 function properly. Consider this delay when speed is a factor.
4. Use of flywheel diodes is recommended where an inductive load is being switched.

Wiring
in series

Wiring proximity sensors in series with
mechanical contact devices



Consider the following points:

1. When the mechanical contact is open, the sensor is not supplied.
2. When the contact closes, the proximity sensor does not operate until a certain time T has elapsed, corresponding to the **power-up delay**. Please refer to the individual sensor characteristics.

Wiring several sensors in parallel
2 wire type

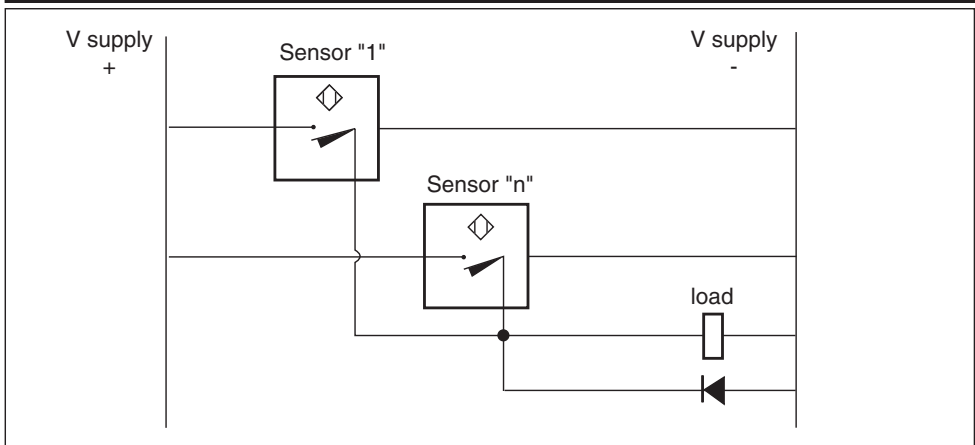
Using proximity sensors wired in parallel either to each other or to mechanical contacts is not recommended.

When one of the sensors is in the On state, the sensor in parallel is shorted out and thus no longer supplied.

As the first unit passes into the Off state, the second sensor becomes energized and is subject to its power-up delay. This configuration is used where the sensors work alternately.

When the sensors are Off, the sum of the leakage currents must be less than the holding current of the load.

3 wire type



No restriction

Proximity

Cable Routing

Cable length

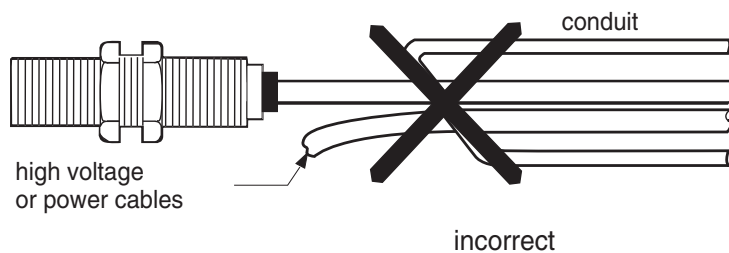
No restrictions up to 660 ft (200 m) or up to a line capacitance of 0.1 μF . It is important to account for voltage drop on the line over 660 ft (200 m).

The XS models can withstand the electrical interference encountered in normal industrial conditions.

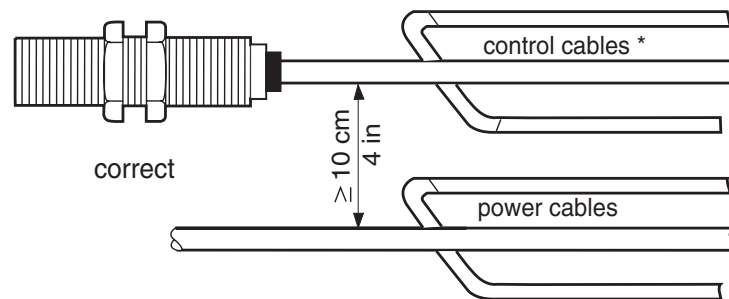
Where extreme electrical noise conditions could occur (large motors, spot welders, etc.), it is advisable to protect against transients in the following ways:

- Suppress interference at the source
- Limit the length of the cables
- Separate power and control wiring
- Ensure that the logic systems contain input transient suppression means
- Use twisted pair and shielded cables

Separation of power and control wiring



Incorrect

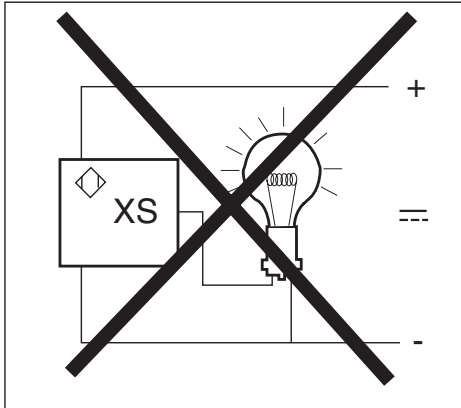


Correct

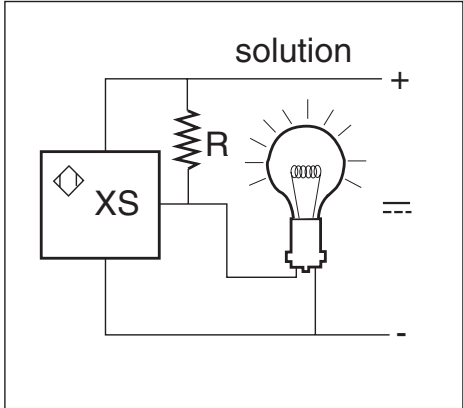
* Use of individual cables is recommended if long lengths are involved.

Proper Loads

Electrical connections

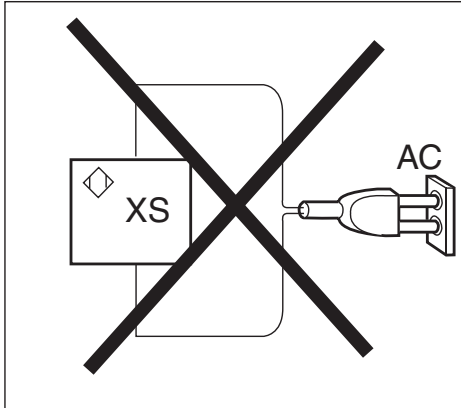


If the load consists of an incandescent lamp, the cold state resistance can be one-tenth the hot state resistance. This can cause very high current levels on switching.

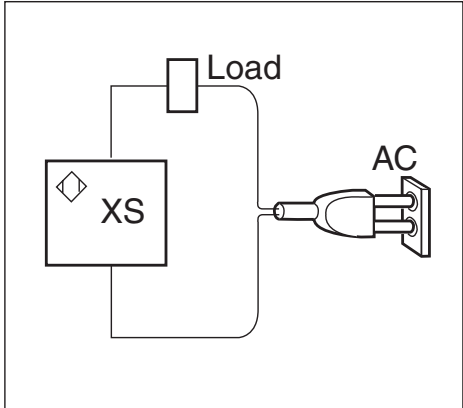


Install a pre-heat resistance in parallel with the proximity sensor.

$$R = \frac{V^2}{P} \times 10$$
*V= supply voltage
 P= power of lamp*



Do not connect an XS proximity sensor directly to an AC supply source.



Connect a suitable load (see product data) in series with the proximity sensor.

Troubleshooting

The sensor's output does not change state when a metal target is moved within its operating zone.





False or erratic operation with or without the presence of the target object.





Possible cause	Remedial action
<i>Output failure, or the short circuit protection has operated.</i>	<ul style="list-style-type: none"> • Check that the sensor is correct for the supply being used. • Check the load current. <p><i>Characteristics:</i></p> <ul style="list-style-type: none"> - If load current is greater than the max. rated current, a relay should be interposed between the sensor and the load. - If load current is lower than the nominal rated current, check for wiring faults which could have caused a short circuit. In any case, a fast-blow fuse should be wired in series with the sensor (AC). - For a tubular sensor, if the sensor is brand new, check the mounting torque.
<i>Wiring error Supply problems</i>	<ul style="list-style-type: none"> • Check the wiring. • Check voltage range. • Check that the supply voltage falls within the operating limits of the sensor in question. Remember that with a rectified supply: $V_{peak} = V_{rms} \times \sqrt{2}$
<i>Transients</i>	<ul style="list-style-type: none"> • Install transient suppressors across potential sources (coils, arcing contactors)
<i>Influence of surrounding metal</i>	<ul style="list-style-type: none"> • Refer to the instruction sheet supplied with the sensor.
<i>Effect of interference on the supply lines</i>	<ul style="list-style-type: none"> • Ensure that any DC supplies, when derived from rectified AC, are correctly filtered ($C \geq 400 \mu f$) • Ensure that AC power cables are run separately from low level DC cables. • Where very long distances are involved, use suitable cable: <ul style="list-style-type: none"> - shielded and/or twisted pair - suitable wire gauge • Position the sensor as far as possible from any source of interference.
<i>Response time of the sensor is too long for the particular target.</i>	<ul style="list-style-type: none"> • Check suitability of the sensor for the target; choose a sensor with a faster response time, or use a longer target.
<i>Effects of high temperature</i>	<ul style="list-style-type: none"> • Eliminate sources of radiated heat, or protect the housing with a heat shield.

Cenelec standards	Cylindrical	Block type	
	Form A	Form C	Form D
	EN 50008 (NFC 63-076) DC 3 or 4 terminals EN 50040 (NFC 63-071) DC 2 terminals EN 50036 (NFC 63-081) AC terminals	EN 50025 (NFC 63-077) DC 3 or 4 terminals EN 50037 (NFC 63-082) AC 2 terminals	EN 50026 (NFC 63-078) DC 3 or 4 terminals EN 50038 (NFC 63-083) AC 2 terminals
	EN 50010 (NFC 63-075) EN 50032 (NFC 63-079) EN 50040 (NFC 63-074)	<i>Determination of sensing distance and operating frequencies</i> <i>Definitions, classification, description</i> <i>Connection identification</i>	

Series XS1N/XS2N, XS1M/XS2M, and XS4P also conform to the requirements of IEC 60947.5.2 standard. (ISO 9000 Self-Certification, NEMA project ICS 5-4-2002X)

Approvals

-  File LR46094 + LR44087 class 321103
-  File E39291 guide NKCR2
-  File E39281 guide NKCR
- Standard version approved
- pending
- ▲ Special North American version (1/2" NPT cable entry, UL label, etc.)
-  Intrinsically safe applications

					USSR
XS1 / XS2 L/N	●	—	●	●	—
XS1 / XS2 M	●	—	●	●	—
XS4P	●	—	●	●	—
XSB	▲	—	▲	●	●
XS7 / 8	▲	—	▲	●	—
XSD	▲	—	▲	●	—
XSE	▲	—	▲	●	●
XSG	▲	▲	—	—	—
XS5	▲	—	●	●	—
XS6	▲	—	●	●	—
XS7	▲	—	●	●	—
XS8	▲	—	●	●	—
XS9	▲	—	●	●	—

Proximity Sensors

Catalog Number Cross-References

Old Design to New Design

Old Design	New Design	Old Design	New Design	Old Design	New Design
8 mm Tubular ☐					
XS1M08DA210	XS508B1DAL2	XS1N08PA349L2	XS608B1PAL10	XS1M12KP340D	XS508B1NBM8
XS1M08DA210D	XS508B1DAM12	XS1N08PA349S	XS608B1PAM12	XS1M12KP340L1	XS508B1PAL5
XS1M08DA210L1	XS508B1DAL5	XS1N08PB340	XS508B1PBL2	XS1M12KP340L1	XS508B1PBL5
XS1M08DA210L2	XS508B1DAL10	XS1N08PB340D	XS508B1PBM8	XS1M12KP340L1	XS508B1NAL5
XS1M08DA210LD	XS508B1DAL08M12	XS1N08PB340L1	XS508B1PBL5	XS1M12KP340L1	XS508B1NBL5
XS1M08DB210	XS508B1DBL2	XS1N08PB340S	XS508B1PBM8	XS1M12KP340L2	XS508B1PAL10
XS1M08DB210D	XS508B1DBM12	XS1N08PB349	XS608B1PBL2	XS1M12KP340L2	XS508B1PBL10
XS1M08DB210L1	XS508B1DBL5	XS1N08PB349D	XS608B1PBM12	XS1M12KP340L2	XS508B1NAL10
XS1M08DB210L1	XS508B1DBL5	XS1N08PB349L1	XS608B1PBL5	XS1M12KP340L2	XS508B1NBL10
XS1M08NA370	XS608B1NAL2	XS1N08PB349L2	XS608B1PBL10	XS1M12NA370	XS612B1NAL2
XS1M08NA370D	XS608B1NAM12	XS1N08PB349S	XS608B1PBM12	XS1M12NA370D	XS612B1NAM12
XS1M08NA370L1	XS608B1NAL5	XS2M08NA340	XS608B1NAL2	XS1M12NA370L1	XS612B1NAL5
XS1M08NB370	XS608B1NBL2	XS2M08NC410	XS608B1NAL2	XS1M12NA370L2	XS612B1NAL10
XS1M08NB370D	XS608B1NBM12	XS2M08NC410	XS608B1NBL2	XS1M12NA370S	XS612B1NAM12
XS1M08NC410	XS508B1NAL2	XS2M08NC410D	XS608B1NAM12	XS1M12NB370	XS612B1NBL2
XS1M08NC410	XS508B1NBL2	XS2M08NC410D	XS608B1NBM12	XS1M12NB370D	XS612B1NBM12
XS1M08NC410D	XS508B1NAM8	XS2M08PC410	XS608B1PAL2	XS1M12PA370	XS612B1PAL2
XS1M08NC410D	XS508B1NBM8	XS2M08PC410	XS608B1PBL2	XS1M12PA370D	XS612B1PAM12
XS1M08PA370	XS608B1PAL2	XS2M08PC410D	XS608B1PAM12	XS1M12PA370L1	XS612B1PAL5
XS1M08PA370D	XS608B1PAM12	XS2M08PC410D	XS608B1PBM12	XS1M12PA370L2	XS612B1PAL10
XS1M08PA370L1	XS608B1PAL5	XS2N08NA340	XS608B1NAL2	XS1M12PB370	XS612B1PBL2
XS1M08PA370L2	XS608B1PAL10	XS2N08NA340D	XS608B1NAM8	XS1M12PB370D	XS612B1PBM12
XS1M08PA370LD	XS608B1PAL08M12	XS2N08NA340L1	XS608B1NAL5	XS1M12PB370L1	XS612B1PBL5
XS1M08PA370S	XS608B1PAM12	XS2N08NA340S	XS608B1NAM8	XS1N12NA340	XS512B1NAL2
XS1M08PB370	XS608B1PBL2	XS2N08NB340	XS608B1NBL2	XS1N12NA340D	XS512B1NAM12
XS1M08PB370D	XS608B1PBM12	XS2N08PA340	XS608B1PAL2	XS1N12NA340L1	XS512B1NAL5
XS1M08PB370L1	XS608B1PBL5	XS2N08PA340D	XS608B1PAM8	XS1N12NA349	XS612B1NAL2
XS1M08PB370L2	XS608B1PBL10	XS2N08PA340L1	XS608B1PAL5	XS1N12NA349D	XS612B1NAM12
XS1M08PC410	XS508B1PAL2	XS2N08PA340L2	XS608B1PAL10	XS1N12NA349L1	XS612B1NAL5
XS1M08PC410	XS508B1PBL2	XS2N08PA340S	XS608B1PAM8	XS1N12NA349L2	XS612B1NAL10
XS1M08PC410D	XS508B1PAM8	XS2N08PB340	XS608B1PBL2	XS1N12NB340	XS512B1NBL2
XS1M08PC410D	XS508B1PBM8	XS2N08PB340D	XS608B1PBM8	XS1N12NB340D	XS512B1NBM12
XS1N08NA340D	XS508B1NAM8	XS2N08PB340S	XS608B1PBM8	XS1N12NB349	XS612B1NBL2
XS1N08NA340L1	XS508B1NAL5	XS3P08NA340	XS508B1NAL2	XS1N12NB349D	XS612B1NBM12
XS1N08NA340L2	XS508B1NAL10	XS3P08NA340D	XS508B1NAM8	XS1N12NB349L2	XS612B1NBL10
XS1N08NA340S	XS508B1NAM8	XS3P08NA370	XS608B1NAL2	XS1N12NC410	XS512B1NAL2
XS1N08NA349	XS608B1NAL2	XS3P08PA340	XS508B1PAL2	XS1N12NC410	XS512B1NBL2
XS1N08NA349D	XS608B1NAM12	XS3P08PA340D	XS508B1PAM12	XS1N12NC410D	XS512B1NBM12
XS1N08NA349L1	XS608B1NAL5	XS3P08PA340L1	XS508B1PAL5	XS1N12NC410D	XS512B1NAM12
XS1N08NA349S	XS608B1NAM12	XS3P08PA370	XS608B1PAL2	XS1N12NC410L1	XS512B1NAL5
XS1N08NB340	XS508B1NBL2	12 mm Tubular ☐		XS1N12NC410L1	XS512B1NBL5
XS1N08NB340D	XS508B1NBM8	XS1M12DA210	XS512B1DAL2	XS1N12PA340	XS512B1PAL2
XS1N08NB340S	XS508B1NBM8	XS1M12DA210D	XS512B1DAM12	XS1N12PA340D	XS512B1PAM12
XS1N08NB349	XS608B1NBL2	XS1M12DA210L1	XS512B1DAL5	XS1N12PA340L1	XS512B1PAL5
XS1N08NB349D	XS608B1NBM12	XS1M12DA210L2	XS512B1DAL10	XS1N12PA340L2	XS512B1PAL10
XS1N08NB349S	XS608B1NBM12	XS1M12DB210	XS512B1DBL2	XS1N12PA340S	XS512B1PAM12
XS1N08PA340	XS508B1PAL2	XS1M12DB210D	XS512B1DBM12	XS1N12PA349	XS612B1PAL2
XS1N08PA340D	XS508B1PAM8	XS1M12DB210L1	XS512B1DBL5	XS1N12PA349D	XS612B1PAM12
XS1N08PA340L1	XS508B1PAL5	XS1M12KP340	XS508B1PAL2	XS1N12PA349L1	XS612B1PAL5
XS1N08PA340L2	XS508B1PAL10	XS1M12KP340	XS508B1PBL2	XS1N12PA349L2	XS612B1PAL10
XS1N08PA340LD	XS508B1PAL08M12	XS1M12KP340	XS508B1NAL2	XS1N12PA349S	XS612B1PAM12
XS1N08PA340S	XS508B1PAM8	XS1M12KP340	XS508B1NBL2	XS1N12PB340	XS512B1PBL2
XS1N08PA349	XS608B1PAL2	XS1M12KP340D	XS508B1PAM8	XS1N12PB340D	XS512B1PBM12
XS1N08PA349D	XS608B1PAM12	XS1M12KP340D	XS508B1PBM8	XS1N12PB349	XS612B1PBL2
XS1N08PA349L1	XS608B1PAL5	XS1M12KP340D	XS508B1NAM8	XS1N12PB349D	XS612B1PBM12

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Old Design	New Design	Old Design	New Design	Old Design	New Design
XS1N12PB349L1	XS612B1PBL5	XS2N12PA340	XS612B1PAL2	XS1M18NA370C	XS618B1NAM12
XS1N12PB349L2	XS612B1PBL10	XS2N12PA340D	XS612B1PAM12	XS1M18NA370D	XS618B1NAM12
XS1N12PB349S	XS612B1PBM12	XS2N12PA340L1	XS612B1PAL5	XS1M18NA370L1	XS618B1NAL5
XS1N12PC410	XS512B1PAL2	XS2N12PA340L2	XS612B1PAL10	XS1M18NA370L2	XS618B1NAL10
XS1N12PC410	XS512B1PBL2	XS2N12PB340	XS612B1PBL2	XS1M18NB370	XS618B1NBL2
XS1N12PC410D	XS512B1PAM12	XS2N12PB340D	XS612B1PBM12	XS1M18NB370C	XS618B1NBM12
XS1N12PC410D	XS512B1PBM12	XS2N12PC410	XS612B1PAL2	XS1M18NB370D	XS618B1NBM12
XS1N12PC410L1	XS512B1PAL5	XS2N12PC410	XS612B1PBL2	XS1M18NB370L1	XS618B1NBL5
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XS1N12PC410L2	XS512B1PAL10	XS2N12PC410D	XS612B1PBM12	XS1M18PA370	XS618B1PAL2
XS1N12PC410L2	XS512B1PBL10	XS2N12PC410L1	XS612B1PAL5	XS1M18PA370A	XS618B1PAM12
XS1N12PC419D	XS612B1PAM12	XS2N12PC410L1	XS612B1PBL5	XS1M18PA370B	XS618B1PAM12
XS1N12PC419D	XS612B1PBM12	XS2N12PC410L2	XS612B1PAL10	XS1M18PA370C	XS618B1PAM12
XS2M12KP340	XS612B1PAL2	XS2N12PC410L2	XS612B1PBL10	XS1M18PA370D	XS618B1PAM12
XS2M12KP340	XS612B1PBL2	XS3P12NA340	XS512B1NAL2	XS1M18PA370E	XS618B1PAM12
XS2M12KP340	XS612B1NAL2	XS3P12NA340D	XS512B1NAM12	XS1M18PA370G	XS618B1PAM12
XS2M12KP340	XS612B1NBL2	XS3P12NA370	XS612B1NAL2	XS1M18PA370L1	XS618B1PAL5
XS2M12KP340D	XS612B1PAM12	XS3P12PA340	XS512B1PAL2	XS1M18PA370L2	XS618B1PAL10
XS2M12KP340D	XS612B1PBM12	XS3P12PA340D	XS512B1PAM12	XS1M18PA370T	XS618B1PAL2T
XS2M12KP340D	XS612B1NAM12	XS3P12PA340L1	XS512B1PAL5	XS1M18PB370	XS618B1PBL2
XS2M12KP340D	XS612B1NBM12	XS3P12PA370	XS612B1PAL2	XS1M18PB370A	XS618B1PBM12
XS2M12KP340L1	XS612B1PAL5	XS3P12PA370L1	XS612B1PAL5	XS1M18PB370B	XS618B1PBM12
XS2M12KP340L1	XS612B1PBL5	18 mm Tubular ---		XS1M18PB370C	XS618B1PBM12
XS2M12KP340L1	XS612B1NAL5	XS1M18DA210	XS518B1DAL2	XS1M18PB370D	XS618B1PBM12
XS2M12KP340L1	XS612B1NBL5	XS1M18DA210B	XS518B1DAM12	XS1M18PB370G	XS618B1PBM12
XS2M12KP340L2	XS612B1PAL10	XS1M18DA210C	XS518B1DAM12	XS1M18PB370L1	XS618B1PAL5
XS2M12KP340L2	XS612B1PBL10	XS1M18DA210D	XS518B1DAM12	XS1M18PB370L2	XS618B1PAL10
XS2M12KP340L2	XS612B1NAL10	XS1M18DA210G	XS518B1DAM12	XS1N18NA340	XS518B1NAL2
XS2M12KP340L2	XS612B1NBL10	XS1M18DA210L1	XS518B1DAL5	XS1N18NA340D	XS518B1NAM12
XS2M12NA370	XS612B1NAL2	XS1M18DA210L2	XS518B1DAL10	XS1N18NA340L1	XS518B1NAL5
XS2M12NA370D	XS612B1NAM12	XS1M18DA210LD	XS518B1DAL08M12	XS1N18NA340L2	XS618B1NAL10
XS2M12NA370L1	XS612B1NAL5	XS1M18DA214D	XS518B1CAM12	XS1N18NA349	XS618B1NAL2
XS2M12NB370	XS612B1NBL2	XS1M18DA214LD	XS518B1CAL08M12	XS1N18NA349D	XS618B1NAM12
XS2M12NB370D	XS612B1NBM12	XS1M18DB210	XS518B1DBL2	XS1N18NA349L1	XS618B1NAL5
XS2M12PA370	XS612B1PAL2	XS1M18DB210B	XS518B1DBM12	XS1N18NB340	XS518B1NBL2
XS2M12PA370D	XS612B1PAM12	XS1M18DB210D	XS518B1DBM12	XS1N18NB340D	XS518B1NBM12
XS2M12PA370L1	XS612B1PAL5	XS1M18KP340	XS518B1PAL2	XS1N18NB349	XS618B1NBL2
XS2M12PA370L2	XS612B1PAL10	XS1M18KP340	XS518B1PBL2	XS1N18NB349D	XS618B1NBM12
XS2M12PB370	XS612B1PBL2	XS1M18KP340	XS518B1NAL2	XS1N18NC410	XS518B1NAL2
XS2M12PB370D	XS612B1PBM12	XS1M18KP340	XS518B1NBL2	XS1N18NC410	XS518B1NBL2
XS2M12PB370S	XS612B1PBM12	XS1M18KP340D	XS518B1PAM12	XS1N18NC410D	XS518B1NAM12
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XS2M12PC410D	XS612B1PBM12	XS1M18KP340D	XS518B1NAM12	XS1N18NC410L1	XS518B1NAL5
XS2N12NA340	XS612B1NAL2	XS1M18KP340D	XS518B1NBM12	XS1N18NC410L1	XS518B1NBL5
XS2N12NA340D	XS612B1NAM12	XS1M18KP340L1	XS518B1PAL5	XS1N18PA340	XS518B1PAL2
XS2N12NA340L1	XS612B1NAL5	XS1M18KP340L1	XS518B1PBL5	XS1N18PA340D	XS518B1PAM12
XS2N12NA340L2	XS612B1NAL10	XS1M18KP340L1	XS518B1NAL5	XS1N18PA340L1	XS518B1PAL5
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XS2N12NB340D	XS612B1NBM12	XS1M18KP340L2	XS518B1PAL10	XS1N18PA349	XS618B1PAL2
XS2N12NC410	XS612B1NAL2	XS1M18KP340L2	XS518B1PBL10	XS1N18PA349D	XS618B1PAM12
XS2N12NC410	XS612B1NBL2	XS1M18KP340L2	XS518B1NAL10	XS1N18PA349L1	XS618B1PAL5
XS2N12NC410D	XS612B1NAM12	XS1M18KP340L2	XS518B1NBL10	XS1N18PA349L2	XS618B1PAL10
XS2N12NC410D	XS612B1NBM12	XS1M18NA370	XS618B1NAL2	XS1N18PA349S	XS618B1PAM12
XS2N12NC410L1	XS612B1NAL5	XS1M18NA370A	XS618B1NAM12	XS1N18PB340	XS518B1PBL2
XS2N12NC410L1	XS612B1NBL5	XS1M18NA370B	XS618B1NAM12	XS1N18PB340D	XS518B1PBM12

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Old Design	New Design	Old Design	New Design	Old Design	New Design
XS1N18PB340L2	XS518B1PBL10	XS2N18NC410	XS618B1NBL2	XS1M30NA370	XS630B1NAL2
XS1N18PB349	XS618B1PBL2	XS2N18NC410D	XS618B1NAM12	XS1M30NA370B	XS630B1NAM12
XS1N18PB349D	XS618B1PBM12	XS2N18NC410D	XS618B1NBM12	XS1M30NA370C	XS630B1NAM12
XS1N18PB349L1	XS618B1PBL5	XS2N18PA340	XS618B1PAL2	XS1M30NA370D	XS630B1NAM12
XS1N18PB349L2	XS618B1PBL10	XS2N18PA340D	XS618B1PAM12	XS1M30NA370G	XS630B1NAM12
XS1N18PB349S	XS618B1PBM12	XS2N18PA340L1	XS618B1PAL5	XS1M30NA370L1	XS630B1NAL5
XS1N18PC410	XS518B1PAL2	XS2N18PA340L2	XS618B1PAL10	XS1M30NA370L2	XS630B1NAL10
XS1N18PC410	XS518B1PBL2	XS2N18PB340	XS618B1PBL2	XS1M30NA370T	XS630B1NAL2T
XS1N18PC410D	XS518B1PAM12	XS2N18PB340D	XS618B1PBM12	XS1M30NB370	XS630B1NBL2
XS1N18PC410D	XS518B1PBM12	XS2N18PC410	XS618B1PAL2	XS1M30NB370B	XS630B1NBM12
XS1N18PC410L1	XS518B1PAL5	XS2N18PC410	XS618B1PBL2	XS1M30NB370D	XS630B1NBM12
XS1N18PC410L1	XS518B1PBL5	XS2N18PC410D	XS618B1PAM12	XS1M30PA349C	XS630B1PAM12
XS1N18PC410P	XS518B1PAL10	XS2N18PC410D	XS618B1PBM12	XS1M30PA349D	XS630B1PAM12
XS1N18PC410P	XS518B1PBL10	XS2N18PC410L1	XS618B1PAL5	XS1M30PA370	XS630B1PAL2
XS2M18KP340	XS618B1PAL2	XS2N18PC410L1	XS618B1PBL5	XS1M30PA370A	XS630B1PAM12
XS2M18KP340	XS618B1PBL2	XS3P18NA340	XS518B1NAL2	XS1M30PA370B	XS630B1PAM12
XS2M18KP340	XS618B1NAL2	XS3P18NA340D	XS518B1NAM12	XS1M30PA370C	XS630B1PAM12
XS2M18KP340	XS618B1NBL2	XS3P18NA370	XS618B1NAL2	XS1M30PA370D	XS630B1PAM12
XS2M18KP340D	XS618B1PAM12	XS3P18PA340	XS518B1PAL2	XS1M30PA370G	XS630B1PAM12
XS2M18KP340D	XS618B1PBM12	XS3P18PA340D	XS518B1PAM12	XS1M30PA370L1	XS630B1PAL5
XS2M18KP340D	XS618B1NAM12	XS3P18PA340L1	XS518B1PAL5	XS1M30PA370L2	XS630B1PAL10
XS2M18KP340D	XS618B1NBM12	XS3P18PA370	XS618B1PAL2	XS1M30PA370T	XS630B1PAL2T
XS2M18KP340L1	XS618B1PAL5	30 mm Tubular ---		XS1M30PB370	XS630B1PBL2
XS2M18KP340L1	XS618B1PBL5	XS1M30DA210	XS530B1DAL2	XS1M30PB370B	XS630B1PBM12
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XS2M18KP340L2	XS618B1PAL10	XS1M30DA210D	XS530B1DAM12	XS1M30PB370G	XS630B1PBM12
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XS2M18KP340L2	XS618B1NBL10	XS1M30DA210L2	XS530B1DAL10	XS1N30NA340	XS530B1NAL2
XS2M18NA370	XS618B1NAL2	XS1M30DA210LA	XS530B1DAM12	XS1N30NA340D	XS530B1NAM12
XS2M18NA370C	XS618B1NAM12	XS1M30DA210LD	XS530B1DAM12	XS1N30NA349	XS630B1NAL2
XS2M18NA370D	XS618B1NAM12	XS1M30DB210	XS530B1DBL2	XS1N30NA349D	XS630B1NAM12
XS2M18NA370L1	XS618B1NAL5	XS1M30DB210B	XS530B1DBM12	XS1N30NA349L1	XS630B1NAL5
XS2M18NA370L2	XS618B1NAL10	XS1M30DB210D	XS530B1DBM12	XS1N30NA349L2	XS630B1NAL10
XS2M18NA370T	XS618B1NAM12T	XS1M30KP340	XS530B1PAL2	XS1N30NB340	XS530B1NBL2
XS2M18NB370	XS618B1NBL2	XS1M30KP340	XS530B1PBL2	XS1N30NB349	XS630B1NBL2
XS2M18NB370D	XS618B1NBM12	XS1M30KP340	XS530B1NAL2	XS1N30NB349D	XS630B1NBM12
XS2M18PA370	XS618B1PAL2	XS1M30KP340	XS530B1NBL2	XS1N30NC410	XS530B1NAL2
XS2M18PA370C	XS618B1PAM12	XS1M30KP340D	XS530B1PAM12	XS1N30NC410	XS530B1NBL2
XS2M18PA370D	XS618B1PAM12	XS1M30KP340D	XS308B1PBM12	XS1N30NC410D	XS530B1NAM12
XS2M18PA370G	XS618B1PAM12	XS1M30KP340D	XS530B1NAM12	XS1N30NC410D	XS530B1NBM12
XS2M18PA370L1	XS618B1PAL5	XS1M30KP340D	XS530B1NBM12	XS1N30PA340	XS530B1PAL2
XS2M18PA370L2	XS618B1PAL10	XS1M30KP340L1	XS530B1PAL5	XS1N30PA340D	XS530B1PAM12
XS2M18PA370T	XS618B1PAL2T	XS1M30KP340L1	XS530B1PBL5	XS1N30PA340L1	XS530B1PAL5
XS2M18PB370	XS618B1PBL2	XS1M30KP340L1	XS530B1NAL5	XS1N30PA340L2	XS530B1PAL10
XS2M18PB370C	XS618B1PBM12	XS1M30KP340L1	XS530B1NBL6	XS1N30PA349	XS630B1PAL2
XS2M18PB370D	XS618B1PBM12	XS1M30KP340L2	XS530B1PAL10	XS1N30PA349D	XS630B1PAM12
XS2M18PB370G	XS618B1PBM12	XS1M30KP340L2	XS530B1PBL10	XS1N30PA349L1	XS630B1PAL5
XS2M18PB370L1	XS618B1PBL5	XS1M30KP340L2	XS530B1NAL10	XS1N30PA349L2	XS630B1PAL10
XS2M18PB370L2	XS618B1PBL10	XS1M30KP340L2	XS530B1NBL10	XS1N30PA349S	XS630B1PAM12
XS2N18NA340	XS618B1NAL2	XS1M30KP370	XS630B1PAL2	XS1N30PB340	XS530B1PBL2
XS2N18NA340D	XS618B1NAM12	XS1M30KP370	XS630B1PBL2	XS1N30PB340D	XS530B1PBM12
XS2N18NA340L1	XS618B1NAL5	XS1M30KP370	XS630B1NAL2	XS1N30PB349	XS630B1PBL2
XS2N18NC410	XS618B1NAL2	XS1M30KP370	XS630B1NBL2	XS1N30PB349D	XS630B1PBM12

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Old Design	New Design	Old Design	New Design	Old Design	New Design
XS1N30PB349L1	XS630B1PBL5	XS2N30PB340D	XS630B1PBM12	XS1M18MA230B	XS618B1MAU20
XS1N30PB349L2	XS630B1PBL10	XS2N30PC410	XS630B1PAL2	XS1M18MA230C	XS618B1MAU20
XS1N30PC410	XS530B1PAL2	XS2N30PC410	XS630B1PBL2	XS1M18MA230G	XS618B1MAU20
XS1N30PC410	XS530B1PBL2	XS2N30PC410D	XS630B1PAM12	XS1M18MA230K	XS618B1MAU20
XS1N30PC410D	XS530B1PAM12	XS2N30PC410D	XS630B1PBM12	XS1M18MA230L1	XS618B1MAL5
XS1N30PC410D	XS530B1PBM12	XS2N30PC410L1	XS630B1PAL5	XS1M18MA230L2	XS618B1MAL10
XS1N30PC410L1	XS530B1PAL5	XS2N30PC410L1	XS630B1PBL5	XS1M18MA230T	XS618B1MAL2T
XS1N30PC410L1	XS530B1PBL5	XS3P30NA340	XS530B1NAL2	XS1M18MA239	XS618B1MAL2
XS1N30PC410L2	XS530B1PAL10	XS3P30NA340D	XS530B1NAM12	XS1M18MA239A	XS618B1MAU20
XS1N30PC410L2	XS530B1PBL10	XS3P30NA370	XS630B1NAL2	XS1M18MA239K	XS618B1MAU20
XS2M30KP340	XS630B1PAL2	XS3P30PA340	XS530B1PAL2	XS1M18MA250	XS618B1MAL2
XS2M30KP340	XS630B1PAL2	XS3P30PA340D	XS530B1PAM12	XS1M18MA250A	XS618B1MAU20
XS2M30KP340	XS630B1PAL2	XS3P30PA340L1	XS530B1PAL5	XS1M18MA250H4	XS618B1MAL2
XS2M30KP340	XS630B1PAL2	XS3P30PA340L2	XS530B1PAL10	XS1M18MA250K	XS618B1MAU20
XS2M30KP340D	XS630B1PAM12	XS3P30PA370	XS630B1PAL2	XS1M18MA250KH4	XS618B1MAU20
XS2M30KP340D	XS630B1PAM12	XS3P30PA370L1	XS630B1PAL5	XS1M18MA250L1	XS618B1MAL5
XS2M30KP340D	XS630B1PAM12	XS3P30PA370L2	XS630B1PAL10	XS1M18MA250L2	XS618B1MAL10
XS2M30KP340D	XS630B1PAM12	12 mm Tubular ~		XS1M18MB230	XS618B1MBL2
XS2M30KP340L1	XS630B1PAL5	XS1M12MA230	XS612B1MAL2	XS1M18MB230A	XS618B1MBU20
XS2M30KP340L1	XS630B1PAL5	XS1M12MA230K	XS612B1MAU20	XS1M18MB230B	XS618B1MBU20
XS2M30KP340L1	XS630B1PAL5	XS1M12MA230L1	XS612B1MAL5	XS1M18MB230C	XS618B1MBU20
XS2M30KP340L1	XS630B1PAL5	XS1M12MA230L2	XS612B1MAL10	XS1M18MB230G	XS618B1MBU20
XS2M30KP340L2	XS630B1PAL10	XS1M12MA239	XS612B1MAL2	XS1M18MB230K	XS618B1MBU20
XS2M30KP340L2	XS630B1PAL10	XS1M12MA239K	XS612B1MAU20	XS1M18MB230L1	XS618B1MBL5
XS2M30KP340L2	XS630B1PAL10	XS1M12MA250	XS612B1MAL10	XS1M18MB230L2	XS618B1MBL10
XS2M30KP340L2	XS630B1PAL10	XS1M12MA250K	XS612B1MAU20	XS1M18MB250	XS618B1MBL2
XS2M30NA370	XS630B1NAL2	XS1M12MA250L1	XS612B1MAL5	XS1M18MB250A	XS618B1MBU20
XS2M30NA370D	XS630B1NAM12	XS1M12MA250L2	XS612B1MAL10	XS1M18MB250K	XS618B1MBU20
XS2M30NA370L1	XS630B1NAL5	XS1M12MB230	XS612B1MBL2	XS1M18MB250L1	XS618B1MBL5
XS2M30NB370	XS630B1NBL2	XS1M12MB230K	XS612B1MBU20	XS1M18MB250L2	XS618B1MBL10
XS2M30NB370D	XS630B1NBM12	XS1M12MB230L1	XS612B1MBL5	XS2M18DA210L2	XS612B1MAL10
XS2M30PA370	XS630B1PAL2	XS1M12MB230L2	XS612B1MBL10	XS2M18MA230	XS618B1MAL2
XS2M30PA370C	XS630B1PAM12	XS1M12MB250	XS612B1MBL2	XS2M18MA230A	XS618B1MAU20
XS2M30PA370D	XS630B1PAM12	XS2M12MA230	XS612B1MAL2	XS2M18MA230C	XS618B1MAU20
XS2M30PA370G	XS630B1PAM12	XS2M12MA230K	XS612B1MAU20	XS2M18MA230G	XS618B1MAU20
XS2M30PA370L1	XS630B1PAL5	XS2M12MA230L1	XS612B1MAL5	XS2M18MA230K	XS618B1MAU20
XS2M30PA370L2	XS630B1PAL10	XS2M12MA230L2	XS612B1MAL10	XS2M18MA230L1	XS618B1MAL5
XS2M30PA370T	XS630B1PAL2T	XS2M12MA250	XS612B1MAL2	XS2M18MA230L2	XS618B1MAL10
XS2M30PB370	XS630B1PBL2	XS2M12MA250K	XS612B1MAU20	XS2M18MA230T	XS618B1MAL2T
XS2M30PB370C	XS630B1PBM12	XS2M12MA250L1	XS612B1MAL5	XS2M18MA250	XS618B1MAL2
XS2M30PB370D	XS630B1PBM12	XS2M12MA250L2	XS612B1MAL10	XS2M18MA250A	XS618B1MAU20
XS2M30PB370L1	XS630B1PBL5	XS2M12MB230	XS612B1MBL2	XS2M18MA250K	XS618B1MAU20
XS2M30PB370L2	XS630B1PBL10	XS2M12MB230K	XS612B1MBU20	XS2M18MA250L1	XS618B1MAL5
XS2N30NA340	XS630B1NAL2	XS2M12MB230L1	XS612B1MBL5	XS2M18MA250L2	XS618B1MAL10
XS2N30NA340D	XS630B1NAM12	XS2M12MB230L2	XS612B1MBL10	XS2M18MB230	XS618B1MBL2
XS2N30NB340	XS630B1NBL2	XS2M12MB250	XS612B1MBL2	XS2M18MB230A	XS618B1MBU20
XS2N30NC410	XS630B1NAL2	XS2M12MB250L1	XS612B1MBL5	XS2M18MB230C	XS618B1MBU20
XS2N30NC410	XS630B1NBL2	XS2M12MB250L2	XS612B1MBL10	XS2M18MB230G	XS618B1MBU20
XS2N30NC410D	XS630B1NAM12	XS3P12MA230	XS612B1MAL2	XS2M18MB230K	XS618B1MBU20
XS2N30NC410D	XS630B1NBM12	XS3P12MA230K	XS612B1MAU20	XS2M18MB230L1	XS618B1MBL5
XS2N30PA340	XS630B1PAL2	XS3P12MA230L1	XS612B1MAL5	XS2M18MB230L2	XS618B1MBL10
XS2N30PA340D	XS630B1PAM12	XS3P12MB230	XS612B1MBL2	XS2M18MB250	XS618B1MBL2
XS2N30PA340L1	XS630B1PAL5	18 mm Tubular ~		XS2M18MB250A	XS618B1MBU20
XS2N30PA340L2	XS630B1PAL10	XS1M18MA230	XS618B1MAL2	XS2M18MB250K	XS618B1MBU20
XS2N30PB340	XS630B1PBL2	XS1M18MA230A	XS618B1MAU20	XS2M18MB250L1	XS618B1MBL5

Proximity Sensors

Catalog Number Cross-References

Old Design to New Design

Old Design	New Design	Old Design	New Design	Old Design	New Design
XS2M18MB250L2	XS618B1MBL10	XS2M30MB230	XS630B1MBL2	XS7C40DP210TF	XS7C1A1DAM8 + XSZBC10
XS3P18MA230	XS618B1MAL2	XS2M30MB230A	XS630B1MBU20	XS7C40DP210TF	XS7C1A1DBM8 + XSZBC10
XS3P18MA230A	XS618B1MAU20	XS2M30MB230C	XS630B1MBU20	XS7C40KPM40	XS9C11MPAM8 + XSZBC10
XS3P18MA230K	XS618B1MAU20	XS2M30MB230G	XS630B1MBU20	XS7C40KPM40	XS9C11MPBM8 + XSZBC10
XS3P18MA230L1	XS618B1MAL5	XS2M30MB230K	XS630B1MBU20	XS7C40KPM40	XS9C11MNAM8 + XSZBC10
XS3P18MA230L2	XS618B1MAL10	XS2M30MB230L1	XS630B1MBL5	XS7C40KPM40	XS9C11MPBM8 + XSZBC10
XS3P18MB230	XS618B1MBL2	XS2M30MB230L2	XS630B1MBL10	XS7C40KPM40H29	XS9C11MPAM8 + XSZBC10
XS3P18MB230A	XS618B1MBU20	XS2M30MB250	XS630B1MBL2	XS7C40KPM40H29	XS9C11MPBM8 + XSZBC10
XS3P18MB230K	XS618B1MBU20	XS2M30MB250K	XS630B1MBU20	XS7C40KPM40H29	XS9C11MNAM8 + XSZBC10
XS3P18MB230L1	XS618B1MBL5	XS2M30MB250L1	XS630B1MBL5	XS7C40KPM40H29	XS9C11MPBM8 + XSZBC10
30 mm Tubular ~		XS3P30MA230	XS630B1MAL2	XS7C40KPM40H7	XS9C11MPAM8 + XSZBC10
XS1M30MA230	XS630B1MAL2	XS3P30MA230A	XS630B1MAU20	XS7C40KPM40H7	XS9C11MPBM8 + XSZBC10
XS1M30MA230A	XS630B1MAU20	XS3P30MA230K	XS630B1MAU20	XS7C40KPM40H7	XS9C11MNAM8 + XSZBC10
XS1M30MA230B	XS630B1MAU20	XS3P30MA230L1	XS630B1MAL5	XS7C40KPM40H7	XS9C11MPBM8 + XSZBC10
XS1M30MA230C	XS630B1MAU20	XS3P30MA230L2	XS630B1MAL10	XS7C40NC440	XS7C1A1NAM8 + XSZBC10
XS1M30MA230G	XS630B1MAU20	XS3P30MB230	XS630B1MBL2	XS7C40NC440	XS7C1A1NBM8 + XSZBC10
XS1M30MA230K	XS630B1MAU20	XS3P30MB230A	XS630B1MBU20	XS7C40NC440D	XS7C1A1NAM8 + XSZBC10
XS1M30MA230L1	XS630B1MAL5	XS3P30MB230K	XS630B1MBU20	XS7C40NC440D	XS7C1A1NBM8 + XSZBC10
XS1M30MA230L2	XS630B1MAL10	XS3P30MB230L1	XS630B1MBL5	XS7C40NC440H29	XS7C1A1NAM8 + XSZBC10
XS1M30MA230T	XS630B1MAL2T	XSC Rectangular ~		XS7C40NC440H29	XS7C1A1NBM8 + XSZBC10
XS1M30MA239	XS630B1MAL2	XSCA150549	XS8C1A1MAL01U20 + XSZBC10	XS7C40NC449	XS8C1A1NAM8 + XSZBC10
XS1M30MA239A	XS630B1MAU20	XSCA150549	XS8C1A1MBL01U20 + XSZBC10	XS7C40NC449	XS8C1A1NBM8 + XSZBC10
XS1M30MA250	XS630B1MAL2	XSD Rectangular ~		XS7C40NC449H29	XS8C1A1NAM8 + XSZBC10
XS1M30MA250A	XS630B1MAU20	XSDA400519	XS8D1A1MAU20 + XSZBD10	XS7C40NC449H29	XS8C1A1NBM8 + XSZBC10
XS1M30MA250AH4	XS630B1MAU20	XSDA400519	XS8D1A1MBU20 + XSZBD10	XS7C40PC440	XS7C1A1PAM8 + XSZBC10
XS1M30MA250H4	XS630B1MAL2	XSDA400519H7	XS8D1A1MAU20 + XSZBD10	XS7C40PC440	XS7C1A1PBM8 + XSZBC10
XS1M30MA250K	XS630B1MAU20	XSDA400519H7	XS8D1A1MBU20 + XSZBD10	XS7C40PC440D	XS7C1A1PAM8 + XSZBC10
XS1M30MA250KH4	XS630B1MAU20	XSDA500519	XS8D1A1MAU20 + XSZBD10	XS7C40PC440D	XS7C1A1PBM8 + XSZBC10
XS1M30MA250L1	XS630B1MAL5	XSDA500519	XS8D1A1MBU20 + XSZBD10	XS7C40PC440H29	XS7C1A1PAM8 + XSZBC10
XS1M30MA250L2	XS630B1MAL10	XSDA500519H7	XS8D1A1MAU20 + XSZBD10	XS7C40PC440H29	XS7C1A1PBM8 + XSZBC10
XS1M30MB230	XS630B1MBL2	XSDA500519H7	XS8D1A1MBU20 + XSZBD10	XS7C40PC440H7	XS7C1A1PAM8 + XSZBC10
XS1M30MB230A	XS630B1MBU20	XSDA505539H4	XS8D1A1MAU20 + XSZBD10	XS7C40PC440H7	XS7C1A1PBM8 + XSZBC10
XS1M30MB230B	XS630B1MBU20	XSDA505539H4	XS8D1A1MBU20 + XSZBD10	XS7C40PC449	XS8C1A1PAM8 + XSZBC10
XS1M30MB230C	XS630B1MBU20	XSDA600519	XS8D1A1MAU20 + XSZBD10	XS7C40PC449	XS8C1A1PBM8 + XSZBC10
XS1M30MB230G	XS630B1MBU20	XSDA600519	XS8D1A1MBU20 + XSZBD10	XS7C40PC449H29	XS8C1A1PAM8 + XSZBC10
XS1M30MB230K	XS630B1MBU20	XSDA600519H7	XS8D1A1MAU20 + XSZBD10	XS7C40PC449H29	XS8C1A1PBM8 + XSZBC10
XS1M30MB230L1	XS630B1MBL5	XSDA600519H7	XS8D1A1MBU20 + XSZBD10	XS7C40PC449H7	XS8C1A1PAM8 + XSZBC10
XS1M30MB230L2	XS630B1MBL10	XSDM500538	XS8D1A1MAU20 + XSZBD10	XS7C40PC449H7	XS8C1A1PBM8 + XSZBC10
XS1M30MB250	XS630B1MBL2	XSDM500538	XS8D1A1MBU20 + XSZBD10	XS7T2DA210	XS7E1A1DAL2 + XSZBE10
XS1M30MB250A	XS630B1MBU20	XSDM600539	XS8D1A1MAU20 + XSZBD10	XS7T2DA214LD	XS7E1A1CAL08M12 + XSZBE10
XS1M30MB250K	XS630B1MBU20	XSDM600539	XS8D1A1MBU20 + XSZBD10	XS7T2DA214LD01	XS7E1A1CAL01M12 + XSZBE10
XS1M30MB250L1	XS630B1MBL5	XSDM600539H7	XS8D1A1MAU20 + XSZBD10	XS7T2NC440	XS7E1A1NAL2 + XSZBE10
XS1M30MB250L2	XS630B1MBL10	XSDM600539H7	XS8D1A1MBU20 + XSZBD10	XS7T2NC440	XS7E1A1NBL2 + XSZBE10
XS2M30MA230	XS630B1MAL2	XS7 Rectangular ==		XS7T2NC440LD	XS7E1A1NAL01M12 + XSZBE10
XS2M30MA230A	XS630B1MAU20	XS7C40DA210	XS7C1A1DAM8 + XSZBC10	XS7T2NC440LD	XS7E1A1NBL01M12 + XSZBE10
XS2M30MA230C	XS630B1MAU20	XS7C40DA210A	XS7C1A1DAM8 + XSZBC10	XS7T2PC440	XS7E1A1PAL2 + XSZBE10
XS2M30MA230G	XS630B1MAU20	XS7C40DA214D	XS7C1A1CAL08M12 + XSZBC10	XS7T2PC440	XS7E1A1PBL2 + XSZBE10
XS2M30MA230K	XS630B1MAU20	XS7C40DP210	XS7C1A1DAM8 + XSZBC10	XS7T2PC440LD	XS7E1A1PAL08M12 + XSZBE10
XS2M30MA230L1	XS630B1MAL5	XS7C40DP210	XS7C1A1DBM8 + XSZBC10	XS7T2PC440LD	XS7E1A1PBL08M12 + XSZBE10
XS2M30MA230L2	XS630B1MAL10	XS7C40DP210H29	XS7C1A1DAM8 + XSZBC10	XS7T4DA210	XS7C1A1DAL2 + XSZBC10
XS2M30MA230T	XS630B1MAL2T	XS7C40DP210H29	XS7C1A1DBM8 + XSZBC10	XS7T4DA214LD	XS7C1A1CAL08M12 + XSZBC10
XS2M30MA250	XS630B1MAL2	XS7C40DP210H7	XS7C1A1DAM8 + XSZBC10	XS7T4DA214LD01	XS7C1A1CAL01M12 + XSZBC10
XS2M30MA250K	XS630B1MAU20	XS7C40DP210H7	XS7C1A1DBM8 + XSZBC10	XS7T4NC440	XS7C1A1NAL2 + XSZBC10
XS2M30MA250L1	XS630B1MAL5	XS7C40DP210TT	XS7C1A1DAM8 + XSZBC10	XS7T4NC440	XS7C1A1NBL2 + XSZBC10
XS2M30MA250L2	XS630B1MAL10	XS7C40DP210TT	XS7C1A1DBM8 + XSZBC10	XS7T4NC440LD	XS7C1A1NAL01M12 + XSZBC10

Proximity Sensors

Catalog Number Cross-References

Old Design to New Design

Old Design	New Design	Old Design	New Design	Old Design	New Design
XS7T4NC440LD	XS7C1A1NBL01M12 + XSZBC10	XS7 Rectangular ~		XS8C40MP230H7	XS8C1A1MAL01U20 + XSZBC10
XS7T4PC440	XS7C1A1PAL2 + XSZBC10	XS7C40DA210	XS8C1A1MAL01U20 + XSZBC10	XS8C40MP230H7	XS8C1A1MBL01U20 + XSZBC10
XS7T4PC440	XS7C1A1PBL2 + XSZBC10	XS7C40DA210A	XS8C1A1MAL01U20 + XSZBC10	XSD Rectangular ---	
XS7T4PC440LD	XS7C1A1PAL01M12 + XSZBC10	XS7C40DP210	XS8C1A1MAL01U20 + XSZBC10	XSDC407138	XS7D1A1DAM12 + XSZBD10
XS7T4PC440LD	XS7C1A1PBL01M12 + XSZBC10	XS7C40DP210	XS8C1A1MBL01U20 + XSZBC10	XSDC407139	XS7D1A1DAM12 + XSZBD10
XS8 Rectangular ---		XS7C40DP210H29	XS8C1A1MAL01U20 + XSZBC10	XSDC407139D4	XS7D1A1DAM12 + XSZBD10
XS8C40DA210	XS7C1A1DAL01M12 + XSZBC10	XS7C40DP210H29	XS8C1A1MBL01U20 + XSZBC10	XSDC407139H7	XS7D1A1DAM12 + XSZBD10
XS8C40DP210	XS8C1A1DAM8 + XSZBC10	XS7C40DP210H7	XS8C1A1MAL01U20 + XSZBC10	XSDC407139LD	XS7D1A1DAM12 + XSZBD10
XS8C40DP210	XS8C1A1DBM8 + XSZBC10	XS7C40DP210H7	XS8C1A1MBL01U20 + XSZBC10	XSDC407139LD01	XS7D1A1DAM12 + XSZBD10
XS8C40DP210H29	XS8C1A1DAM8 + XSZBC10	XS7C40DP210TT	XS8C1A1MAL01U20 + XSZBC10	XSDC507139	XS7D1A1DAM12 + XSZBD10
XS8C40DP210H29	XS8C1A1DBM8 + XSZBC10	XS7C40DP210TT	XS8C1A1MBL01U20 + XSZBC10	XSDC607139	XS7D1A1DAM12 + XSZBD10
XS8C40DP210H7	XS8C1A1DAM8 + XSZBC10	XS7C40DP210TF	XS8C1A1MAL01U20 + XSZBC10	XSDC607139H7	XS7D1A1DAM12 + XSZBD10
XS8C40DP210H7	XS8C1A1DBM8 + XSZBC10	XS7C40DP210TF	XS8C1A1MBL01U20 + XSZBC10	XSDC607139LD	XS7D1A1DAM12 + XSZBD10
XS8C40NC440	XS8C1A1NAM8 + XSZBC10	XS7C40FP260	XS8C1A1MAL01U20 + XSZBC10	XSDC607139LD01	XS7D1A1DAM12 + XSZBD10
XS8C40NC440	XS8C1A1NBM8 + XSZBC10	XS7C40FP260	XS8C1A1MBL01U20 + XSZBC10	XSDC607319	XS7D1A1DAM12 + XSZBD10
XS8C40NC440H29	XS8C1A1NAM8 + XSZBC10	XS7C40FP260A	XS8C1A1MAL01U20 + XSZBC10	XSDC607319	XS7D1A1DBM12 + XSZBD10
XS8C40NC440H29	XS8C1A1NBM8 + XSZBC10	XS7C40FP260A	XS8C1A1MBL01U20 + XSZBC10	XSDH407339	XS8D1A1PAM12 + XSZBD10
XS8C40NC449	XS8C1A1NAM8 + XSZBC10	XS7C40FP260H29	XS8C1A1MAL01U20 + XSZBC10	XSDH407339	XS8D1A1PBM12 + XSZBD10
XS8C40NC449	XS8C1A1NBM8 + XSZBC10	XS7C40FP260H29	XS8C1A1MBL01U20 + XSZBC10	XSDH407339H7	XS8D1A1PAM12 + XSZBD10
XS8C40NC449H29	XS8C1A1NAM8 + XSZBC10	XS7C40FP260H7	XS8C1A1MAL01U20 + XSZBC10	XSDH407339H7	XS8D1A1PBM12 + XSZBD10
XS8C40NC449H29	XS8C1A1NBM8 + XSZBC10	XS7C40FP260H7	XS8C1A1MBL01U20 + XSZBC10	XSDH607339	XS8D1A1PAM12 + XSZBD10
XS8C40NC449H7	XS8C1A1NAM8 + XSZBC10	XS7C40FP260TF	XS8C1A1MAL01U20 + XSZBC10	XSDH607339	XS8D1A1PBM12 + XSZBD10
XS8C40NC449H7	XS8C1A1NBM8 + XSZBC10	XS7C40FP260TF	XS8C1A1MBL01U20 + XSZBC10	XSDH607339H7	XS8D1A1PAM12 + XSZBD10
XS8C40PC440	XS8C1A1PAM8 + XSZBC10	XS7C40FP260TT	XS8C1A1MAL01U20 + XSZBC10	XSDH607339H7	XS8D1A1PBM12 + XSZBD10
XS8C40PC440	XS8C1A1PBM8 + XSZBC10	XS7C40FP260TT	XS8C1A1MBL01U20 + XSZBC10	XSDH607339TF	XS8D1A1PAM12 + XSZBD10
XS8C40PC440D	XS8C1A1PAL01M12 + XSZBC10	XS7C40MP230	XS8C1A1MAL01U20 + XSZBC10	XSDH607339TF	XS8D1A1PBM12 + XSZBD10
XS8C40PC440D	XS8C1A1PAL01M12 + XSZBC10	XS7C40MP230	XS8C1A1MBL01U20 + XSZBC10	XSDJ407339	XS8D1A1NAM12 + XSZBD10
XS8C40PC440H29	XS8C1A1PAM8 + XSZBC10	XS7C40MP230A	XS8C1A1MAL01U20 + XSZBC10	XSDJ407339	XS8D1A1NBM12 + XSZBD10
XS8C40PC440H29	XS8C1A1PBM8 + XSZBC10	XS7C40MP230A	XS8C1A1MBL01U20 + XSZBC10	XSDJ407339H7	XS8D1A1NAM12 + XSZBD10
XS8C40PC440H7	XS8C1A1PAM8 + XSZBC10	XS7C40MP230H29	XS8C1A1MAL01U20 + XSZBC10	XSDJ407339H7	XS8D1A1NBM12 + XSZBD10
XS8C40PC440H7	XS8C1A1PBM8 + XSZBC10	XS7C40MP230H29	XS8C1A1MBL01U20 + XSZBC10	XSDJ607339	XS8D1A1NAM12 + XSZBD10
XS8C40PC449	XS8C1A1PAM8 + XSZBC10	XS7C40MP230H7	XS8C1A1MAL01U20 + XSZBC10	XSDJ607339	XS8D1A1NBM12 + XSZBD10
XS8C40PC449	XS8C1A1PBM8 + XSZBC10	XS7C40MP230H7	XS8C1A1MBL01U20 + XSZBC10	XSDJ607339H7	XS8D1A1NAM12 + XSZBD10
XS8C40PC449D	XS8C1A1PAL01M12 + XSZBC10	XS7C40MP230TF	XS8C1A1MAL01U20 + XSZBC10	XSDJ607339H7	XS8D1A1NBM12 + XSZBD10
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XS8C40PC449H29	XS8C1A1PAM8 + XSZBC10	XS7C40MP230TT	XS8C1A1MAL01U20 + XSZBC10	XSEC107130	XS7E1A1DAL01M12 + XSZBE10
XS8C40PC449H29	XS8C1A1PBM8 + XSZBC10	XS7C40MP230TT	XS8C1A1MBL01U20 + XSZBC10	XSEC1071300	XS7E1A1DAL2 + XSZBE10
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XS8T2NC440LD	XS8E1A1NBL01M12 + XSZBE10	XS8C40DP210H29	XS8C1A1MBL01U20 + XSZBC10	XSEC107130H7	XS7E1A1DAL01M12 + XSZBE10
XS8T2PC440	XS8E1A1PAL2 + XSZBE10	XS8C40DP210H7	XS8C1A1MAL01U20 + XSZBC10	XSEC107133	XS7E1A1DAL01M12 + XSZBE10
XS8T2PC440	XS8E1A1PBL2 + XSZBE10	XS8C40DP210H7	XS8C1A1MBL01U20 + XSZBC10	XSEC1071330	XS7E1A1DAL2 + XSZBE10
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XS8T2PC440LD	XS8E1A1PBL01M12 + XSZBE10	XS8C40FP260	XS8C1A1MBL01U20 + XSZBC10	XSEC1071332	XS7E1A1DAL01M12 + XSZBE10
XS8T4NC440	XS8C1A1NAL2 + XSZBC10	XS8C40FP260H29	XS8C1A1MAL01U20 + XSZBC10	XSEC1071334	XS7E1A1DAL01M12 + XSZBE10
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XS8T4PC440LD	XS8C1A1PBL01M12 + XSZBC10	XS8C40MP230H29	XS8C1A1MBL01U20 + XSZBC10	XSEC1571330	XS7E1A1DAL2 + XSZBE10

Proximity Sensors
Catalog Number Cross-References
Old Design to New Design

Old Design	New Design
XSC Rectangular ~	
XSCA150549	XS8C1A1MAL01U20 + XSZBC10
XSCA150549	XS8C1A1MBL01U20 + XSZBC10
XSD Rectangular ~	
XSDA400519	XS8D1A1MAU20 + XSZBD10
XSDA400519	XS8D1A1MBU20 + XSZBD10
XSDA400519H7	XS8D1A1MAU20 + XSZBD10
XSDA400519H7	XS8D1A1MBU20 + XSZBD10
XSDA500519	XS8D1A1MAU20 + XSZBD10
XSDA500519	XS8D1A1MBU20 + XSZBD10
XSDA500519H7	XS8D1A1MAU20 + XSZBD10
XSDA500519H7	XS8D1A1MBU20 + XSZBD10
XSDA505539H4	XS8D1A1MAU20 + XSZBD10
XSDA505539H4	XS8D1A1MBU20 + XSZBD10
XSDA600519	XS8D1A1MAU20 + XSZBD10
XSDA600519	XS8D1A1MBU20 + XSZBD10
XSDA600519H7	XS8D1A1MAU20 + XSZBD10
XSDA600519H7	XS8D1A1MBU20 + XSZBD10
XSDM500538	XS8D1A1MAU20 + XSZBD10
XSDM500538	XS8D1A1MBU20 + XSZBD10
XSDM600539	XS8D1A1MAU20 + XSZBD10
XSDM600539	XS8D1A1MBU20 + XSZBD10
XSDM600539H7	XS8D1A1MAU20 + XSZBD10
XSDM600539H7	XS8D1A1MBU20 + XSZBD10

Proximity Sensors
Catalog Number Cross-References
AC Only to AC/DC

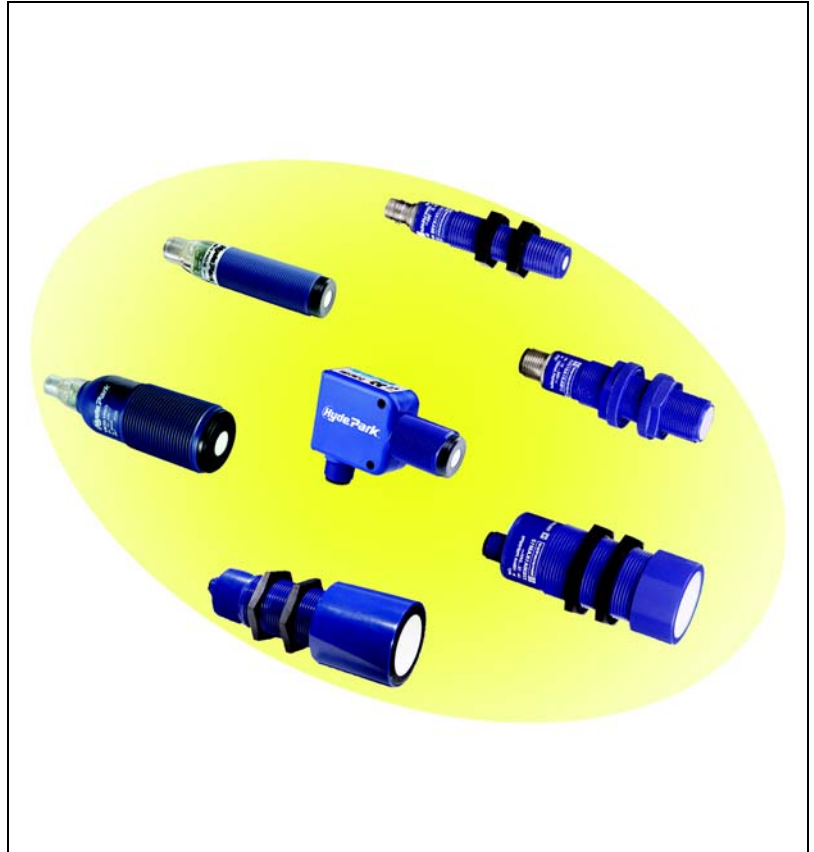
Obsolete Part Number	Replaced by Part Number
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XS1M12FA260K	XS1M12MA230K
XS1M12FB260	XS1M12MB230
XS1M12FB260K	XS1M12MB230K
XS1M18FA260	XS1M18MA230
XS1M18FA260A	XS1M18MA230A
XS1M18FA260K	XS1M18MA230K
XS1M18FB260	XS1M18MB230
XS1M18FB260A	XS1M18MB230A
XS1M18FB260K	XS1M18MB230K
XS1M30FA260	XS1M30MA230
XS1M30FA260A	XS1M30MA230A
XS1M30FA260K	XS1M30MA230K
XS1M30FB260	XS1M30MB230
XS1M30FB260A	XS1M30MB230A
XS1M30FB260K	XS1M30MB230K
XS2M12FA260	XS2M12MA230
XS2M12FA260K	XS2M12MA230K
XS2M12FB260	XS2M12MB230
XS2M12FB260K	XS2M12MB230K
XS2M18FA260	XS2M18MA230
XS2M18FA260A	XS2M18MA230A
XS2M18FA260K	XS2M18MA230K
XS2M18FB260	XS2M18MB230
XS2M18FB260A	XS2M18MB230A
XS2M18FB260K	XS2M18MB230K
XS2M30FA260	XS2M30MA230
XS2M30FA260A	XS2M30MA230A
XS2M30FA260K	XS2M30MA230K
XS2M30FB260	XS2M30MB230
XS2M30FB260A	XS2M30MB230A
XS2M30FB260K	XS2M30MB230K
XS3P12FA260	XS3P12MA230
XS3P12FA260K	XS3P12MA230K
XS3P12FB260	XS3P12MB230
XS3P12FB260K	XS3P12MB230K
XS3P18FA260	XS3P18MA230
XS3P18FA260A	XS3P18MA230A
XS3P18FA260K	XS3P18MA230K
XS3P18FB260	XS3P18MB230
XS3P18FB260A	XS3P18MB230A
XS3P18FB260K	XS3P18MB230K
XS3P30FA260	XS3P30MA230
XS3P30FA260A	XS3P30MA230A
XS3P30FA260K	XS3P30MA230K
XS3P30FB260	XS3P30MB230
XS3P30FB260A	XS3P30MB230A
XS3P30FB260K	XS3P30MB230K
XS4P12FA260	XS4P12MA230
XS4P12FA260K	XS4P12MA230K
XS4P12FB260	XS4P12MB230
XS4P12FB260K	XS4P12MB230K
XS4P18FA260	XS4P18MA230
XS4P18FA260A	XS4P18MA230A
XS4P18FA260K	XS4P18MA230K
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XS4P30FB260	XS4P30MB230
XS4P30FB260A	XS4P30MB230A
XS4P30FB260K	XS4P30MB230K

Ultrasonic Sensors

Catalog
September

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File 9006



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Osisonic™ Ultrasonic Sensors

Technical Overview

Standards and Environment

Quality, standards, and certifications

Osisonic ultrasonic sensors are designed and manufactured to provide reliable service in the most arduous industrial environments.

- **Qualification**

A **qualification procedure** on the characteristics of Osisonic ultrasonic sensors is performed in our laboratories.

- **Production**

- The electrical characteristics and the sensing distances at ambient temperature and operating temperatures are 100% verified.
- Sensors randomly selected during production are subjected to **monitoring tests** on all qualified characteristics.

- **Customer returns**

Defective ultrasonic sensors are subjected to systematic analysis, and corrective actions are implemented to eliminate recurrence of the fault.

Compliance with standards

The Osisonic ultrasonic sensors comply with IEC 60947-5-2 standards. Refer to “Definitions” on page 356.

Resistance to chemicals in the environment

To provide reliable operation, Osisonic ultrasonic sensors are highly resistant to:

- Food products
 - Vegetable oils, animal fats
 - Fruit juices
 - Milk proteins, etc.
- Chemical agents
 - Salts
 - Aliphatic and aromatic oils
 - Petroleum, diluted bases, and acids

Depending on their nature and concentration, tests should be carried out beforehand for the following chemical agents:

- Alcohols
- Ketones
- Phenols

Resistance to the environment

- IP 67: Protection against the effects of immersion.
Tested in accordance with IEC 60529: Immersion in 1 m of water for 30 minutes, with no deterioration in either operating or insulation characteristics.

Recommendations

Ultrasonic sensors do not incorporate a redundant electrical circuit, so they are **not** suitable for use in safety applications. Refer to catalog 9007CT0201, *Preventa™ Machine Safeguarding Products*, for safety applications.

Osisonic™ Ultrasonic Sensors

Technical Overview

Principle of Detection

Principle of ultrasonic detection



Introduction

Ultrasonic sensors enable detection, without contact, of any object regardless of its:

- material (metal, plastic, wood, cardboard, etc.)
- nature (solid, liquid, powder, etc.)
- color
- degree of transparency

Uses in industrial applications include the detection of:

- the position of machine parts
- the presence of the windshield during automobile assembly
- the flow of objects on a conveyor system: glass bottles, cardboard packages, cakes, etc.
- the level of:
 - different colored paints in pots
 - plastic pellets in injection-molding machine feeders

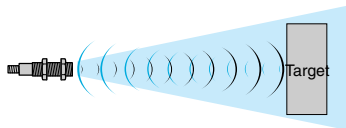
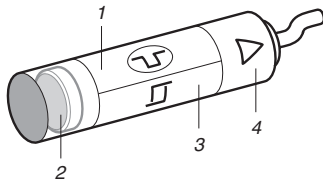
The ultrasonic sensors are simple to install thanks to their output connectors, cabling, and mounting accessories.

Operating principle

The principle of ultrasonic detection is based on measuring the time between the transmission of an ultrasonic wave (pressure wave) and the reception of its echo (return of the transmitted wave).

Osisonic ultrasonic sensors are of the barrel and flat-profile type. They contain:

1. a high voltage generator
2. a piezo-electric transducer (transmitter and receiver)
3. a signal processing stage
4. an output stage



Excited by the high-voltage generator **1**, the transducer (transmitter-receiver) **2** generates a pulsed ultrasonic wave (200 to 500 kHz depending on the sensor) which travels through the air at the speed of sound. When it encounters an object, a reflected sound wave (echo) returns to the transducer. A microprocessor **3** analyzes the received signal and measures the elapsed time interval between the transmitted signal and the echo. By comparing this with the preset or learned times, it determines and controls the output states **4**.

The output stage **4** controls a solid-state switch (PNP or NPN transistor) corresponding to an N.O. or N.C. closing contact (detection of object).

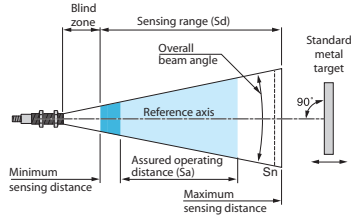
Advantages of ultrasonic detection

- No physical contact with the detected object, eliminating wear and allowing detection of fragile or freshly painted objects, etc.
- Detection of any material, regardless of color, at the same distance, without adjustment or correction factor.
- Teach mode function, by the press of a button, defining the effective sensing range. Self-teaching of the minimum and maximum sensing distances (very precise foreground and background suppression, ± 6 mm).
- Very good resistance to industrial environments (robust sensors entirely encapsulated in resin).
- Solid-state units: no moving parts in the sensor, so the service life is independent of the number of operating cycles.

Osisonic™ Ultrasonic Sensors

Technical Overview

Principle of Detection



Definitions

The terms listed below are defined by standard IEC 60947-5-2:

- **Nominal sensing distance (S_n)**—The conventional value for indicating the sensing distance. It does not consider manufacturing tolerances or variations caused by external conditions such as voltage and temperature.
- **Sensing range (S_d)**—The zone in which the sensor is sensitive to objects.
- **Minimum sensing distance**—The lower limit of the specified sensing range.
- **Maximum sensing distance**—The upper limit of the specified sensing range.
- **Assured operating distance (S_a)**—The operating zone of the sensor (activation of outputs), included in the sensing range.

Its limits are established:

- at the factory for sensors with a fixed sensing distance
- during application setup for sensors with teach mode

- **Blind zone (Deadband)**—The zone between the sensing face of the sensor and the minimum sensing distance, where no object can be detected reliably.

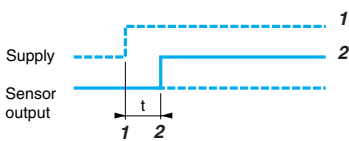
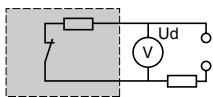
Avoid passing objects through the deadband during operation of the sensor. This could lead to instability of the output states.

- **Repeat accuracy**—The repeat accuracy (R) is the precision of reproduction between two successive measurements of the sensing distance, made in identical conditions.
- **Overall beam angle**—Solid angle around the reference axis of an ultrasonic proximity sensor.
- **Standard target**—IEC 60947-5-2 defines the standard target as a square metal plate, 1 mm thick with rolled finish, placed perpendicular to the reference axis.

Its dimensions depend on the sensing range:

Sensing range (mm)	Size of target (mm)
< 300	10 x 10
300 < d < 800	20 x 20
> 800	100 x 100

- **Voltage drop (U_d)**—The voltage drop (U_d) corresponds to the voltage at the terminals of the sensor when in the closed state (value measured at the sensor's rated current).



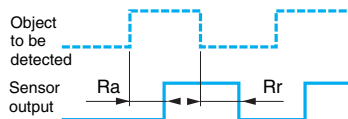
- **First-up delay**—Time required to ensure operation of the sensor's output signal following power-up.

1. Power-up
2. Output signal state (0 or 1)

- **Response time**

— **Response time (R_a)**: the time between an object's entry into the active zone and the changing of the output signal state. Response time limits the passing speed of the target relative to its dimensions.

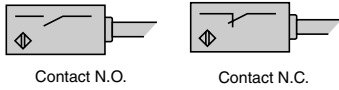
— **Recovery time (R_r)**: the time between an object's departure from the active zone and the changing of the output signal state. Recovery time limits the interval between two objects.



Osisonic™ Ultrasonic Sensors

Technical Overview

Principle of Detection

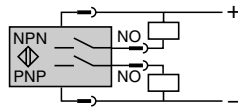


Discrete switching sensors—Output logic contacts

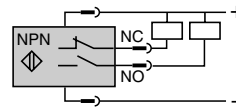
- **N.O.** (normally open)—The sensor's output changes to the closed state when an object is detected in the operating zone.
- **N.C.** (normally closed)—The sensor's output changes to the open state when an object is detected in the operating zone.
- **PNP**—switching a load connected to the negative side (sourcing)
- **NPN**—switching a load connected to the positive side (sinking)

4-wire technique

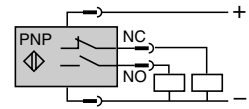
N.O. / PNP and NPN output



N.O. + N.C. / NPN output



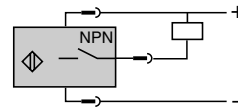
N.O. + N.C. / PNP output



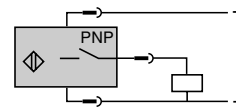
These sensors include two wires for the power supply and one wire for each output signal.

3-wire technique

N.O. / NPN output



N.O. / PNP output



These sensors include two wires for the power supply and one wire for the output signal.

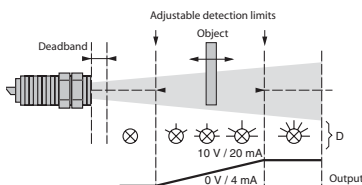
Analog output sensors—Operation

The characteristic feature of these sensors is that the output generates a signal (in current or voltage) that is proportional to the distance of the object detected. This value increases as the object moves further away, within the detection limits. These detection limits can be adjusted using the self-teaching function.

As soon as an object is detected, an LED indicator illuminates and increases in brightness proportionally to the output signal value.

Advantages

- Availability of physical data based on the distance between the sensor and the object
- Reverse polarity protection
- Overload and short circuit protection
- No residual current, low level of voltage drop



Osisonic™ Ultrasonic Sensors

Technical Overview

Power Supply and Mounting Considerations

Power supply

DC source

Ensure that the supply used is compatible with the voltage limits of the sensor and the acceptable level of ripple.

AC source (consisting of a transformer, rectifier, and smoothing capacitor)

Ensure that the supply voltage is within the operating limits of the sensor.

If the voltage is derived from a single-phase AC supply, the voltage must be rectified and smoothed to ensure that:

- The peak voltage of the DC supply is lower than the maximum voltage rating of the sensor.
Peak voltage = rated voltage $\times \sqrt{2}$

- The minimum voltage of the DC supply is greater than the minimum voltage rating of the sensor, given that:

$$\Delta V = (I \times t) \div C$$

Where:

$$\Delta V = \text{maximum ripple: } 10\% (V),$$

$$I = \text{anticipated load current (mA),}$$

$$t = \text{period of 1 cycle (10 ms full-wave rectified for a 50 Hz supply frequency),}$$

$$C = \text{capacitance } (\mu\text{F}).$$

As a general rule, use a transformer with a lower secondary voltage (U_e) than the required DC voltage (U).

Example: 18 Vac to obtain 24 Vdc.

Mounting

Adhere to the minimum mounting distance between ultrasonic sensors. If two standard sensors are mounted too close together, the wave transmitted by one sensor can interfere with the wave transmitted by the other, causing erratic operation.

Maximum tightening torque

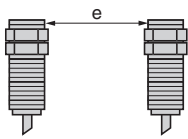
Sensor Diameter	Torque—all models
12 mm	0.7 N•m (6.2 lb-in)
18 mm	1.4 N•m (12.4 lb-in)
30 mm	1.4 N•m (12.4 lb-in)

Interchangeability

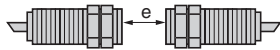
Using the indexed **mounting bracket**, the assembly is similar to a block type sensor.

Cabling—Electrical connection

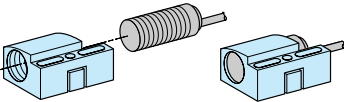
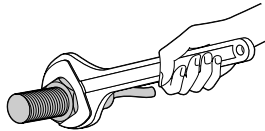
- Connect the sensor before turning on the supply.
- Cable length
 - Use a maximum cable length of 200 m (656 ft), or a line capacitance of $< 0.1 \mu\text{F}$.
 - Consider the voltage drop on the line.
- Separation of control and power cables
 - The sensors are immune to electrical interference encountered in normal industrial conditions.
 - Where extreme conditions of electrical noise could occur (such as large motors and spot welders), take standard precautions for protecting against transients:
 - o Suppress interference at the source.
 - o Separate power wiring from control wiring.
 - o Smooth the supply.
 - o Limit the cable length.



Mounting side by side
 $e \geq 2 S_n$



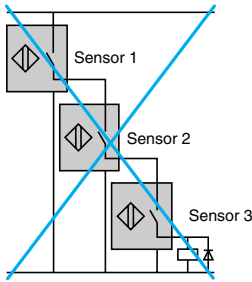
Mounting face to face
 $e \geq \text{max. } 4.5 S_n$



Osisonic™ Ultrasonic Sensors

Technical Overview

Connection Considerations



Connection in series

Connection in series is **not** recommended.

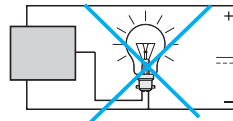
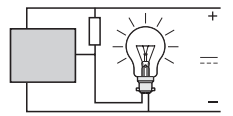
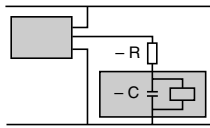
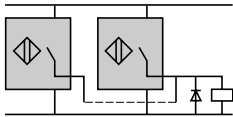
- Correct operation of the sensors cannot be assured and, if this method is used, tests must be made before installation. Consider the following points:
 - Sensor 1 carries the load current in addition to the no-load current consumption values of the other sensors connected in series. For certain models, this connection method is not possible unless a current limiting resistor is used.
 - When in the closed state, each sensor will produce a voltage drop and, therefore, the load voltage should be selected accordingly.
 - As sensor 1 closes, sensor 2 will not operate until a certain time T has elapsed (corresponding to the first-up delay) and likewise for the following sensors in the sequence.
 - Flywheel diodes should be used when the load being switched is inductive.

Sensors and units in series with an external mechanical contact

- Consider the following points:
 - When the mechanical contact is open, the sensor is not supplied.
 - When the contact closes, the sensor will not operate until a certain time T has elapsed (corresponding to the first-up delay).

Connection in parallel

- There are no specific restrictions for connection in parallel. The use of flywheel diodes is recommended when an inductive load (relay) is being switched.



Capacitive load (C > 0.1 μF)

- At power-on, limit the inrush current of the capacitive load C using a resistor. The voltage drop in the sensor can also be accounted for by subtracting it from the supply voltage for the calculation of R.

$$R = \frac{U \text{ (supply)}}{I \text{ max. (sensor)}}$$

Load containing an incandescent lamp

- If the load contains an incandescent lamp, the cold state resistance can be one-tenth of the hot state resistance. This can cause very high current levels on switching. Provide for a preheat resistor in parallel with the sensor.

$$R = \frac{U^2}{P} \times 10, \text{ where } U = \text{supply voltage and } P = \text{lamp power}$$

Osisonic™ Ultrasonic Sensors

Technical Overview

Detection

Detection

- Influencing factors

The ultrasonic sensors are particularly suited to the detection of a hard object with a flat surface perpendicular to the detection axis.

However, proper operation of the ultrasonic sensor can be disrupted by:

- Air currents, which can accelerate or divert the acoustic wave transmitted by the sensor (ejection of part by air jet)
- High temperature gradients within the sensing range: an object emitting considerable heat can create zones of varying temperature that will modify the propagation time of the wave and thus prevent reliable operation
- Sound insulators: sound-absorbing materials (cotton, fabrics, rubber, etc.)
- The angle between the surface of the object to be detected and the reference axis of the sensor:
When the angle is offset from 90°, the wave is no longer reflected back along the sensor axis, and the operating distance is reduced. The greater the distance between the sensor and the target, the greater the effect. Detection is not possible when the angle exceeds $\pm 10^\circ$.
- The shape of the object to be detected: similar to the example above, an excessively angular object can be difficult to detect (1).

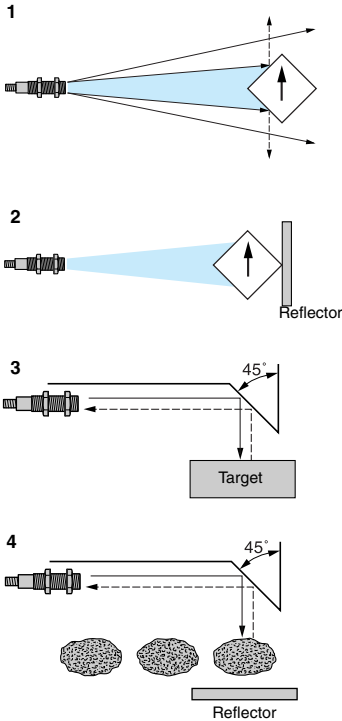
- Detection by beam break (reflex system)

In cases requiring detection of sound-insulating materials or angular objects, or when an angle exists between the surface of the object to be detected and the reference axis of the sensor, selection of a sensor with the teach mode feature is recommended. This feature enables beam break detection using a reflector, which can be any flat, hard, stationary part of the machine (2).

The sensor with the teach mode feature can also be used in confined spaces by using a 90° reflector. In the same manner as for the return reflector, the 90° reflector can be a flat part of the machine (3).

It is also possible to use beam break detection (reflex system) with the 90° reflector (4).

NOTE: In reflex mode, the N.O. function **de-energizes** when an object is present, and the N.C. function **energizes** when an object is present.



Osisonic™ Ultrasonic Sensors
Declaration of Conformity



MANUFACTURER'S DECLARATION OF CONFORMITY

The undersigned, representing the manufacturer

Document No: EW2007042401

Company:	HYDE PARK ELECTRONICS LLC
address:	1875 Founders Drive Dayton, OH 45420-4017 USA

Herewith declares that the product(s)

Product identification:	<i>SM300 Series, 12mm cylindrical ultrasonic sensor SM600 Series, 18 mm cylindrical and flat profile ultrasonic sensors SM900 Series, 30 mm cylindrical ultrasonic sensors Virtu Series, 18 mm, 30 mm cylindrical and dual mount ultrasonic sensors XX512A1KAM8, 12 mm cylindrical ultrasonic sensor XX518A1KAM12, 18 mm cylindrical ultrasonic sensor XX630A1KAM12, 30 mm cylindrical ultrasonic sensor</i>
-------------------------	--

To which this declaration refers are in conformity with the following:

Standards	<i>Low Voltage Switchgear and Controlgear,</i>
And/Or	<i>EN60947-1: General rules</i>
Normative Documents:	<i>EN60947-5-2: Proximity Switches</i>

Subject to installation, maintenance and utilization in accordance with their purpose, regulations, current standards, manufacturer's instructions and industry standards. Meet(s) the provisions of the following EC Directive(s): (Including all applicable amendments)

reference n°	title
<i>2006/95/EEC</i>	<i>Low-voltage Directive 73/23/EEC of February 19, 1973 modified by Directive 93/68/EC of July 22, 1993.</i>
<i>2004/10/EC</i>	<i>Electromagnetic Compatibility Directive of May 3, 1989 modified by Directives 92/31/CEE of April 28, 1992 and 93/68/CEE of July 22, 1993.</i>

The CE marking on the product and/or the packaging signifies that the product is in compliance with the applicable EU Directives .

Location

Dayton, OH

Date

May 1, 2007

Authorization Signature

Name: Mike Edmiston

Position: Vice President of Operations

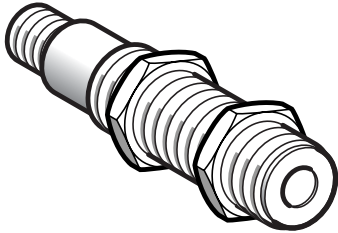
Signature:

Ultrasonic

Osisonic™ Ultrasonic Sensors

SM300 Series

Features



SM300

Features

- PNP or NPN output
- Plastic housing with durable glass epoxy sensing face
- 360° LED for complete visual inspection
- Mounting nuts included
- Nano (M8) connector version

The SM300 range offers two special model types:

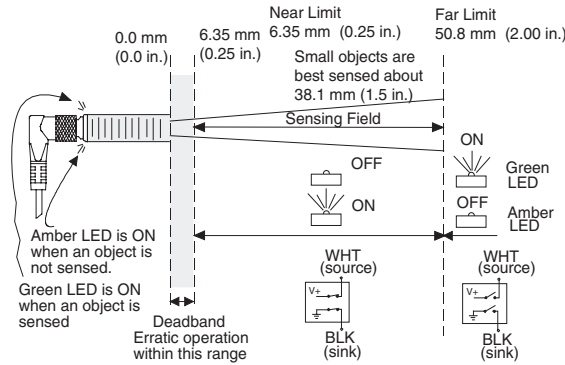
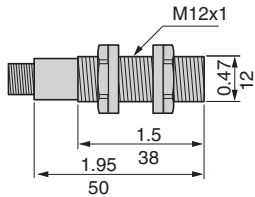
• Windowed

An example of a windowed model is SM3•04A1600, which has a sensing window of 3–4 in. (76.2–101.6 mm). Moving the sensing window of the sensor away from the deadband allows for more discriminate sensing: objects immediately in front of the sensor are ignored, while objects further away (within the sensing range of 3–4 in.) are detected.

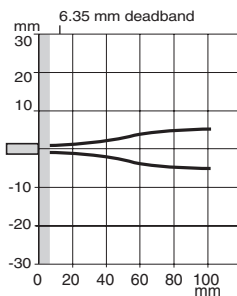
• Non-windowed

An example of a non-windowed model is SM3•04A46000, which has a sensing window of 0.25–4 in. (6.35–101.6 mm). This range allows detection of objects immediately in front of the sensor (minus the deadband), up to a distance of 4 in.

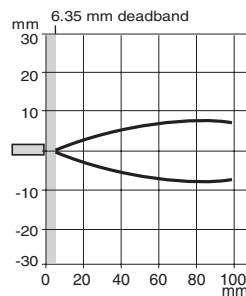
SM300



Windowed



Non-Windowed



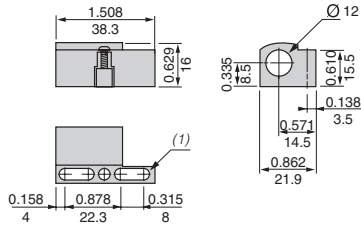
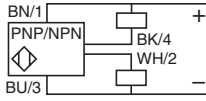
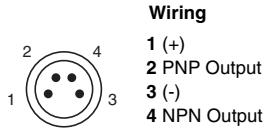
Sensing Range: Example of Windowed vs. Non-Windowed

Windowed	Sensing Range, in. (mm)	Non-Windowed	Sensing Range, in. (mm)
SM3•04A1600	1–4 (25.4–101.6)	SM3•04A46000	3.75–4.0 (95.3–101.6)

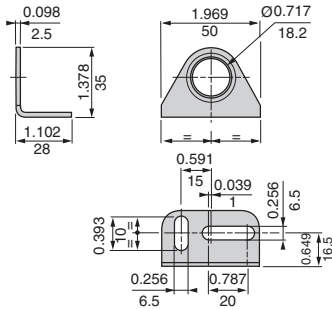
Osisonic™ Ultrasonic Sensors

SM300 Series

Specifications and Accessories



(1) 2 elongated holes 4 x 8 mm



9006PA112

Specifications

		SM3•0A...
Mechanical		
Sensing range		0.25–5.0 in. (6.4–127.0 mm)
Ultrasonic cone angle (see beam plot)		7°
Maximum angular deviation		±10°
Temperature range		-4 to 149 °F (-20 to 65 °C)
Humidity		100%
Enclosure rating	NEMA Type	4X
	CENELEC	IP 67 conforming to IEC 60529
Hysteresis (max)		0.7 mm (0.027 in.)
Vibration		7 G amplitude + 1 mm (f = 10 to 55 Hz)
Shock resistance		30 G for 11 ms (conforming to 68-2-27)
Repeat accuracy		±0.027 in. (0.7 mm)
Wiring		22 AWG
Minimum size detection		0.1 in. dia. (2.5 mm) rod or 0.4 in. (1 mm) flat bar
Enclosure material	Case	Ultem® Plastic
	Sensing face	Glass epoxy

Electrical		
Voltage rating		12–24 Vdc
Voltage limits (including ripple)		10–28 Vdc
Voltage drop (across switch, closed state)		0.79 V (PNP), 0.58 V (NPN)
Max. load current		100 mA
Residual current (open state)		0.7 uA max.
Current consumption, no load		25 mA
LED indicators		360° LED ring
	Power	Amber
	Output	Green
Power-up delay (max.)		20 ms
On delay (max.)		2 ms
Off delay (max.)		2 ms
Ultrasonic frequency		500 kHz
Protective circuitry	Electrostatic	Yes
	Overvoltage	Yes
	Reverse polarity	Yes
Agency listings		IEC 60947-5-2, UL508, CSA C22-2

Accessories

Description	Catalog Number
Flush mount plastic mounting bracket	XSZB112
90° metal mounting bracket	9006PA112
Plastic mounting nuts	XSZE112

Nano (M8) Connector Cables

Nano connector, 4 pin, 2 m (6.6 ft), straight	XSZCS141
Nano connector, 4 pin, 2 m (6.6 ft), 90°	XSZCS151

For additional cable options and lengths, see page 368.

Osisonic™ Ultrasonic Sensors

SM300 Series

General Specifications

General Specifications


Sensing [T _A = 20 °C (68 °F)]	Sensing range		6.4 to 102 mm (0.25 to 4.0 in.) (large flat objects) Highest sensitivity over the range 38.1 to 102 mm (1.5 to 4.0 in.)	
	Sonic frequency		500 kHz	
	Minimum size detection		2.5 mm (0.098 in.) diameter rod or 1.0 mm (0.039 in.) wide flat bar at a distance of 38 mm (1.5 in.) <i>NOTE: Smaller object may not be detected at closer distances.</i>	
	Maximum angular deviation		± 8° on a 100 x 100 mm (4 x 4 in.) flat target at a distance of 89 mm (3.5 in.) (4 in. range flat-profile)	
	Sonic cone profile		See beam plot	
	Limit position accuracy		± 1.6 mm (0.062 in.) max.	
	Repeatability		± 0.7 mm (0.027 in.) or better	
Power requirements	Supply voltage		12 Vdc to 24 Vdc ± 10%, regulated supply	
	Current consumption		25 mA max. (excluding load)	
	Power consumption		0.5 W max. (excluding load)	
Output	Sinking output (NPN)	Maximum on-state voltage	0.75 V @ 100 mA	
		Maximum load current	100 mA	
		Maximum applied voltage	30 Vdc	
	Sourcing output (PNP)	Maximum on-state voltage drop	1.10 V @ 100 mA	
		Maximum load current	100 mA	
		Output voltage	V _{Supply} - 1.10 V @ 100 mA	
Response time	2 in. range barrel unit		2.0 ms on / 2.0 ms off	
	2 in. range flat-profile unit		3.0 ms on / 3.0 ms off	
	4 in. range flat-profile unit		4.0 ms on / 4.0 ms off	
Indicators	Amber LED		Illuminated if power applied and no object detected	
	Green LED		Illuminated if object is detected within the window, regardless of output polarity (N.O./N.C.) style <i>NOTE: Amber and green LEDs are never illuminated simultaneously</i>	
Connections	Cable style models		28 AWG, foil shield, lead-free, PVC jacket, 4-conductor, 3 m (10 ft) long	
	Connector style models		8 mm, circular 4-pole, male, Flat-profile pigtail 152 mm (6.0 in.) long micro-connector	
Protection	Power supply		Current-limited over-voltage, ESD, reverse polarity	
	Outputs		Current-limited over-voltage, ESD, reverse polarity, over-current	
Environment	Temperature Range	Operating	-30 to 70 °C (-22 to 152 °F) @ 12 V supply -30 to 65 °C (-22 to 149 °F) @ 24 V supply	
		Storage	-40 to 100 °C (-40 to 212 °F)	
	Operating humidity		100%	
	Protection ratings		NEMA Type 4X, IP67	
Chemical resistance		Resists most acids and bases, including most food products.		
Agency approvals	CE mark		CE conformity is declared to: EN60947:1998 (proximity sensors); EN61010-1 (general safety)	
	EMC		FCC 47 CFR Part 15 Class A (USA); EN5022:1994 / A2:1997 Class A ITE (EU) VCCI Class A ITE (Japan); AS/NZS 3548:1995 / CISPR 22 Class A ITE (Australia)	
Construction	Barrel dimensions	Cable model	12 mm (0.472 in.) dia. x 1 mm-6g threaded housing x 53.3 mm (2.10 in.) long	
		Connector model	12 mm (0.472 in.) dia. x 1 mm-6g threaded housing x 55 mm (2.17 in.) long	
	Overall length, including right angle, connector/cable assembly		67.6 mm (2.66 in.)	
	Flat-profile	Cable/connector model		33.0 x 7.62 x 19.05 mm (1.3 x 0.3 x 0.75 in.) H x W x L
		Housing	Shock and vibration resistant case	
	Transducer face		Epoxy	
	Sensor cable		Lead-free, PVC jacketed, black	
LED light ring		Polycarbonate		

Osisonic™ Ultrasonic Sensors

SM300 Series

Selection and Specifications

Specifications and Catalog Numbers

					
Specifications		12 mm / Flat Profile M12			
Sensing characteristics					
Range	51–127 mm (2.0–5.0 in.)				
Frequency	500 kHz				
Power requirements (supply)					
Voltage	12–24 Vdc				
Current	25 mA (excluding load)				
Environmental ratings					
Operating temperature	-30 to 70 °C (-22 to 158 °F)				
Environment	NEMA Type 4X, IP67				
Construction					
Barrel, ØxL	12 x 1 mm threaded housing				
Flat Profile, wxhxd	7.62 x 33.0 x 19.05 mm (0.3 x 1.3 x 0.75 in.)				
Housing	Ultem® Plastic				
Transducer	Glass epoxy				
Output Type		Catalog Number			
Proximity output	Cable	Barrel	Flat Profile		
	N.O.	SM300A46000	SM300A46000FP		
	N.C.	SM300A46010	SM300A46010FP		
	Connector				
	N.O.	SM350A46000	SM350A46000FP		
	N.C.	SM350A46010	SM350A46010FP		
Dual-level	Cable	Barrel	Flat Profile		
	N.O., pump-out latch	SM302A42000	SM302A42000FP		
	N.O., pump-in latch	SM302A42010	SM302A42010FP		
	Connectors		Barrel	Flat Profile	
	N.O., pump-out latch	SM352A42000	SM352A42000FP		
	N.O., pump-in latch	SM352A42010	SM352A42010FP		

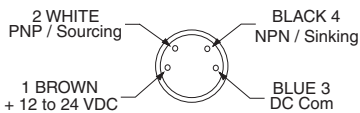
NOTE: Other configurations available. Contact your local field office.

Electrical Wiring

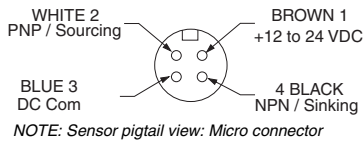
The sensor wires must be run in conduit free of any AC power or control wires.

Connector Model Pin Assignments

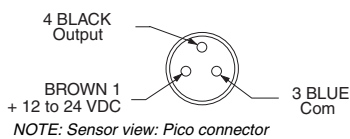
On/Off Latch Outputs, SM352



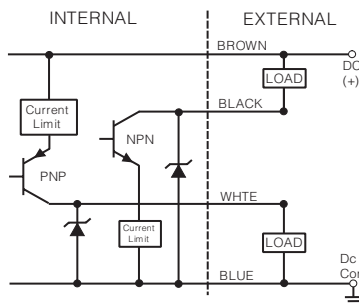
On/Off Latch Outputs, SM382



On/Off Latch Outputs, SM332 & SM342



NPN/Sinking and PNP/Sourcing Outputs



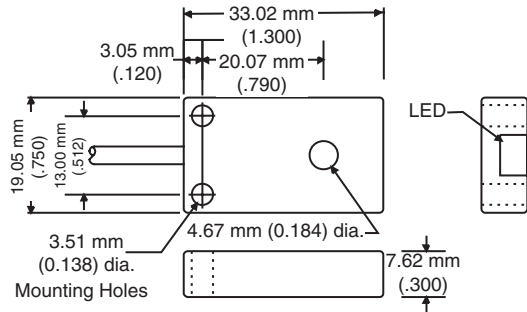
Osisonic™ Ultrasonic Sensors

SM300 Series

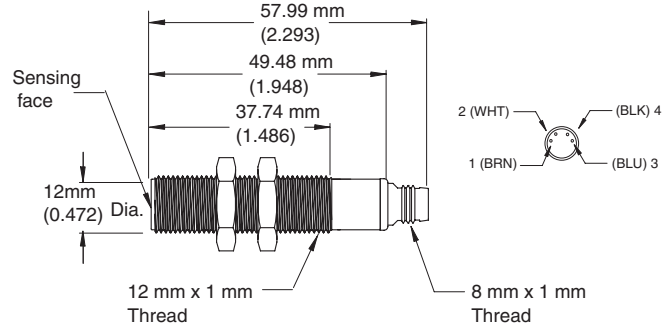
Dimensions and Operating Profiles

Dimensions

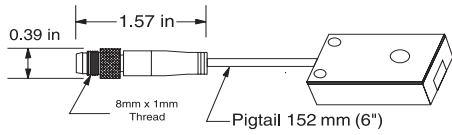
Flat-profile Cable/Connector Style
(Ultem® Plastic) SM300A-XXX-XXFP



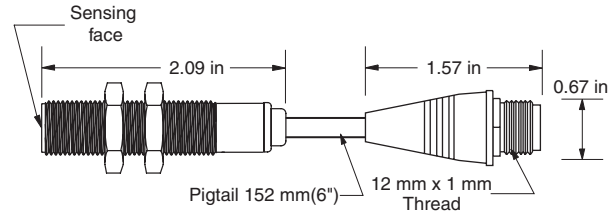
Barrel Connector Style
(Ultem Plastic) SM332, SM 342, SM352A-XXX-XX



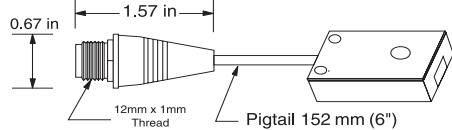
Flat-profile pico connector style
(Ultem plastic) SM330FP, SM340FP, SM350-XX-XXXFP



Barrel Cable Micro Style
(Ultem Plastic) SM382A-XXX-XX

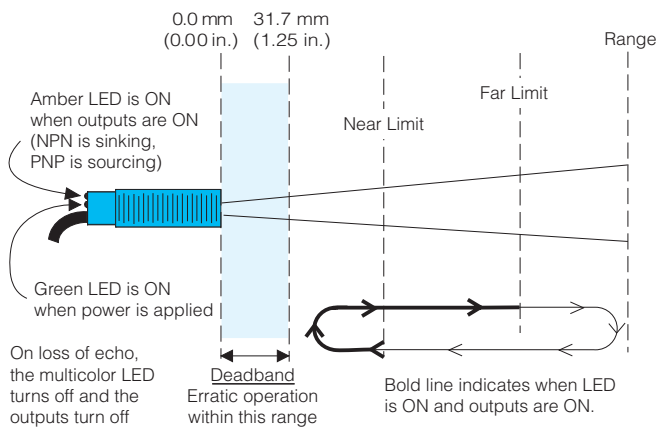


Flat-profile micro connector style
(Ultem plastic) SM380A-XXX-XXFP

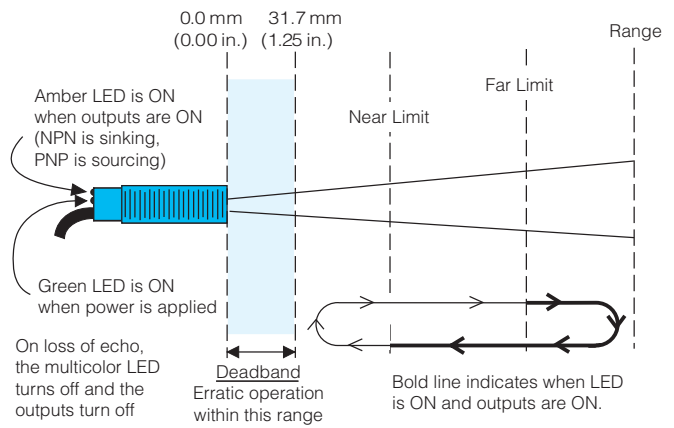


Sensor Operating Profiles (SM302—Dual Level)

Pump-out Level Control



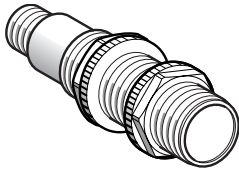
Pump-in Level Control



Osisonic™ Ultrasonic Sensors

SM600 Series

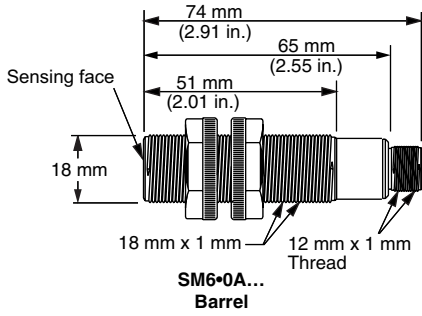
Features, Selection, and Specifications



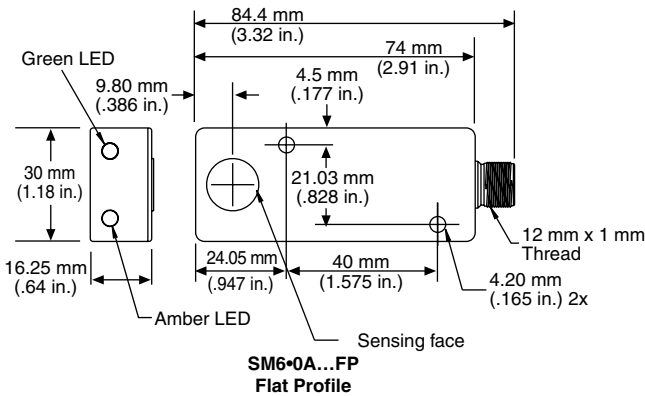
SM6•0A

Features

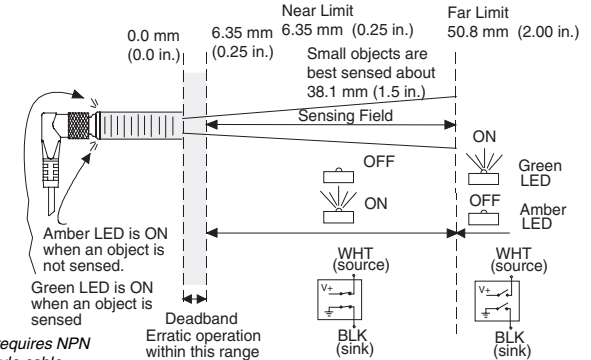
- Most popular 18 mm body style
- PNP or NPN output
- Plastic housing with durable silicone rubber face
- Mounting nuts included
- Micro (M12) connector version



SM6•0A...
Barrel

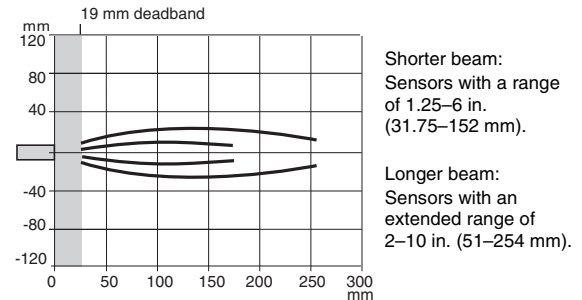


SM6•0A...FP
Flat Profile



NOTE: LED requires NPN illuminated style cable.

SM6•0A...



NOTE: Some extended range sensors are not listed in the table below. Contact the factory for part numbers and availability.

Specifications	Catalog Numbers					
	Proximity Output			Analog Output		
	Cable	Barrel	Flat Profile	Cable	Barrel	Flat Profile
		N.O. SM600A21600	SM600A21600FP	Voltage		
		N.C. SM600A21610	SM600A21610FP	Inverse slope	SM606A44800	SM606A44800FP
	Connector	Barrel	Flat Profile	Inverse slope, LOE	SM606A44803	SM606A44803FP
		N.O. SM650A21600	SM650A21600FP	Direct slope	SM606A44801	SM606A44801FP
		N.C. SM650A21610	SM650A21610FP	Direct slope, LOE	SM606A44806	SM606A44806FP
	Dual-Level Output			Current		
	Cable	Barrel	Flat Profile	Inverse slope	SM606A44810	SM606A44810FP
	Pump-out latch	SM602A60400	SM602A60400FP	Inverse slope, LOE	SM606A44813	SM606A44813FP
	Pump-out latch, LOE	SM602A60403	SM602A60403FP	Direct slope	SM606A44811	SM606A44811FP
	Pump-in latch	SM602A60410	SM602A60410FP	Direct slope, LOE	SM606A44816	SM606A44816FP
	Pump-in latch, LOE	SM602A60413	SM602A60413FP	Connector	Barrel	Flat Profile
	Dual alarm, N.O.	SM602A60420	SM602A60420FP	Voltage		
	Dual alarm, N.O., LOE	SM602A60423	SM602A60423FP	Inverse slope	SM656A44800	SM606A44800FP
	Dual alarm, N.C.	SM602A60430	SM602A60430FP	Inverse slope, LOE	SM656A44803	SM606A44803FP
	Dual alarm, N.C., LOE	SM602A60433	SM602A60433FP	Direct slope	SM656A44801	SM606A44801FP
	Connectors	Barrel	Flat Profile	Direct slope, LOE	SM656A44806	SM606A44806FP
	Pump-out latch	SM652A60400	SM652A60400FP	Current		
	Pump-out latch, LOE	SM652A60403	SM652A60403FP	Inverse slope	SM656A44810	SM656A44810FP
	Pump-in latch	SM652A60410	SM652A60410FP	Inverse slope, LOE	SM656A44813	SM656A44813FP
	Pump-in latch, LOE	SM652A60413	SM652A60413FP	Direct slope	SM656A44811	SM656A44811FP
	Dual alarm, N.O.	SM652A60420	SM652A60420FP	Direct slope, LOE	SM656A44816	SM656A44816FP
	Dual alarm, N.O., LOE	SM652A60423	SM652A60423FP	NOTE: LOE = hold on loss of echo		
	Dual alarm, N.C.	SM652A60430	SM652A60430FP			
	Dual alarm, N.C., LOE	SM652A60433	SM652A60433FP			
18 mm / Flat Profile M18						
Sensing characteristics						
Range	51–254 mm (2–10 in.)					
Frequency	500 kHz					
Power requirements (supply)						
Voltage	12–24 Vdc					
Current	50 mA (excluding load)					
Environmental ratings						
Operating temp.	0 to 60 °C (32 to 140 °F)					
Environment	NEMA Type 4X, IP67					
Construction						
Barrel, ØxL	18 x 1 mm threaded housing					
Flat Profile, wxhxd	16.25 x 30 x 84.40 mm (1.182 x 0.640 x 3.322 in.)					
Housing	Ultem® Plastic					
Transducer	Silicon Rubber					

Osisonic™ Ultrasonic Sensors

SM600 Series

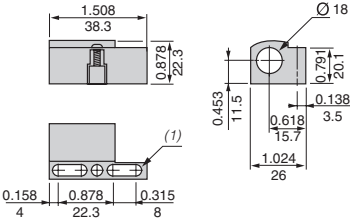
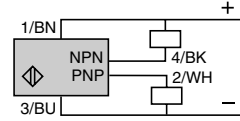
Specifications and Accessories

Wiring

M12 Connector

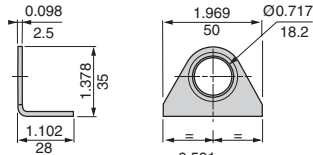


- 1 (+)
- 2 PNP Output
- 3 (-)
- 4 NPN Output



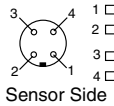
(1) 2 elongated holes 4 x 8 mm

XSZB118



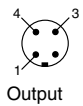
9006PA118

M12 Female Connector



Sensor Side

M12 Male Connector



Output

Specifications

		Barrel (SM6•0A...)	Flat Profile (SM6•0A...FP)
Mechanical			
Sensing range		1–10 in. (25–254 mm)	
Ultrasonic cone angle (see beam plot)		10°	
Maximum angular deviation		±10°	
Temperature range		+32 to 122 °F (0 to 50 °C)	
Humidity		100%	
Enclosure rating		NEMA Type 4X	CENELEC IP 67 conforming to IEC 60529
Hysteresis		0.013 in. (0.35 mm)	0.98 in. (2.5 mm)
Vibration		7 G amplitude + 1 mm (f = 10 to 55 Hz)	
Shock resistance		30 G for 11 ms (conforming to 68-2-27)	
Repeat Accuracy		±0.027 in. (0.7 mm)	±0.05 in. (1.27 mm)
Wiring		22 AWG	
Minimum size detection		0.06 in. (1.5 mm) dia. rod	2.5 in. (63.5 mm) dia. rod
Enclosure material		Case Ultem® plastic	Sensing face Silicone rubber

Electrical

Voltage rating		12–24 Vdc	
Voltage limits (including ripple)		10–28 Vdc	
Voltage drop (across switch, closed state)		1 V (PNP or NPN)	
Max. load current		100 mA	
Residual current (open state)		0.5 uA max.	
Current consumption, no load		60 mA	50 mA (60 mA connector)
LED Indicators		No LED	
Power-up delay (max.)		350 ms	100 ms
Ultrasonic frequency		500 kHz	300 kHz
Protective circuitry		Electrostatic Yes	Overvoltage Yes
		Reverse polarity Yes	
Agency listings		IEC 60947-5-2, UL508, CSA C22-2	

Accessories

Description	Catalog Number
Flush mount plastic mounting bracket	XSZB118
90° metal mounting bracket	9006PA118
Plastic mounting nuts	XSZE118
Micro (M12) Connector Cables	
Micro connector, 4 pin, 2 m (6.6 ft), straight	XSZCD101Y
Micro connector, 4 pin, 2 m (6.6 ft), 90°	XSZCD111Y

For additional cable options and lengths, see the Cabling section beginning on page 625.

Osisonic™ Ultrasonic Sensors

SM600 Series

General Specifications and Operating Profiles—SM600

General Specifications—SM600

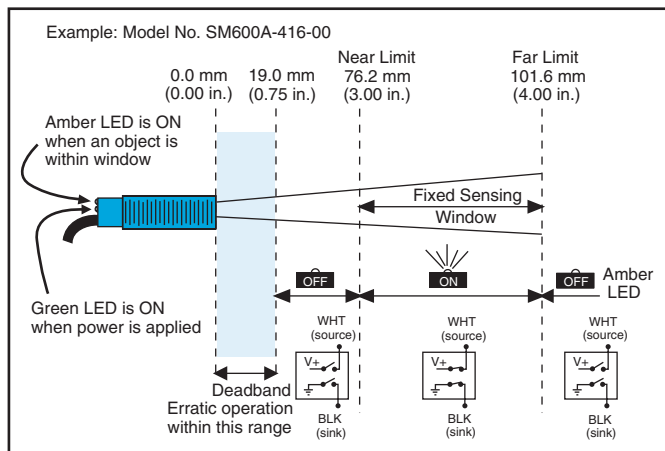
Sensing	Ranges	Up to 254 mm (10 in.)	
	Spans	From 3.18 mm (1/8 in.) to 228.6 mm (9 in.)	
	Window position, initial accuracy	± 1.59 mm (0.062 in.) max.	
	Window position repeatability	± 0.69 mm (0.027 in.) max.	
	Detection benchmarks	Models with ranges to 177.8 mm (7 in.)	1.59 mm (1/16 in.) diameter rod at a distance of 63.5 mm (2.5 in.) Max. ± 10° tilt of large flat object at a distance of 127 mm (5 in.)
		Models with ranges from over 177.8 to 254 mm (7 to 10 in.)	1.59 mm (1/16 in.) diameter rod at a distance of 76.2 mm (3 in.) Max. ± 10° tilt of large flat object at a distance of 203.2 mm (8 in.)
	Sonic frequency	500 kHz	
Sonic cone angle	7° (see beam plots, page 4-64)		
Power requirements	Supply voltage	12 Vdc to 24 Vdc ± 10%, regulated supply	
	Current consumption	Cable	50 mA max. (excluding load)
		Connector	60 mA max. (excluding load)
Power consumption	1 W max. (excluding load)		
Output	NPN Sinking	0 to 30 V Maximum on-state voltage 10.2 volts @100 mA	
	PNP Sourcing	100 mA @ 24 Vdc, max.	
Response time	Standard	On 3 ms, Off 3 ms	
	Optional	On 1.5 ms, Off 1.5 ms	
	Green LED	power On	
Indicators	Amber LED	On if object is detected within the window, regardless of output polarity (N.O./N.C.) style. Connector model using cable with built-in LEDs: On if NPN output is low.	
	Connections	Cable 24 AWG, foil shield, lead-free, PVC jacket, 4-conductor, 3 m (10 ft) long Connector 24 AWG, foil shield, lead-free, PVC jacket, 4-conductor, right-angle Micro style	
Protection	Power supply	current-limited over-voltage, ESD, reverse polarity	
	Outputs	current-limited over-voltage, ESD, over-current	
Environment	Operating temperature range	0 to 60 °C (32 to 140 °F) @ 12 Vdc supply 0 to 50 °C (32 to 122 °F) @ 24 Vdc supply	
	Storage temperature range	-40 to 100 °C (-40 to 212 °F)	
	Operating humidity	100%	
	Protection ratings	NEMA Type 4X, IP67	
	Chemical resistance	Resists most acids and bases, including most food products.	
Agency approvals	CE Mark	CE conformity is declared to: EN61326:1997 (annex A, industrial) including amendment A1:1998. EN55011 Group1 Class A.	
	Construction	Dimensions	Cable
Connector			18 mm dia. x 1 mm threaded housing x 102 mm (4 in.) long, including connector/cable assembly
Flat-profile		Cable	30 x 16.25 x 93 mm (1.182 x 0.640 x 3.66 in.) H x W x L
		Connector	30 x 16.25 x 84.40 mm (1.182 x 0.640 x 3.322 in.) H x W x L
Housing		Shock and vibration resistant	Case
		Transducer Face	Silicone rubber, gray
		Sensor Cables	Lead-free PVC jacket, black (Model AC117)
		LED	Polycarbonate

Ultrasonic

Sensor Operating Profiles—SM600

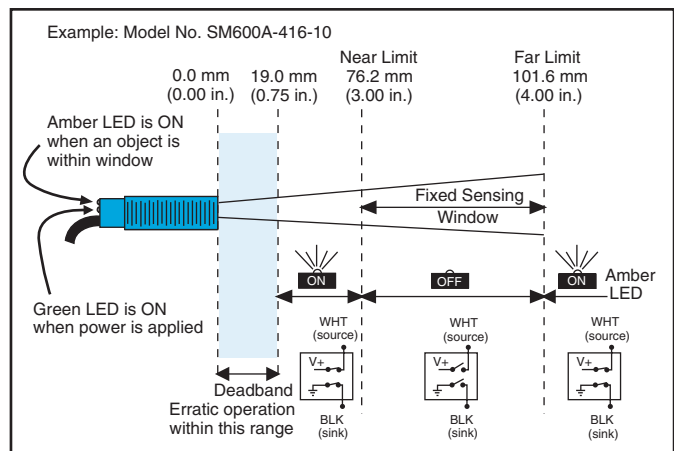
Normally Open Output

The sensor output is On with the object in the fixed sensing window.



Normally Closed Output

The sensor output is Off with the object in the fixed sensing window.



Osisonic™ Ultrasonic Sensors

SM600 Series

General Specifications—SM602

General Specifications—SM602

Sensing	Ranges	Up to 254 mm (10 in.)		
	Spans	From 3.18 mm (1/8 in.) to 228.6 mm (9 in.)		
	Window position, initial accuracy	± 1.59 mm (0.062 in.) max.		
	Window position repeatability	± 0.69 mm (0.027 in.) max.		
	Detection benchmarks	Models with ranges to 177.8 mm (7 in.)	1.59 mm (1/6 in.) diameter rod at a distance of 63.5 mm (2.5 in.) Max. ±10° tilt of large flat object at a distance of 127 mm (5 in.)	
		Models with ranges from over 177.8 mm (7 in.) to 254 mm (10 in.)	1.59 mm (1/6 in.) diameter rod at a distance of 76.2 mm (3 in.) Max. ± 10° tilt of large flat object at a distance of 203.2 mm (8 in.)	
	Sonic frequency	500 kHz		
	Sonic cone angle	7° (see beam plot, page 4-72)		
Power requirements	Supply voltage	12 to 24 Vdc ± 10%, regulated supply		
	Current consumption	Cable model	50 mA max. (excluding load)	
		Connector model	60 mA max. (excluding load)	
	Power consumption	1.0 W max. (excluding load)		
Output	NPN sinking	0 to 30 V Maximum on-state voltage at 100 mA: 0.2 volts		
	PNP sourcing	100 mA @ 24 Vdc, max.		
Response Time	Standard	On 3 ms, Off 3 ms		
	Optional	On 1.5 ms, Off 1.5 ms		
Indicators	Green LED	Power On		
	Amber LED	Cable model	On if object is detected within the window, regardless of output polarity (N.O./N.C.) style	
		Connector model with built-in cable LEDs ⁽¹⁾	On if NPN output is sinking	
Connections	Cable models	24 AWG, foil shield, lead-free, PVC jacket, 4-conductor, 3 m (10 ft) long		
	Connector models	4-conductor, straight and right-angle micro-style		
Protection	Power supply	Current-limited over-voltage, ESD, reverse polarity		
	Outputs	Current-limited over-voltage, ESD, over-current		
Environment	Operating temperature range	0 to 60 °C @ 12 Vdc supply 0 to 50 °C @ 24 Vdc supply		
	Storage temperature range	-40 to 100 °C (-40 to 212 °F)		
	Operating humidity	100%		
	Protection ratings	NEMA Type 4X, IP67		
	Chemical resistance	Resists most acids and bases, including most food products		
Agency approvals	CE mark	CE conformity is declared to: EN61326:1997 (annex A, industrial) including amendment A1:1998. EN55011 Group1 Class A.		
Construction	Dimensions	Cable model	18 mm dia. x 1 mm threaded housing x 65 mm (2.55 in.) long	
		Barrel	Connector model	18 mm dia. x 1 mm threaded housing x 102 mm (4 in.) long, including connector/cable assembly
		Flat-profile	Cable model	30 x 16.25 x 93 mm (1.182 x 0.640 x 3.66 in.) H x W x L
			Connector model	30 x 16.25 x 84.40 mm (1.182 x 0.640 x 3.322 in.) H x W x L
	Housing Shock and vibration resistant	Case	Ultem® plastic (FDA Approved) (SS303 stainless steel available only in 18 mm barrel-style)	
		Transducer face	Silicone rubber, gray	
Sensor cables		Lead-free PVC jacket, black (Model AC117)		
LED		Polycarbonate		

¹ Requires an NPN illuminated-style cable.

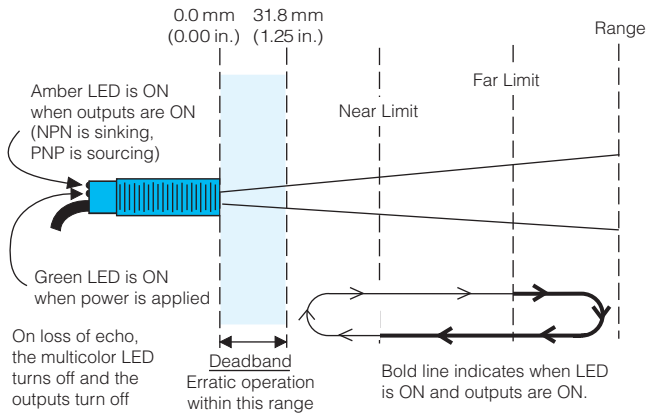
Osisonic™ Ultrasonic Sensors

SM600 Series

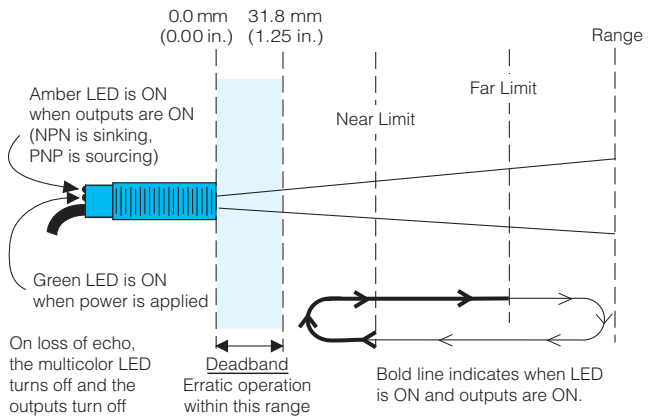
Operating Profiles and Wire Assignments—SM602

Sensor Operating Profiles—SM602

Pump-in Level Control

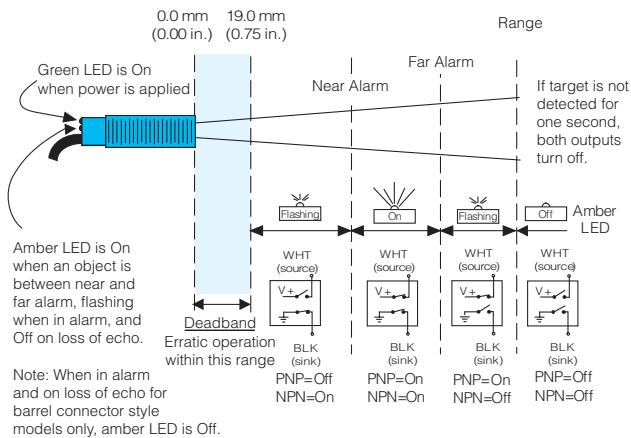


Pump-out Level Control

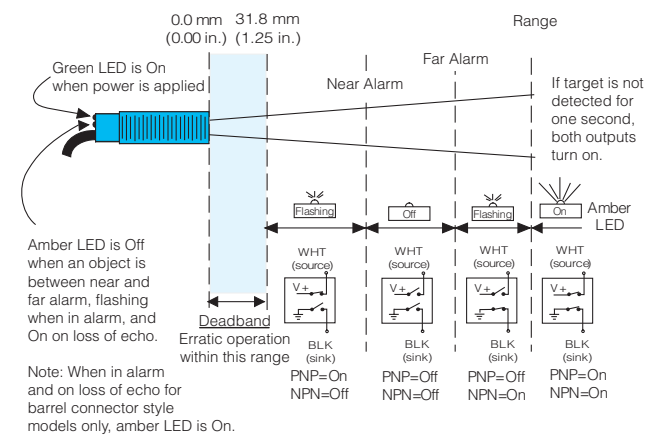


Alarm Level Control

Normally Open Outputs Operation



Normally Closed Outputs Operation

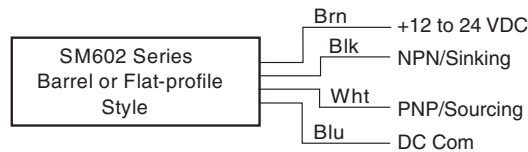


Electrical Wiring—SM602

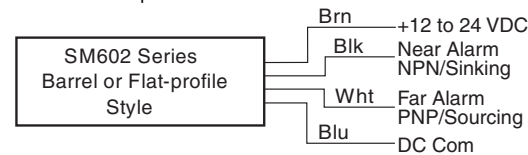
The sensor wires must be run in conduit free of any AC power or control wires.

Cable Model Wire Assignments

On/Off Latch Outputs

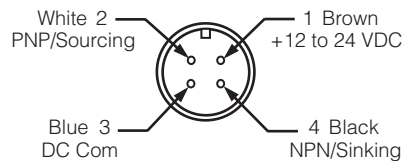


Dual Alarm Outputs

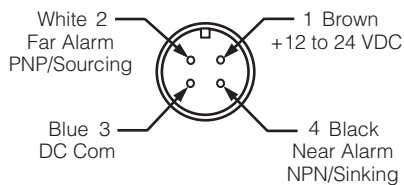


Connector Model Pin Assignments

On/Off Latch Outputs



Dual Alarm Outputs



Osisonic™ Ultrasonic Sensors

SM600 Series

General Specifications—SM606

General Specifications—SM606

	Ranges		Up to 254 mm (10 in.)		
	Spans		From 3.18 mm (0.125 in.) to 228.6 mm (9 in.)		
Sensing	Detection benchmarks	Models with ranges to 177.8 mm (7 in.)	1.59 mm (0.06 in.) diameter rod at a distance of 63.5 mm (2.5 in.) Max. ±10° tilt of large flat object at a distance of 127 mm (5 in.)		
		Models with ranges from over 177.8 mm (7 in.) to 254 mm (10 in.)	1.59 mm (1/6 in.) diameter rod at a distance of 76.2 mm (3 in.) Max. ±10° tilt of large flat object at a distance of 203.2 mm (8 in.)		
	Resolution, position	Voltage model	span/1023, minimum 0.043 mm (0.0017 in.)		
		Current model	span/818, minimum 0.043 mm (0.0017 in.)		
	Resolution, output	Voltage model	9.775 mV		
		Current model	15.6 µA		
	Position sensing @ 20 °C	Window edge position (either edge)	Error, maximum ±1.57 mm (0.062 in.) Repeatability, max. error ±0.381 mm (0.015 in.)		
		Zero offset	Voltage model	+18 mV/-11 mV	
			Current model	4 mA +0.11 mA/-0.141 mA	
		Full scale offset, maximum	Voltage model	±43 mV	
			Current model	+0.147 mA/-0.300 mA	
		Slope error, maximum	0.59% of Span (1% to 99% of Span)		
		Non-linearity, maximum	0.76 mm (.030 in.)		
		Temperature compensation	-20 to 60 °C		
	Position error due to temperature shift	±01.59 mm (0.062 in.)			
	Sonic frequency	500 kHz			
	Sonic cone angle	7° (see beam plot)			
	Sensing bandwidth (sinusoidal oscillation)	50 Hz			
Power requirements	Supply voltage	15 to 24 Vdc ± 10%, regulated supply			
	Current consumption	50 mA max. (excluding load)			
	Power consumption	1.2 W max. (excluding load)			
Output	Voltage model	Range	0-10 Vdc		
		Min. load resistance	1000 Ohms		
	Current model (flat-profile only)	Range	4-20 mA (0-20 mA optional)		
		Load resistance	0.1 to 350 Ohms		
Response time	Standard	2.5 ms			
	Optional	1.5 ms			
Indicators	Green LED	Connector model only	power		
	Amber LED	Connector & cable models	intensity increases as output voltage increases		
Connections⁽¹⁾	Cable	24 AWG, foil shield, lead-free, PVC jacketed, 4-conductor, 3 m (10 ft) long			
	Connector	4-pin, 12 mm micro-style			
Protection	Power supply	current-limited over-voltage, ESD, reverse polarity			
	Outputs	current-limited over-voltage, ESD, overcurrent			
Environment	Operating temperature range	0 to 60 °C @ 15 Vdc supply 0 to 50 °C @ 24 Vdc supply			
	Storage temperature range	-40 to 100 °C (-40 to 212 °F)			
	Operating humidity	100%			
	Protection ratings	NEMA Type 4X, IP67			
	Chemical resistance	Resists most acids and bases, including most food products.			
Agency approvals	CE mark	CE conformity is declared to: EN61326:1997 (annex A, industrial) including amendment A1:1998. EN55011 Group 1 Class A.			
Construction	Dimensions	Barrel	Cable	18 mm dia. x 1 mm threaded housing x 65 mm (2.55 in.) long	
			Connector	18 mm dia. x 1 mm threaded housing x 102 mm (4 in.) long, including connector/cable assembly	
		Flat-profile	Cable	30 x 16.25 x 93 mm (1.182 x 0.640 x 3.66 in.) H x W x L	
			Connector	30 x 16.25 x 84.40 mm (1.182 x 0.640 x 3.322 in.) H x W x L	
	Housing Shock and vibration resistant	Case	Ultem® plastic (FDA Approved) (SS303 stainless steel available only in 18 mm barrel-style)		
		Transducer face	Silicone rubber, gray		
Sensor cables		Nontoxic PVC jacket, food grade			
	LED	Polycarbonate			

¹ LEDs not built into this sensor. Must use AC119 right-angle mating connector with built-in LEDs. No other mating connector cable may be substituted due to unique LED circuit impedance.

Osisonic™ Ultrasonic Sensors

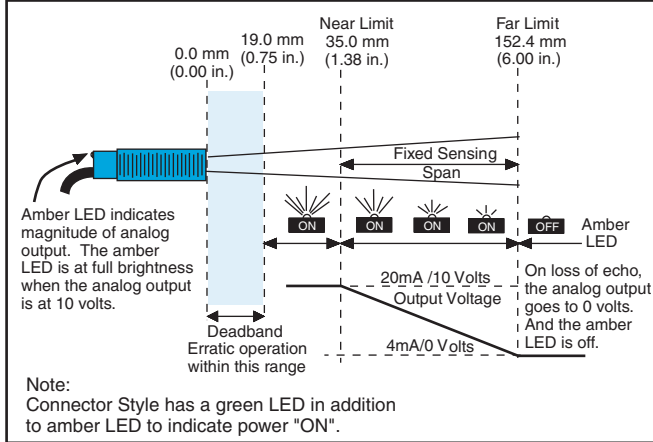
SM600 Series

Operating Profiles and Wire Assignments—SM600

Sensor Operating Profiles—SM600

Direct Proportional Output

The analog signal value increases as the object moves closer to the near span limit.

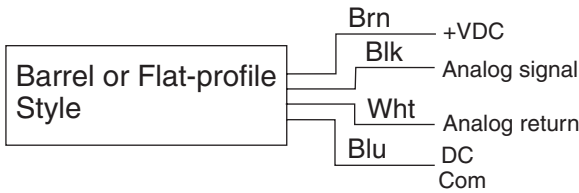


Note: Cable style sensors have an amber signal LED only—no green LED.

Electrical Wiring

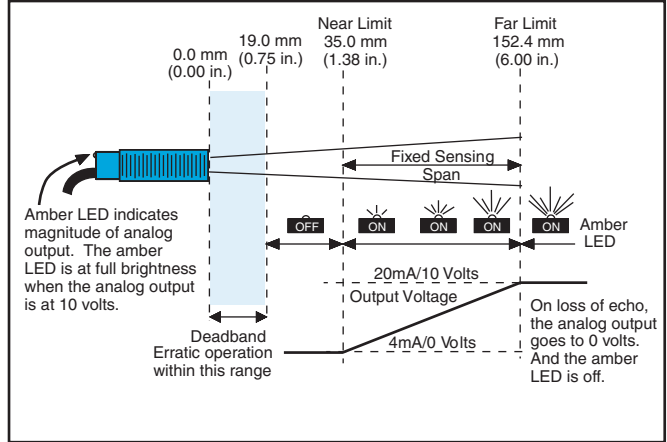
The sensor wires must be run in conduit free of any AC power or control wires.

Cable Style Model Wire Assignments



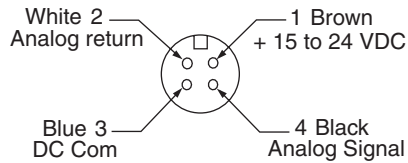
Inverse Proportional Output

The analog signal value decreases as the object moves closer to the near span limit.

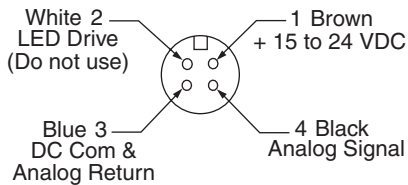


Connector Style Model Pin Assignments

Flat-profile style



Barrel style

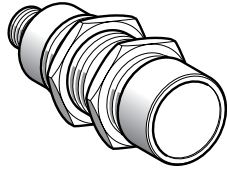


Ultrasonic

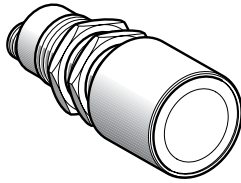
Osisonic™ Ultrasonic Sensors

SM900 Series

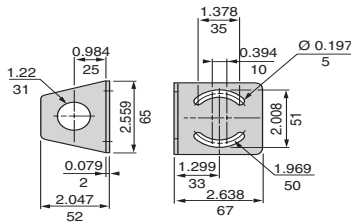
Specifications and Accessories



SM900A1



SM900A8



XXZ30

Specifications

		1 or 2 m (SM9•0A1 or SM9•0A4)	8 m (SM9•0A8)
Mechanical			
Nominal sensing range		3.3 ft (1 m) or 6.6 ft (2 m)	26.2 ft (8 m)
Sensing zone		2.0–39.0 in. (51–991 mm)	8 in. to 26.25 ft (203 mm to 8 m)
Ultrasonic cone angle (see beam plot)		10°	16°
Maximum angular deviation		±7°	±5°
Temperature range		32 to 122 °F (0 to 50 °C)	-4 to 149 °F (-20 to 65 °C)
Humidity		100%	
Enclosure rating	NEMA Type	4X	
	CENELEC	IP 67 conforming to IEC 60529	
Hysteresis (max)		0.98 in. (24.8 mm)	0.5 in. (12.7 mm)
Vibration		7 G amplitude + 1 mm (f =10 to 55 Hz)	
Shock resistance		30 G for 11 ms (conforming to 68-2-27)	
Repeat accuracy		±0.035 in. (0.9 mm)	±0.1 in. (2.54 mm)
Wiring		22 AWG	
Minimum size detection		0.063 in. (1.6 mm) dia. rod	2.00 in. (50.68 mm) dia. rod
Enclosure material	Case	Ultem® plastic	
	Sensing face	Silicone rubber	Epoxy
Electrical			
Voltage rating		12–24 Vdc	
Voltage limits (including ripple)		10–28 Vdc	
Voltage drop (across switch, closed state)		1 V (PNP or NPN)	
Max. load current		100 mA	
Residual current (open state)		0.5 uA max.	
LED indicators		Multi-Color	
	Power	Green	
	Output	Amber	
Power-up delay (max.)		720 ms	800 ms
On delay (max.)		20 ms	200 ms
Off delay (max.)		20 ms	200 ms
Ultrasonic Frequency		200 kHz	75 kHz
Protective Circuitry	Electrostatic	Yes	
	Overvoltage	Yes	
	Reverse polarity	Yes	
Agency listings		IEC 60947-5-2, UL508, CSA C22-2	

Accessories

Description	Catalog Number
90° metal mounting bracket	9006PA130
Plastic mounting nuts	XSZE130
Micro (M12) Connector Cables	
Micro connector, 4 pin, 2 m (6.6 ft), straight	XSZCD101Y
Micro connector, 4 pin, 2 m (6.6 ft), 90°	XSZCD111Y



For additional cable options and lengths, see page 368.

Osisonic™ Ultrasonic Sensors

SM900 Series

Selection and Specifications

Specifications and Catalog Numbers

						
	30 mm (1 or 2 m) M30		30 mm (8 m) M30			
Sensing characteristics						
Range	51 mm to 1 m (2–39 in.); 119 mm to 2 m (4.7–79 in.)		203 mm to 8 m (8–315 in.)			
Frequency	200 kHz		200 kHz			
Power requirements (supply)						
Voltage	12–24 Vdc Discrete; 15–24 Vdc Analog		12–24 Vdc Discrete; 15–24 Vdc Analog			
Current	60 mA (excluding load)					
Environmental ratings						
Operating temperature	-30 to 70 °C (-22 to 158 °F)					
Environment	NEMA Type 4X, IP67		NEMA Type 4X, IP67			
Construction						
Barrel, ØxL	30 x 1 x 95.26 mm (1.18 x 3.75 in.)					
Flat profile, WxHxD	—					
Housing	Ultem® plastic		Ultem plastic			
Transducer	Silicon rubber		Glass epoxy			
Output type	Description	Catalog No.		Description	Catalog No.	
Proximity output	1 m			8 m		
	Connector	SM950A100000		Cable	SM900A800000	
	Cable	SM900A100000		Connector	SM950A800000	
	2 m					
	Connector	SM950A400000				
	Cable	SM900A400000				
Dual-level	Cable	1 m	2 m	Cable	8 m	
	Pump-out latch	SM902A100000	SM902A400000	Pump-out latch	SM902A800000	
	Pump-out latch w/alarm	SM902A150000	SM902A450000	Pump-out latch w/alarm	SM902A850000	
	Pump-out latch, w/setpoint	SM902A170000	SM902A470000	Pump-out latch, w/setpoint	SM902A870000	
	Pump-in latch	SM902A110000	SM902A410000	Pump-in latch	SM902A810000	
	Pump-in latch w/alarm	SM902A140000	SM902A440000	Pump-in latch w/alarm	SM902A840000	
	Pump-in latch, w/setpoint	SM902A160000	SM902A460000	Pump-in latch, w/setpoint	SM902A860000	
	Dual setpoint	SM902A120000	SM902A420000	Dual setpoint	SM902A820000	
	Dual alarm	SM902A130000	SM902A430000	Dual alarm	SM902A830000	
	Connector		Connector		Connector	
	Pump-out latch	SM952A100000	SM952A400000	Pump-out latch	SM952A800000	
	Pump-out latch w/alarm	SM952A150000	SM952A450000	Pump-out latch w/alarm	SM952A850000	
	Pump-out latch, w/setpoint	SM952A170000	SM952A470000	Pump-out latch, w/setpoint	SM952A870000	
	Pump-in latch	SM952A110000	SM952A410000	Pump-in latch	SM952A810000	
	Pump-in latch w/alarm	SM952A140000	SM952A440000	Pump-in latch w/alarm	SM952A840000	
	Pump-in latch, w/setpoint	SM952A160000	SM952A460000	Pump-in latch, w/setpoint	SM952A860000	
	Dual setpoint	SM952A120000	SM952A420000	Dual setpoint	SM952A820000	
	Dual alarm	SM952A130000	SM952A430000	Dual alarm	SM952A830000	
	Analog	Cable	1 m	2 m	Cable	8 m
		Voltage		Voltage		Voltage
Auto slope		SM906A180000	SM906A480000	Auto slope	SM906A880000	
Direct slope		SM906A110000	SM906A410000	Direct slope	SM906A810000	
Inverse slope		SM906A100000	SM906A400000	Inverse slope	SM906A800000	
Current		Current		Current		
Auto slope		SM906A190000	SM906A490000	Auto slope	SM906A890000	
Direct slope		SM906A130000	SM906A430000	Direct slope	SM906A830000	
Inverse slope		SM906A120000	SM906A420000	Inverse slope	SM906A820000	
Connector		Connector		Connector		
Voltage		Voltage		Voltage		
Auto slope		SM956A180000	SM956A480000	Auto slope	SM956A880000	
Direct slope		SM956A110000	SM956A410000	Direct slope	SM956A810000	
Inverse slope		SM956A100000	SM956A400000	Inverse slope	SM956A800000	
Current		Current		Current		
Auto slope		SM956A190000	SM956A490000	Auto slope	SM956A890000	
Direct slope		SM956A130000	SM956A430000	Direct slope	SM956A830000	
Inverse slope		SM956A120000	SM956A420000	Inverse slope	SM956A820000	

Ultrasonic

Osisonic™ Ultrasonic Sensors

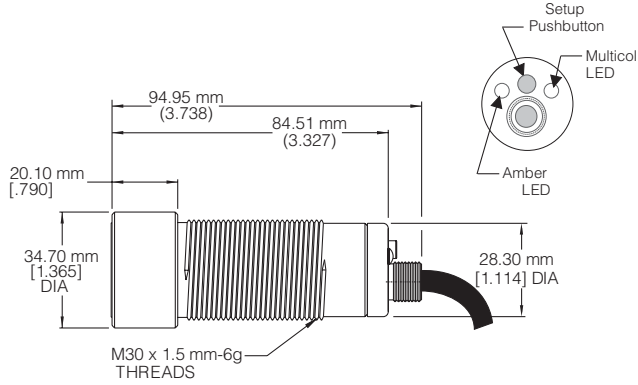
SM900 Series

Dimensions

Dimensions—SM900 Series

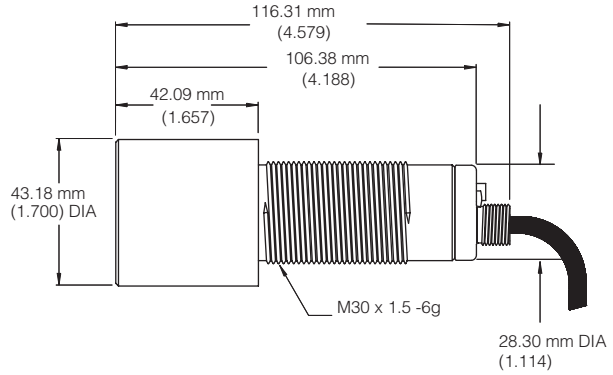
Cable Style

(Ultem® plastic and SS303 stainless steel)
SM900A-1, SM900A-4, SM900A-7STS



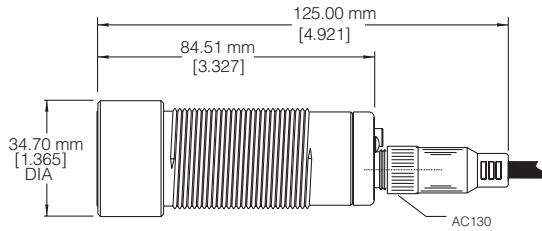
Cable Style

(Ultem plastic & SS303 stainless steel)
SM900A-8 Long-range



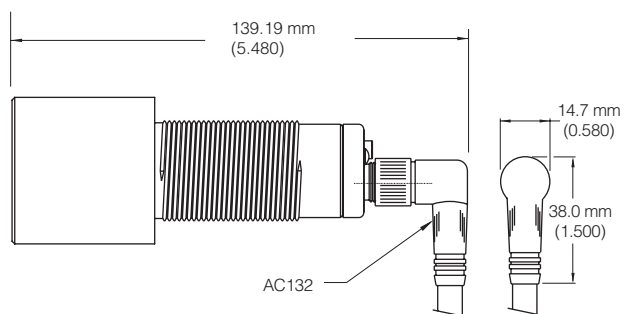
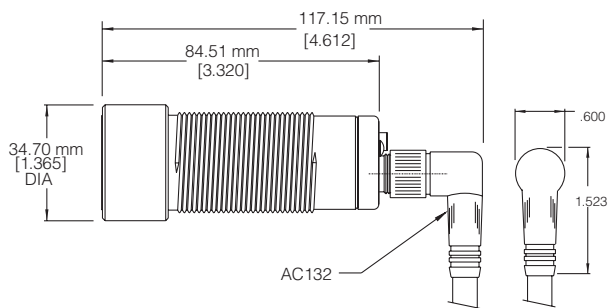
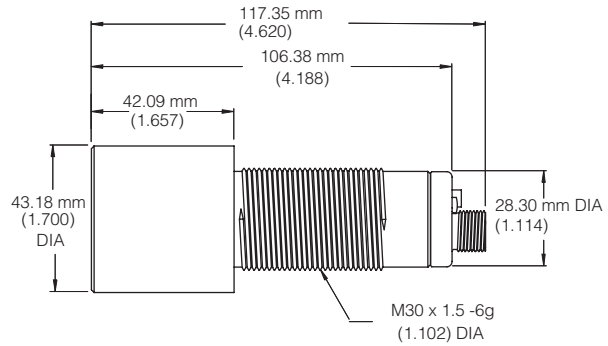
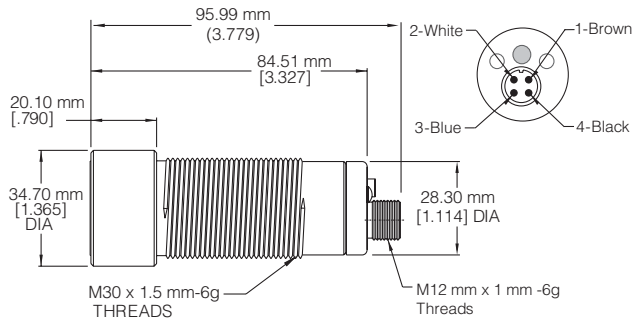
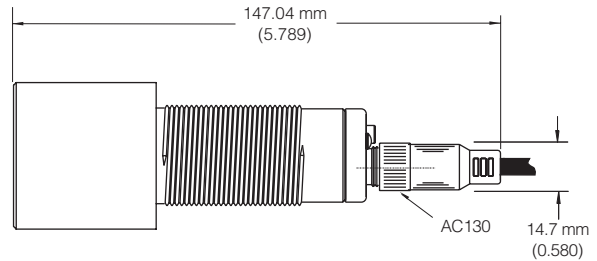
Connector Style

(Ultem plastic and SS303 stainless steel)
SM950A-1, SM950A-4, SM950A-7STS



Connector Style

(Ultem plastic & SS303 stainless steel)
SM950A-8 Long-range



Osisonic™ Ultrasonic Sensors

SM900 Series

General Specifications—SM900

General Specifications—SM900

		1 and 2 m ranges	8 m, long range	
Sensing [TA = 20 °C (68 °F)]	Model Sensing Ranges	51 mm to 1 m (2.0 to 39 in.) 120 mm to 1 m (4.7 to 39 in.) ⁽¹⁾ 120 mm to 2 m (4.7 to 79 in.)	203 mm to 8 m (8.0 in. to 26 ft)	
	Sonic Frequency	200 kHz	75 kHz	
	Minimum Size Detection	Model SM900A1: 1.59 mm (0.0625 in.) diameter rod up to 635 mm (25 in.) distance from sensor	Model SM900A8: 50.8 mm (2.0 in.) diameter rod up to 4572 mm (15 ft) distance from the sensor	
	Maximum Angular Deviation	+ 10° on 305 x 305 mm (12 x 12 in.) flat target at a distance of 305 mm (12 in.)	+ 10° on a large flat surface at a distance of 6.096 m (20 ft) + 5° on a large flat surface at a distance of 8 m (26 ft)	
	Sonic Cone Profile	See Beam Plots		
	Limit Adjustment Resolution	0.08 mm (0.003 in.)	0.254 mm (0.01 in.)	
	Repeatability	+ 0.8716 mm (0.03431 in.) max. Temperature Compensated	+ 2.54 mm (0.10 in.) max. Temperature Compensated	
Power Requirements	Supply Voltage	12 to 24 Vdc + 10% excluding output load (regulated supply)		
	Current Consumption	100 mA max., excluding load		
	Peak Inrush Current	0.50 A		
	Power Consumption	1.2 W max., excluding load		
Outputs	Sinking Output (NPN)	Maximum on-state voltage	0.37 V @ 100 mA	
		Maximum load current	100 mA	
		Maximum applied voltage	35 Vdc	
	Sourcing Output (PNP)	Maximum on-state voltage drop	0.50 V @ 100 mA	
	Maximum load current	100 mA		
Response Times	Minimum, Standard (Other response times are available)	1 m range models: 10 ms on/off, 20 ms on/off	100 ms on/off, 200 ms on/off	
		2 m range models: 15 ms on/off, 30 ms on/off		
Indicators	Multicolored LED (Amber, Red, Green)	Indicates limits, setup, and operational modes		
	Amber LED	Illuminated when sensor output is in an active (on) state.		
Connection Options	Cable Model	24 AWG, foil shield, lead-free PVC jacketed, 4-conductor, 3 m (10 ft) long, standard		
	Connector Model	12 mm, 4 pole, male		
Protection	Note: This sensor is not rated explosion proof!	Power Supply	Current-limited over-voltage, ESD, reverse polarity	
		Outputs	Current-limited over-voltage, ESD, over-current	
Environment	Operating Temperature Range:	Silicone faced: 0 to 50 °C (32 to 122 °F) Stainless-steel faced: -20 to 50 °C (-4 to 122 °F)	-20 to 60 °C (-4 to 140 °F)	
	Storage Temperature Range	Silicone faced: -20 to 80 °C (-4 to 176 °F) Stainless-steel faced: -50 to 80 °C (-58 to 176 °F)	-40 to 100 °C (-40 to 212 °F)	
	Operating Humidity	100%	100%	
	Protection Ratings	NEMA Type 4X, IP67		
Construction	Chemical Resistance	Unaffected by most acids, bases, and oils. Fluorosilicone- and stainless steel-faced transducers available for severe, corrosive-type environments.		
		Unaffected by most acids, bases, and oils.		
	Dimensions	Cable Model	30 mm (1.181 in.) dia. x 1.5 mm-6g threaded housing x 94.95 mm (3.738 in.) mm long, including 34.70 mm (1.365 in.) dia. x 20.10 mm (0.790 in.) long sensing head	30 mm (1.181 in.) dia. x 1.5 mm-6g threaded housing x 116.31 mm (4.579 in.) mm long, including 43.18 mm (1.700 in.) dia. x 42.09 mm (1.657 in.) long sensing head
		Connector Model	30 mm (1.181 in.) dia x 1.5 mm-6g threaded housing x 95.99 mm (3.779 in.) long. With AC132 right-angle, M12 micro, connector/cable assembly: 117.15 mm (4.612 in.) long. With AC130 straight, M12 micro, connector/cable assembly: 125.00 mm (4.921 in.) long. Sensing head dimension same as cable model.	30 mm (1.181 in.) dia x 1.5 mm-6g threaded housing x 117.35 mm (4.620 in.) long. With AC132 right-angle, connector/cable assembly: 139.19 mm (5.480 in.) long. With AC130 straight, connector/cable assembly: 147.04 mm (5.789 in.) long. Sensing head dimension same as cable model.
	Housing	Epoxy encapsulated to resist shock and vibration		
	Case	Ultem® plastic (FDA Approved) or SS303 stainless steel	Ultem plastic (FDA Approved)	
	Transducer Face	Silicone rubber, gray SS304 stainless steel, 0.051 mm (0.002 in.) thick ⁽¹⁾	Epoxy, white	
Sensor Cables	Lead-free, black PVC jacketed			
Agency Approvals	CE Mark	CE conformity is declared to: EN61326:1997 (annex A, industrial) including amendment A1:1998. EN55011 Group 1 Class A		

¹ Available only in the stainless-steel faced, 1 m range models.

Osisonic™ Ultrasonic Sensors

SM900 Series

Wire Assignments—SM900

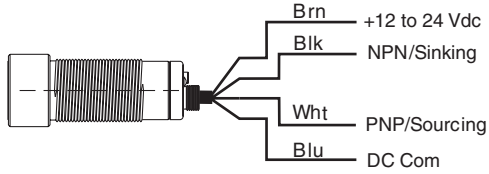
Electrical Wiring—SM900

The sensor wires must be run in conduit free of any AC power or control wires.

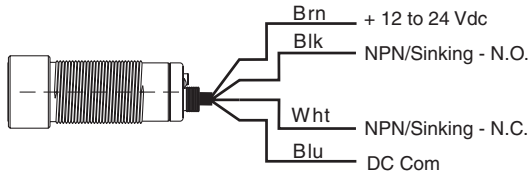
Cable/Connector Wire Colors and Outputs

Cable Model Wire Assignments

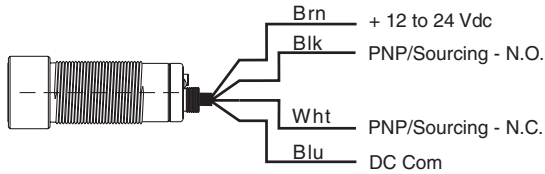
Sinking/Sourcing N.O./N.C.



Complementary Sinking

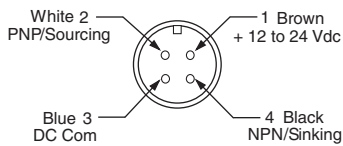


Complementary Sourcing

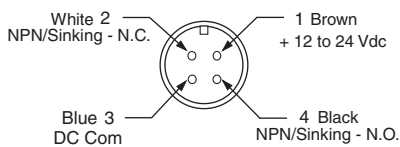


Connector Model Pin Assignments

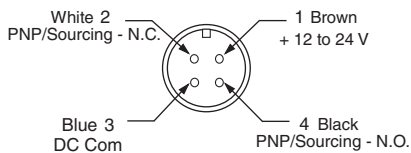
Sinking/Sourcing N.O./N.C.



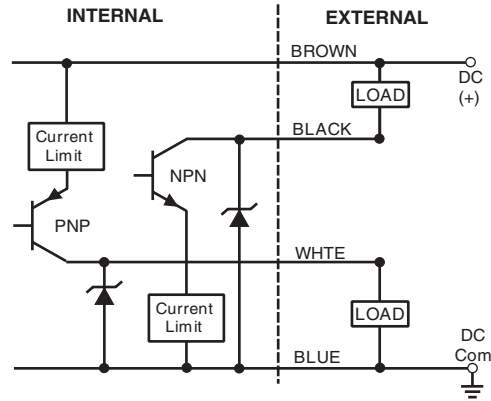
Complementary Sinking



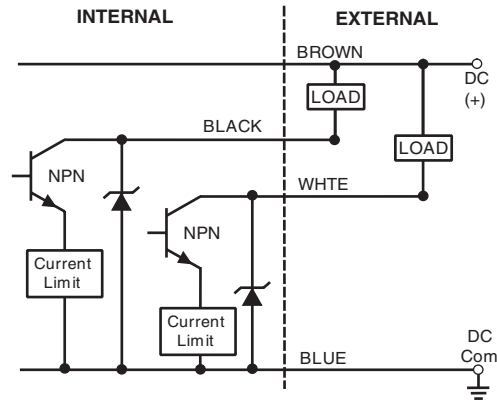
Complementary Sourcing



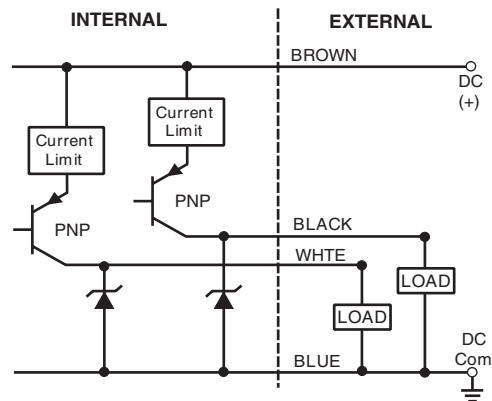
NPN/Sinking and PNP/Sourcing Outputs



Complementary NPN/Sinking Outputs



Complementary PNP/Sourcing Outputs



Osisonic™ Ultrasonic Sensors

SM900 Series

General Specifications—SM902

General Specifications—SM902

		1 and 2 m ranges	8 m, long range
Sensing [TA = 20 °C (68 °F)]	Model Sensing Ranges	51 mm to 1 m (2.0 to 39 in.) 120 mm to 1 m (4.7 to 39 in.) ⁽¹⁾ 120 mm to 2 m (4.7 to 79 in.)	203 mm to 8 m (8.0 in. to 26 ft)
	Sonic Frequency	200 kHz	75 KHz
	Minimum Size Detection	(Model SM902A-1): 1.59 mm (0.0625 in.) diameter rod up to 635 mm (25 in.) distance from sensor	(Model SM902A-8): 50.8 mm (2.0 in.) diameter rod up to 4572 mm (15 ft) distance from the sensor
	Maximum Angular Deviation	+ 10° on 305 x 305 mm (12 x 12 in.) flat target at a distance of 305 mm (12 in.)	+ 10° on a large flat surface at a distance of 6.096 m (20 ft) + 5° on a large flat surface at a distance of 8 m (26 ft)
	Sonic Cone Profile	See Beam Plots	
	Limit Adjustment Resolution	0.08 mm (0.003 in.)	0.254 mm (0.01 in.)
	Repeatability	+ 0.8716 mm (0.03431 in.) max. Temperature Compensated	+ 2.54 mm (0.10 in.) max. Temperature Compensated
Power Requirements	Supply Voltage	12 to 24 Vdc + 10% excluding output load (regulated supply)	12 to 24 Vdc + 10% excluding output load (regulated supply)
	Current Consumption	100 mA max., excluding load	100 mA max., excluding load
	Peak Inrush Current	0.50 A	0.50 A
	Power Consumption	1.2 W max., excluding load	1.2 W max., excluding load
Outputs	Sinking Output (NPN)	Maximum on-state voltage	0.37 V @ 100 mA
		Maximum load current	100 mA
	Sourcing Output (PNP)	Maximum applied voltage	35 Vdc
		Maximum on-state voltage drop	0.50 V @ 100 mA
	Maximum load current	100 mA	
Response Time	Standard (Other response times are available)	150 ms on/off (1 m range models) 200 ms on/off (2 m range models)	1 s on/off
Indicators	Multicolored LED (Amber, Red, Green)	Indicates limits setup and operational modes.	
	Amber LED	Illuminated when sensor output is in an active (on) state.	
Connection Options	Cable Model	24 AWG, foil shield, lead-free PVC jacketed, 4-conductor, 3 m (10 ft) long, standard	24 AWG, foil shield, lead-free PVC jacketed, 4-conductor, 3 m (10 ft) long, standard
	Connector Model	12 mm, 4 pole, male	12 mm, 4 pole, male
Protection	Note: This sensor is not rated explosion proof!	Power Supply	Current-limited overvoltage, ESD, reverse polarity
		Outputs	Current-limited overvoltage, ESD, overcurrent
Environment	Operating Temperature Range	Silicone faced: 0 to 50 °C (32 to 122 °F) Stainless-steel faced: -20 to 50 °C (-4 to 122 °F)	-20 to 60 °C (-4 to 140 °F)
	Storage Temperature Range	Silicone faced: 20 to 80 °C (14 to 176 °F) Stainless-steel faced: -50 to 80 °C (-58 to 176 °F)	-40 to 100 °C (-40 to 212 °F)
	Operating Humidity	100%	
	Protection Ratings	NEMA Type 4X, IP67	NEMA Type 4X, IP67
	Chemical Resistance	Unaffected by most acids, bases, and oils. Fluorosilicone and stainless steel-faced transducers available for severe, corrosive-type environments.	Unaffected by most acids, bases, and oils.
Construction	Dimensions	Cable Model	30 mm (1.181 in.) dia. x 1.5 mm-6g threaded housing x 94.95 mm (3.738 in.) long, including 34.70 mm (1.365 in.) dia. x 20.10 mm (0.790 in.) long sensing head
		Connector Model	30 mm (1.181 in.) dia x 1.5 mm-6g threaded housing x 117.35 mm (4.62 in.) long; With AC132 right-angle, M12 micro, connector/cable assembly: 117.15 mm (4.612 in.) long. With AC130 straight, M12 micro, connector/cable assembly: 125 mm (4.921 in.) long. Sensing head dimension same as cable model.
	Housing	Epoxy encapsulated to resist shock and vibration	
	Case	Ultem® plastic (FDA Approved) or SS303 stainless steel	
	Transducer Face	Silicone rubber, gray SS304 stainless steel, 0.051 mm (0.002 in.) thick ⁽¹⁾	
	Sensor Cables	Lead-free, black PVC jacketed	
	Agency Approvals	CE Mark	—
		CE conformity is declared to: EN63126: 1997 (annex A, industrial) including amendment A1:1998. EN55011 group 1 Class A.	

¹ Available only in the stainless-steel faced, 1 m range models.

Osisonic™ Ultrasonic Sensors

SM900 Series

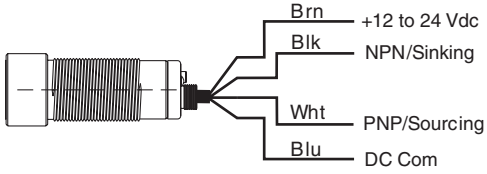
Wire Assignments—SM902

Electrical Wiring—SM902

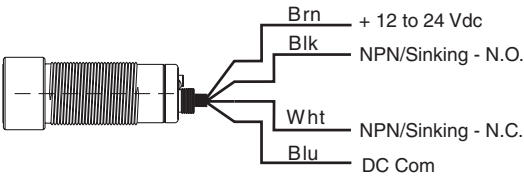
The sensor wires must be run in conduit free of any AC power or control wires.

Cable Model Wire Assignments

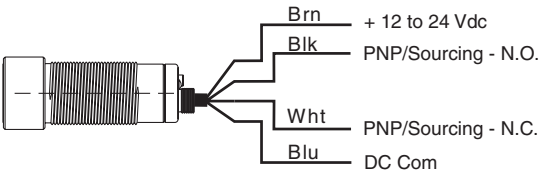
Sinking/Sourcing N.O./N.C.



Complementary Sinking

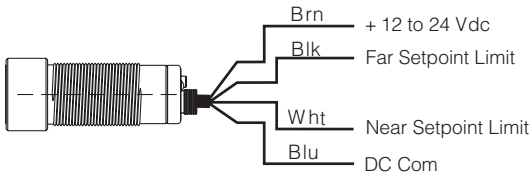


Complementary Sourcing



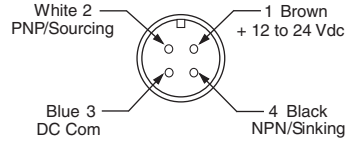
Dual Alarm Setpoint Outputs

NPN/Sinking - N.O./N.C., PNP/Sourcing - N.O./N.C.

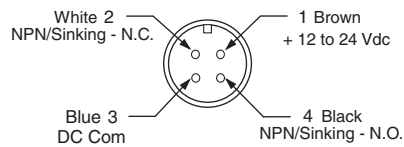


Connector Model Pin Assignments

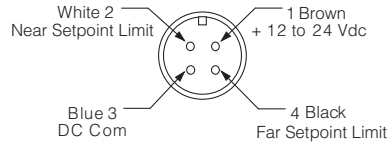
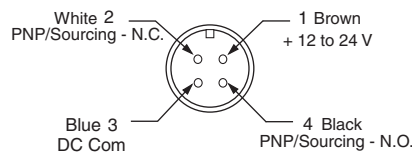
Sinking/Sourcing N.O./N.C.



Complementary Sinking

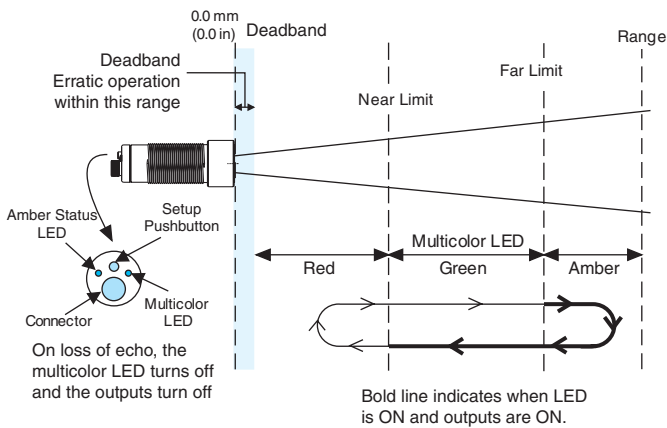


Complementary Sourcing

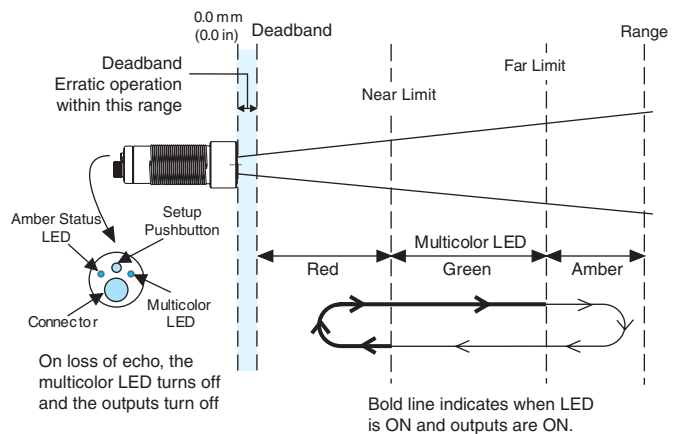


Sensor Operating Profiles—SM902

Pump-in Latch



Pump-out Latch



Continued on next page

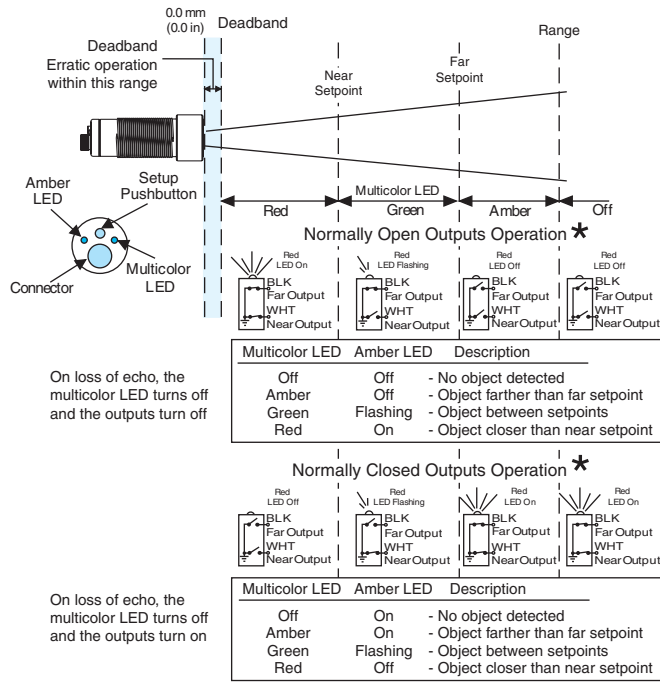
Osisonic™ Ultrasonic Sensors

SM900 Series

Operating Profiles—SM902

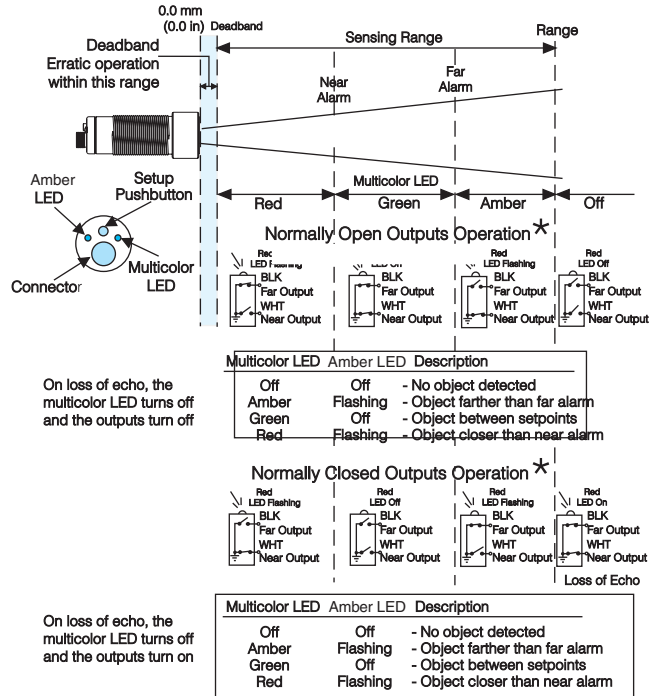
Sensor Operating Profiles—SM902 (continued)

Dual Setpoint



* = Illustrated are NPN/Sinking Outputs. PNP/Sourcing Outputs are also available.

Dual Alarm



* = Illustrated are NPN/Sinking Outputs. PNP/Sourcing Outputs are also available.

NPNs Pump Latch with N.O. Setpoint

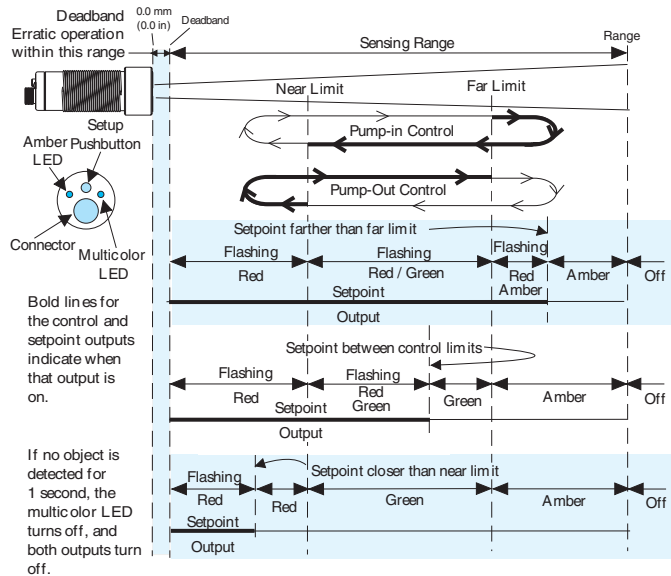


Diagram is for Pump Latch output with N.O. Setpoint. N.C. setpoint is also available

NPNs Pump Latch with N.O. Alarm

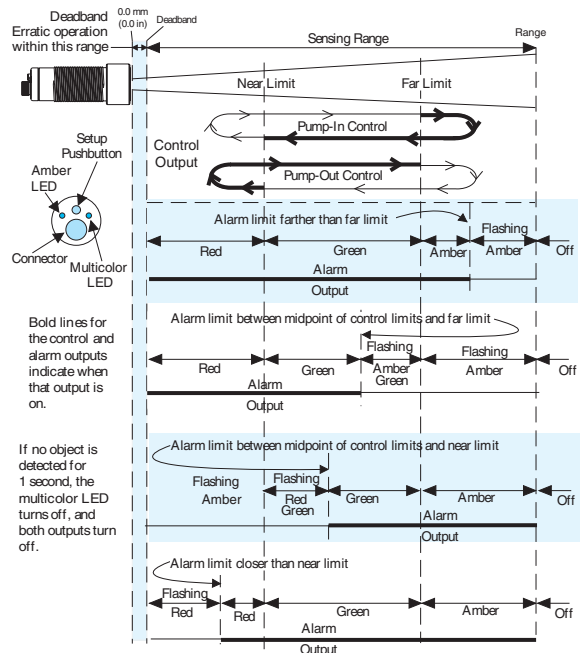


Diagram is for Pump Latch output with N.O. Alarm. N.C. alarm is also available

Ultrasonic

Osisonic™ Ultrasonic Sensors

SM900 Series

General Specifications—SM906

General Specifications—SM906

		1 and 2 m ranges	8 m, long range	
Sensing [TA = 20 °C (68 °F)]	Model Sensing Ranges	51 mm to 1 m (2.0 to 39 in.) 120 mm to 1 m (4.7 to 39 in.) ⁽¹⁾ 120 mm to 2 m (4.7 to 79 in.)	203 mm to 8 m (8.0 in. to 26 ft)	
	Sonic Frequency	200 kHz	75 kHz	
	Minimum Object-size Detection	1.59 mm (0.0625 in.) diameter rod up to 635 mm (26 in.) distance from sensor	50.8 mm (2.0 in.) diameter rod up to 4.572 m (15 ft) distance from the sensor	
	Maximum Angular Deviation	+ 10° on 305 mm x 305 mm (12 x 12 in.) flat target at a distance of 305 mm (12 in.)	+ 10° on a large flat surface at a distance of 6.096 m (20 ft) + 5° on a large flat surface at a distance of 8 m (26 ft)	
	Sonic Cone Profile	See Beam Plots		
	Limit Adjustment Resolution	0.08 mm (0.003 in.)	0.254 mm (0.01 in.)	
	Repeatability	+ 0.8716 mm (0.03431 in.) max. Temperature Compensated	Repeatability: + 2.54 mm (0.10 in.) max. Temperature Compensated	
Power Requirements	Supply Voltage	15 to 24 Vdc @ 80 mA, excluding output load	15 to 24 Vdc + 10%, excluding output load, regulated supply	
	Current Consumption	100 mA max., excluding load		
	Peak Inrush Current	0.5 A		
	Power Consumption	1.2 W max., excluding load		
Outputs	Output Range	0 to 10 Vdc or 4 to 20 mA, depending on model		
	Output Configuration	Inverse	0 to 10 Vdc or 4 to 20 mA	
		Direct	10 to 0 Vdc or 20 to 4 mA	
	Voltage Output Slope	33 mV/mm (0.833 V/inch) using a 305 mm (12 in.) span	3.28 mV/mm (83.3 mV/inch) using a 3.048 m (10 ft) span 1.64 mV/mm (41.7 mV/inch) using a 6.096 m (20 ft) span	
	Minimum Load Resistance	1 kΩ (5 kΩ recommended for best accuracy)		
	Current Output Slope:	52 μA/mm (1.33 mA/inch) using a 305 mm (12 in.) span	5.2 μA/mm (0.133 mA/inch) using a 3.048 m (10 ft) span 2.6 μA/mm (0.066 mA/inch) using a 6.096 m (20 ft) span	
Maximum Load Resistance	500 Ω (250 Ω recommended for best accuracy)	500 Ω		
Response Times	Minimum, standard Other response times are available	15 ms on/off, 25 ms on/off (1 m range models) 20 ms on/off, 35 ms on/off (2 m range models)	150 ms on/off, 250 ms on/off	
	Indicators	Multicolored LED (Amber, Red, Green) Red LED	Indicates object position relative to the span limits Intensity increases as output signal increases.	
Connection Options	Cable Style	24 AWG, foil shield, lead-free PVC jacketed, 4-conductor, 3 m (10 ft) long, standard		
	Connector Style	12 mm, 4-pole, male	4-conductor, straight and right-angle, micro style	
Protection	Note: This sensor is not rated explosion proof!	Power Supply	Current-limited overvoltage, ESD, reverse polarity	
		Outputs	Current-limited overvoltage, ESD, overcurrent	
Environment	Operating Temperature	Silicone-faced: 0 to 50 °C (32 to 122 °F) Stainless-steel faced: -20 to 50 °C (-4 to 122 °F)	-20 to 60 °C (-4 to 140 °F)	
	Storage Temperature	Silicone-faced: -40 to 100 °C (-40 to 212 °F) Stainless-steel faced: -50 to 80 °C (-58 to 176 °F)	-40 to 100 °C (-40 to 212 °F)	
	Operating Humidity	100%		
	Protection Ratings	NEMA Type 4X, IP67		
	Chemical Resistance	Unaffected by most acids, bases, and oils. Fluorosilicone and stainless steel-faced transducers available for severe, corrosive-type environments.	Unaffected by most acids, bases, and oils.	
Construction	Cable Model	30 mm (1.181 in.) dia. x 1.5 mm-6g threaded housing x 94.95 mm (3.738 in.) mm long, including 34.70 mm (1.365 in.) dia. x 20.10 mm (0.790 in.) long sensing head		
		30 mm (1.181 in.) dia. x 1.5 mm-6g threaded housing x 94.95 mm (3.738 in.) mm long, including 34.70 mm (1.365 in.) dia. x 20.10 mm (0.790 in.) long sensing head		
	Dimensions	Cable Model	30 mm (1.181 in.) dia x 1.5mm-6g threaded housing x 95.99 mm (3.779 in.) long. With AC 132 rightangle, M12 micro, connector/cable assembly: 117.15 mm (4.612 in.) long. With AC130 straight, M12 micro, connector/cable assembly: 125 mm (4.921 in.) long. Sensing head dimension same as cable model.	
		Connector Model	30 mm (1.181 in.) dia x 1.5 mm-6g threaded housing x 95.99 mm (3.779 in.) long. With AC132 right-angle, connector/cable assembly: 117.15 mm (4.612 in.) long. With AC130 straight, connector/cable assembly: 125.00 mm (4.921 in.) long. Sensing head dimension same as cable model.	
	Housing	Epoxy encapsulated to resist shock and vibration		
	Case	Ultem® plastic or SS303 stainless steel		
	Transducer Face	Silicone rubber, gray SS304 stainless steel, 0.051 mm (0.002 in.) thick ⁽¹⁾		
Sensor Cables	Lead-free, black PVC jacketed			
Agency Approvals	CE Mark	—	CE conformity is declared to: EN63126: 1997 (annex A, industrial) including amendment A1:1998. EN55011 group 1 Class A.	

¹ Available only in the stainless steel-faced, 1 m-span models.

Osisonic™ Ultrasonic Sensors

SM900 Series

Output Specifications and Wire Assignments—SM906

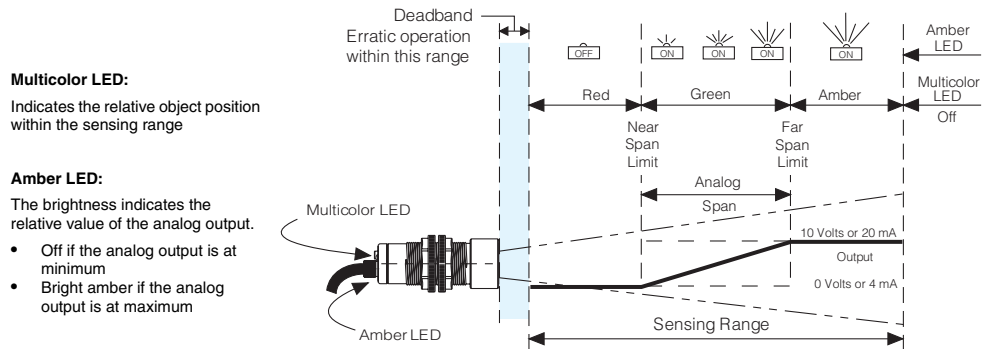
Analog Output Electrical Specifications—SM906

	1 and 2 m ranges		8 m, long range	
	Current output (1)	Voltage output (2)	Current output (1)	Voltage output (2)
Output Range	4-20 mA	0-10 V	4-20 mA	0-10 V
Load Resistance	10 to 500 Ω	1 kΩ to ∞	10 to 500 Ω	1 kΩ to ∞
Resolution (3)	4.88 μA	2.44 mVdc	4.88 μA	2.44 mVdc
Accuracy (% of span) (4)	+ 0.50	+ 0.40	+ 0.50	+ 0.40
Linearity (% of span)	+ 0.10	+ 0.10	+ 0.15	+ 0.15
Temperature Dependence (% of span/°C)	+ 0.006	+ 0.004	+ 0.006	+ 0.004
Test conditions	24 Vdc, TA = 20 °C, large flat target, still air, @ minimum span size of 304.8 mm or 12 in.)		24 Vdc, TA = 20 °C, large flat target, still air, @ minimum span size of 3.048 m or 10 ft)	

¹ Tested with 250 Ω load.
² Tested with 1000 Ω load; a low value is recommended to minimize noise pickup.
³ Resolution = span/4096. Maximum: 0.23 mm (0.009 in.) for 1 m model, max. span; 0.459 mm (0.018 in.) for 2 m model, max. span; 1.90 mm; (0.071 in.) for 8 m, long-range model, max. span
⁴ For 1 m and 2 m models: Best accuracy may be limited to 0.794 mm (0.03125 in.) due to wave-skip phenomena.
 For 8 m models: Best accuracy may be limited to 2.117 mm (0.083 in.) due to wave-skip phenomena.

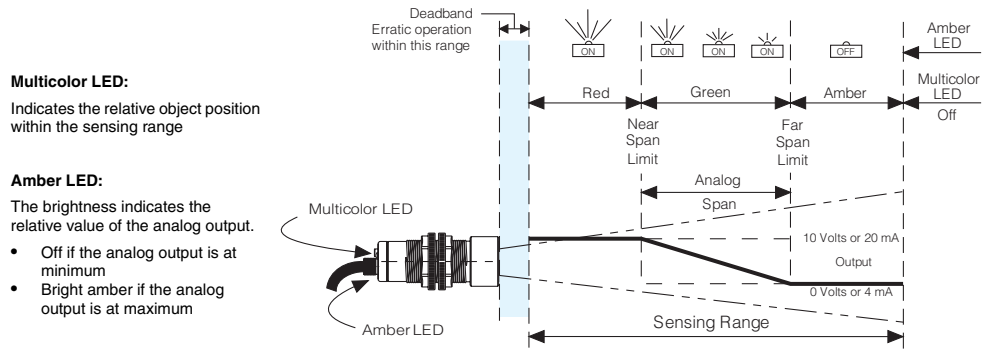
Inverse Proportional Output

The analog 0 to 10 Volt or 4 to 20 mA signal value decreases as the object moves closer to the near span limit.



Direct Proportional Output

The analog 10 to 0 Volt or 20 to 4 mA signal value increases as the object moves closer to the near span limit.



Multicolor LED Operation

- Red:** object sensed closer than the near span limit.
- Green:** object sensed at or between the near and far span limits.
- Amber:** object sensed beyond the far span limit.
- Off:** no object sensed within the full sensing range.

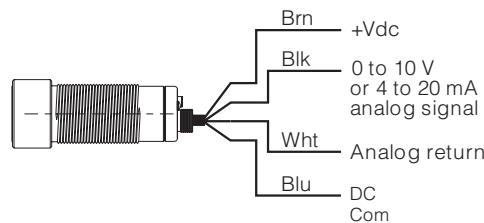
Amber LED Operation

The amber LED intensity varies directly with the magnitude of the analog output. The amber LED is off when the output is at the minimum and full brightness when the output is at the maximum.

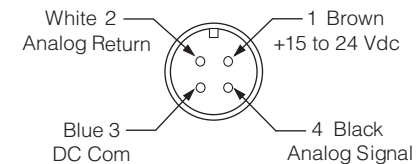
Electrical Wiring

The sensor wires must be run in conduit free of any AC power or control wires.

Cable Model Wire Assignments



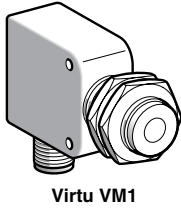
Connector Model Pin Assignments



Osisonic™ Ultrasonic Sensors

Virtu® Series

Features and Selection



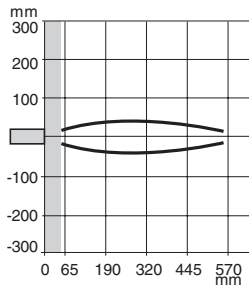
Features:

- Combination of dual-mount or barrel-style PNP or NPN output
- Plastic housing with durable glass epoxy sensing face
- Mounting nuts included
- Self-Teach removable cable offered separately
- Micro (M12) connector version

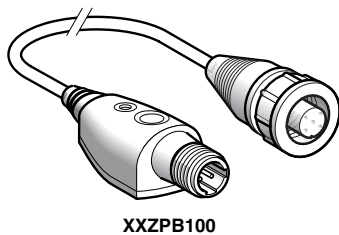
Specifications and Catalog Numbers—Virtu VM1 and VM18



Sensing Characteristics																							
Range	51–508 mm (2–20 in.)																						
Frequency	300 kHz																						
Power Requirements (Supply)																							
Voltage	12–24 Vdc																						
Current	40 mA (excluding load)																						
Environmental Ratings																							
Operating Temperature	-30 to 70 °C (-22 to 158 °F)																						
Environment	NEMA Type 4X, IP67																						
Construction																							
Barrel, ØxL	18 x 77.62 mm (0.70 x 3.06 in.)																						
Flat Profile, wxhxd	43.7 x 18 x 59.7 mm (1.72 x 0.70 x 2.35 in.)																						
Housing	Valox® Plastic																						
Transducer	Glass Epoxy																						
Catalog Numbers																							
	<table border="1"> <thead> <tr> <th>Output</th> <th>Cable</th> <th colspan="2">Quick Disconnect</th> </tr> </thead> <tbody> <tr> <td rowspan="2">PNP Sourcing</td> <td>N.O.</td> <td>VM1PNO</td> <td>VM1PNOQ</td> <td>VM18PNOQ</td> </tr> <tr> <td>N.C.</td> <td>VM1PNC</td> <td>VM1PNCQ</td> <td>VM18PNCQ</td> </tr> <tr> <td rowspan="2">NPN Sinking</td> <td>N.O.</td> <td>VM1NNO</td> <td>VM1NNOQ</td> <td>VM18NNOQ</td> </tr> <tr> <td>N.C.</td> <td>VM1NNC</td> <td>VM1NNCQ</td> <td>VM18NNCQ</td> </tr> </tbody> </table>	Output	Cable	Quick Disconnect		PNP Sourcing	N.O.	VM1PNO	VM1PNOQ	VM18PNOQ	N.C.	VM1PNC	VM1PNCQ	VM18PNCQ	NPN Sinking	N.O.	VM1NNO	VM1NNOQ	VM18NNOQ	N.C.	VM1NNC	VM1NNCQ	VM18NNCQ
Output	Cable	Quick Disconnect																					
PNP Sourcing	N.O.	VM1PNO	VM1PNOQ	VM18PNOQ																			
	N.C.	VM1PNC	VM1PNCQ	VM18PNCQ																			
NPN Sinking	N.O.	VM1NNO	VM1NNOQ	VM18NNOQ																			
	N.C.	VM1NNC	VM1NNCQ	VM18NNCQ																			



Ultrasonic



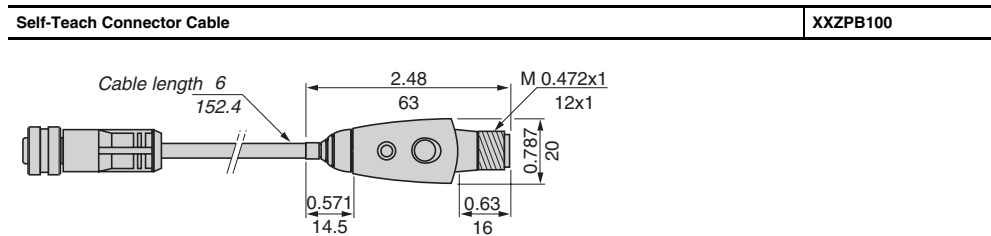
Self-Teach Connector Cable (XXZPB100)—6 in. length

Description

Connector cable, 6 in. (152 mm) long, with a male M12 connector, a female M12 connector, and a push button module for customizing performance of the Virtu VM1 and VM18 ultrasonic sensor.

Operation

With the self-teach cable connected between the sensor and the standard connector cable, push the button at each sensing point to teach the sensing range. The sensor can be set using one sensing point, or can provide foreground and background suppression to create a sensing window.

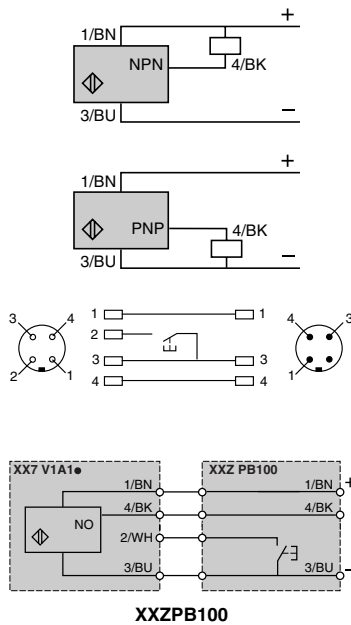


Osisonic™ Ultrasonic Sensors

Virtu® Series

Specifications and Accessories

Wiring



Specifications

	VM1	VM18
Mechanical		
Sensing Range	2–20 in. (51–508 mm)	
Ultrasonic Cone Angle (see beam plot)	10°	
Maximum Angular Deviation	±10°	
Temperature range	+32 to 122 °F (0 to 50 °C)	
Humidity	100%	
Enclosure rating	NEMA Type	4X
	CENELEC	IP 67 conforming to IEC 60529
Hysteresis	0.013 in. (0.35 mm)	
Vibration	7 G amplitude + 1 mm (f =10 to 55 Hz)	
Shock resistance	30 G for 11 ms (conforming to 68-2-27)	
Repeat Accuracy	±0.027 in. (0.7 mm)	
Wiring	22 AWG	
Minimum size detection	0.06 in. (1.5 mm) dia. rod	2.5 in. (63.5 mm) dia. rod
Enclosure material	Case	Ultem® Plastic
	Sensing Face	Glass epoxy
Electrical		
Voltage Rating	12–24 Vdc	
Voltage Limits (including ripple)	10–28 Vdc	
Voltage Drop (across switch, closed state)	1 V (PNP or NPN)	
Max. Load Current	100 mA	
Residual Current (open state)	0.5 uA max.	
Current Consumption, No Load	60 mA	40 mA
LED Indicators	No LED	
Power-up delay (max.)	350 ms	100 ms
On delay (max.)	3 ms	10 ms
Off delay (max.)	3 ms	10 ms
Ultrasonic Frequency	500 kHz	300 kHz
Protective Circuitry	Electrostatic	Yes
	Overvoltage	Yes
	Reverse polarity	Yes
Agency Listings	IEC 60947-5-2, UL508, CSA C22-2	

Accessories

Description	Catalog Number
Flush mount plastic mounting bracket	XSZB118
90° metal mounting bracket	9006PA118
Plastic mounting nuts	XSZE118
Micro (M12) Connector Cables	
Micro Connector, 4 pin, 2 m (6.6 ft), straight	XSZCD101Y
Micro Connector, 4 pin, 2 m (6.6 ft), 90°	XSZCD111Y
Micro Connector, 4 pin, 5 m (16.4 ft), straight	XXZAC130

For additional cable options and lengths, see page 368.

Osisonic™ Ultrasonic Sensors

Virtu® Series

General Specifications—VM1 and VM18

General Specifications—Virtu VM1 and VM18

Sensing [TA = 20 °C (68 °F)]	Sensing Range:		50 to 508 mm (2 to 20 in.), large flat objects
	Sonic Frequency		300 kHz
	Minimum-size Detection		2.5 mm (0.098 in.) diameter rod or 1.0 mm (.039 in.) bar at a distance of 200 mm (8 in.) <i>NOTE: Smaller object may not be detected at closer distances</i>
	Maximum Angular Deviation		± 5° on a 100 x 100 mm (4 x 4 in.) flat target at a distance of 508 mm (20 in.)
	Sonic Cone Profile		See beam plot
	Limit Position Accuracy		± 1.6 mm (0.062 in.) max.
	Repeatability		± 0.7 mm (0.027 in.) or better
Power Requirements	Supply Voltage		12 to 24 Vdc ± 10%, regulated supply
	Current Consumption		40 mA max. (excluding load)
	Power Consumption		1.0 W max. (excluding load)
Output	Sinking Output (NPN Model VM1-NXX)	Maximum on-state voltage	0.75 V @ 100 mA
		Maximum load current	100 mA
		Maximum applied voltage	30 Vdc
	Sourcing Output (PNP Model VM1-PXX)	Maximum on-state voltage drop	1.10 V @ 100 mA
		Maximum load current	100 mA
	Output voltage		V _{Supply} - 1.10 V @ 100 mA
Input	Teach Setup		Contact Closure (push-button) to common. Internal 115KW pull-up to 5V
	Voltage Range	Setup Input Active	0 to 1 V
		Setup Input Inactive	2.5 to 5 V
		Max Voltage without Damage	-30 to 30 V
Response Time		15.0 ms on/ 15.0 ms off max	
Indicators <i>(Green and Amber LEDs are never illuminated simultaneously)</i>	Green LED		Illuminated if output is off
	Amber LED		Illuminated if output is on
Connections	Cable models		24 AWG, foil shield, lead-free, PVC jacket, 4-conductor, 3 m (10 ft) long
	Connector models		12 mm, circular 4-pole, male micro connector
Protection	Power Supply		Current-limited over-voltage, ESD, reverse polarity
	Output		Current-limited over-voltage, ESD, reverse polarity
	Input		Current-limited over-voltage, ESD, reverse polarity
Environment	Operating Temperature		-30 to 70 °C (-22 to 152 °F)
	Storage Temperature		-40 to 85 °C (-40 to 185 °F)
	Operating Humidity		100% non-condensing
	Protection Ratings		NEMA Type 4X, IP67
	Chemical Resistance		Resists most acids and bases, including most food products

Osisonic™ Ultrasonic Sensors

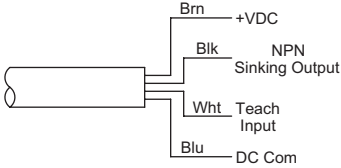
Virtu® Series

Wire Assignments, Operating Profiles, and Dimensions—VM1 and VM18

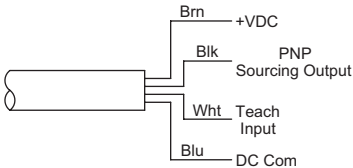
Electrical Wiring

The sensor cable must be run in conduit, free of any AC power or control wires.

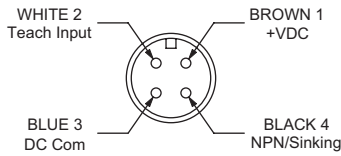
NPN Cable Style Wire (dual-mount model only)



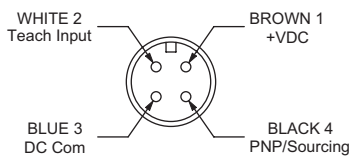
PNP Cable Style Wire (dual-mount model only)



NPN Discrete Micro Connector Style



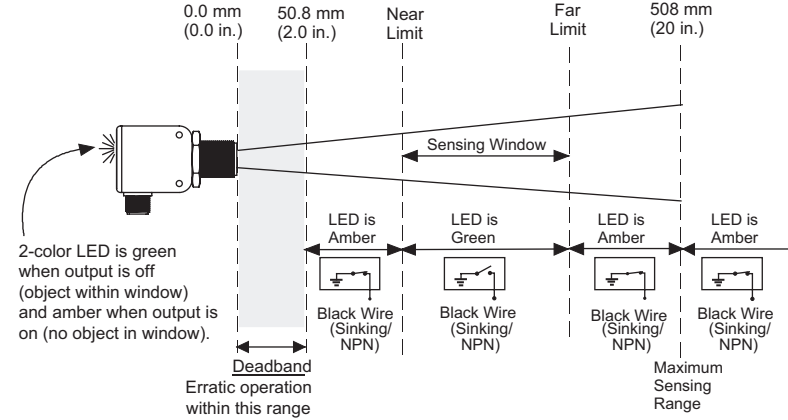
PNP Discrete Micro Connector Style



Output Type

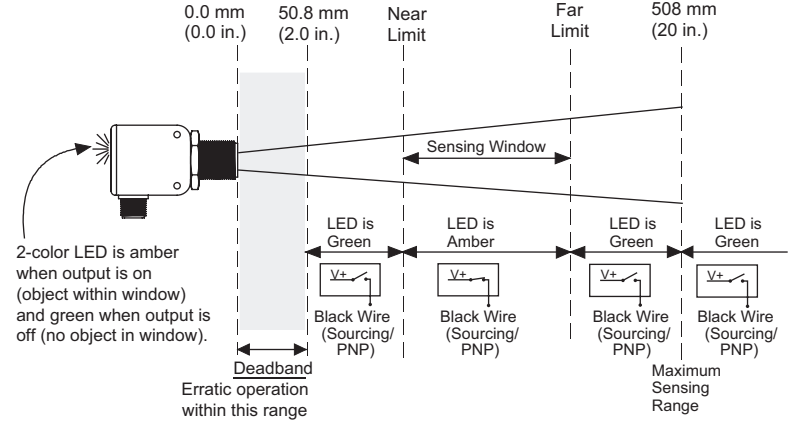
NPN - Normally Closed Output

The sensing window is determined by a teachable near and far limit, which can be set anywhere between the deadband (50.8 mm / 2.0 in.) and the maximum sensing range (508 mm / 20 in.). The sensing window is taught using either an inline pushbutton switch or by grounding the teach wire.



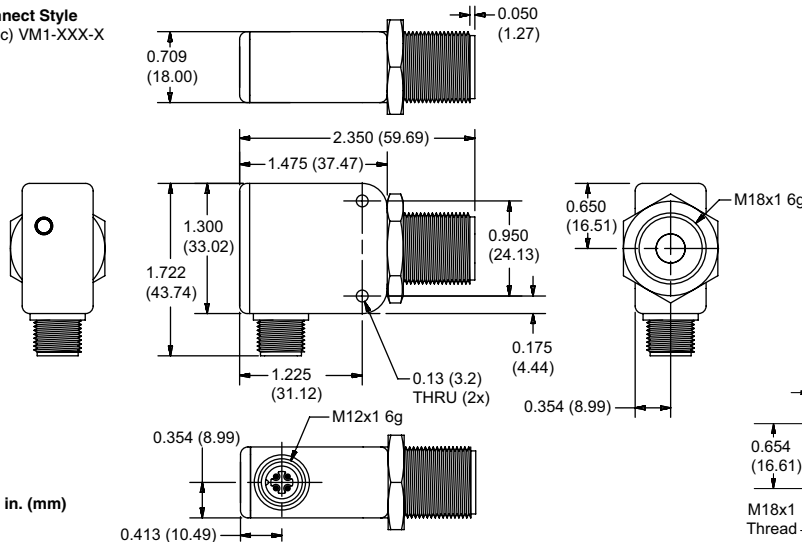
PNP - Normally Open Output

The sensing window is determined by a teachable near and far limit, which can be set anywhere between the deadband (50.8 mm / 2.0 in.) and the maximum sensing range (508 mm / 20 in.). The sensing window is taught using either an inline pushbutton switch or by grounding the teach wire.

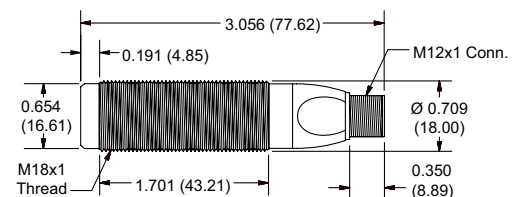


Dimensions

Quick Disconnect Style (Valox® Plastic) VM1-XXX-X



18 mm Barrel Style (Valox® Plastic) VM18-XXX-X



Dimensions: in. (mm)

Limit Switches

Catalog
September

07

File 9007 / XC



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Square D
Telemecanique

Schneider
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Building a New Electric World

Limit Switches

Selection Guide

Osiswitch® Universal

Design	Miniature		Compact	
				
Catalog number	XCMD	XCKD	XCKP	XCKT
Enclosure	Metal		Plastic, double insulated	
Features	Mounting by the body or by the head			
Modularity	Head, body and connection modularity			Head and body modularity
GENELEC conformity	—	EN 50047	EN 50047 compatible	
Body dimensions (w x h x d), mm (in.)	30 x 50 x 16 (1.18 x 1.97 x 0.63)	31 x 65 x 30 (1.22 x 2.56 x 1.18)	58 x 51 x 30 (2.28 x 2.01 x 1.18)	
Head	Linear movement (plunger) Rotary movement (lever) Rotary movement, multi-directional Same heads for ranges XCMD, XCKD, XCKP and XCKT			
Contact blocks	2 snap action contacts with positive opening operation	N/C + N/O; N/C + N/C		N/C + N/O
	3 snap action contacts with positive opening operation	N/C + N/C + N/O	N/C + N/C + N/O; N/C + N/O + N/O	
	4 snap action contacts with positive opening operation	N/C + N/C + N/O + N/O	—	
	2 slow break contacts with positive opening operation	N/C + N/O break before make	N/C + N/O break before make; N/O + N/C make before break; N/C + N/C simultaneous	
	2 slow break contacts	—	N/O + N/O simultaneous	
Insulation voltage (Ui) / thermal current (Ithe)	Pre-cabled 2 contacts: 400 V/6 A 3 contacts: 400 V/4 A 4 contacts: 400 V/3 A	Screw terminal 2 contacts: 500 V/10 A 3 contacts: 400 V/6 A		Screw terminal 2 contacts: 500 V/10 A
	Connector	Integral M12, 4-pin: 250 V/3 A Integral M12, 5-pin: 60 V/4 A Remote 7/8" 16UN: 250 V/6 A	Integral M12, 5-pin: 60 V/4 A	Integral M12, 4-pin: 250 V/3 A
Degree of protection	NEMA Types 1, 2, 4X, 6, 12 IP 66, IP 67, IP 68, IK 06	NEMA Types 1, 2, 4, 6, 12, 13 IP 66, IP 67, IK 06	NEMA Types 1, 2, 4, 6, 6P, 12, 13 IP 66, IP 67, IK 04	NEMA Types 1, 2, 4, 6, 12, 13 IP 66, IP 67, IK 04
Connection	Screw terminals	—	1 entry for ISO M16 or M20, PG 11, PG 13 conduit thread or 1/2" NPT, PF 1/2	
	Pre-cabled	Integral: No Remote: Yes	—	
	Connector	Integral or remote M12 or remote 7/8" 16UN	Integral M12	
Page	430	442 and 446	448 and 452	454

Limit Switches

Selection Guide

Osiswitch® Optimum and Application

Design	Miniature Optimum	Compact Application: with manual reset		
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Catalog number		XCMN	XCDR	X CPR	XCTR
Enclosure		Plastic, double insulated	Metal	Plastic, double insulated	
Features		Mounting by the body or by the head	Mounting by the body		
Modularity		—			
CENELEC conformity		—			
Body dimensions (w x h x d), mm (in.)		30 x 50 x 16 (1.18 x 1.97 x 0.63)	31 x 65 x 30 (1.22 x 2.56 x 1.18)		58 x 51 x 30 (2.28 x 2.01 x 1.18)
Head		Linear movement (plunger) Rotary movement (lever) Rotary movement, multi-directional	Linear movement (plunger) Rotary movement (lever) Same heads for ranges XCDR, X CPR and XCTR		
Contact blocks	2 snap action contacts with positive opening operation	N/C + N/O			
	3 snap action contacts with positive opening operation	—			
	4 snap action contacts with positive opening operation	—			
	2 slow break contacts with positive opening operation	—	N/C + N/O break before make		
	2 slow break contacts	—			
Insulation voltage (Ui) / thermal current (Ithe)		Screw terminal 2 contacts: 400 V/6 A	Screw terminal 2 contacts: 500 V/10 A		
	Connector	—			
Degree of protection		NEMA Types 1, 2, 13 IP 65, IK 04	IP 66, IP 67, IK 04		
Connection	Screw terminals	—	1 entry for ISO M20 or PG 13 conduit thread or 1/2" NPT	2 entries for ISO M16 or PG 11 conduit thread or 1/2" NPT (using adapter)	
	Pre-cabled	Yes	—		
	Connector	—			
Page		438	462	464	466

Limit Switches

Selection Guide

Osiswitch® Classic

Design	Classic		
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Catalog number	XCKM	XCKL	XCKJ
Enclosure	Metal		
Features	3 conduit entries		Fixed or plug-in body, -40 °C (-40 °F) or +120 °C (+248 °F) versions
Modularity	Head + Body + Operator		
CENELEC or DIN conformity	—		EN 50041
Body dimensions (w x h x d), mm (in.)	63 x 64 x 30 (2.48 x 2.52 x 1.18)	52 x 72 x 30 (2.05 x 2.83 x 1.18)	40 x 77 x 44 (1.57 x 3.03 x 1.73) 42.5 x 84 x 36 (1.67 x 3.31 x 1.42)
Head	Linear movement (plunger) Rotary movement (lever) Rotary movement, multi-directional		
Contact blocks	2 snap action contacts with positive opening operation	N/C + N/O; N/C + N/C	N/C + N/O
	3 snap action contacts with positive opening operation	N/C + N/C + N/O; N/C + N/O + N/O	
	C/O snap action contacts	—	
	C/O slow break contacts	—	
	2 slow break contacts with positive opening operation	N/C + N/O break before make N/O + N/C make before break N/C + N/C simultaneous	
2 slow break contacts	N/O + N/O simultaneous		
3 slow break contacts with positive opening operation	N/C + N/C + N/O break before make; N/C + N/O + N/O break before make		
Insulation voltage (Ui) / thermal current (Ithe)	Screw terminal 2 contacts: 500 V/10 A 3 contacts: 400 V/6 A		—
	—		Connector Integral M12, 5-pin: 60 V/4 A Integral 7/8" 16UN: 250 V/6 A
Degree of protection	NEMA Types 1, 2, 4, 6, 6P, 12, 13 IP 66, IK 06		NEMA Types 1, 2, 4, 12 IP 66 IK 07
Connection	Screw terminals (cable entry)	3 entries for ISO M20 or PG 11 conduit thread or 1/2" NPT	1 entry for ISO M20 or PG 13 conduit thread or 1/2" NPT
	Connector	—	
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Limit Switches

Selection Guide

Osiswitch® Classic, Application, and Miniature Snap Switches

Design	Classic	Application: for installations requiring electrical redundancy	Application: for lifting and materials handling equipment or very severe applications	Sub-miniature, miniature: applications requiring high precision and a low operating force
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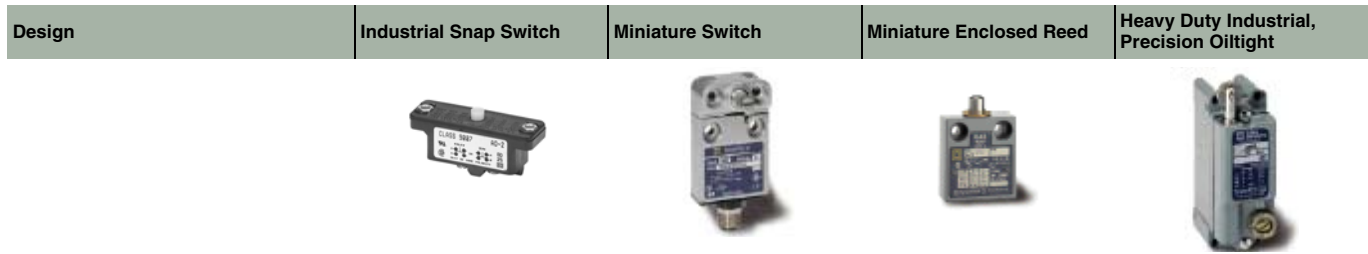


Catalog number	XCKS	XCKML	XCR, XC1AC	XEP, XCO	
Enclosure	Plastic, double insulated	Metal	Metal or polyester	Plastic	
Features	—	2 sets of contacts	—	Depending on type	
Modularity	Head + Body + Operator		Fixed composition	Depending on type, fixed composition or contact and operator	
CENELEC or DIN conformity	EN 50041	—	—	—	
Body dimensions (w x h x d), mm (in.)	40 x 72.5 x 36 (1.57 x 2.85 x 1.42)	72 x 81 x 36 (2.83 x 3.19 x 1.42)	Depending on type	DIN 41635, depending on type	
Head	Linear movement (plunger) Rotary movement (lever) Rotary movement, multi-directional	Linear movement (plunger) Rotary movement (lever)	—	Linear movement (plunger)	
Contact blocks	2 snap action contacts with positive opening operation	N/C + N/O; N/C + N/C	2 x N/C + N/O contact blocks	Depending on type	
	3 snap action contacts with positive opening operation	N/C + N/C + N/O; N/C + N/O + N/O	—	—	
	C/O snap action contacts	2 C/O	—	Depending on type	1 single-pole contact
	C/O slow break contacts	—	—	Depending on type	—
	2 slow break contacts with positive opening operation	N/C + N/O break before make N/O + N/C make before break N/C + N/C simultaneous	2 x N/C + N/O break before make contact blocks	Depending on type	—
	2 slow break contacts	N/O + N/O simultaneous	—	—	—
Insulation voltage (Ui) / thermal current (Ithe)	Screw terminal 2 contacts: 500 V/10 A 3 contacts: 400 V/6 A	—	Screw terminal 2 contacts: 500 V/10 A	Depending on type	
	—	—	—	—	
Degree of protection	IP 65 IK 03	NEMA Types: 1, 2, 4, 6, 6P, 12, 13 IP 66 IK 06	Depending on type: IP 66, IK 05; IP 65, IK 05; or IP 54, IK 05	Depending on type	
Connection	Screw terminals (cable entry)	1 entry for ISO M20 or PG 13 conduit thread	3 entries for ISO M20 or PG 13 conduit thread; or PG 13 to 1/2" NPT with adapter	Depending on type: 1 or 3 entries for ISO M20 or PG 13 conduit thread	
	Connector	—	—	Depending on type: by tags or pre-wired	
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Limit Switches

Selection Guide

Class 9007 Industrial Snap Switches and Miniature Industrial Switches



Catalog Number Prefix	9007A 9007C	9007MS 9007ML	9007XA	9007AW
Description	Industrial snap switches with or without operators	Miniature enclosed switches, potted and pre-wired with cable. Unique rotary head. 9007 ML has double break contacts.	Miniature enclosed switches, potted and pre-wired with cable. Reed contacts for superior low-energy switching.	Precision oil tight enclosed switches with unique features, micrometer adjustable and low temperature operation.
Enclosure Material	Plastic	Metal bodies, metal head	Metal bodies, metal head	Metal bodies, metal heads
Enclosure Rating	None	NEMA: Types 1, 2, 4, 6, 6P, 12, 13 IEC: IP67	NEMA: Types 1, 2, 4, 6, 6P, 12, 13	NEMA: Types 1, 2, 4, 6, 6P, 12, 13
Approximate Body Dimensions, mm (in.)	29.0 x 63.5 x 21.0 (1.14 x 2.5 x 0.83)	40.1 x 44.4 x 15.8 (1.58 x 1.75 x 0.62)	40.1 x 44.2 x 16.0 (1.58 x 1.74 x 0.63)	36.6 x 98.5 x 63.5 (1.44 x 3.88 x 2.5)
Heads	Linear	Linear or Rotary	Linear or Rotary	Linear or Rotary
Contact Blocks				
N.C. + N.O. snap action	X	X	N.O. or N.C.	X
N.C. + N.O. break before make, slow break				
N.O. + N.C. make before break, slow break				
N.C. + N.C. simultaneous, slow break				
N.O. + N.O. simultaneous, slow break				
C/O snap action				
C/O slow break				
N.C. + N.C. 2-step, slow break				
N.O. + N.O. 2-step, slow break				
N.C. + N.C. snap action				
N.O. + N.C. slow make, slow break				
Cabling		Pre-wired cable, M12 Connector option available.	Pre-wired cable.	
Temperature Range	-65 to +221 °F (-54 to +105 °C)	-40 to +221 °F (-40 to +105 °C)	-20 to +140 °F (-29 to +60 °C)	0 to +185 °F (-17.8 to 85 °C) Lever operated: -65 to +185 °F (-54 to 85 °C)
Additional Features	A variety of operators are available, page 536	Bottom or side cable entry. Full range of operating heads, page 540.	Bottom cable entry. Three common operating heads, page 544.	Most common operating heads. Micrometer adjustable push rod plunger. Uses 9007C levers, page 574.

Limit Switches

Selection Guide

Class 9007 Type C Heavy Duty Industrial

Applications	Material handling—mechanical conveying, automotive, machine tool, packaging			Hazardous application locations: gases (explosion), dust environment.
Design	Standard body type 9007C****	Standard body reed contacts	Compact body type 9007C52**	Hazardous location body type 9007CR****



Catalog number	9007C54*** 9007C62*** 9007C68*** 9007C66***	9007C84*** 9007C86***	9007C52**	9007CR53** 9007CR61** 9007CR65** 9007CR67**																			
Enclosure	Metal, diecast, zinc alloy																						
Features	Plug-in body			Non-plug-in body																			
Factory modifications (Forms)	See pages 560 to 564																						
Modularity	Head + body + lever																						
Conforming to standards	NEMA 250, EN 60947-1, EN 60947-5-1, IEC 60947, UL 508, C22-2-14-95, CE conformity documentation			NEMA 250, EN 60947-1, EN 60947-5-1, IEC 60947, UL 508, C22-2-14-95, CE conformity documentation																			
Product certifications	UL, CSA, CE																						
Body dimensions (w x h x d), mm (in.) with rotary head	39 x 102 x 45 (1.54 x 4.02 x 1.77)		39 x 80 x 45 (1.54 x 3.15 x 1.77)	69 x 156 x 53 (2.72 x 6.14 x 2.10)																			
Head	Linear movement (plunger) Rotary movement (lever) Multi-directional movement (wobble stick, cat whisker)																						
Contact blocks	<table border="1"> <tr> <td>9007C54***</td> <td>1 N.O. + 1 N.C.</td> <td rowspan="4">Reed contacts 1 N.O. or 1 N.C.</td> <td rowspan="4">1 N.O. + 1 N.C.</td> <td>9007CR53**</td> <td>1 N.O. + 1 N.C.</td> </tr> <tr> <td>9007C62***</td> <td>2 N.O. + 2 N.C.</td> <td>9007CR61**</td> <td>2 N.O. + 2 N.C.</td> </tr> <tr> <td>9007C68***</td> <td>2 N.O. + 2 N.C. neutral position</td> <td>9007CR65**</td> <td>2 N.O. + 2 N.C. neutral position</td> </tr> <tr> <td>9007C66***</td> <td>2 N.O. + 2 N.C. two stage</td> <td>9007CR67**</td> <td>2 N.O. + 2 N.C. two stage</td> </tr> </table>	9007C54***	1 N.O. + 1 N.C.	Reed contacts 1 N.O. or 1 N.C.	1 N.O. + 1 N.C.	9007CR53**	1 N.O. + 1 N.C.	9007C62***	2 N.O. + 2 N.C.	9007CR61**	2 N.O. + 2 N.C.	9007C68***	2 N.O. + 2 N.C. neutral position	9007CR65**	2 N.O. + 2 N.C. neutral position	9007C66***	2 N.O. + 2 N.C. two stage	9007CR67**	2 N.O. + 2 N.C. two stage	Direct opening (positive opening)		9007C**** Y1561 (→) Plunger and lever heads only Single pole only	9007CR**** Y1561 (→) Single pole only
	9007C54***	1 N.O. + 1 N.C.	Reed contacts 1 N.O. or 1 N.C.			1 N.O. + 1 N.C.	9007CR53**	1 N.O. + 1 N.C.															
9007C62***	2 N.O. + 2 N.C.	9007CR61**					2 N.O. + 2 N.C.																
9007C68***	2 N.O. + 2 N.C. neutral position	9007CR65**					2 N.O. + 2 N.C. neutral position																
9007C66***	2 N.O. + 2 N.C. two stage	9007CR67**		2 N.O. + 2 N.C. two stage																			
Rated insulation voltage	600 V		—	600 V Except: 9007CR63, 9007CR65, 9007CR67 (Ui = 250 V)																			
Insulation voltage (Ui)—top half of body	600 V Except: 9007CO62, 9007CO66, 9007CO68 (Ui = 250 V) and 9007C84, 9007C86 (Ui = 125 V)		600 V	600 V Except: 9007CR63, 9007CR65, 9007CR67 (Ui = 250 V)																			
Thermal current (Ithe)—top half of body	10 A Excepted: 9007CO84, 9007CO86 (2.5 A)		10 A	10 A																			
Degree of protection	IP 67 conforming to IEC 60529, NEMA Types 2, 4, 6, 6P, 12, 13		IP 67 conforming to IEC 60529 NEMA Types 2, 4, 6, 6P, 12, 13,	NEMA Types 2, 4, 6P, 7, 9, 13																			
Connection (1)	Cable entry or connector Depending on model: 1/2"-14 NPT, M20 x 1.5 ISO cable entry, 5-pin mini connector.		Cable entry or connector Depending on model: 1/2"-14 NPT, M20 X 1.5 ISO cable entry, 5 pin mini connector.	Cable entry or connector Depending on model: 1/2"-14 NPT, M20 X 1.5 ISO cable entry, 3/4 14 NPT available.																			
Page	548		556	582																			

1. A wide range of connectors are available. Contact your local field office.

Limit Switches

Selection Guide

Severe Duty Mill and Foundry Switches

Applications	Mill	Mill	Mill	Mill
Design	9007T Convertible sequence	L100 Fixed sequence	L14 Single Cable Pulls Fixed sequence	L525 Belt Conveyor Fixed sequence



Catalog number	9007T***	L100***	L14	L525
Enclosure	Metal	Metal	Metal	Metal
Features	Extra heavy duty contact ratings	Extra heavy duty contact ratings	Extra heavy duty contact ratings	Extra heavy duty contact ratings
Factory modifications (Forms)	Page 605	Page 621	Page 621	Page 621
Conforming to standards	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508
Product certifications	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified
Body dimensions (w x h x d), mm (in.) surface mounting	58.7 x 114.3 x 64.5 (2.31 x 4.5 x 2.54)	58.7 x 126 x 53.3 (2.31 x 4.95 x 2.10)	58.7 x 126 x 53.3 (2.31 x 4.95 x 2.10)	58.7 x 126 x 53.3 (2.31 x 4.95 x 2.10)
Head	Rotary movement (lever)	Rotary movement (lever)	Rotary movement (lever) (3)	Rotary movement (lever) (3)
Contact blocks	1 N.C. + 1 N.O.	1 N.C. + 1 N.O.	1 N.C. + 1 N.O.	1 N.C. + 1 N.O.
Rated insulation voltage	600 V	600 V	600 V	600 V
Thermal current (Ithe)	20 A ac/dc	20 A ac, 5 A dc	20 A ac, 5 A dc	20 A ac, 5 A dc
Degree of protection	NEMA Types 1, 2, 4, 12, 13 IP65, 66, 67	NEMA Types 1, 4, 13 IP65, 66	NEMA Types 1, 4, 13 IP65, 66	NEMA Types 1, 4, 13 IP65, 66
Connection (2)	Cable entry or connector 1/2" NPT (metric available)	Cable entry or connector 1/2" NPT (metric available)	Cable entry or connector 1/2" NPT (metric available)	Cable entry or connector 1/2" NPT (metric available)
Presentation, Applications and Characteristics	Page 600	Page 612	Page 616	Page 617
Interpretation of Catalog Numbers	Page 623	Page 623	Page 623	Page 623

1. For other contact options see page 600.
2. A wide range of connectors are available. Contact your local field office.
3. Lever arms are optional and must be ordered separately.

Limit Switches

Selection Guide

Severe Duty Mill and Foundry Switches

Applications	Foundry	Foundry	Mill and Foundry
Design	9007FT Convertible sequence	L300 Fixed sequence	L2153 Dual Pull Stop Fixed sequence



Catalog number	9007FT**	L300***	L2153
Enclosure	Metal	Metal	Metal
Features	Designed specifically for rough foundry applications	Designed specifically for rough foundry applications	Extra heavy duty contact ratings
Factory modifications (Forms)	Page 605	Page 621	Page 621
Conforming to standards	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508
Product certifications	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified
Body dimensions (w x h x d), mm (in.) surface mounting	58.7 x 114.3 x 86.6 (2.31 x 4.5 x 3.41)	58.7 x 126 x 53.3 (2.31 x 4.95 x 2.10)	58.7 x 126 x 53.3 (2.31 x 4.95 x 2.10)
Head	Rotary movement (lever)	Rotary movement (lever)	Rotary movement (lever) (2)
Contact blocks	1 N.C. + 1 N.O.	1 N.C. + 1 N.O.	1 N.C. + 1 N.O.
Snap action contacts ♦ Sequences	Convertible	Fixed	Fixed
Rated insulation voltage	600 V	600 V	600 V
Thermal current (Ithe)	20 A ac/dc	20 A ac, 5 A dc	20 A ac, 5 A dc
Degree of protection	NEMA Types 1, 2, 4, 12, 13 IP65, 66, 67	NEMA Types 1, 4, 13 IP65, 66	NEMA Types 1, 4, 13 IP65, 66
Connection (1)	Cable entry or connector 1/2" NPT (metric available)	Cable entry or connector 1/2" NPT (metric available)	Cable entry or connector 1/2" NPT (metric available)
Presentation, Applications and Characteristics	Page 602	Page 614	Page 616
Interpretation of Catalog Numbers	Page 623	Page 623	Page 623

1. A wide range of connectors are available. Contact your local field office.
2. Lever arms are optional and must be ordered separately.

Limit Switches Selection Guide Applications by Market Segment

Crane and Hoist

- Overhead Cranes
- Transport Systems

Mill and Foundry

- Iron and Steel
- Cement and Glass

Process Machinery

- Machine Tools
- Plastic, Rubber, Molding
- Printing
- Textile
- Pulp, Paper, Wood

Material Handling

- Conveyance
- Carousels
- Automatic Storage/Retrieval

Packaging Machinery

- Packaging Machines
- Shrink Wrap

Food and Beverage Machinery

- Bottling
- Canning

Simple Machines

- Transportation Wash
- Light Handling
- Assembly Stations
- General Purpose

Electric Lifts

- Lifting Platforms
- Elevators
- Escalators

NOTE: Special electrical options available for:

- Low current switching for programmable controllers
- Hazardous locations



XCKP
XCKT
XCKD

XCKM
XCKL
XCKML

XCMD
9007MS/ML
9007XA

XCKS

Limit Switches
Selection Guide
Applications by Market Segment



9007AW

XCKJ
9007C

L100/L300
9007T/FT

XCR
9007CLS

Limit Switches

Limit Switches

Selection Guide

Osiswitch® XC Product Overview

Introduction

Electromechanical detection

Limit switches are used in all automated installations and also in a wide variety of applications, due to the numerous advantages inherent to their technology.

They transmit data to the logic processing system regarding:

- presence/absence
- passing
- positioning
- end of travel

Simplicity of installation, advantages

From an electrical viewpoint

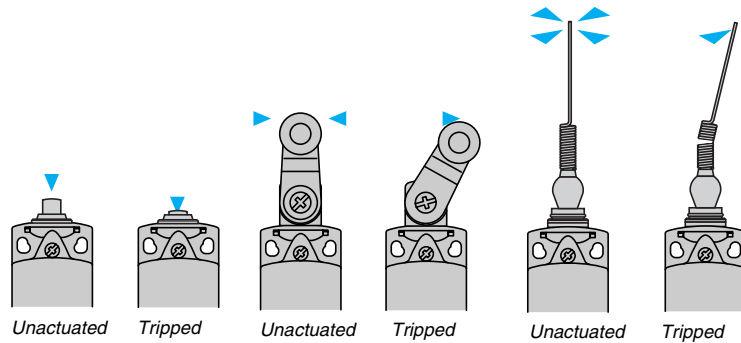
- galvanic separation of circuits,
- models suitable for low power switching, combined with good electrical durability,
- very good short-circuit withstand in coordination with appropriate fuses,
- total immunity to electromagnetic interference,
- high rated operational voltage.

From a mechanical viewpoint

- N/C contacts with positive opening operation,
- high resistance to the different ambient conditions encountered in industry (standard tests and specific tests under laboratory conditions),
- high repeat accuracy, up to 0.01 mm on the tripping points.

Detection movements

- Linear movement (plunger)
- Rotary movement (lever)
- Multi-directional movement



Terminology

Rated value of a quantity

- This replaces the term "nominal value."
- It is the fixed value for a specific function.

Utilization categories

- AC-15 replaces AC-11: control of an electromagnet on a.c., test 10 le/le.
- AC-12: control of a resistive load on a.c. or static load isolated by opto-coupler.
- DC-13 replaces DC-11: control of an electromagnet on d.c., test le/le.
- Ithe is no longer a rated value but a conventional current used for heating tests.

Switching capacity

Example: for category A300 the corresponding operational current, I_e maximum, is 6 A-120 V or 3 A-240 V, the equivalent I_{the} being 10 A.

Positive opening travel

- Minimum travel from the initial movement of contact actuator to the position required to accomplish positive opening operation.

Positive opening force

- The force required on the contact actuator to accomplish positive opening operation.

Positive opening operation

- A limit switch complies with this specification when all the closed contact elements of the switch can be changed, with certainty, to the open position (no flexible link between the moving contacts and the operator of the switch, to which an actuating force is applied).
- All limit switches incorporating either a slow break contact block or a snap action N/C + N/O (form Zb), N/C + N/O + N/O, N/C + N/C + N/O, N/C + N/C + N/O + N/O contact block are positive opening operation, in complete conformity with standard IEC 60947-5-1 Appendix K.

Limit Switches

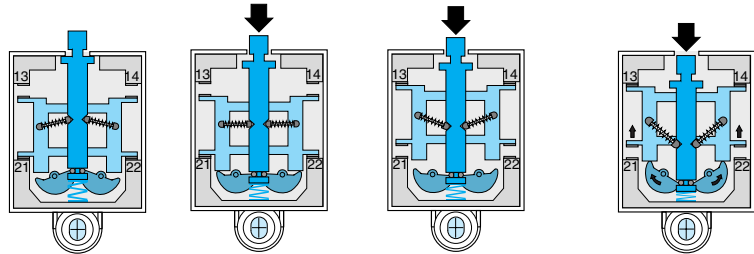
Selection Guide

Osiswitch® XC Product Overview

Contact blocks

Snap action contacts

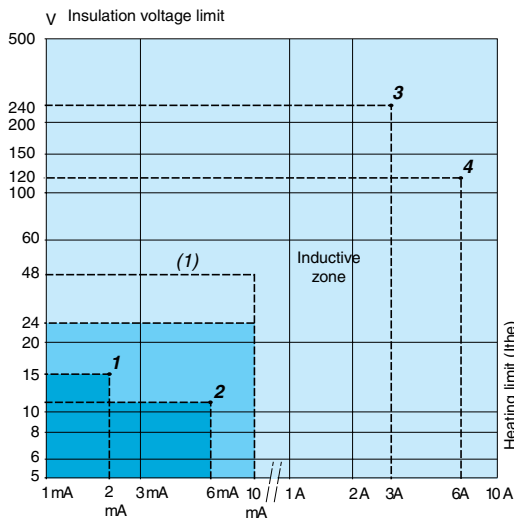
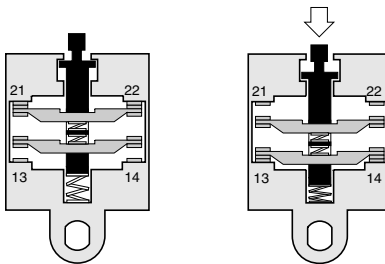
- Snap action contacts are characterized by different tripping and reset points (differential travel).
- The displacement speed of the moving contacts is not related to the speed of the operator.
- This feature ensures satisfactory electrical performance in applications involving low speed actuators.



Unactuated state Approach travel Contact change of state Positive opening

Slow break contacts

- Slow break contacts are characterized by identical tripping and resetting points.
- The displacement speed of the moving contacts is equal, or proportional, to the speed of the operator—which must not be less than 0.1 m/s, or 6 m/minute (0.33 ft/s, or 19.68 ft/minute).
- The opening distance also depends on the distance traveled by the operator.



Electrical durability for normal loads

- Normally, for inductive loads, the current value is less than 0.1 A (sealed), i.e., values of 3 to 40 VA sealed and 30 to 1000 VA inrush, depending on the voltage.

For this type of application the electrical durability exceeds 10 million operating cycles.
Application example: XCKJ161 + LC1D12*** (7 VA sealed, 70 VA inrush).
 Electrical durability = 10 million operating cycles.

Switching capacity

3. Normal industrial PLC input type 1
4. Normal industrial PLC input type 2
5. Switching capacity conforming to IEC 60947-5-5, utilization category AC-15, DC-13

A300	240 V	3 A	B300	240 V	1.5 A
Q300	250 V	0.27 A	R300	250 V	0.13 A
6. Switching capacity conforming to IEC 60947-5-1, utilization category AC-15, DC-13

A300	120 V	6 A	B300	120 V	3 A
Q300	125 V	0.55 A	R300	125 V	0.27 A

Electrical durability for small loads

- The use of limit switches with programmable controllers is becoming more common.
- With small loads, limit switches offer the following levels of reliability:
- failure rate of less than 1 for 100 million operating cycles using snap action contacts (contacts XE2SP).
- failure rate of less than 1 for 20 million operating cycles using slow break contacts (contacts XE•NP and XE3SP).
- failure rate of less than 1 for 5 million operating cycles using contacts XCMD.

Range of use	
Standard contacts Continuous service (frequent switching)	XE2SP2151, P3151
	XE2NP***
	Contacts of XCMD, XE3•P***
Gold flashed contacts on resistive load	Occasional service Infrequent switching, ≤ 1 operating cycle/day and/or corrosive atmosphere

(1) 1. Usable up to 48 V/10 mA.

Limit Switches

Selection Guide

Osiswitch® XC Product Overview

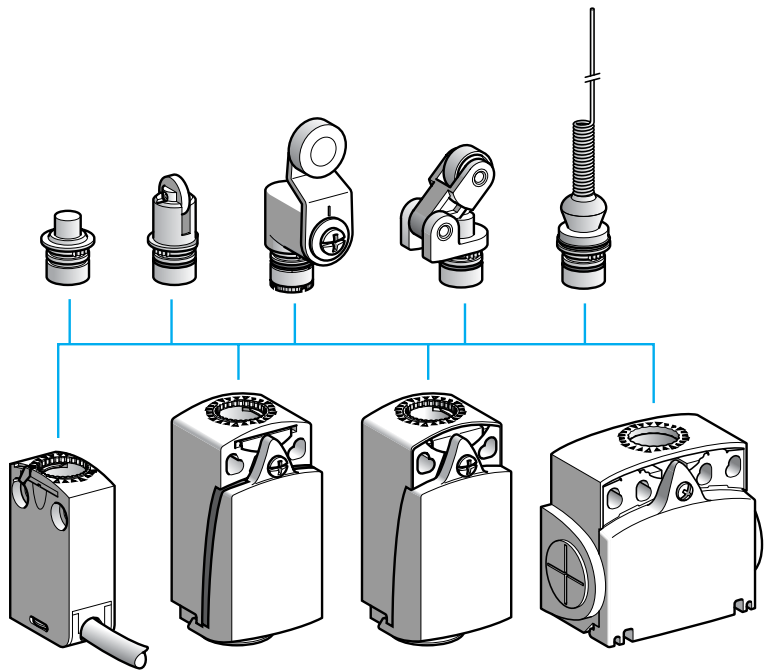
Principle

Innovation through modularity

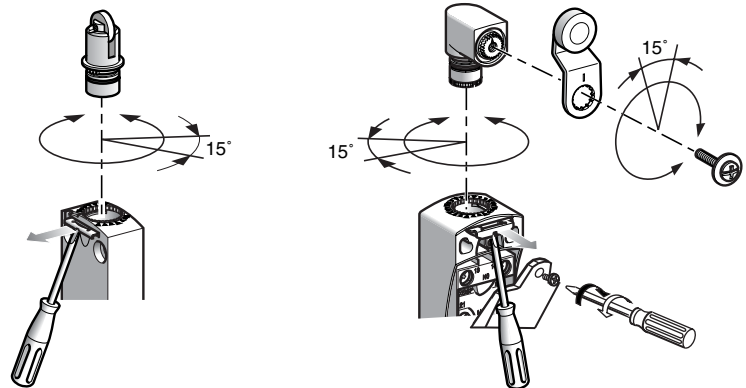
- The Miniature design XCMD and Compact design XCKD, XCKP and XCKT product range family benefits from the **Osisconcept™** principle: **Offering simplicity through innovation.**
- A first in worldwide detection for improving productivity.
A complete offer for resolving the most commonly encountered detection problems:
 - product selection simplified,
 - product availability simplified,
 - installation and setup simplified,
 - maintenance simplified.

Heads

- A single metal operating head type for the Miniature design XCMD and Compact design XCKD, XCKP and XCKT ranges.



- Interchanging of heads achieved by simple operation of forked metal latch.
- Adjustable in 3 planes:



All the heads can be adjusted in 15° steps throughout 360°, in relation to the body.

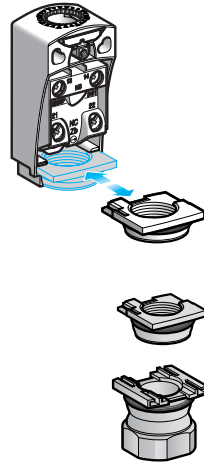
All the levers can be adjusted in 15° steps throughout 360°, in relation to the horizontal axis of the head.

Limit Switches

Selection Guide

Osiswitch® XC Product Overview

Principle (continued)



Cable entries

The cable entries for Compact design XCKD and XCKP switches enable:

- simple cabling due to unrestricted access to contacts
- simple adaptation to the various worldwide markets

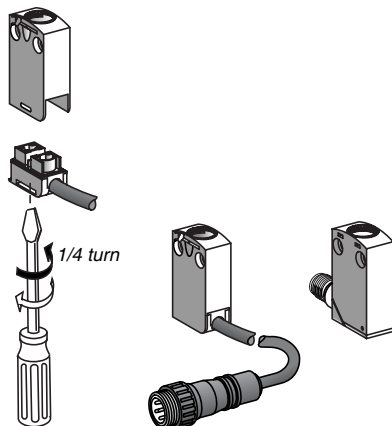
6 models are available:

- ISO M16 x 1.5
- PG 11
- ISO M20 x 1.5
- PG 13
- 1/2" NPT
- PF 1/2 (G 1/2)

Each model is available in metal or plastic, suited for compact design XCKD or XCKP, respectively. A connector version is also available.

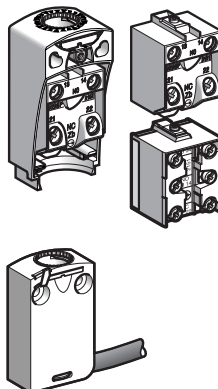
Connection components

- The miniature XCMD range allows interchangeability of these pre-cabled connection components:
 - 1/4 turn is all that is required to remove the connection component on XCMD bodies with 2 and 3 contacts,
 - 6 alternative cable lengths are available.
- The miniature XCMD range also includes an integral or remote connector solution.



Contact block or body with contacts

- 2 and 3 snap action and slow break contact blocks, with positive opening operation, are interchangeable between the Compact design XCKD and XCKP and Classic XCKJ, XCKS, XCKM and XCKL ranges.
- For the Miniature design XCMD range, the contacts are an integral part of the body:
 - 2 and 3 snap action and slow break contacts, with positive opening operation, and interchangeable connection component,
 - 4 snap action contacts, with positive opening operation, with monolithic body and connection components.

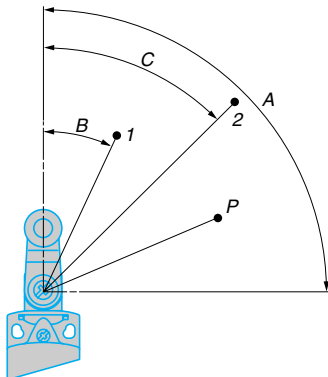
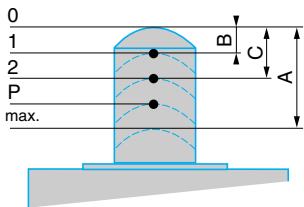
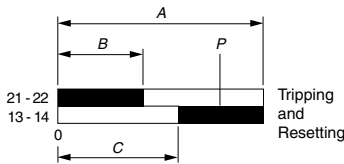
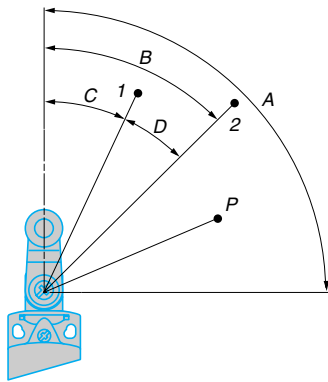
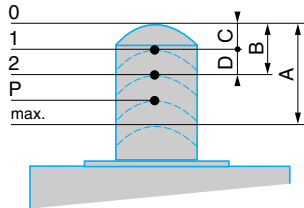
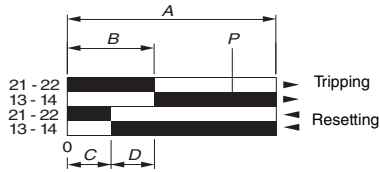


Limit Switches

Selection Guide

Osiswitch® XC Product Overview

Contact blocks (continued)



Functional diagrams of snap action contacts

Example: N/C + N/O

- A—Maximum travel of the operator in mm or degrees.
- B—Tripping travel of contact.
- C—Resetting travel of contact.
- D—Differential travel = B–C.
- P—Point from which positive opening is assured.

Linear movement (plunger)

- 1—Resetting point of contact.
- 2—Tripping point of contact.
- A—Maximum travel of the operator in mm.
- B—Tripping travel of contact.
- C—Resetting travel of contact.
- D—Differential travel = B–C.
- P—Point from which positive opening is assured.

Rotary movement (lever)

- 1—Resetting point of contact.
- 2—Tripping point of contact.
- A—Maximum travel of the operator in degrees.
- B—Tripping travel of contact.
- C—Resetting travel of contact.
- D—Differential travel = B–C.
- P—Point from which positive opening is assured.

Functional diagrams of slow break contacts

Example: N/C + N/O break before make

- A—Maximum travel of the operator in mm or degrees.
- B—Tripping and resetting travel of contact 21-22.
- C—Tripping and resetting travel of contact 13-14.
- P—Point from which positive opening is assured.

Linear movement (plunger)

- 1—Tripping and resetting points of contact 21-22.
- 2—Tripping and resetting points of contact 13-14.
- A—Maximum travel of the operator in mm.
- B—Tripping and resetting travel of contact 21-22.
- C—Tripping and resetting travel of contact 13-14.
- P—Positive opening point.

Rotary movement (lever)

- 1—Tripping and resetting points of contact 21-22.
- 2—Tripping and resetting points of contact 13-14.
- A—Maximum travel of the operator in degrees.
- B—Tripping and resetting travel of contact 21-22.
- C—Tripping and resetting travel of contact 13-14.
- P—Positive opening point.

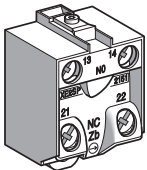
Limit Switches

Selection Guide

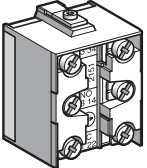
Osiswitch® XC Product Overview

Contact blocks (continued)

XE2•P screw clamp terminal connections



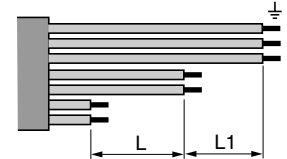
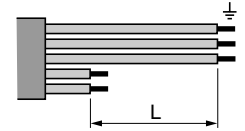
XE3•P screw clamp terminal connections



Mounting

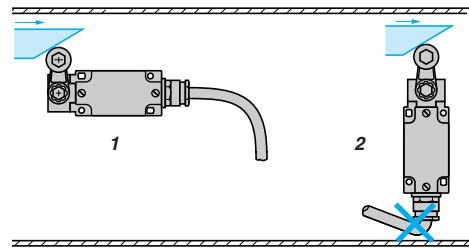
Contact connections

- Tightening torque:
 - minimum tightening torque ensuring the nominal characteristics of the contact: 0.8 N•m (7.08 lb-in)
 - maximum tightening torque without damage to the terminals: 1.2 N•m (10.62 lb-in) for XE2•P, 1 N•m (8.85 lb-in) for XE3•P
- Connecting cable: cable preparation lengths:
 - for XE2•P, L = 22 mm (0.87 in.)
 - for XE2•P3••, L = 45 mm (1.77 in.)
 - for XE3•P:
 - L = 14 mm (0.55 in.)
 - L1 = 11 mm (0.43 in.)



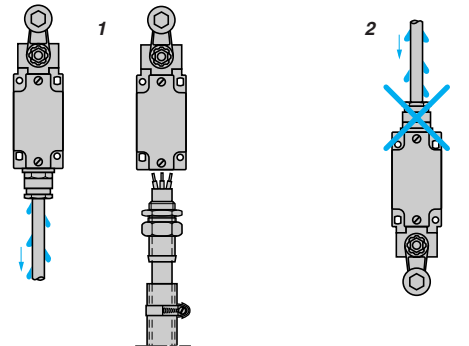
Sweep of connecting cable

1. Recommended
2. To be avoided



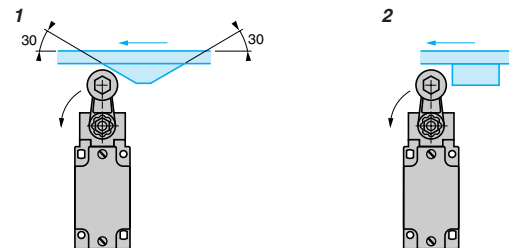
Position of cable entry

1. Recommended
2. To be avoided



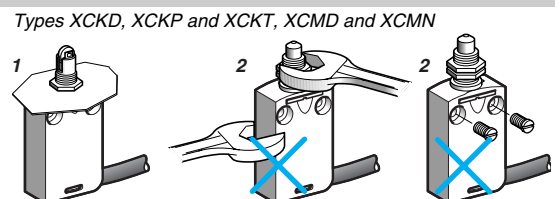
Type of cam

1. Recommended
2. To be avoided



Mounting limit switches by the head

1. Recommended
2. Forbidden



Types XCKD, XCKP and XCKT, XCMD and XCMN

Limit Switches

Selection Guide

Osiswitch® XC Product Overview

Setup

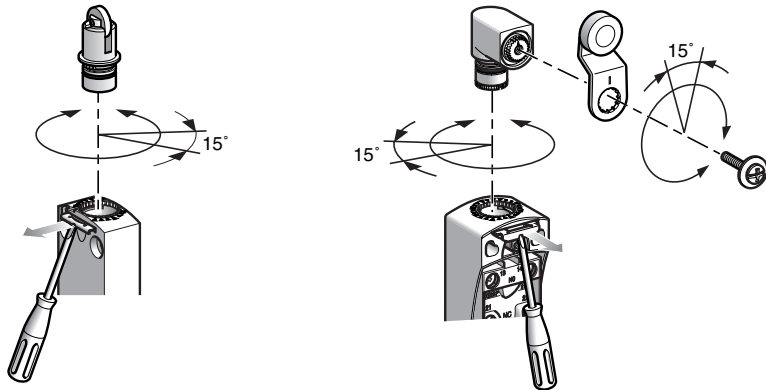
Tightening torque

- The minimum torque is that required to ensure correct operation of the switch.
- The maximum torque is the value which, if exceeded, will damage the switch.

Range	Item	Torque, N•m (lb-in)	
		Min.	Max.
Compact design XCKD, XCKP, XCKT	Cover	0.8 (7.08)	1.2 (10.62)
	Mounting screw for lever on rotary head	1 (8.85)	1.5 (13.28)
Miniature design XCMD, XCMN	—	—	—
	Mounting screw for lever on rotary head	1 (8.85)	1.5 (13.28)
Classic design XCKJ	Cover	1 (8.85)	1.5 (13.28)
	Mounting nut for lever on rotary head	1 (8.85)	1.5 (13.28)
Classic design XCKS	Cover	0.8 (7.08)	1.2 (10.62)
	Mounting nut for lever on rotary head	1 (8.85)	1.5 (13.28)
Classic design XCKM, XCKML, XCKL	Cover	0.8 (7.08)	1.2 (10.62)
	Mounting nut for lever on rotary head	1 (8.85)	1.5 (13.28)

Types XCKD, XCKP, XCKT, XCMD

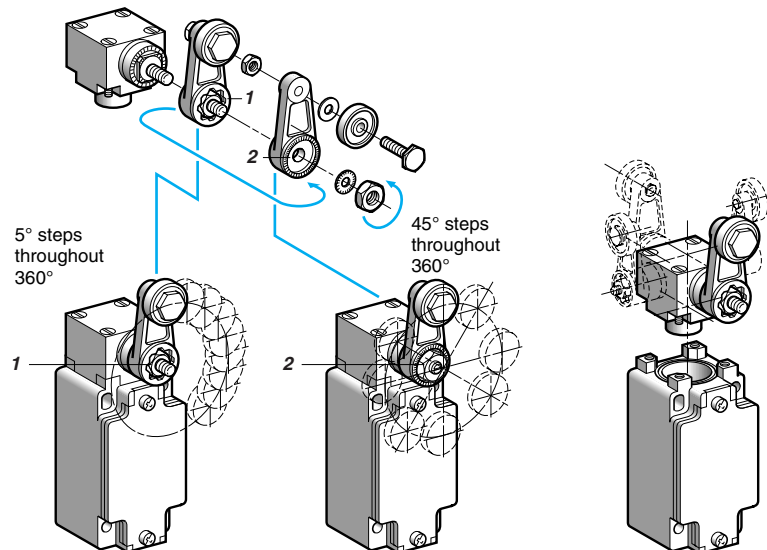
- Adjustable in 3 planes:



All the heads can be adjusted in 15° steps throughout 360°, in relation to the body. All the levers can be adjusted in 15° steps throughout 360°, in relation to the horizontal axis of the head.

Type XCKJ

- Adjustable through 360° in 5° steps, or in 45° steps by reversing the lever or its mounting.
 1. Reversed $\alpha = 5^\circ$
 2. Forward $\alpha = 45^\circ$



Limit Switches

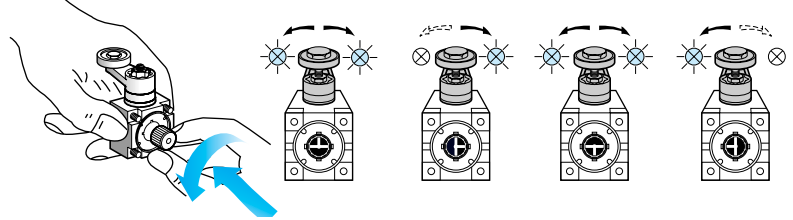
Selection Guide

Osiswitch® XC Product Overview

Setup (continued)

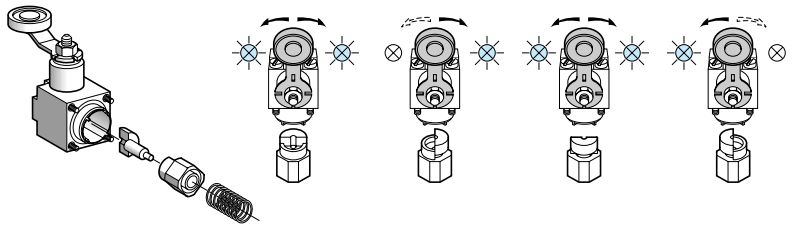
Direction of actuation programming

- XCKJ



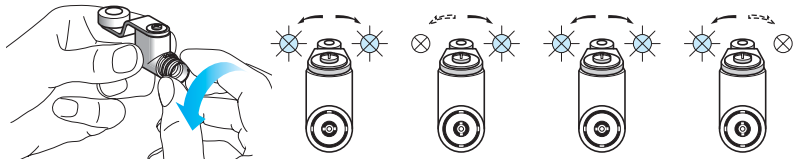
Head ZCKE05

- XCKS



Head ZCKD05

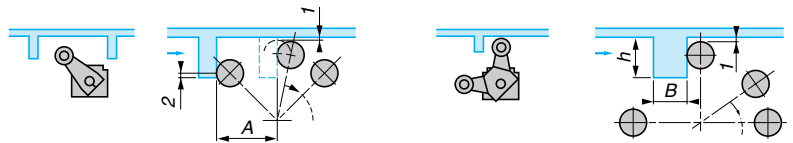
- XCKD, XCKP, XCKT and XCMD



Head ZCE05

Specific cams for heads ZCKE09 and ZC2J09

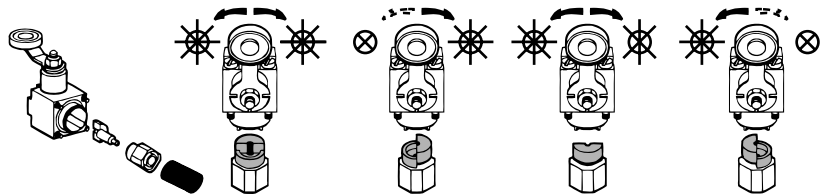
1. 0.5 mm (0.02 in.) min.
2. 2 mm (0.08 in.) min.



A = length of lever + 11 mm (0.43 in.)
 ZCKE09: h = 13–18 mm (0.51–0.71 in.) and B = 12 mm (0.47 in.) max.
 ZCKJE09: h = 14–24 mm (0.55–0.94 in.) and B = 6 mm (0.24 in.) max.

ZCKG00 Head Programming

The ZCKG00 head is field convertible to CW, CCW or CW/CCW. The diagram below shows the conversion process.



Limit Switches

Selection Guide





Osiswitch® XC Product Overview

Compliance with standards

The majority of Telemecanique® brand products comply to national standards (such as French NF C standards, German DIN standards), European standards (such as CENELEC), or international standards (such as IEC). These standards rigidly stipulate the characteristic requirements of the designated products (for example IEC 60947 relating to low voltage switchgear and controlgear).

These products, when correctly used, enable the production of control equipment assemblies, machine control equipment or installations conforming to their own specific standards (for example IEC 60204 for the electrical equipment of industrial machines).

IEC 60947-5-1

Insulation coordination (and dielectric strength)	<ul style="list-style-type: none"> The standard IEC 60664 defines 4 categories of prospective transient overvoltages. It is important for the user to select control circuit components which are able to withstand these overvoltages. To these ends, the manufacturer states the rated impulse withstand voltage (U_{imp}) applicable to the product. 	
Terminal connections	<ul style="list-style-type: none"> The cabling capacity, mechanical robustness and durability of the terminals, as well as the ability to resist loosening, are verified by standardized tests. Terminal reference marking conforms to standard EN 50013. 	
Switching capacity	<ul style="list-style-type: none"> With maximum electrical load. A single designation (A300 for example) enables indication of the contact block characteristics related to its utilization category. 	
Positive opening operation (IEC 60947-5-1 Appendix K)	<ul style="list-style-type: none"> For contacts used in safety applications (end of travel, emergency stop device, etc.) the assurance of positive opening is required (see IEC 60204, EN 60204) after each test, the opening of the contact being verified by testing with an impulse voltage (2500 V). 	
Electrical symbols for contacts	 <ul style="list-style-type: none"> Form Za, the 2 contacts are the same polarity. 	 <ul style="list-style-type: none"> Form Zb, the 2 contacts are electrically separate.
Symbol for positive opening	 <ul style="list-style-type: none"> Simplified version 	 <ul style="list-style-type: none"> Complete symbol

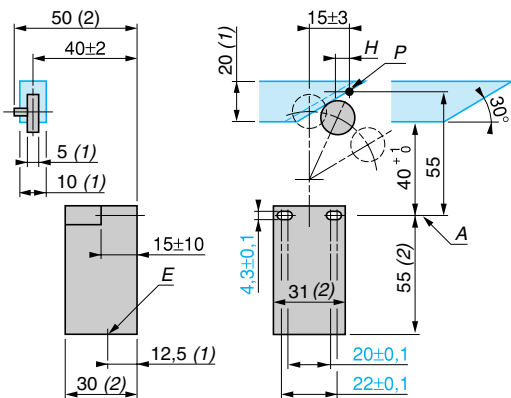
CENELEC EN 50047

The European standards organization CENELEC, which has 14 member countries, has defined in this standard the first type of limit switch.

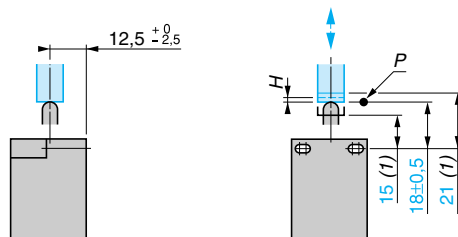
This standard defines 4 variants of devices (forms A, B, C, E).

Limit switches XCKP, XCKD and XCKT conform to standard EN 50047.

Form A, with roller lever



Form B, with end plunger (rounded)

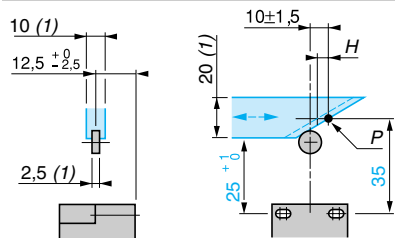


1. Minimum value
2. Maximum value

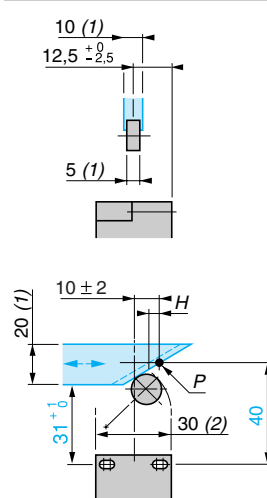
A: reference axis
H: differential travel

P: tripping point
E: cable entry

Form C, with end roller plunger



Form E, with roller lever for 1 direction of actuation



Limit Switches

Selection Guide

Osiswitch® XC Product Overview

Compliance with standards (continued)

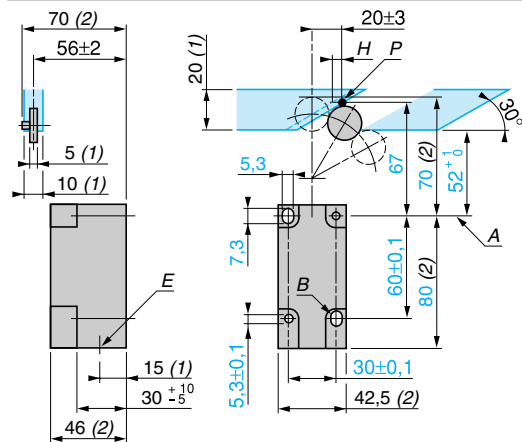
CENELEC EN 50041

The European standards organization CENELEC, which has 14 member countries, has defined in this standard the second type of limit switch.

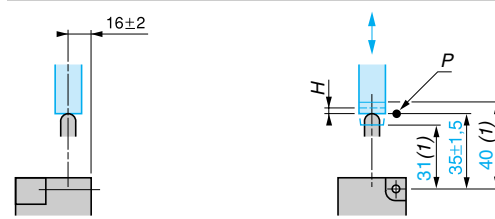
It defines 6 variants of devices (forms A, B, C, D, F, G).

Limit switches XCKJ and XCKS conform to standard EN 50041.

Form A, with roller lever



Form B, with end plunger (rounded)

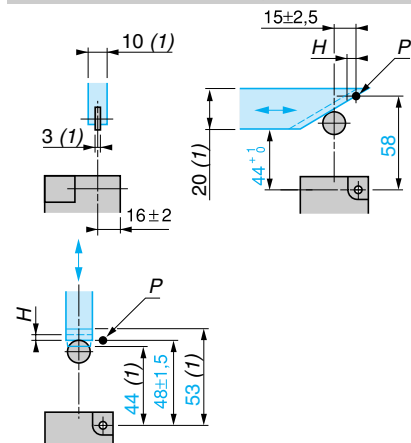


1. Minimum value
2. Maximum value

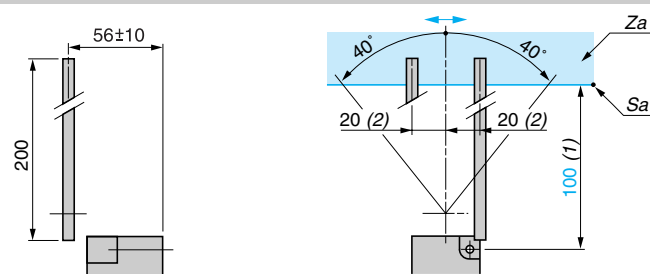
A: reference axis
B: optional elongated holes
H: differential travel
P: tripping point

E: cable entry
Za: tripping zone
Sa: tripping threshold

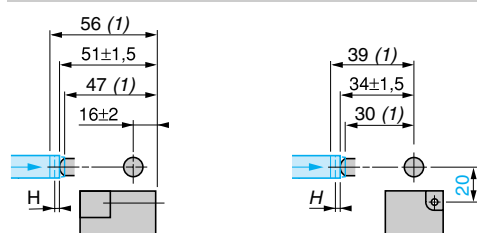
Form C, with end roller plunger



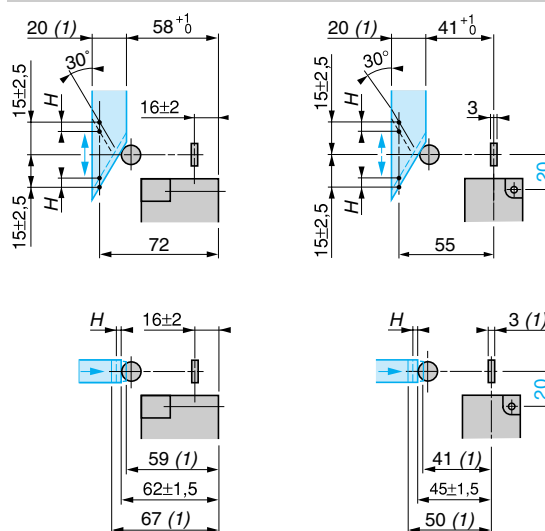
Form D, with rod lever



Form F, with side plunger (rounded)



Form G, with side roller plunger

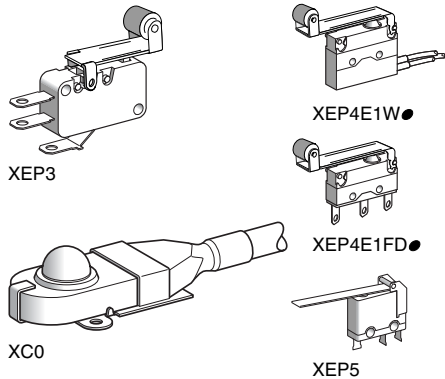


Limit Switches

Osiswitch® Miniature Snap Switches

XEP and XC0

Introduction



Electromechanical detection

Osiswitch miniature snap switches, featuring electromechanical technology, assure the following functions:

- detection of presence or absence
- detection of position.

Actuation of the operator (plunger or lever) on the miniature snap switch causes the electrical contact to change state. This information can then be processed by a PLC controlling the installation.

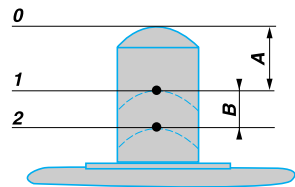
Osiswitch miniature snap switches can be used both for industrial applications and the building sector.

Features

Osiswitch miniature snap switches incorporate a C/O snap-action, single-break contact. They are characterized by:

- high electrical ratings for their very small size
- short tripping travel
- low tripping force
- high repeat accuracy on the tripping points
- long service life

Terminology



Forces

Maximum tripping force: maximum force which must be applied to the operator to move it from the rest (unactuated) position to the trip position (tripping point).

Minimum release force: value to which the force on the operator must be reduced to allow the snap action mechanism to return to its rest (unactuated) position.

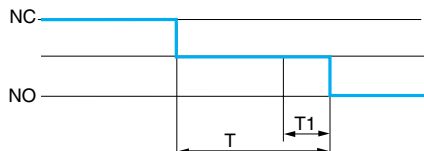
Maximum permissible end of travel force: maximum force that can be applied to the operator at the end of its travel without damaging the switch.

Position / Travel

1. Tripping point: position of the operator in relation to the switch mountings (mounting hole center line) at the instant the switch contact changes state.
 - A. Differential travel: distance between the tripping point and the position at which the snap action mechanism returns to its initial state on release of the operator.
2. Overtravel limit: position of the operator when an extreme force has moved it to the effective end of its available travel.
 - B. Overtravel: distance between the tripping point and the overtravel limit.

The reference point for the figures given for forces and travel is a point F, which is situated on the plunger in the case of a basic switch or at 3 mm (0.12 in.) from the end of the plain lever in the case of a lever operated switch.

Mechanical characteristics



T1: bounce time
T: changeover time

Changeover time

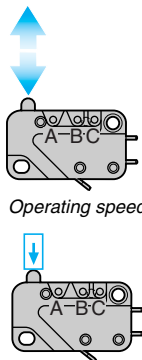
This is the time taken by the moving contact when moving from one fixed contact to another until it becomes fully stable (contact bounce included).

This time is related to the inter-contact distance, the mechanical characteristics of the snap action mechanism, and the mass of the moving element. However, due to the snap action mechanisms used, the time is largely independent of the speed of operation. It is normally less than 20 ms (including bounce times of less than 5 ms).

Operating speed and maximum usable operating rate

Our miniature snap switches are suitable for a wide range of operating speeds: generally, from 1 mm/mn to 1 m/s (0.04 in/mn to 3.28 ft/s). The maximum usable operating rate on a light electrical load may be as high as 10 operations/second.

Mounting



Operating speed and rate

Mounting and operation

To conform to the leakage paths and air gaps in standards EEC 24 - EN/IEC 61058 and EN/IEC 60947:

- an insulation pad must be inserted between the snap switch and the mounting surface if the latter is metal,
- manual operation of a metal actuator must only be carried out with the aid of an intermediate actuator made of an insulating material.
- The installer must ensure adequate protection against direct contact with the output terminals.

Actuation method

Direct operation: The plunger should preferably be actuated along its axis. However, the majority of our miniature snap switches will accept skewed operation provided the angle of actuation is not more than 45°.

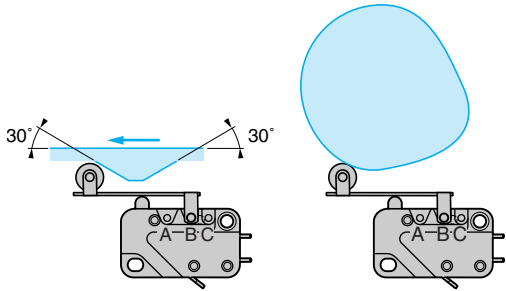
The travel of the actuator must not be limited to only reaching the tripping point. The actuator must always be operated in such a manner that the plunger reaches a point at least 0.5 times the stated overtravel value of the switch. Also, it should not reach its end of travel nor exceed the maximum permissible end-of-travel force.

Limit Switches

Osiswitch® Miniature Snap Switches

XEP and XC0

Mounting (continued)



Actuation method (continued)

Lever operators:

- when actuation is by a roller lever, force should preferably be applied in the direction shown in the diagrams opposite,
- where the movements involved are fast, the ramp should be so designed as to ensure that the operator is not subjected to any violent impact or abrupt release.

Mounting—Tightening torque

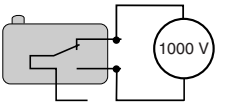
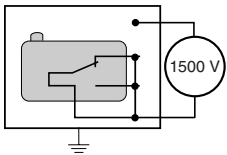
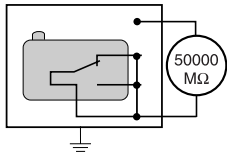
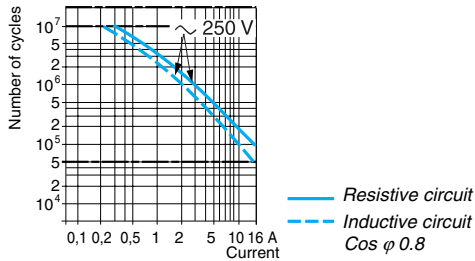
The tightening torque of the fixing screws must conform to the following values:

Ø of mounting screw		2	2.5	3	3.5	4
Tightening torque, N•cm (lb-in)	Maximum	25 (2.21)	35 (3.10)	60 (5.31)	100 (8.85)	150 (13.28)
	Minimum	15 (1.33)	25 (2.21)	40 (3.54)	60 (5.31)	100 (8.85)

Resistance to mechanical shock and vibration

- Resistance to shock and vibration depends on the mass of the moving parts and on the forces holding the contacts together.
- In general, for a miniature snap switch without accessory:
 - vibration > 10 gn, 10 to 500 Hz
 - shock > 50 gn 11 ms 1/2 sine wave

Electrical characteristics



Operating curves

These indicate the electrical life of the miniature snap switches under standard conditions [20°C (68 °F), 1 cycle/2 seconds], by showing the number of switching operations which can be performed with given types of load. For sealed snap switches, the operating rate is 1 cycle/6 s.

Insulation resistance

The insulation resistance of the miniature snap switches is generally greater than 50,000 MΩ, measured at 500 Vdc

Dielectric strength

The dielectric strength of our miniature snap switches is generally superior to:

- 1500 V between live parts and earth
- 1000 V between contacts
- 600 V between contacts for switches with an inter-contact distance less than 0.3 mm

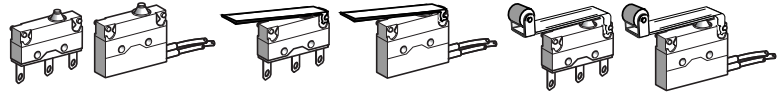
Limit Switches

Osiswitch® Miniature Snap Switches

Subminiature (DIN 41635 B format, sealed) and Sub-subminiature (DIN 41635 D format)

Catalog numbers

Subminiature design, DIN 41635 B format, sealed



Type of operator	Plunger	Flat lever (1)	Roller lever (1)	
<p>Single-pole C/O snap action Wiring: 1 Black 2 Grey 4 Blue</p>	2.8 mm (0.11 in.) cable clip tag connections	XEP4E1W7 (3)	XEP4E1W7A326 (3)	
	Weight, g (oz)	2.4 (0.08)	3.1 (0.11)	3.2 (0.11)
	Pre-cabled connections	XEP4E1FD (3)	XEP4E1FDA326 (3)	XEP4E1FDA454 (3)
	Weight, g (oz)	14.1 (0.50)	14.8 (0.52)	14.9 (0.53)
Separate components	Flat lever (2)	ZEP4L326 (3)	—	
	Weight, g (oz)	0.7 (0.02)	—	
	Roller lever (2)	ZEP4L454 (3)	—	
	Weight, g (oz)	0.8 (0.03)	—	

Sub-subminiature design, DIN 41635D format



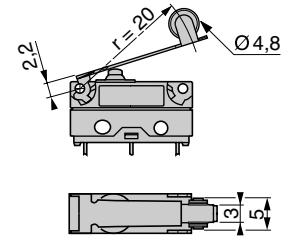
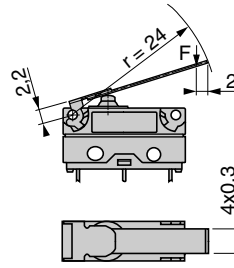
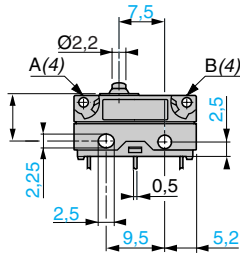
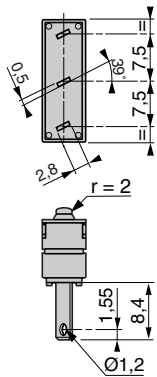
Type of operator	Plunger	Flat lever (1)
<p>Single-pole C/O snap action</p>	Solder tag connections	XEP5P1W2 (3)
	Weight, g (oz)	1.4 (0.05)
		1.9 (0.07)

Dimensions

XEP4E1W7

XEP4E1W7A326

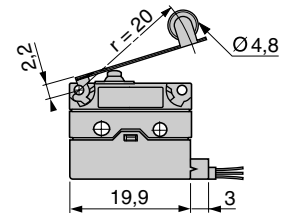
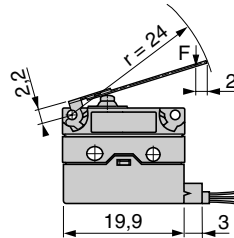
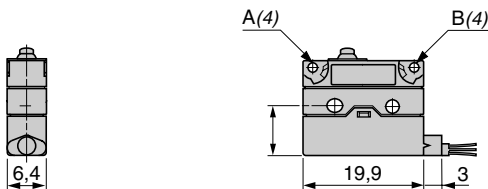
XEP4E1W7A454



XEP4E1FD

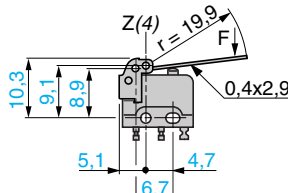
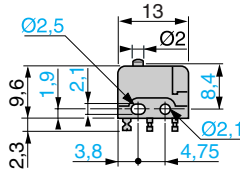
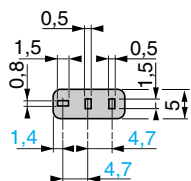
XEP4E1FDA326

XEP4E1FDA454



XEP5P1W2

XEP5P1W2Z55B



- To avoid damage to the mounting spigots, removal of the lever from complete products is not recommended.
- Levers only for mounting on basic (plunger) snap switches (XEP4E1W7 and XEP4E1FD).

- Switches sold in lots of 5.
- A, B, Z: lever fixing positions.

Limit Switches

Osiswitch® Miniature Snap Switches

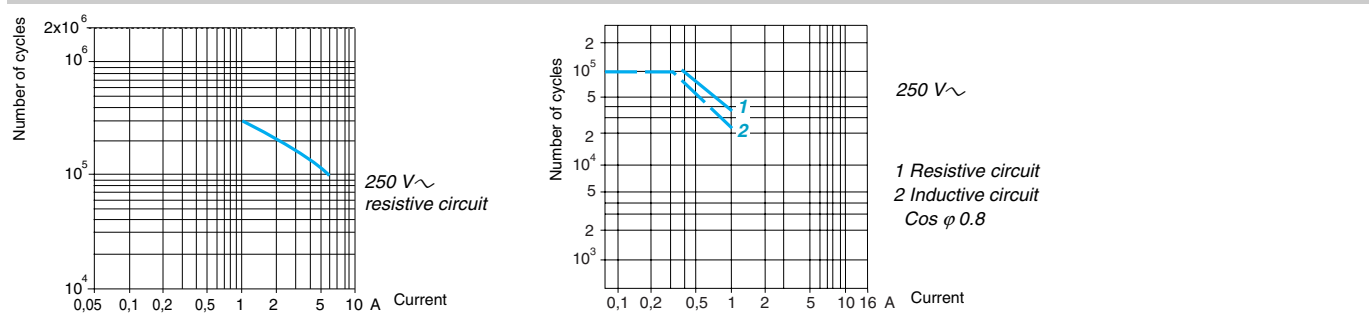
Subminiature (DIN 41635 B format, sealed) and Sub-subminiature (DIN 41635 D format)

Switch type	XEP4E1**, XEP5P1W2 Plunger	XEP4E1**A326, XEP5P1W2Z55B Flat lever	XEP4E1**A454 Roller lever
Environmental characteristics			
Lever fixing position (1)	—	A	A
Switch actuation	On end	Horizontal	
Product certifications	CE, IEC 60947-5-1, EN 60947-5-1, c UR us, UL 1054, EN 61058		
Degree of protection	IP 67 XEP4E1FD**, case IP 67 and tags IP 00 XEP4E1W7**, case IP 40 and tags IP 00 XEP5P1W2**		
Operating temperature	- 40...+ 105 °C XEP4E1FD**, -40...+125 °C XEP4E1W**** and XEP5P1**		
Materials	Enclosure	Polyester XEP4, diallyl-phtalate XEP5	
	Lever	—	Stainless steel
	Contact	AgCdO XEP4E1**, Ag XEP5	
	Tags	Tinned brass XEP4E1W**, gold plated brass XEP5P1**	

		Lever fixing position (1)	XEP4	XEP5
Maximum tripping force, N (oz)	XEP4	A	2.5 N (8.99 oz)	0.63 N (2.27 oz)
		B	2.5 N (8.99 oz)	1.25 N (4.50 oz)
	XEP5		2 N (7.19 oz)	0.80 N (2.88 oz)
Minimum release force, N (oz)	XEP4	A	0.80 N (2.88 oz)	0.20 N (0.72 oz)
		B	0.80 N (2.88 oz)	0.40 N (1.44 oz)
	XEP5		0.40 N (1.44 oz)	0.15 N (0.54 oz)
Maximum permissible end of travel force, N (lb)	XEP4	A	10 N (2.25 lb)	2.5 N (0.56 lb)
		B	10 N (2.25 lb)	5 N (1.12 lb)
	XEP5		10 N (2.25 lb)	—
Tripping point (TP) (2)	XEP4	A	8.40 +/- 0.3 mm	10.7 +/- 1.7 mm
		B	8.40 +/- 0.3 mm	9.6 +/- 1.0 mm
	XEP5		8.40 mm	9.20 mm
Maximum differential travel	XEP4	A	0.13 mm	0.52 mm
		B	0.13 mm	0.26 mm
	XEP5		0.06 mm	0.25 mm
Minimum overtravel	XEP4	A	0.60 mm	2.40 mm
		B	0.60 mm	1.20 mm
	XEP5		0.10 mm	—
Inter-contact distance	XEP4		0.4 mm	
		XEP5		0.3 mm
Mechanical durability	XEP4		2 million operating cycles	
		XEP5		0.1 million operating cycles

		XEP4	XEP5
Electrical characteristics			
Operational characteristics	XEP4	AC-15: B300 (Ue: 240 V, Ie: 1.5 A) DC-13: R300 (Ue: 250 V, Ie: 0.1 A) conforming to IEC 60947-5-1, EN 60947-5-1 Appendix A 125-250 Vac 6.0 A conforming to UL 1054 6 (1) A 250 Vac 10,000 cycles conforming to EN 61058	
	XEP5	AC-15: D300 (Ue: 240 V, Ie: 0.3 A) conforming to IEC 60947-5-1, EN 60947-5-1 Appendix A	
Thermal current	XEP4	7.5 A on 250 V (50/60 Hz)	
	XEP5	8.5 A on 250 V (50/60 Hz)	
Connection	XEP4	XEP4E1W7*: 2.8 mm (0.11 in.) cable clip tags XEP4E1FD: Pre-cabled (horizontally in-line), 3 x 0.5 mm ² , length 0.5 m (1.6 ft)	
	XEP5	Solder tags	

Operating curves



- Miniature snap switches fitted with a lever are supplied with the lever fixed in position A (see page 412). For basic (plunger) snap switches, it is possible to fix a lever in position A or B, depending on the required tripping conditions (see page 412).
- Position of the operator in relation to the switch mountings (mounting hole center line), at the instant the contact changes state.

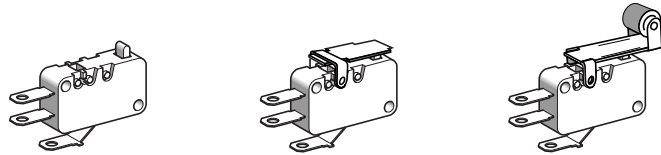
Limit Switches

Limit Switches

Osiswitch® Miniature Snap Switches

Miniature (DIN 41635 A format)

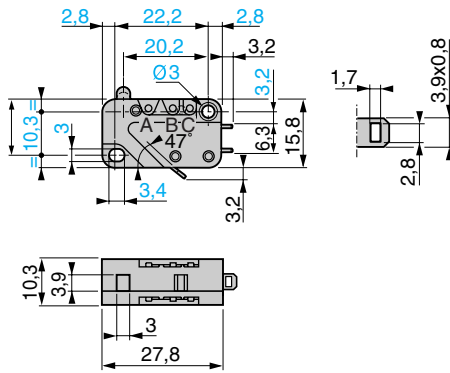
Catalog numbers



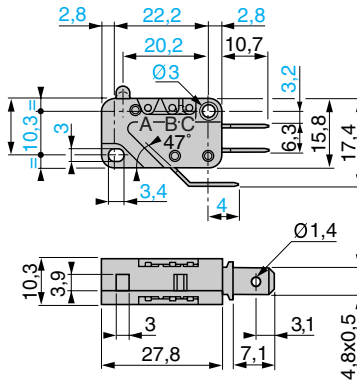
Type of operator		Plunger (2)	Flat lever (1) (2)	Roller lever (1) (2)	
Single-pole C/O snap action	Standard contacts	Solder tags	XEP3S1W2	XEP3S1W2B524	
		4.8 mm (0.19 in.) cable clip tags	XEP3S1W6	XEP3S1W6B524	
		6.35 mm (0.25 in.) cable clip tags	XEP3S1W3	XEP3S1W3B524	
		Weight, g (oz)	5.6 (0.20)	6.3 (0.22)	6.6 (0.23)
	Very low operating force contacts	Solder tags	XEP3S2W2	XEP3S2W2B524	XEP3S2W2B529
		4.8 mm (0.19 in.) cable clip tags	XEP3S2W6	XEP3S2W6B524	XEP3S2W6B529
6.35 mm (0.25 in.) cable clip tags		XEP3S2W3	XEP3S2W3B524	XEP3S2W3B529	
	Weight, g (oz)	5.6 (0.20)	6.3 (0.22)	6.6 (0.23)	
Flat lever (3)		ZEP3L524			
		Weight, g (oz)			
Separate components		ZEP3L529			
Roller lever (3)		Weight, g (oz)			
		1 (0.04)			

Dimensions

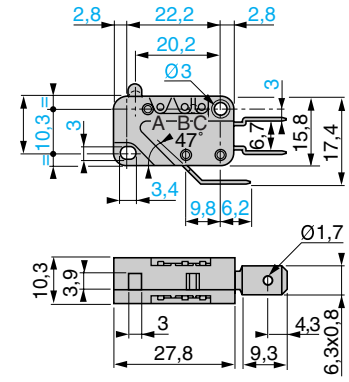
XEP3S•W2



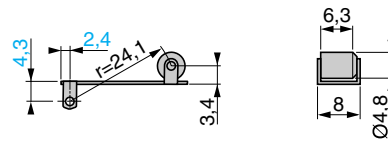
XEP3S•W6



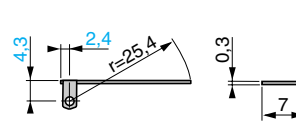
XEP3S•W3



ZEP3L529



ZEP3L524



- To avoid damage to the mounting spigots, removal of the lever from complete products is not recommended.
- Switches sold in lots of 10.
- Levers only for mounting on basic (plunger) snap switches (XEP3S•W2, XEP3S•W3 and XEP3S•W6), in mounting positions A, B or C.

Limit Switches

Osiswitch® Miniature Snap Switches

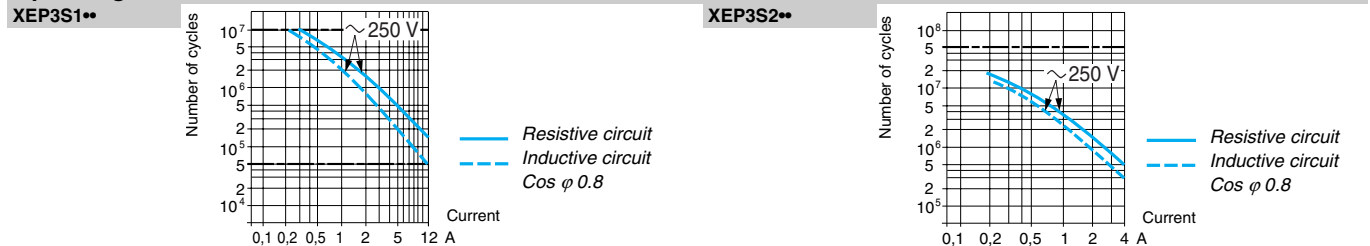
Miniature (DIN 41635 A format)

Switch type	XEP3S-W2		XEP3S-W2B254	XEP3S-W2B259
Type of operator	Plunger		Flat lever	Roller lever
Environmental characteristics				
Lever fixing position (1)	—		B	B
Switch actuation	On end		Horizontal	
Product certifications	--- UR us, CE, IEC/EN 60947-5-1, UL 1054, EN 61058-1			
Degree of protection	Case IP 40 and tags IP 00			
Operating temperature	- 25...+ 125 °C			
Materials	Enclosure	Polyester		
	Lever	—	Stainless steel	Stainless steel, glass reinforced polyamide roller
	Contact	AgNi		

Mechanical characteristics					
Lever fixing position (1)					
Maximum tripping force, N (oz)	Standard	A	0.80 N (2.88 oz)	0.20 N (0.72 oz)	
		B	0.80 N (2.88 oz)	0.40 N (1.44 oz)	
		C	0.80 N (2.88 oz)	0.53 N (1.91 oz)	
	Very low force	A	0.25 N (0.90 oz)	0.06 N (0.22 oz)	
		B	0.25 N (0.90 oz)	0.13 N (0.47 oz)	
		C	0.25 N (0.90 oz)	0.17 N (0.61 oz)	
Minimum release force, N (oz)	Standard	A	0.20 N (0.72 oz)	0.05 N (0.18 oz)	
		B	0.20 N (0.72 oz)	0.10 N (0.36 oz)	
		C	0.20 N (0.72 oz)	0.13 N (0.47 oz)	
	Very low force	A	0.05 N (0.18 oz)	0.01 N (0.04 oz)	
		B	0.05 N (0.18 oz)	0.03 N (0.11 oz)	
		C	0.05 N (0.18 oz)	0.03 N (0.11 oz)	
Maximum permissible end of travel force, N (lb)	Standard, very low force	A	20 N (4.50 lb)	5 N (1.12 lb)	
		B	20 N (4.50 lb)	10 N (2.25 lb)	
		C	20 N (4.50 lb)	13 N (2.92 lb)	
Tripping point (TP) (2)	Standard, very low force	A	14.70 ^{+/-0.4} mm	15.20 ^{+/-2.5} mm	20.5 ^{+/-2.9} mm
		B	14.70 ^{+/-0.4} mm	15.20 ^{+/-1.0} mm	20.5 ^{+/-1.5} mm
		C	14.70 ^{+/-0.4} mm	15.20 ^{+/-0.8} mm	20.5 ^{+/-1.2} mm
Maximum differential travel	Standard, very low force	A	0.35 mm	1.40 mm	
		B	0.35 mm	0.70 mm	
		C	0.35 mm	0.53 mm	
Minimum overtravel	Standard	A	1.20 mm	4.80 mm	
		B	1.20 mm	2.40 mm	
		C	1.20 mm	1.80 mm	
	Very low force	A	1.10 mm	4.40 mm	
		B	1.10 mm	2.20 mm	
		C	1.10 mm	1.65 mm	
Inter-contact distance	0.40 mm				
Mechanical durability for 2/3 overtravel	Standard	20 million operating cycles			
	Very low force	50 million operating cycles			

Electrical characteristics		
Operational characteristics	Standard	AC-15: B300 (Ue: 240 V, Ie: 1.5 A) DC-13: R300 (Ue: 250 V, Ie: 0.1 A) conforming to IEC/EN 60947-5-1 Appendix A 125-250 Vac 10.1 A—1/2 HP conforming to UL 1054 12 (3) A 250 Vac 10,000 cycles conforming to EN 61058-1
	Very low force	AC-15: D300 (Ue: 240 V, Ie: 0.3 A) conforming to IEC/EN 60947-5-1 Appendix A 125-250 Vac 4 A—1/10 HP conforming to UL 1054 4 (1) A 250 Vac 50,000 cycles conforming to EN 61058-1
Thermal current	Standard	15 A on 250 V (50/60 Hz)
	Very low force	5 A on 250 V (50/60 Hz)
Connection	XEP3 S-W2: solder tags. XEP3 S-W6: 4.8 mm (0.19 in.) cable clip tags XEP3 S-W3: 6.35 mm (0.25 in.) cable clip tags.	

Operating curves



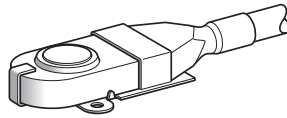
- Miniature snap switches fitted with a lever are supplied with the lever fixed in position B (see page 414). For basic (plunger) snap switches, it is possible to fix a lever in position A, B or C, depending on the required tripping conditions (see page 414).
- Position of the operator in relation to the switch mountings (mounting hole center line), at the instant the contact changes state.

Limit Switches

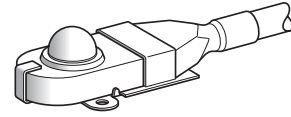
Osiswitch® Miniature Snap Switches

Sealed Design Pre-Cabled

Type of head Plunger (mounting by the body)



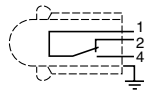
Head with flat plunger



Head with domed encased plunger

Type of operator

Catalog numbers



Single-pole C/O snap action
Wiring:
1 Black
2 Brown
4 Blue

XC010L2

XC011L2

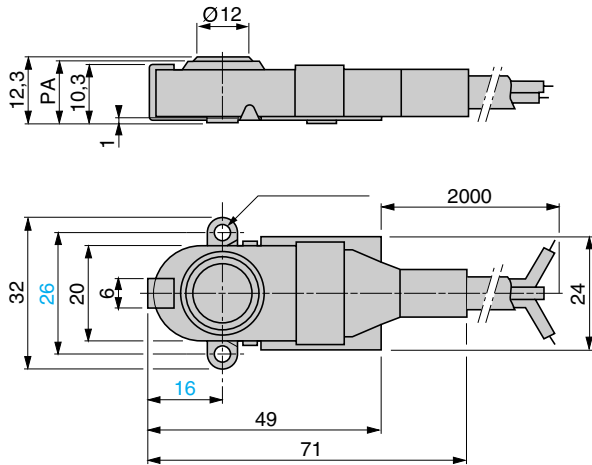
Weight, kg (lb)

0.145 (0.320)

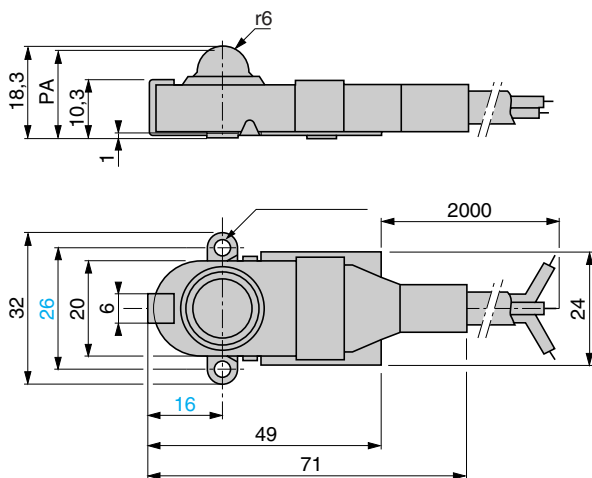
0.150 (0.331)

Dimensions

XC010L2



XC011L2



Limit Switches

Osiswitch® Miniature Snap Switches

Sealed Design Pre-Cabled

Switch type	XC010•	XC011•
Environmental characteristics		
Switch actuation	On end, flat plunger (1)	On end, domed plunger (1)
Product certifications	CE, IEC 60947-5-1	
Degree of protection	IP 66	
Operating temperature	0...85 °C (32...185 °F)	
Materials	Internal housing	Metal
	Casing	Nitrile
	Mounting support	Steel, zinc passivated
	Contact	Ag
Mechanical characteristics		
Maximum tripping force	5.3 N (1.19 lb)	
Minimum release force	1.5 N (0.34 lb)	
Maximum permissible end of travel force	30 N (6.74 lb)	
Tripping point (TP) (2)	11.4 ^{±0.4} mm	17.4 ^{±0.5} mm
Maximum differential travel	0.2 mm	
Minimum overtravel	0.2 mm	
Inter-contact distance	0.5 mm	
Mechanical durability	2 million operating cycles	
Electrical characteristics		
Operational current	1 A on 24 V (50/60 Hz)	
Thermal current/insulation voltage	12 A/60 V	
Connection	A05 VVF cable, 3 x 0.75 mm ² , length 2 m (6.6 ft), overall diameter ≤ 7.6 mm (0.30 in.)	
Electrical durability	AC-15: 0.5 million operating cycles	
Operating curve		

- Manual actuation must be made by an intermediate insulated part, in order to meet basic safety requirements. One of the two mounting holes must also be used as an earth protection terminal.
- Distance between the base of the switch and the top of the plunger at the instant the contact changes state (see dimensions, page 416).

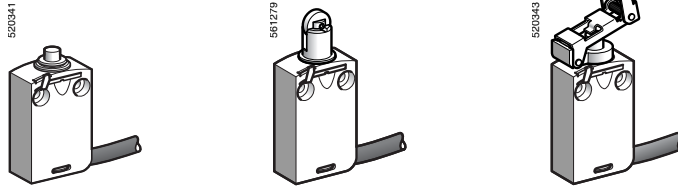
Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD

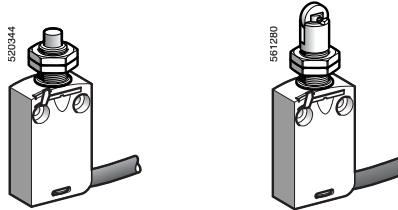
■ XCMD
pre-cabled

□ With head for linear movement (plunger). Mounting by the body.



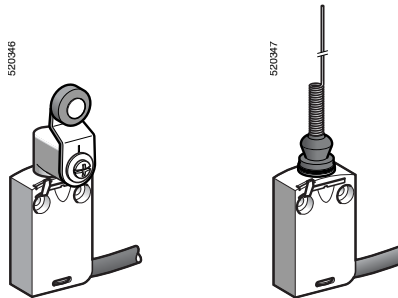
Page 420

□ With head for linear movement (plunger). Mounting by the head.



Page 420

□ With head for rotary movement (lever) or multi-directional. Mounting by the body.



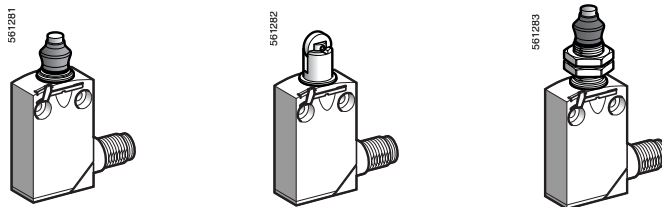
Page 421

■ XCMD
with integral connector

□ With head for linear movement (plunger)

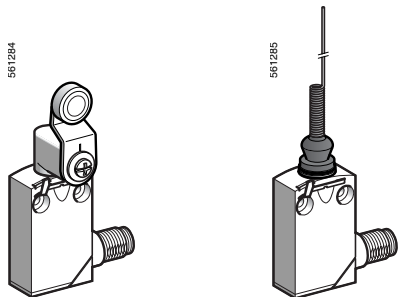
Mounting by the body

Mounting by the head



Page 424

□ With head for rotary movement (lever) or multi-directional. Mounting by the body.



Page 425

Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD

Environmental characteristics																																				
Conforming to standards	Products	IEC 60947-5-1, EN 60947-5-1, UL 508, CSA C22-2 n° 14																																		
	Machine assemblies	IEC 60204-1, EN 60204-1																																		
Product certifications		UL, CSA (except products with special cables), CCC																																		
Protective treatment		Standard version: "TC"																																		
Ambient air temperature		Operation: -25...+70 °C (-13...+158 °F). Storage: -40...+70 °C (-40...+158 °F)																																		
Vibration resistance		XCMD snap action: 5 gn. XCMD slow break: 25 gn (10...500 Hz) conforming to IEC 60068-2-6																																		
Shock resistance		25 gn (18 ms) conforming to IEC 60068-2-27																																		
Electric shock protection		Class I conforming to IEC 61-140 and NF C 20-030																																		
Degree of protection		NEMA Types 1, 2, 4, 12, 13 IP 66, IP 67 and IP 68 (1) conforming to IEC 60529 IK 06 conforming to EN 50102																																		
Materials		Bodies and heads: Zamak® zinc alloy																																		
Repeat accuracy		0.05 mm on the tripping points, with 1 million operating cycles for head with end plunger																																		
Protection against prolonged immersion: the test conditions are subject to agreement between the manufacturer and the user.																																				
Contact block characteristics																																				
Rated operational characteristics	Switches with 2 contacts	~ AC-15; B300 (Ue = 240 V, Ie = 1.5 A) = DC-13; R300 (Ue = 250 V, Ie = 0.1 A), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1																																		
	Switches with 3 and 4 contacts	~ AC-15; C300 (Ue = 240 V, Ie = 0.75 A) = DC-13; R300 (Ue = 250 V, Ie = 0.1 A), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1																																		
	Pre-cabled switches	Ithe = 6 A for 2 contacts, 4 A for 3 contacts, 3 A for 4 contacts																																		
	Switches with 4-pin M12 connector	Ui = 250 V, Ie = 3 A maximum, Ithe = 3 A																																		
	Switches with 5-pin M12 connector	Ui = 60 V, Ie = 4 A maximum, Ithe = 4 A																																		
	Switches with 5-pin 7/8" 16UN connector	Ui = 250 V, Ie = 6 A maximum, Ithe = 6 A																																		
Rated insulation voltage	Ui = 400 V degree of pollution 3 conforming to IEC 60947-5-1 Ui = 300 V conforming to UL 508, CSA C22-2 n° 14																																			
Rated impulse withstand voltage	U imp = 4 kV conforming to IEC 60947-1, IEC 60664																																			
Positive operation (depending on model)	N/C contacts with positive opening operation conforming to IEC 60947-5-1 Appendix K, EN 60947-5-1																																			
Resistance across terminals	≤ 25 mΩ conforming to IEC 60255-7 category 3																																			
Electric shock protection	6 A cartridge fuse type gG (gl)																																			
Minimum actuation speed	Snap action contact: 0.01 m/minute (0.03 ft/minute) Slow break contact: 6 m/minute (19.68 ft/minute)																																			
Electrical durability	<ul style="list-style-type: none"> Conforming to IEC 60947-5-1 Appendix C Utilization categories AC-15 and DC-13 Maximum operating rate: 3600 operating cycles/hour Load factor: 0.5 																																			
	<table border="0"> <tr> <td rowspan="2">a.c. supply ~ 50/60 Hz mm inductive circuit</td> <td> XCMD snap action (N/C + N/O, N/C + N/C, N/C + N/C + N/O, N/C + N/C + N/O + N/O contacts) </td> <td> XCMD slow break (N/C + N/O, N/C + N/C + N/O contacts) </td> </tr> <tr> <td> <table border="1"> <tr> <td>Power switched in W for 5 million operating cycles</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Voltage</td> <td>V</td> <td>24</td> <td>48</td> <td>120</td> </tr> <tr> <td>mm</td> <td>W</td> <td>3</td> <td>2</td> <td>1</td> </tr> </table> </td> <td> <table border="1"> <tr> <td>Power switched in W for 5 million operating cycles</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Voltage</td> <td>V</td> <td>24</td> <td>48</td> <td>120</td> </tr> <tr> <td>mm</td> <td>W</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table> </td> </tr> </table>	a.c. supply ~ 50/60 Hz mm inductive circuit	XCMD snap action (N/C + N/O, N/C + N/C, N/C + N/C + N/O, N/C + N/C + N/O + N/O contacts)	XCMD slow break (N/C + N/O, N/C + N/C + N/O contacts)	<table border="1"> <tr> <td>Power switched in W for 5 million operating cycles</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Voltage</td> <td>V</td> <td>24</td> <td>48</td> <td>120</td> </tr> <tr> <td>mm</td> <td>W</td> <td>3</td> <td>2</td> <td>1</td> </tr> </table>	Power switched in W for 5 million operating cycles					Voltage	V	24	48	120	mm	W	3	2	1	<table border="1"> <tr> <td>Power switched in W for 5 million operating cycles</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Voltage</td> <td>V</td> <td>24</td> <td>48</td> <td>120</td> </tr> <tr> <td>mm</td> <td>W</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table>	Power switched in W for 5 million operating cycles					Voltage	V	24	48	120	mm	W	4	3	3
a.c. supply ~ 50/60 Hz mm inductive circuit	XCMD snap action (N/C + N/O, N/C + N/C, N/C + N/C + N/O, N/C + N/C + N/O + N/O contacts)		XCMD slow break (N/C + N/O, N/C + N/C + N/O contacts)																																	
	<table border="1"> <tr> <td>Power switched in W for 5 million operating cycles</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Voltage</td> <td>V</td> <td>24</td> <td>48</td> <td>120</td> </tr> <tr> <td>mm</td> <td>W</td> <td>3</td> <td>2</td> <td>1</td> </tr> </table>	Power switched in W for 5 million operating cycles					Voltage	V	24	48	120	mm	W	3	2	1	<table border="1"> <tr> <td>Power switched in W for 5 million operating cycles</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Voltage</td> <td>V</td> <td>24</td> <td>48</td> <td>120</td> </tr> <tr> <td>mm</td> <td>W</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table>	Power switched in W for 5 million operating cycles					Voltage	V	24	48	120	mm	W	4	3	3				
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d.c. supply =	<table border="1"> <tr> <td>Power switched in W for 5 million operating cycles</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Voltage</td> <td>V</td> <td>24</td> <td>48</td> <td>120</td> </tr> <tr> <td>mm</td> <td>W</td> <td>3</td> <td>2</td> <td>1</td> </tr> </table>	Power switched in W for 5 million operating cycles					Voltage	V	24	48	120	mm	W	3	2	1	<table border="1"> <tr> <td>Power switched in W for 5 million operating cycles</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Voltage</td> <td>V</td> <td>24</td> <td>48</td> <td>120</td> </tr> <tr> <td>mm</td> <td>W</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table>	Power switched in W for 5 million operating cycles					Voltage	V	24	48	120	mm	W	4	3	3				
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Voltage	V	24	48	120																																
mm	W	4	3	3																																

Limit Switches

Osiswitch® Miniature, Metal Universal, XCMD, Pre-Cabled

Type of head	Plunger (mounting by the body)				Plunger (mounting by the head)		
Type of operator	Metal end plunger	Metal end plunger with elastomer boot	Steel roller plunger	Retractable steel roller lever plunger	M12 with metal end plunger	M16 with metal end plunger with elastomer boot	M12 with steel roller plunger
Catalog numbers							
2-pole N/C + N/O snap action	 XCMD2110L1	 XCMD2111L1	 XCMD2102L1	 XCMD2124L1	 XCMD21F0L1	 XCMD21G1L1	 XCMD21F2L1
2-pole N/C + N/O break before make, slow break	 XCMD2510L1	 XCMD2511L1	 XCMD2502L1	 XCMD2524L1	 XCMD25F0L1	 XCMD25G1L1	 XCMD25F2L1
2-pole N/C + N/C snap action	 ZCMD29L1 + ZCE10	 ZCMD29L1 + ZCE11	 ZCMD29L1 + ZCE02	 ZCMD29L1 + ZCE24	 ZCMD29L1 + ZCEF0	 ZCMD29L1 + ZCEG1	 ZCMD29L1 + ZCEF2
3-pole N/C + N/C + N/O snap action	 ZCMD39L1 + ZCE10	 ZCMD39L1 + ZCE11	 ZCMD39L1 + ZCE02	 ZCMD39L1 + ZCE24	 ZCMD39L1 + ZCEF0	 ZCMD39L1 + ZCEG1	 ZCMD39L1 + ZCEF2
3-pole N/C + N/C + N/O break before make, slow break	 ZCMD37L1 + ZCE10	 ZCMD37L1 + ZCE11	 ZCMD37L1 + ZCE02	 ZCMD37L1 + ZCE24	 ZCMD37L1 + ZCEF0	 ZCMD37L1 + ZCEG1	 ZCMD37L1 + ZCEF2
Weight, kg (lb)	0.180 (0.397)	0.180 (0.397)	0.185 (0.408)	0.200 (0.441)	0.195 (0.430)	0.220 (0.485)	0.205 (0.452)
4-pole N/C + N/C + N/O + N/O snap action	 ZCMD41L1 + ZCE10	 ZCMD41L1 + ZCE11	 ZCMD41L1 + ZCE02	 ZCMD41L1 + ZCE24	 ZCMD41L1 + ZCEF0	 ZCMD41L1 + ZCEG1	 ZCMD41L1 + ZCEF2
Weight, kg (lb)	0.160 (0.353)	0.160 (0.353)	0.165 (0.364)	0.180 (0.397)	0.175 (0.386)	0.200 (0.441)	0.185 (0.408)
Contact operation			(A) = cam displacement (P) = positive opening point		⊖ N/C contact with positive opening operation, when properly mounted and using a conforming operator		
Characteristics							
Switch actuation	On end		By 30° cam		On end		By 30° cam
Type of actuation							
Maximum actuation speed	0.5 m/s (1.64 ft/s)						0.1 m/s (0.33 ft/s)
Minimum force or torque	For tripping	8.5 N (1.91 lb)	7 N (1.57 lb)	2.5 N (0.56 lb)	8.5 N (1.91 lb)		7 N (1.57 lb)
	For positive opening	42.5 N (9.55 lb)	35 N (7.87 lb)	12.5 N (2.81 lb)	42.5 N (9.55 lb)		35 N (7.87 lb)
Cabling	PvR cable, 1 m (3.3 ft) long: 5 x 0.75 mm ² for 2-pole contact versions; 7 x 0.5 mm ² for 3-pole contact versions; 9 x 0.34 mm ² for 4-pole contact versions. For other cable lengths, see page 430.						

NOTE: For more information, consult pages 426–428.

Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD, Pre-Cabled

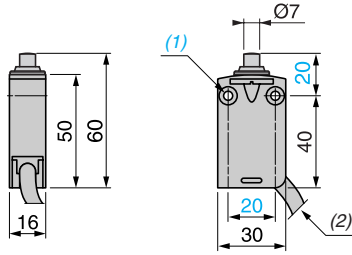
Type of head	Rotary (mounting by the body)				Multi-directional	
Type of operator	Thermoplastic roller lever	Steel roller lever	Roller lever with ball bearing mounted roller	Variable length thermoplastic roller lever	Cat's whisker (1)	
Catalog numbers						
 BK-WH, BU, BN, GN-YE	2-pole N/C + N/O snap action	XCMD2115L1 	XCMD2116L1 	XCMD2117L1 	XCMD2145L1 	XCMD2106L1
 BK-WH, BU, BN, GN-YE	2-pole N/C + N/O break before make, slow break	XCMD2515L1 	XCMD2516L1 	XCMD2517L1 	XCMD2545L1 	XCMD2506L1
 BK-WH, RD, WH, GN-YE	2-pole N/C + N/C snap action	ZCMD29L1 + ZCE01 + ZCY15 	ZCMD29L1 + ZCE01 + ZCY16 	ZCMD29L1 + ZCE01 + ZCY17 	ZCMD29L1 + ZCE01 + ZCY45 	ZCMD29L1 + ZCE06
 BK-WH, RD, WH, BU, GN-YE	3-pole N/C + N/C + N/O snap action	ZCMD39L1 + ZCE01 + ZCY15 	ZCMD39L1 + ZCE01 + ZCY16 	ZCMD39L1 + ZCE01 + ZCY17 	ZCMD39L1 + ZCE01 + ZCY45 	ZCMD39L1 + ZCE06
 BK-WH, RD, WH, BU, GN-YE	3-pole N/C + N/C + N/O break before make, slow break	ZCMD37L1 + ZCE01 + ZCY15 	ZCMD37L1 + ZCE01 + ZCY16 	ZCMD37L1 + ZCE01 + ZCY17 	ZCMD37L1 + ZCE01 + ZCY45 	ZCMD37L1 + ZCE06
Weight, kg (lb)	0.220 (0.485)	0.225 (0.496)	0.220 (0.485)	0.230 (0.507)	0.180 (0.397)	
 BK-WH, RD, WH, BU, VT, GN-YE	4-pole N/C + N/C + N/O + N/O snap action	ZCMD41L1 + ZCE01 + ZCY15 	ZCMD41L1 + ZCE01 + ZCY16 	ZCMD41L1 + ZCE01 + ZCY17 	ZCMD41L1 + ZCE01 + ZCY45 	ZCMD41L1 + ZCE06
Weight, kg (lb)	0.200 (0.441)	0.205 (0.452)	0.200 (0.441)	0.210 (0.463)	0.160 (0.353)	
Contact operation	contact closed contact open	(A) = cam displacement (P) = positive opening point		N/C contact with positive opening operation, when properly mounted and using a conforming operator		
1. Value taken with actuation by moving part at 100 mm (3.94 in.) from the mountings.						
Characteristics						
Switch actuation	By 30° cam				By any moving part	
Type of actuation						
Maximum actuation speed	1.5 m/s (4.92 ft/s)				1 m/s (3.28 ft/s)	
Minimum force or torque	For tripping	0.1 N•m (0.89 lb-in)				
	For positive opening	0.5 N•m (4.43 lb-in)				
Cabling	PvR cable, 1 m (3.3 ft) long: 5 x 0.75 mm ² for 2-pole contact versions; 7 x 0.5 mm ² for 3-pole contact versions, 9 x 0.34 mm ² for 4-pole contact versions. For other cable lengths, see page 430.					
NOTE: For more information, consult pages 426–428.						

Limit Switches

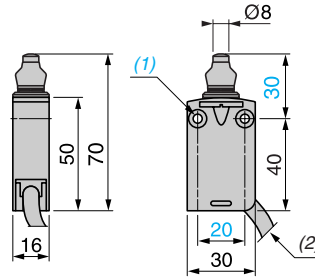
Osiswitch® Miniature, Metal

Universal, XCMD, Pre-Cabled—Dimensions

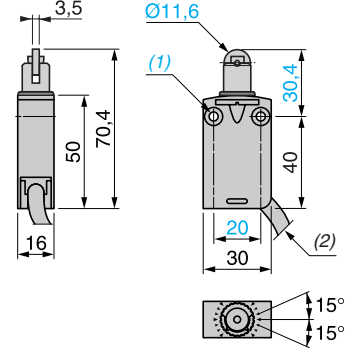
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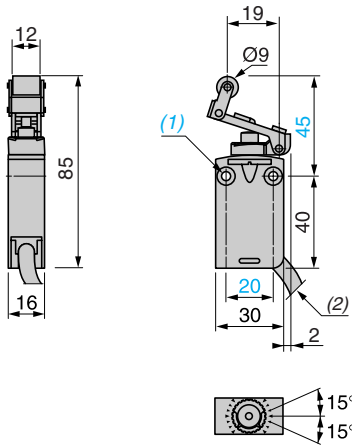
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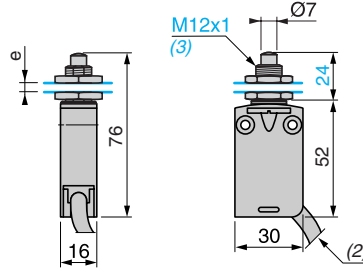
XCMD2•02L1



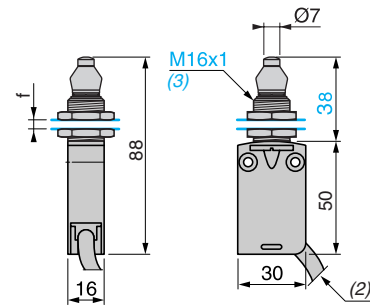
XCMD2•24L1



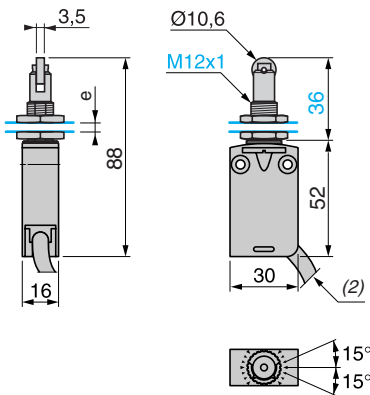
XCMD2•F0L1



XCMD2•G1L1



XCMD2•F2L1



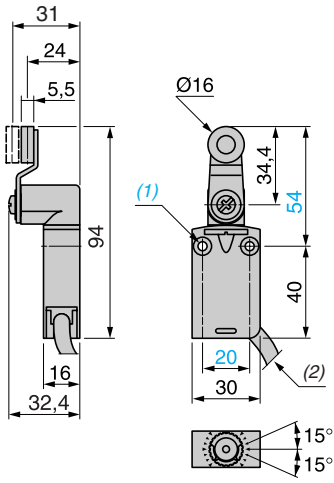
1. 2 mounting holes $\text{Ø} 4.2 \text{ mm}$ (0.17 in.), counterbored $\text{Ø} 8 \text{ mm}$ (0.31 in.) by 4 mm (0.16 in.) deep.
2. Overall diameter of cable 7.5 mm (0.30 in.).
3. Mounting nut thickness 3.5 mm (0.14 in.).
- e: 8 mm (0.31 in.) max, panel cut-out $\text{Ø} 12.5 \text{ mm}$ (0.49 in.).
- f: 8 mm (0.31 in.) max, panel cut-out $\text{Ø} 16.5 \text{ mm}$ (0.65 in.).

Limit Switches

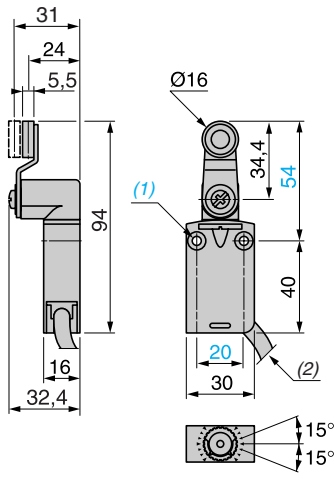
Osiswitch® Miniature, Metal

Universal, XCMD, Pre-Cabled—Dimensions

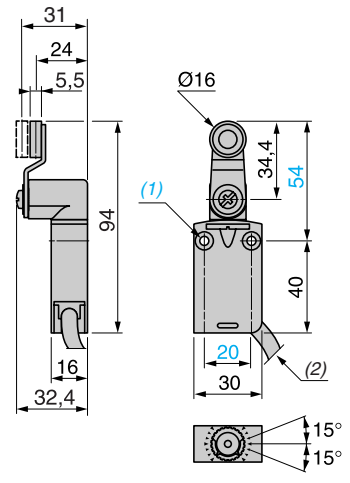
XCMD2•15L1



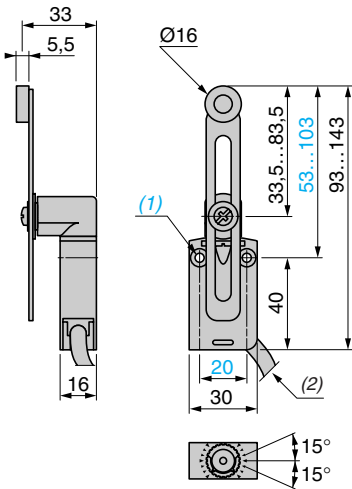
XCMD2•16L1



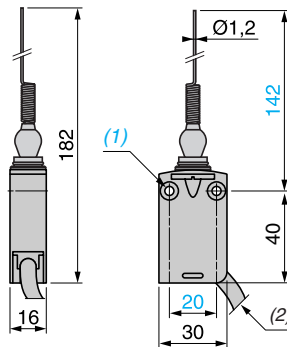
XCMD2•17L1



XCMD2•45L1



XCMD2•06L1



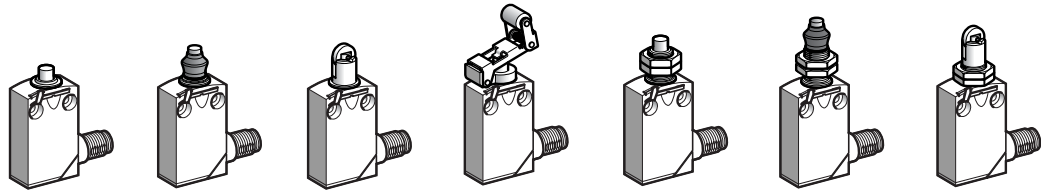
- 1. 2 mounting holes $\varnothing 4.2$ mm (0.17 in.), counterbored $\varnothing 8$ mm (0.31 in.) by 4 mm (0.16 in.) deep.
- 2. Overall diameter of cable 7.5 mm (0.30 in.).
- e: 8 mm (0.31 in.) max, panel cut-out $\varnothing 12.5$ mm (0.49 in.).
- f: 8 mm (0.31 in.) max, panel cut-out $\varnothing 16.5$ mm (0.65 in.).

Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD, Integral or Remote Connector

Type of head Plunger (mounting by the body) Plunger (mounting by the head)



Type of operator Metal end plunger Metal end plunger with elastomer boot Steel roller plunger Retractable steel roller lever plunger M12 with metal end plunger M16 with metal end plunger with elastomer boot M12 with steel roller plunger

Catalog numbers

<p>Single-pole C/O snap action + integral M12 4-pin connector</p>	<p>XCMD2110M12 1,8 4,2(P) 0,8 5mm</p>	<p>XCMD2111M12 1,8 4,2(P) 0,8 5mm</p>	<p>XCMD2102M12 3,1(A) 7(P) 1,4 mm</p>	<p>XCMD2124M12 11,2(A) 25(P) 0 4,9 mm</p>	<p>XCMD21F0M12 1,8 4,2(P) 0,8 5mm</p>	<p>XCMD21G1M12 1,8 4,2(P) 0,8 5mm</p>	<p>XCMD21F2M12 3,1(A) 7(P) 1,4 mm</p>
<p>2-pole N/C + N/O snap action + integral M12 5-pin connector</p>	<p>XCMD2110C12 1,8 4,2(P) 0,8 5mm</p>	<p>XCMD2111C12 1,8 4,2(P) 0,8 5mm</p>	<p>XCMD2102C12 3,1(A) 7(P) 1,4 mm</p>	<p>XCMD2124C12 11,2(A) 25(P) 0 4,9 mm</p>	<p>XCMD21F0C12 1,8 4,2(P) 0,8 5mm</p>	<p>XCMD21G1C12 1,8 4,2(P) 0,8 5mm</p>	<p>XCMD21F2C12 3,1(A) 7(P) 1,4 mm</p>
<p>2-pole N/C + N/C snap action + integral M12 5-pin connector</p>	<p>ZCMD29C12 + ZCE10 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD29C12 + ZCE11 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD29C12 + ZCE02 3,1(A) 7(P) 1,4 mm</p>	<p>ZCMD29C12 + ZCE24 11,2(A) 25(P) 0 4,9 mm</p>	<p>ZCMD29C12 + ZCEF0 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD29C12 + ZCEG1 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD29C12 + ZCEF2 3,1(A) 7(P) 1,4 mm</p>
<p>Weight, kg (lb)</p>	0.085 (0.187)	0.085 (0.187)	0.090 (0.198)	0.105 (0.231)	0.100 (0.220)	0.125 (0.276)	0.110 (0.243)
<p>2-pole N/C + N/O snap action + M12 5-pin connector on 0.8 m (2.6 ft) flying lead</p>	<p>ZCMD21L08R12 + ZCE10 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD21L08R12 + ZCE11 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD21L08R12 + ZCE02 3,1(A) 7(P) 1,4 mm</p>	<p>ZCMD21L08R12 + ZCE24 11,2(A) 25(P) 0 4,9 mm</p>	<p>ZCMD21L08R12 + ZCEF0 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD21L08R12 + ZCEG1 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD21L08R12 + ZCEF2 3,1(A) 7(P) 1,4 mm</p>
<p>2-pole N/C + N/O snap action + 7/8" 16UN 5-pin connector on 0.8 m (2.6 ft) flying lead</p>	<p>ZCMD21L08U78 + ZCE10 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD21L08U78 + ZCE11 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD21L08U78 + ZCE02 3,1(A) 7(P) 1,4 mm</p>	<p>ZCMD21L08U78 + ZCE24 11,2(A) 25(P) 0 4,9 mm</p>	<p>ZCMD21L08U78 + ZCEF0 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD21L08U78 + ZCEG1 1,8 4,2(P) 0,8 5mm</p>	<p>ZCMD21L08U78 + ZCEF2 3,1(A) 7(P) 1,4 mm</p>
<p>Weight, kg (lb)</p>	0.150 (0.331)	0.150 (0.331)	0.155 (0.342)	0.170 (0.375)	0.165 (0.364)	0.190 (0.419)	0.175 (0.386)
<p>Contact operation</p>	contact closed contact open		(A) = cam displacement (P) = positive opening point		N/C contact with positive opening operation, when properly mounted and using a conforming operator		

Characteristics

Switch actuation	On end	By 30° cam		On end	By 30° cam
Type of actuation					
Maximum actuation speed	0.5 m/s (1.64 ft/s)			0.1 m/s (0.33 ft/s)	
Minimum force or torque	For tripping	8.5 N (1.91 lb)	7 N (1.57 lb)	2.5 N (0.56 lb)	8.5 N (1.91 lb)
	For positive opening	42.5 N (9.55 lb)	35 N (7.87 lb)	12.5 N (2.81 lb)	42.5 N (9.55 lb)
Positive operation	Although their design is identical to the pre-cabled switches, the switches incorporating an M12 4-pin connector cannot be marked with the symbol because they are single-pole C/O.				

NOTE: For more information, consult pages 426–428.

Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD, Integral or Remote Connector

Type of head	Rotary (mounting by the body)			Multi-directional	

Type of operator	Thermoplastic roller lever	Steel roller lever	Roller lever with ball bearing mounted roller	Variable length thermoplastic roller lever	Cat's whisker (1)
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Catalog numbers

 Single-pole C/O snap action With integral M12 4-pin connector	XCMD2115M12 25° 70°(P) 0 12° 90°	XCMD2116M12 25° 70°(P) 0 12° 90°	XCMD2117M12 25° 70°(P) 0 12° 90°	XCMD2145M12 25° 70°(P) 0 12° 90°	XCMD2106M12 20° 10°
 2-pole N/C + N/O snap action With integral M12 5-pin connector	XCMD2115C12 25° 70°(P) 0 12° 90°	XCMD2116C12 25° 70°(P) 0 12° 90°	XCMD2117C12 25° 70°(P) 0 12° 90°	XCMD2145C12 25° 70°(P) 0 12° 90°	XCMD2106C12 20° 10°
 2-pole N/C + N/C snap action With integral M12 5-pin connector	ZCMD29C12 + ZCE01 + ZCY15 20° 70°(P) 0 12° 90°	ZCMD29C12 + ZCE01 + ZCY16 20° 70°(P) 0 12° 90°	ZCMD29C12 + ZCE01 + ZCY17 20° 70°(P) 0 12° 90°	ZCMD29C12 + ZCE01 + ZCY45 20° 70°(P) 0 12° 90°	ZCMD29C12 + ZCE06 20° 10°
Weight, kg (lb)	0.125 (0.276)	0.130 (0.287)	0.125 (0.276)	0.135 (0.298)	0.085 (0.187)
 2-pole N/C + N/O snap action With M12 5-pin connector on 0.8 m (2.6 ft) flying lead	ZCMD21L08R12 + ZCE01 + ZCY15 25° 70°(P) 0 12° 90°	ZCMD21L08R12 + ZCE01 + ZCY16 25° 70°(P) 0 12° 90°	ZCMD21L08R12 + ZCE01 + ZCY17 25° 70°(P) 0 12° 90°	ZCMD21L08R12 + ZCE01 + ZCY45 25° 70°(P) 0 12° 90°	ZCMD21L08R12 + ZCE06 20° 10°
 2-pole N/C + N/O snap action With 7/8" 16UN 5-pin connector on 0.8 m (2.6 ft) flying lead	ZCMD21L08U78 + ZCE01 + ZCY15 25° 70°(P) 0 12° 90°	ZCMD21L08U78 + ZCE01 + ZCY16 25° 70°(P) 0 12° 90°	ZCMD21L08U78 + ZCE01 + ZCY17 25° 70°(P) 0 12° 90°	ZCMD21L08U78 + ZCE01 + ZCY45 25° 70°(P) 0 12° 90°	ZCMD21L08U78 + ZCE06 20° 10°
Weight, kg (lb)	0.200 (0.441)	0.205 (0.452)	0.200 (0.441)	0.210 (0.463)	0.160 (0.353)
Contact operation	contact closed contact open	(A) = cam displacement (P) = positive opening point		⊖ N/C contact with positive opening operation, when properly mounted and using a conforming operator	

1. Value taken with actuation by moving part at 100 mm (3.94 in.) from the mounting.

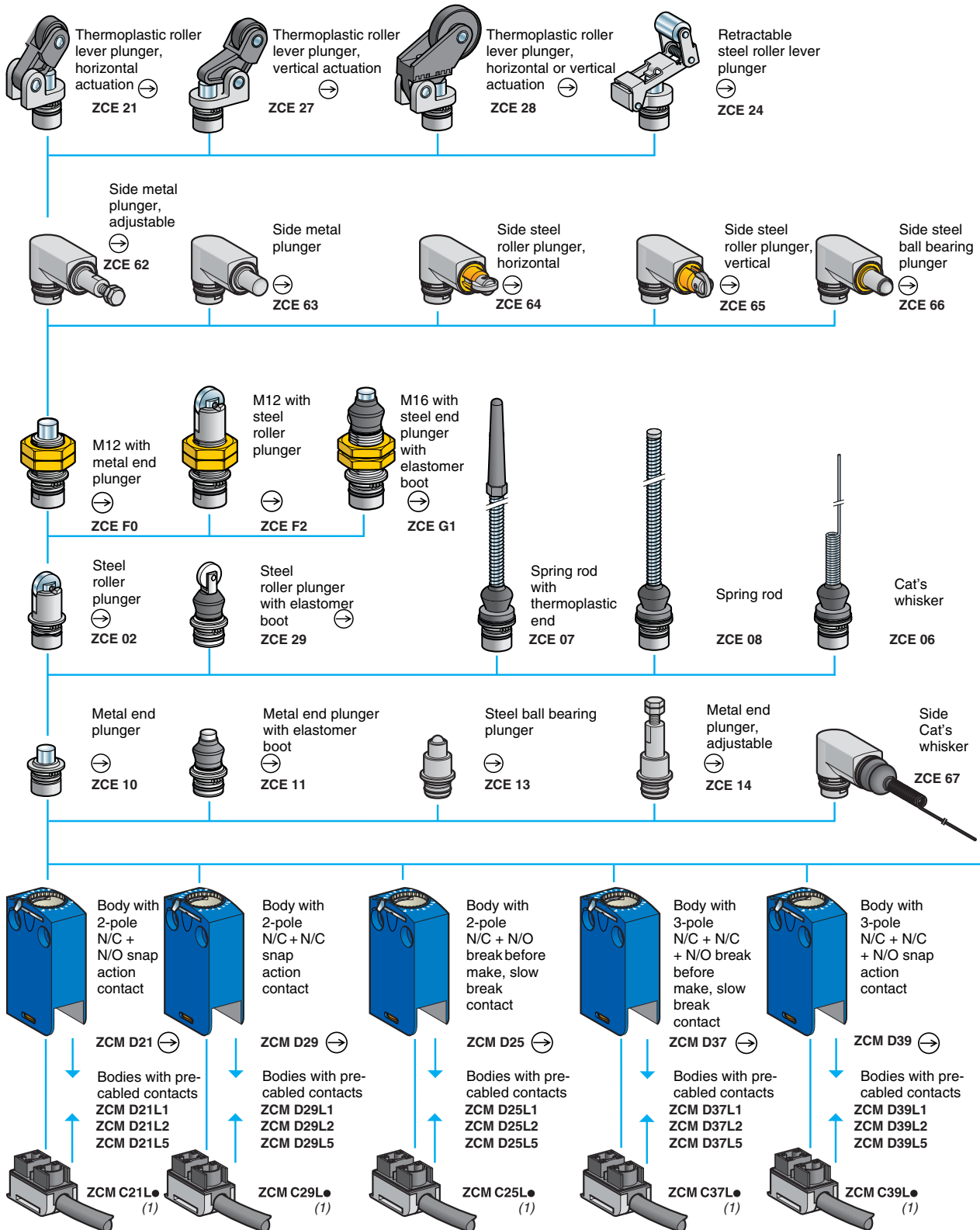
Characteristics

Switch actuation	By 30° cam	By any moving part
Type of actuation		
Maximum actuation speed	1.5 m/s (4.92 ft/s)	1 m/s (3.28 ft/s)
Minimum force or torque	For tripping: 0.1 N*m (0.89 lb-in) For positive opening: 0.5 N*m (4.43 lb-in)	
Positive operation	Although their design is identical to the pre-cabled switches, the switches incorporating an M12 4-pin connector cannot be marked with the ⊖ symbol because they are single-pole C/O.	

Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD—Modular



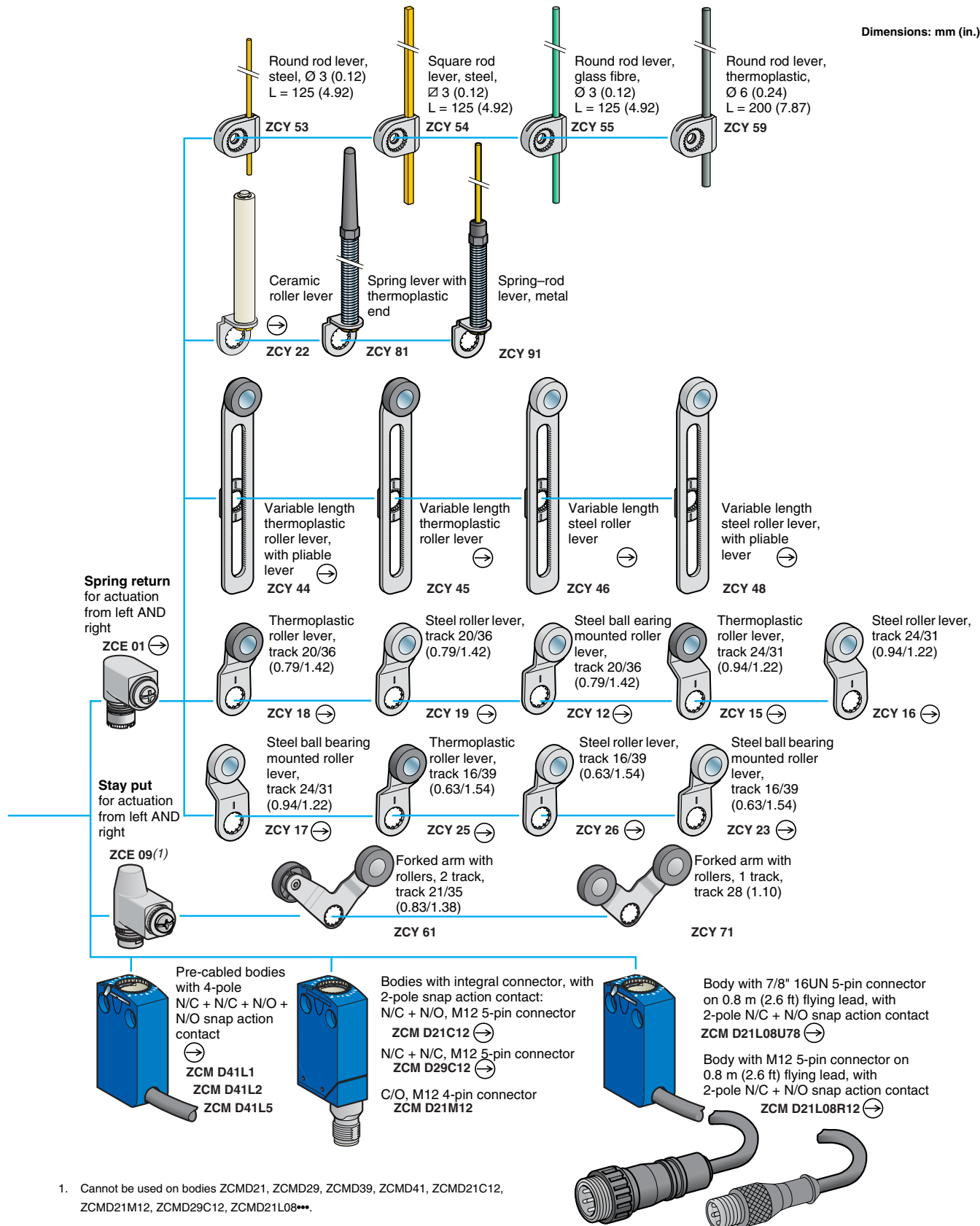
1. Pre-cabled connection components: replace the "*" in the catalog number with the required cable length in meters, either: 1, 2, 3, 5, 7 or 10. Example: ZCMC21L* becomes ZCMC21L7 for a 7 m (23.0 ft) cable. Note: only cable lengths of 1, 2 and 5 m (3.3, 6.6, and 16.4 ft) are available for pre-cabled connection components ZCMC37L* and ZCMC39L*.

Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD—Modular

Dimensions: mm (in.)



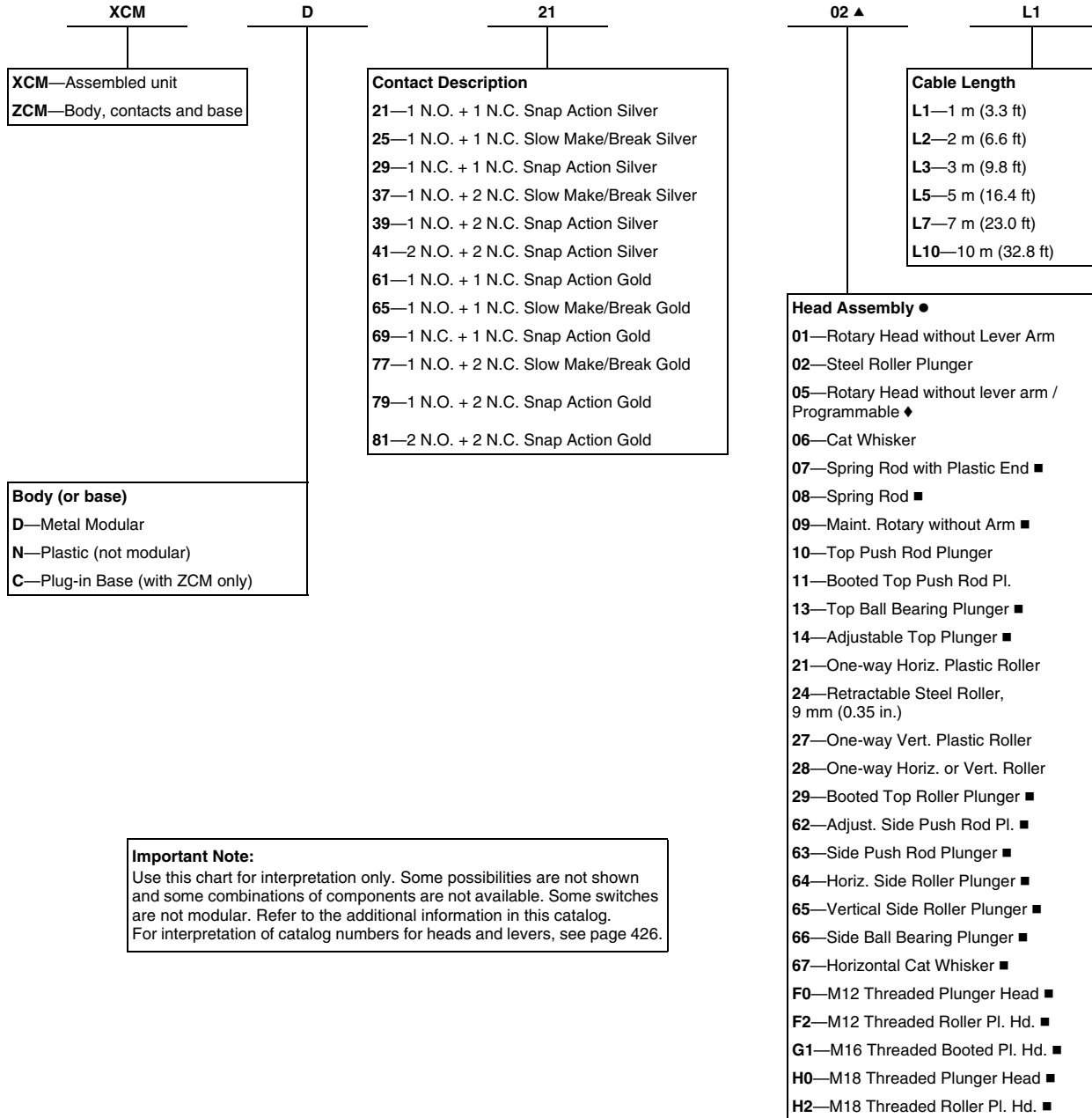
Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD—Modular

Special Features and Catalog Number Explanation

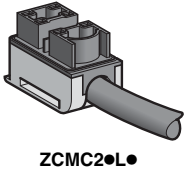
Interpretation of the Catalog Number



Important Note:
 Use this chart for interpretation only. Some possibilities are not shown and some combinations of components are not available. Some switches are not modular. Refer to the additional information in this catalog. For interpretation of catalog numbers for heads and levers, see page 426.

- Consult your local field sales office for availability.
- ▲ Last two digits of lever catalog number occupy this position when rotary heads with levers are required.
- See page 426 for levers.
- ◆ See page 431 for available levers, specifically allowed for the ZCE05 programmable head.

Limit Switches
Osiswitch® Miniature, Metal
Universal, XCMD—Modular



Components

Plug-in base with PVR cable ♦				
Contact type	Diagram	Length of PVR cable m (ft)	Catalog number ■	Weight lb (kg)
2-pole				
2-pole N.C. + N.O. snap action		1 (3.3)	ZCMC21L1	0.22 (0.100)
2-pole N.C. + N.O. snap action		2 (6.6)	ZCMC21L2	0.42 (0.190)
2-pole N.C. + N.O. snap action		3 (9.8)	ZCMC21L3	0.62 (0.280)
2-pole N.C. + N.O. snap action		5 (16.4)	ZCMC21L5	1.00 (0.440)
2-pole N.C. + N.O. snap action		7 (23.0)	ZCMC21L7	1.50 (0.700)
2-pole N.C. + N.O. snap action		10 (32.8)	ZCMC21L10	2.10 (0.970)
2-pole N.C. + N.O. slow break-before-make		1 (3.3)	ZCMC25L1	0.22 (0.100)
2-pole N.C. + N.O. slow break-before-make		2 (6.6)	ZCMC25L2	0.42 (0.190)
2-pole N.C. + N.O. slow break-before-make		3 (9.8)	ZCMC25L3	0.62 (0.280)
2-pole N.C. + N.O. slow break-before-make		5 (16.4)	ZCMC25L5	1.00 (0.440)
2-pole N.C. + N.O. slow break-before-make		7 (23.0)	ZCMC25L7	1.50 (0.700)
2-pole N.C. + N.O. slow break-before-make		10 (32.8)	ZCMC25L10	2.10 (0.970)

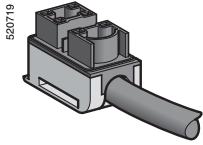
- ♦ The plug-in base receptacle must match the contact pin outs in the body. Only the length of cord is variable. See page 426 for 3-pole plug-in bases with cord. The 4-pole units and connector versions do not have component modular bases. See pages 420 and 421 for 4 contact bodies, and pages 424 and 425 for M12 connector bodies.
- Available cable lengths:
 ZCMC29L•: 1, 2, 3, 5, 7, and 10 m (3.3, 6.6, 9.8, 16.4, 23.0, and 32.8 ft)
 ZCMC37L•: 1, 2, and 5 m (3.3, 6.6, and 16.4 ft)
 ZCMC39L•: 1, 2, and 5 m (3.3, 6.6, and 16.4 ft)

Limit Switches

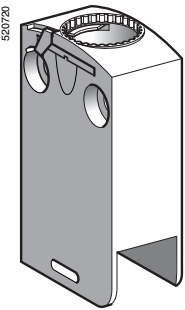
Osiswitch® Miniature, Metal

Universal, XCMD—Modular

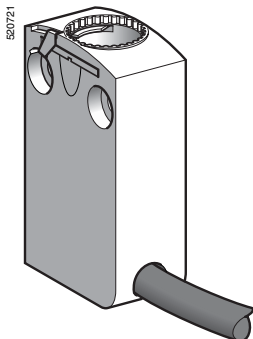
Components



ZCMC21E•



ZCMD6•
ZCMD7•



ZCMD81L•

Pre-cabled connection components (CEI cable) (1)

Type of contact	Wiring diagram	Length of CEI cable, m (ft)	Catalog Number	Weight kg (lb)
2-pole				
N/C + N/O snap action		1 (3.28)	ZCMC21E1	0.100 (0.220)
		2 (6.56)	ZCMC21E2	0.190 (0.419)
		3 (9.84)	ZCMC21E3	0.280 (0.617)
		5 (16.40)	ZCMC21E5	0.440 (0.970)
		7 (22.97)	ZCMC21E7	0.700 (1.543)
		10 (32.81)	ZCMC21E10	0.970 (2.138)

Bodies with gold contacts

Type of contact	Positive operation (2)	Wiring diagram	Length of cable, m (ft)	Catalog Number	Weight kg (lb)
2-pole					
N/C + N/O snap action	⊕		—	ZCMD61	0.055 (0.121)
N/C + N/C snap action	⊕		—	ZCMD69	0.055 (0.121)
N/C + N/O break before make, slow break	⊕		—	ZCMD65	0.055 (0.121)
3-pole					
N/C + N/C + N/O snap action	⊕		—	ZCMD79	0.055 (0.121)
N/C + N/C + N/O break before make, slow break	⊕		—	ZCMD77	0.055 (0.121)
4-pole					
N/C + N/C + N/O + N/O snap action	⊕		1 (3.28)	ZCMD81L1	0.160 (0.353)
			2 (6.56)	ZCMD81L2	0.255 (0.562)
			5 (16.40)	ZCMD81L5	0.525 (1.157)

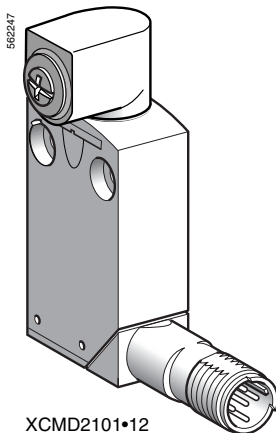
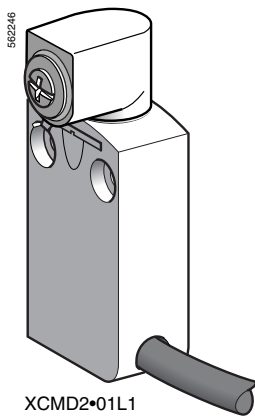
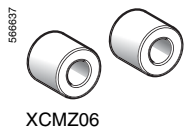
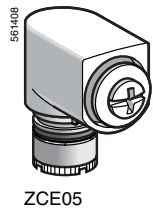
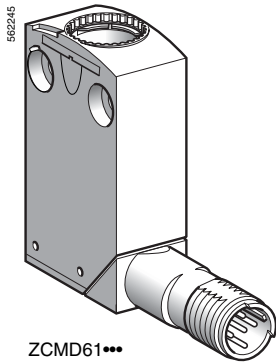
1. Cable not UL, CSA certified.

2. ⊕ bodies with contacts assuring positive opening operation, when properly mounted and using a conforming operator.

Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD



Bodies with gold contacts, integral connector

Type of contact	Positive operation (1)	Wiring diagram	Connector	Catalog Number	Weight kg (lb)
2-pole					
N/C + N/O snap action	—		M12 5-pin	ZCMD61C12	0.065 (0.143)
N/C + N/C snap action	—		M12 5-pin	ZCMD69C12	0.065 (0.143)
Single-pole					
C/O snap action	—		M12 4-pin	ZCMD61M12	0.065 (0.143)

Accessories

Description	Positive operation (1)	Suitable levers for use with head	Catalog Number	Weight kg (lb)
Rotary head, without lever, spring return, for actuation from left AND right or from left OR right (2)	⊕	ZCY12, ZCY15, ZCY16, ZCY17, ZCY18, ZCY19, ZCY22, ZCY23, ZCY25, ZCY26, ZCY39, ZCY53, ZCY54, ZCY55, ZCY81	ZCE05	0.045 (0.099)
Spacer for mounting multi-track XCMD	—	—	XCMZ06	0.005 (0.011)
Spacer for angular positioning of heads with adjustable levers, for values other than -90°, 0° and 90°	—	—	XCMZ07	0.005 (0.011)

Bodies with contacts, with rotary head (without operating lever), pre-cabled

Type of contact	Positive operation (1)	Wiring diagram	Length of cable, m (ft)	Catalog Number	Weight kg (lb)
2-pole					
N/C + N/O snap action	⊕		1 (3.28)	XCMD2101L1	0.180 (0.397)
N/C + N/O break before make, slow break	⊕		1 (3.28)	XCMD2501L1	0.180 (0.397)

Bodies with contacts, with rotary head (without operating lever), integral connector

Type of contact	Positive operation (1)	Wiring diagram	Connector	Catalog Number	Weight kg (lb)
2-pole					
N/C + N/O snap action	⊕		M12 5-pin	XCMD2101C12	0.110 (0.243)
Single-pole					
C/O snap action	—		M12 4-pin	XCMD2101M12	0.110 (0.243)

- ⊕ bodies with contacts or head assuring positive opening operation, when properly mounted and using a conforming operator.
- For programming see page 400.

Limit Switches

Osiswitch® Miniature, Metal

Universal, XCMD—Connector Cabling Accessories

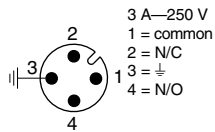
Catalog Numbers of suitable pre-wired female connectors

Type of connector	M12 straight, 4-pin 4 A, 250 V	M12 straight, 5-pin 4 A, 24 V	M12 elbowed, 5-pin 4 A, 24 V	7/8" 16 UN straight, 5-pin, 6 A, 250 V
With cable	L = 2 m (6.56 ft)	XZCP1169L2	XZCP1164L2	XZCP1264L2
	L = 5 m (16.40 ft)	XZCP1169L5	XZCP1164L5	XZCP1264L5
	L = 10 m (32.81 ft)	XZCP1169L10	XZCP1164L10	XZCP1264L10
Weight, kg (lb)	0.105 (0.231)	0.115 (0.254)	0.115 (0.254)	0.190 (0.419)

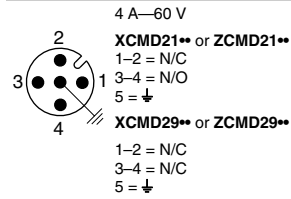
Connections

XCMD with connector

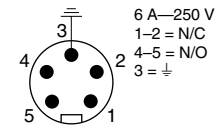
4-pin, M12



5-pin, M12

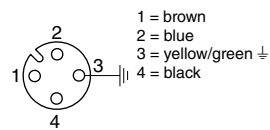


5-pin, 7/8" 16 UN

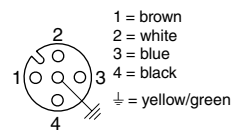


Pre-wired female connectors XZCP

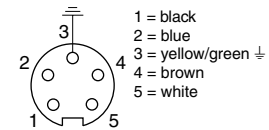
4-pin, M12



5-pin, M12

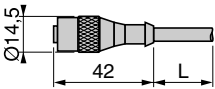


5-pin, 7/8" 16 UN

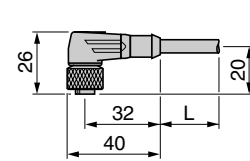


Dimensions

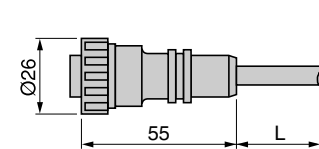
XZCP116•L•



XZCP1264L•



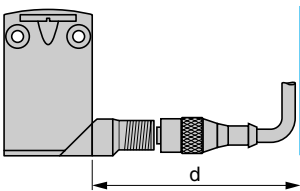
XZCP1771L•



L: cable length 2, 5, or 10 m (6.6, 16.4, or 32.8 ft)

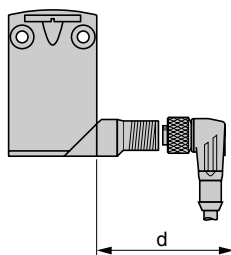
Distances required for plug-in connectors

M12 straight connector



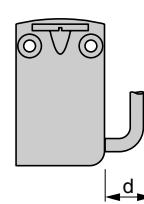
d: min. 65 mm (2.56 in.),
recommended 69 mm (2.72 in.)

M12 elbowed connector



d: min. 42 mm (1.65 in.),
recommended 45 mm (1.77 in.)

Connector on flying lead



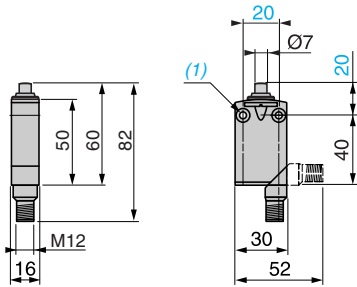
d: min. 20 mm (0.79 in.)

Limit Switches

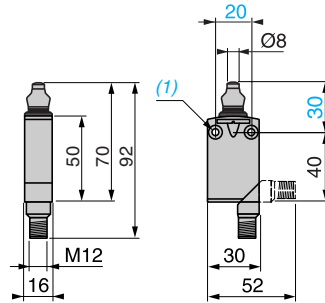
Osiswitch® Miniature, Metal

Universal, XCMD, Integral or Remote Connector

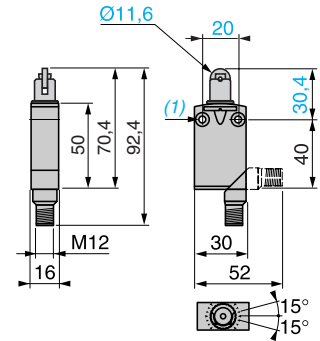
XCMD2•10M12



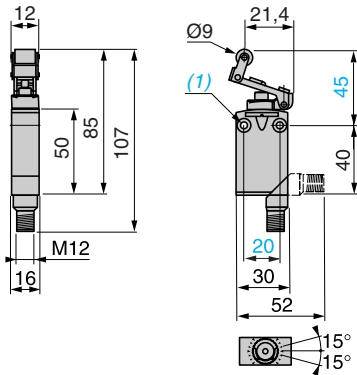
XCMD2•11M12



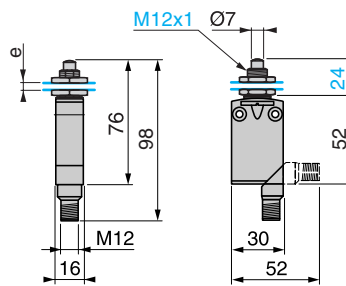
XCMD2•02M12



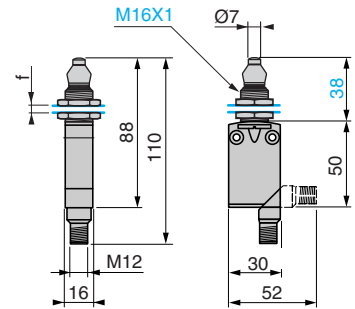
XCMD2•24M12



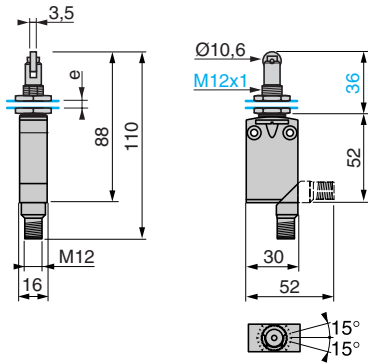
XCMD2•F0M12



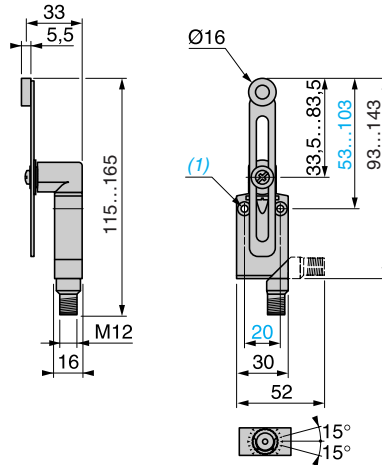
XCMD2•G1M12



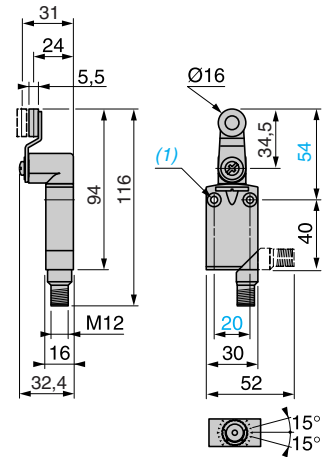
XCMD2•F2M12



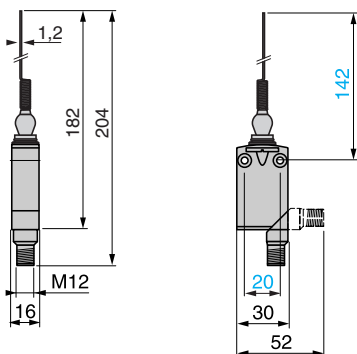
XCMD2•45M12



XCMD2•15M12 / 16M12 / 17M12



XCMD2•06M12



- 1. 2 mounting holes Ø 4.2 mm (0.17 in.), counterbored Ø 8 mm (0.31 in.) by 4 mm (0.16 in.) deep.
- e: 8 mm (0.31 in.) max., panel cut-out Ø 12.5 mm (0.49 in.), mounting nut thickness 3.5 mm (0.14 in.).
- f: 8 mm (0.31 in.) max., panel cut-out Ø 16.5 mm (0.65 in.), mounting nut thickness 3.5 mm (0.14 in.).

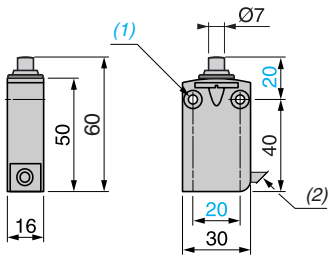
Limit Switches

Limit Switches

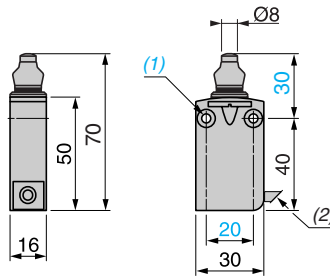
Osiswitch® Miniature, Metal

Universal, XCMD, Integral or Remote Connector

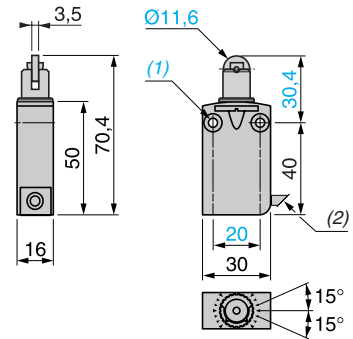
ZCMD21L08*** + ZCE10



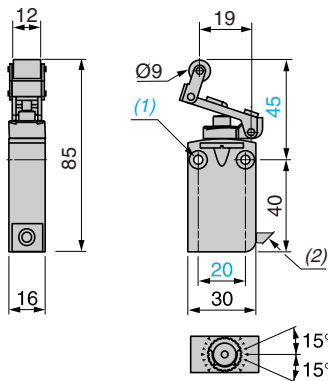
ZCMD21L08*** + ZCE11



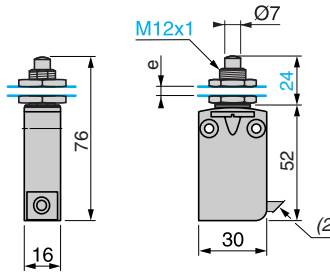
ZCMD21L08*** + ZCE02



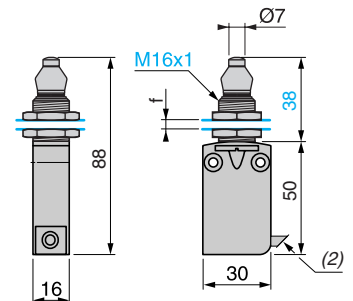
ZCMD21L08*** + ZCE24



ZCMD21L08*** + ZCEF0



ZCMD21L08*** + ZCEG1



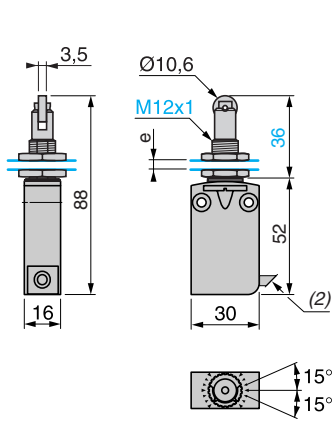
1. 2 mounting holes $\text{Ø} 4.2 \text{ mm}$ (0.17 in.), counterbored $\text{Ø} 8 \text{ mm}$ (0.31 in.) by 4 mm (0.16 in.) deep.
2. Overall diameter 7.5 mm (0.30 in.).
- e: 8 mm (0.31 in.) max., panel cut-out $\text{Ø} 12.5 \text{ mm}$ (0.49 in.), mounting nut thickness 3.5 mm (0.14 in.).
- f: 8 mm (0.31 in.) max., panel cut-out $\text{Ø} 16.5 \text{ mm}$ (0.65 in.), mounting nut thickness 3.5 mm (0.14 in.).

Limit Switches

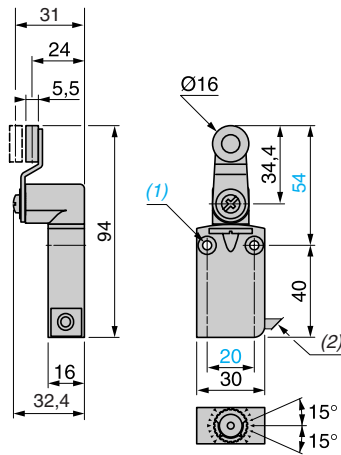
Osiswitch® Miniature, Metal

Universal, XCMD, Integral or Remote Connector

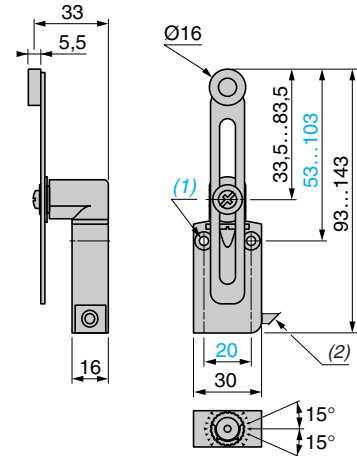
ZCMD21L08*** + ZCEF2



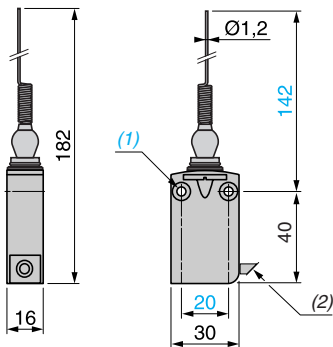
ZCMD21L08*** + ZCE01 + ZCY15/16/17



ZCMD21L08*** + ZCE01 + ZCY45



ZCMD21L08*** + ZCE06



1. 2 mounting holes Ø 4.2 mm (0.17 in.), counterbored Ø 8 mm (0.31 in.) by 4 mm (0.16 in.) deep.
2. Overall diameter 7.5 mm (0.30 in.).
- e: 8 mm (0.31 in.) max., panel cut-out Ø 12.5 mm (0.49 in.), mounting nut thickness 3.5 mm (0.14 in.).
- f: 8 mm (0.31 in.) max., panel cut-out Ø 16.5 mm (0.65 in.), mounting nut thickness 3.5 mm (0.14 in.).

Limit Switches

Osiswitch® Miniature, Plastic

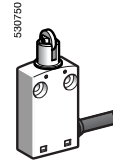
XCMN

■ XCMN
pre-cabled

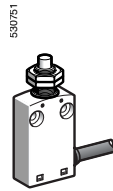
□ With head for linear movement (plunger). Mounting by the body.



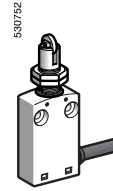
Page 438



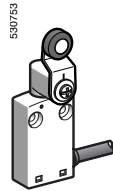
□ With head for linear movement (plunger). Mounting by the head.



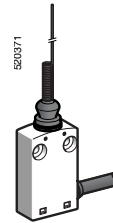
Page 438



□ With head for rotary movement (lever) or multi-directional.



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Limit Switches

Osiswitch® Miniature, Plastic

XCMN

Environmental characteristics		
Conforming to standards	Products	IEC 60947-5-1, EN 60947-5-1, UL 508, CSA C22-2 n° 14
	Machine assemblies	IEC 60204-1, EN 60204-1
Product certifications		UL, CSA, CCC
Protective treatment	Standard version	"TC"
Ambient air temperature	Operation	- 25...+70 °C (-13...+158 °F)
	Storage	- 40...+70 °C (-40...+158 °F)
Vibration resistance	Conforming to IEC 60068-2-6	5 gn (10...500 Hz)
Shock resistance	Conforming to IEC 60068-2-27	25 gn (18 ms)
Electric shock protection		Class II conforming to IEC 61140 and NF C 20030
Degree of protection		IP 65 conforming to IEC 60529; IK 04 conforming to EN 50102
Materials	Bodies	Plastic
	Heads	Zamak® zinc alloy
Contact block characteristics		
Rated operational characteristics		~ AC-15; B300 (Ue = 240 V, Ie = 1.5 A); Ithe = 6 A
		== DC-13; R300 (Ue = 250 V, Ie = 0.1 A), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1
Rated insulation voltage		Ui = 400 V degree of pollution 3 conforming to IEC 60947-1 Ui = 300 V conforming to UL 508, CSA C22-2 n° 14
Rated impulse withstand voltage		U imp = 4 kV conforming to IEC 60947-1, IEC 60664
Short-circuit protection		6 A cartridge fuse type gG (gl)

Limit Switches

Osiswitch® Miniature, Plastic

XCMN, Pre-Cabled

Type of head	Plunger (mounting by the body)				Plunger (mounting by the head)		
Type of operator	Metal end plunger	Steel roller plunger for lateral cam approach	Steel roller plunger for traverse cam approach	Thermoplastic roller lever plunger, 1 direction of actuation	M12 with metal end plunger	M12 with steel roller plunger for lateral cam approach	M12 with steel roller plunger for traverse cam approach

Catalog Numbers							
<p>2-pole N/C + N/O snap action</p>	XCMN2110L1	XCMN2102L1	XCMN2103L1	XCMN2121L1	XCMN21F0L1	XCMN21F2L1	XCMN21F3L1
Weight, kg (lb)	0.080 (0.176)	0.080 (0.176)	0.080 (0.176)	0.090 (0.198)	0.065 (0.143)	0.095 (0.209)	0.095 (0.209)
Contact operation				(A) = cam displacement (P) = positive opening point			

Characteristics								
Switch actuation	On end	By 30° cam			On end	By 30° cam		
Type of actuation								
Maximum actuation speed	0.5 m/s (1.64 ft/s)	0.1 m/s (0.33 ft/s)			0.5 m/s (1.64 ft/s)	0.1 m/s (0.33 ft/s)		
Minimum force or torque	For tripping	8.5 N (1.91 lb)	7 N (1.57 lb)			8.5 N (1.91 lb)	7 N (1.57 lb)	
	For positive opening	42.5 N (9.55 lb)	35 N (7.87 lb)			42.5 N (9.55 lb)	35 N (7.87 lb)	
Cabling	PvR cable, 4 x 0.75 mm ² , length 1 m (3.28 ft)							

Dimensions

XCMN2110L1

XCMN2102L1, XCMN2103L1

XCMN21F2L1, XCMN21F3L1

XCMN2121L1

XCMN21F0L1

1. 2 mounting holes \varnothing 4.2 mm (0.17 in.), counterbored \varnothing 8 mm (0.31 in.) by 4 mm (0.16 in.) deep.
2. Overall diameter 7.5 mm (0.30 in.).
- e: 8 mm (0.31 in.) max, panel cut-out \varnothing 12.5 mm (0.49 in.), mounting nut thickness 3.5 mm (0.14 in.).

Limit Switches

Limit Switches

Osiswitch® Miniature, Plastic

XCMN, Pre-Cabled

Type of head	Rotary (mounting by the body)			Multi-directional	
Type of operator	Thermoplastic roller lever	Variable length thermoplastic roller lever	Round thermoplastic rod lever Ø 6 mm (0.24 in.) (1)	Spring lever with thermoplastic end (1)	Cat's whisker (1)
Catalog Numbers	XCMN2115L1 	XCMN2145L1 	XCMN2159L1 	XCMN2107L1 	XCMN2106L1
Weight, kg (lb)	0.100 (0.220)	0.105 (0.231)	0.080 (0.176)	0.085 (0.187)	0.080 (0.176)
Contact operation	(A) = cam displacement (P) = positive opening point			⊕ N/C contact with positive opening operation, when properly mounted and using a conforming operator	

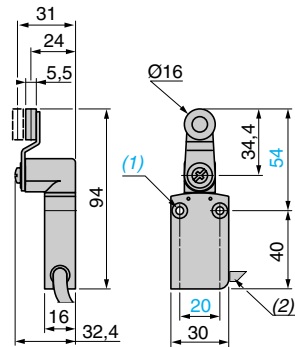
1. Value taken with actuation by moving part at 100 mm (3.94 in.) from the mountings.

Characteristics

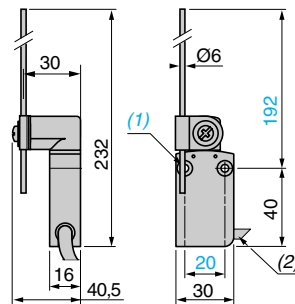
Switch actuation	By 30° cam	By any moving part
Type of actuation		
Maximum actuation speed	1.5 m/s (4.92 ft/s)	1 m/s (3.28 ft/s)
Minimum force or torque	For tripping: 0.1 N•m (0.89 lb-in) For positive opening: 0.5 N•m (4.43 lb-in)	—
Cabling	PvR cable, 4 x 0.75 mm ² , length 1 m (3.28 ft)	

Dimensions

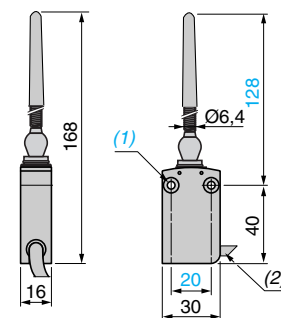
XCMN2115L1



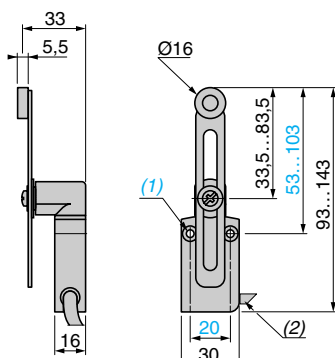
XCMN2159L1



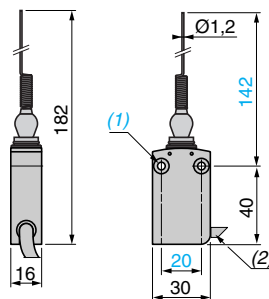
XCMN2107L1



XCMN2145L1



XCMN2106L1



- 2 mounting holes Ø 4.2 mm (0.17 in.), counterbored Ø 8 mm (0.31 in.) by 4 mm (0.16 in.) deep.
- Overall diameter 7.5 mm (0.30 in.).

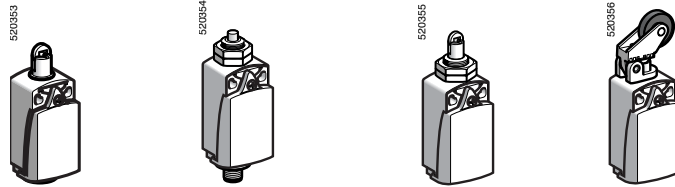
Limit Switches

Osiswitch® Compact

Universal, XCKP and XCKT Plastic / XCKD Metal

■ **XCKP, XCKD**
with 1 cable entry
Conforming to CENELEC EN 50047

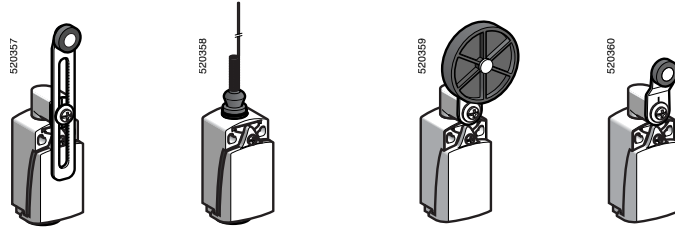
□ With head for linear movement (plunger). Mounting by the head or by the body.
XCKD **XCKP**



Pages 442 and 446

Pages 448 and 452

□ With head for rotary movement (lever) or multi-directional. Mounting by the body.
XCKD **XCKP**

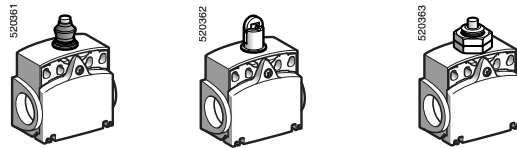


Pages 443 and 447

Pages 449 and 453

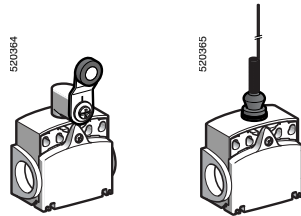
■ **XCKT**
with 2 cable entries
Tripping/resetting points and mounting centers conform to CENELEC EN 50047

□ With head for linear movement (plunger). Mounting by the head or by the body.
XCKT



Page 454

□ With head for rotary movement (lever) or multi-directional. Mounting by the body.
XCKT



Page 454

Environmental characteristics

Conforming to standards	Products	IEC 60947-5-1, EN 60947-5-1, UL 508, CSA C22-2 n° 14
	Machine assemblies	IEC 60204-1, EN 60204-1
Product certifications		UL, CSA, CCC
Protective treatment	Standard version	"TC"
Ambient air temperature	Operation	- 25...+70 °C (-13...+158 °F)
	Storage	- 40...+70 °C (-40...+158 °F)
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10...500 Hz) except switch with head ZCE24: 20 gn
Shock resistance	Conforming to IEC 60068-2-27	50 gn (11 ms) except heads ZCE08: 15 gn (11 ms) and ZCE24: 30 gn (18 ms)
Electric shock protection		Class II conforming to IEC 61140 and NF C 20-030 for XCKP and XCKT
		Class I conforming to IEC 61140 and NF C 20-030 for XCKD
Degree of protection		IP 66 and IP 67 conforming to IEC 60529; IK 04 conforming to EN 50102 for XCKP and XCKT, IK 06 conforming to EN 50102 for XCKD
Repeat accuracy		0.1 mm on the tripping points, with 1 million operating cycles for head with end plunger
Cable entry or integral connector	Depending on model	Either: tapped entry for PG 11 or PG 13 conduit thread, tapped ISO M16 x 1.5 or ISO M20 x 1.5, tapped 1/2" NPT, tapped PF 1/2 (G1/2) or integral M12 connector
Materials		XCKD : Zamak® bodies and heads, XCKP and XCKT : plastic bodies, Zamak heads

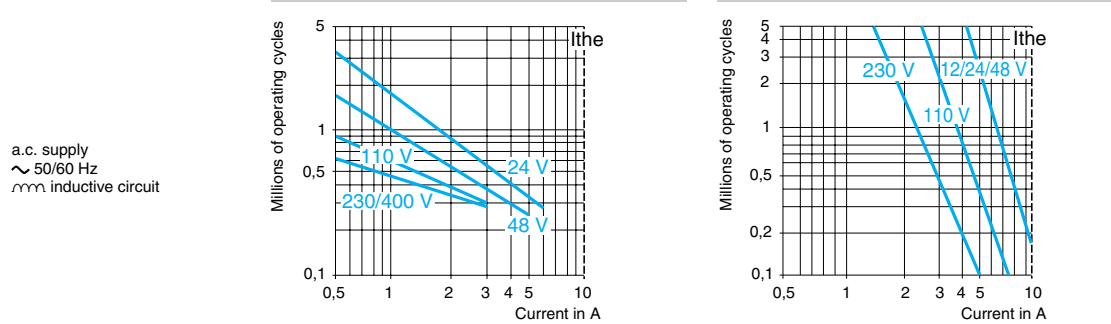
Limit Switches

Osiswitch® Compact

Universal, XCKP and XCKT Plastic / XCKD Metal

Contact block characteristics	
Rated operational characteristics	XE2•P ~ AC-15; A300 (Ue = 240 V, Ie = 3 A); Ithe = 10 A ≡ DC-13; Q300 (Ue = 250 V, Ie = 0.27 A), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1
	XE3•P ~ AC-15; B300 (Ue = 240 V, Ie = 1.5 A); Ithe = 6 A ≡ DC-13; R300 (Ue = 250 V, Ie = 0.1 A), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1
Rated insulation voltage	XE2•P Ui = 500 V degree of pollution 3 conforming to IEC 60947-1 Ui = 300 V conforming to UL 508, CSA C22-2 n° 14
	XE3•P Ui = 400 V degree of pollution 3 conforming to IEC 60947-1 Ui = 300 V conforming to UL 508, CSA C22-2 n° 14
Rated impulse withstand voltage	XE2•P U imp = 6 kV conforming to IEC 60947-1, IEC 60664
	XE3•P U imp = 4 kV conforming to IEC 60947-1, IEC 60664
Positive operation (depending on model)	N/C contacts with positive opening operation conforming to IEC 60 947-5-1 Appendix K, EN 60947-5-1
Resistance across terminals	≤ 25 mΩ conforming to IEC 60255-7 category 3
Short-circuit protection	XE2•P 10 A cartridge fuse type gG (gl)
	XE3•P 6 A cartridge fuse type gG (gl)
Cabling (screw clamp terminals)	XE2SP•151 and XE2SP2141 Clamping capacity, min: 1 x 0.34 mm ² , max: 2 x 1.5 mm ²
	XE2NP21•1 and XE2NP31•1 Clamping capacity, min: 1 x 0.5 mm ² , max: 2 x 2.5 mm ²
	XE3NP and XE3SP Clamping capacity, min: 1 x 0.34 mm ² , max: 1 x 1 mm ² or 2 x 0.75 mm ²
Minimum actuation speed (for head with end plunger)	XE2SP•151, XE2SP2141 and XE3SP: 0.01 m/minute (0.03 ft/minute)
	XE2NP21•1, XE2NP31•1 and XE3NP: 6 m/minute (19.68 ft/minute)
Electrical durability	<ul style="list-style-type: none"> Conforming to IEC 60947-5-1 Appendix C Utilization categories AC-15 and DC-13 Maximum operating rate: 3600 operating cycles/hour Load factor: 0.5

XE2SP•151, XE2SP2141	XE2NP21•1, XE2NP31•1
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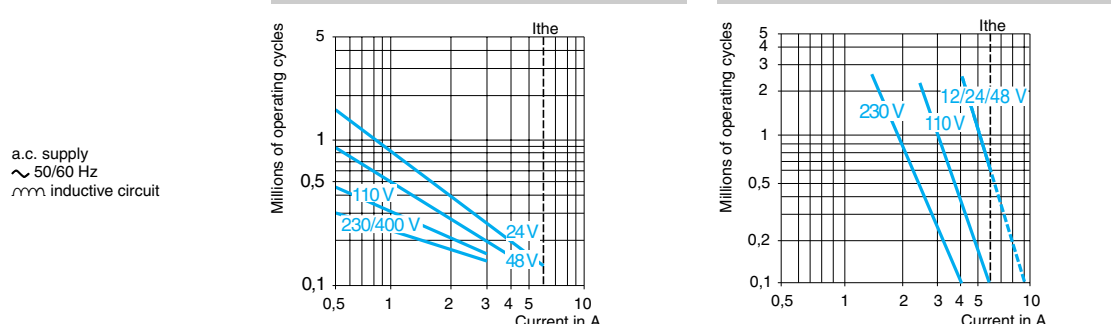


Power switched in W for 5 million operating cycles.				
Voltage	V	24	48	120
~	W	10	7	4

Power switched in W for 5 million operating cycles.				
Voltage	V	24	48	120
~	W	13	9	7

For XE2SP•151 on ~ or ≡, N/C and N/O contacts simultaneously loaded to the values shown with reverse polarity.

XE3NP••••	XE3SP••••
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Power switched in W for 5 million operating cycles.				
Voltage	V	24	48	120
~	W	3	2	1

Power switched in W for 5 million operating cycles.				
Voltage	V	24	48	120
~	W	4	3	2

Limit Switches

Osiswitch® Compact, Metal

Universal, XCKD—Complete Units with 1/2" NPT Cable Entry

Type of head	Plunger (mounting by the body)					
	Form B (1)		Form C (1)		Form E (1)	
Type of operator	Metal end plunger	Metal end plunger with elastomer boot	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever plunger, vertical actuation in 1 direction	Thermoplastic roller lever plunger, horiz. or vert. actuation in 1 direction
Catalog Numbers (2) (3)						
	2-pole N/C + N/O snap action (XE2SP2151) XCKD2110N12 1.8 4,6(P) 0,9 5mm	2-pole N/C + N/O snap action (XE2SP2151) XCKD2111N12 1.8 4,6(P) 0,9 5mm	2-pole N/C + N/O snap action (XE2SP2151) XCKD2102N12 3,1(A) 7,8(P) 1,5 mm	2-pole N/C + N/O snap action (XE2SP2151) XCKD2121N12 6,5(A) 15,7(P) 3 mm	2-pole N/C + N/O snap action (XE2SP2151) XCKD2127N12 6,5(B) 15,7(P) 3 mm	2-pole N/C + N/O snap action (XE2SP2151) XCKD2128N12 9,8(A) 22,5(P) 4,9 mm
	2-pole N/C + N/O break before make, slow break (XE2NP2151) XCKD2510N12 1,8 3,2(P) 0 3 5mm	2-pole N/C + N/O break before make, slow break (XE2NP2151) XCKD2511N12 1,8 3,2(P) 0 3 5mm	2-pole N/C + N/O break before make, slow break (XE2NP2151) XCKD2502N12 3,1(A) 5,6(P) 0 5,2 mm	2-pole N/C + N/O break before make, slow break (XE2NP2151) XCKD2521N12 6,5(A) 11,3(P) 0 10,5 mm	2-pole N/C + N/O break before make, slow break (XE2NP2151) XCKD2527N12 6,5(B) 11,3(P) 0 10,5 mm	2-pole N/C + N/O break before make, slow break (XE2NP2151) XCKD2528N12 9,8(A) 17,2(P) 0 16,1 mm
	2-pole N/C + N/C snap action (XE2SP2141) ZCD29 + ZCDEN12 + ZCE10 1,8 4,6(P) 0,9 5mm	2-pole N/C + N/C snap action (XE2SP2141) ZCD29 + ZCDEN12 + ZCE11 1,8 4,6(P) 0,9 5mm	2-pole N/C + N/C snap action (XE2SP2141) ZCD29 + ZCDEN12 + ZCE02 3,1(A) 7,8(P) 1,5 mm	2-pole N/C + N/C snap action (XE2SP2141) ZCD29 + ZCDEN12 + ZCE21 6,5(A) 15,7(P) 3 mm	2-pole N/C + N/C snap action (XE2SP2141) ZCD29 + ZCDEN12 + ZCE27 6,5(B) 15,7(P) 3 mm	2-pole N/C + N/C snap action (XE2SP2141) ZCD29 + ZCDEN12 + ZCE28 9,8(A) 22,5(P) 4,9 mm
	2-pole N/C + N/C simultaneous, slow break (XE2NP2141) ZCD27 + ZCDEN12 + ZCE10 1,8 3,2(P) 0 5mm	2-pole N/C + N/C simultaneous, slow break (XE2NP2141) ZCD27 + ZCDEN12 + ZCE11 1,8 3,2(P) 0 5mm	2-pole N/C + N/C simultaneous, slow break (XE2NP2141) ZCD27 + ZCDEN12 + ZCE02 3,1 5,6(P) 5mm	2-pole N/C + N/C simultaneous, slow break (XE2NP2141) ZCD27 + ZCDEN12 + ZCE21 6,6(A) 11,6(P) 0 5mm	2-pole N/C + N/C simultaneous, slow break (XE2NP2141) ZCD27 + ZCDEN12 + ZCE27 6,6(B) 11,6(P) 0 5mm	2-pole N/C + N/C simultaneous, slow break (XE2NP2141) ZCD27 + ZCDEN12 + ZCE28 5,3(A) 0 5mm
	3-pole N/C + N/C + N/O snap action (XE3SP2141) ZCD39 + ZCDEN12 + ZCE10 1,8 4,6(P) 0,9 5mm	3-pole N/C + N/C + N/O snap action (XE3SP2141) ZCD39 + ZCDEN12 + ZCE11 1,8 4,6(P) 0,9 5mm	3-pole N/C + N/C + N/O snap action (XE3SP2141) ZCD39 + ZCDEN12 + ZCE02 3,1(A) 7,8(P) 1,5 mm	3-pole N/C + N/C + N/O snap action (XE3SP2141) ZCD39 + ZCDEN12 + ZCE21 6,5(A) 15,7(P) 3 mm	3-pole N/C + N/C + N/O snap action (XE3SP2141) ZCD39 + ZCDEN12 + ZCE27 6,5(B) 15,7(P) 3 mm	3-pole N/C + N/C + N/O snap action (XE3SP2141) ZCD39 + ZCDEN12 + ZCE28 9,8(A) 22,5(P) 4,9 mm
	3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141) ZCD37 + ZCDEN12 + ZCE10 1,8 3,2(P) 0 3 5mm	3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141) ZCD37 + ZCDEN12 + ZCE11 1,8 3,2(P) 0 3 5mm	3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141) ZCD37 + ZCDEN12 + ZCE02 3,1(A) 5,6(P) 0 5,2 mm	3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141) ZCD37 + ZCDEN12 + ZCE21 6,5(A) 11,3(P) 0 10,5 mm	3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141) ZCD37 + ZCDEN12 + ZCE27 6,5(B) 11,3(P) 0 10,5 mm	3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141) ZCD37 + ZCDEN12 + ZCE28 9,8(A) 17,2(P) 0 16,1 mm
Weight, kg (lb)	0.180 (0.397)	0.180 (0.397)	0.185 (0.408)	0.195 (0.430)	0.190 (0.419)	0.195 (0.430)
Contact operation	contact closed contact open		(A)(B) = cam displacement (P) = positive opening point		N/C contact with positive opening operation, when properly mounted and using a conforming operator	
Characteristics						
Switch actuation	On end			By 30° cam		
Type of actuation						
Maximum actuation speed	0.5 m/s (1.64 ft/s)			1 m/s (3.28 ft/s)		
Minimum force or torque	For tripping		15 N (3.37 lb)		12 N (2.70 lb)	
	For positive opening		45 N (10.12 lb)		36 N (8.09 lb)	
Cable entry (3)	1 entry tapped M16 x 1.5 mm for ISO cable entry, clamping capacity 4 to 8 mm (0.16 to 0.31 in.)					

- Form conforming to EN 50047. See page 408.
- Switches with gold contacts or ring type connections: please consult your local sales office.
- For an entry tapped for a PG 11 conduit thread, replace N12 in the catalog number with **G11**. Examples: XCKD2110N12 becomes **XCKD2110G11**, ZCDEN12 becomes **ZCDEG11**.

Limit Switches

Osiswitch® Compact, Metal

Universal, XCKD—Complete Units with 1/2" NPT Cable Entry

Type of head	Plunger (mounting by the head)		Rotary (mounting by the body) Form A (1)			Multi-directional	
Type of operator	M18 with metal end plunger	M18 with steel roller plunger	Thermoplastic roller lever	Variable length thermoplastic roller lever	Thermoplastic roller lever, Ø 50 mm (1.97 in.)	Variable length thermoplastic roller lever, Ø 50 mm (1.97 in.)	Cat's whisker (3)
Catalog Numbers (2) (4)							
	XCKD21H0N12 2-pole N/C + N/O snap action (XE2SP2151) 	XCKD21H2N12 	XCKD2118N12 	XCKD2145N12 	XCKD2139N12 	XCKD2149N12 	XCKD2106N12
	XCKD25H0N12 2-pole N/C + N/O break before make, slow break (XE2NP2151) 	XCKD25H2N12 	XCKD2518N12 	XCKD2545N12 	XCKD2539N12 	XCKD2549N12 	XCKD2506N12
	ZCD29 + ZCDEN12 + ZCEH0 2-pole N/C + N/C snap action (XE2SP2141) 	ZCD29 + ZCDEN12 + ZCEH2 	ZCD29 + ZCDEN12 + ZCE01 + ZCY18 	ZCD29 + ZCDEN12 + ZCE01 + ZCY45 	ZCD29 + ZCDEN12 + ZCE01 + ZCY39 	ZCD29 + ZCDEN12 + ZCE01 + ZCY49 	ZCD29 + ZCDEN12 + ZCE06
	ZCD27 + ZCDEN12 + ZCEH0 2-pole N/C + N/C simultaneous, slow break (XE2NP2141) 	ZCD27 + ZCDEN12 + ZCEH2 	ZCD27 + ZCDEN12 + ZCE01 + ZCY18 	ZCD27 + ZCDEN12 + ZCE01 + ZCY45 	ZCD27 + ZCDEN12 + ZCE01 + ZCY39 	ZCD27 + ZCDEN12 + ZCE01 + ZCY49 	ZCD27 + ZCDEN12 + ZCE06
	ZCD39 + ZCDEN12 + ZCEH0 3-pole N/C + N/C + N/O snap action (XE3SP2141) 	ZCD39 + ZCDEN12 + ZCEH2 	ZCD39 + ZCDEN12 + ZCE01 + ZCY18 	ZCD39 + ZCDEN12 + ZCE01 + ZCY45 	ZCD39 + ZCDEN12 + ZCE01 + ZCY39 	ZCD39 + ZCDEN12 + ZCE01 + ZCY49 	ZCD39 + ZCDEN12 + ZCE06
	ZCD37 + ZCDEN12 + ZCEH0 3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141) 	ZCD37 + ZCDEN12 + ZCEH2 	ZCD37 + ZCDEN12 + ZCE01 + ZCY18 	ZCD37 + ZCDEN12 + ZCE01 + ZCY45 	ZCD37 + ZCDEN12 + ZCE01 + ZCY39 	ZCD37 + ZCDEN12 + ZCE01 + ZCY49 	ZCD37 + ZCDEN12 + ZCE06
Weight, kg (lb)	0.220 (0.485)	0.220 (0.485)	0.225 (0.496)	0.235 (0.518)	0.235 (0.518)	0.245 (0.540)	0.175 (0.386)
Contact operation			(A) = cam displacement (P) = positive opening point	⊖ N/C contact with positive opening operation, when properly mounted and using a conforming operator			
Characteristics							
Switch actuation	On end	By 30° cam			By any moving part		
Type of actuation							
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)			1 m/s (3.28 ft/s), any direction	
Minimum force or torque	For tripping	15 N (3.37 lb)	10 N (2.25 lb)	0.1 N•m (0.89 lb-in)			0.13 N•m (1.15 lb-in)
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	0.25 N•m (2.21 lb-in)			—
Cable entry (4)	1 entry tapped M16 x 1.5 mm for ISO cable entry, clamping capacity 4 to 8 mm (0.16 to 0.31 in.)						

- Form conforming to EN 50047. See page 408.
- Switches with gold contacts or ring type connections: please consult your local sales office.
- Value taken with actuation by moving part at 100 mm (3.94 in.) from the mountings.
- For an entry tapped for a PG 11 conduit thread, replace N12 in the catalog number with G11. Examples: XCKD21H0N12 becomes XCKD21H0G11, ZCDEN12 becomes ZCDEG11.

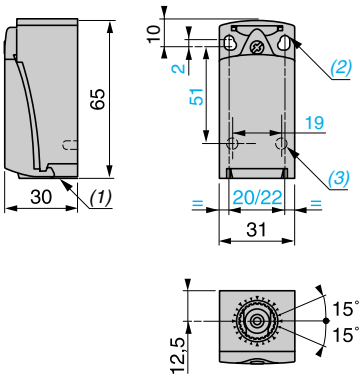
Note: For more information, consult pages 63, 456–457.

Limit Switches

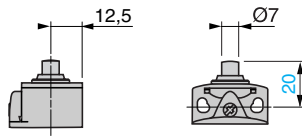
Osiswitch® Compact, Metal

Universal, XCKD—Complete Units with 1/2" NPT Cable Entry

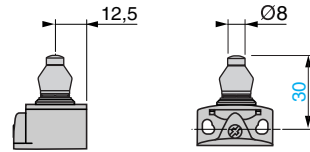
ZCD2• + ZCDEN12 / ZCD3• + ZCDEN12



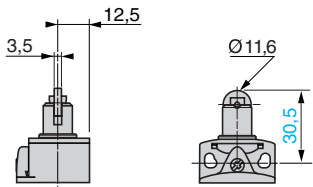
ZCE10



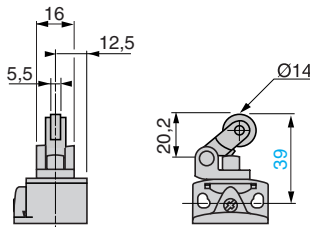
ZCE11



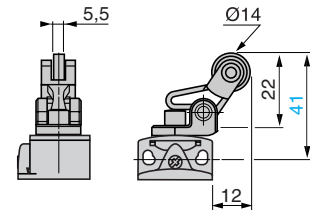
ZCE02



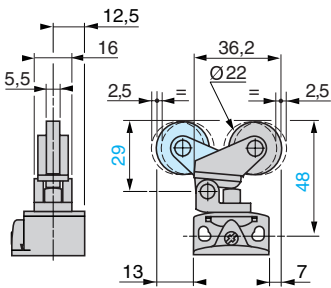
ZCE21



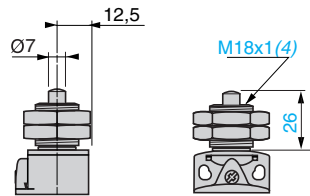
ZCE27



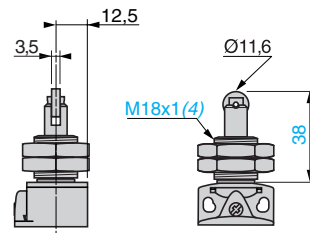
ZCE28



ZCEH0



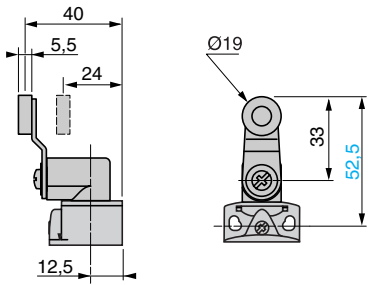
ZCEH2



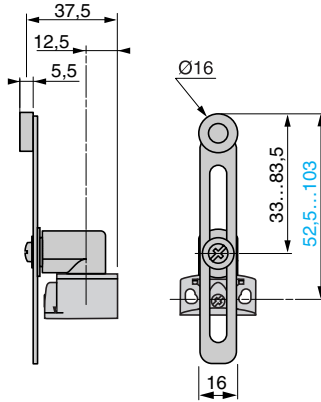
1. Tapped entry for ISO M16 x 1.5 or PG 11 conduit thread.
2. 2 elongated holes $\text{Ø} 4.3 \times 6.3 \text{ mm}$ (0.17 x 0.25 in.) on 22 mm (0.87 in.) centers, 2 holes $\text{Ø} 4.3 \text{ mm}$ (0.17 in.) on 20 mm (0.79 in.) centers.
3. 2 x $\text{Ø} 3$ holes for support studs, depth 4 mm (0.16 in.).
4. Mounting nut thickness 3.5 mm (0.14 in.).

Limit Switches
Osiswitch® Compact, Metal
Universal, XCKD—Complete Units with 1/2" NPT Cable Entry

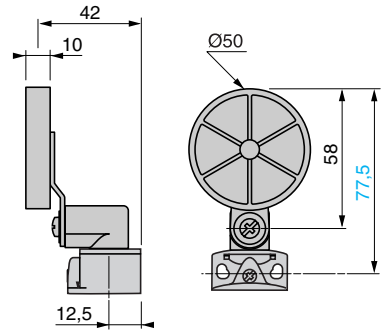
ZCE01 + ZCY18



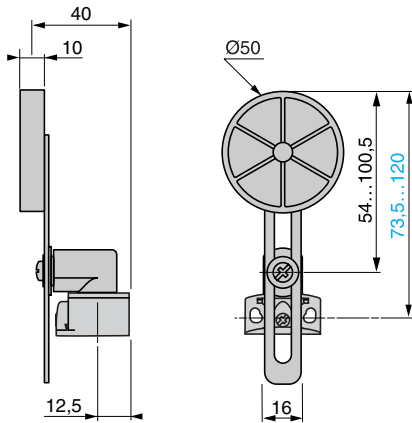
ZCE01 + ZCY45



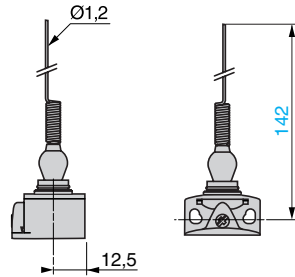
ZCE01 + ZCY39



ZCE01 + ZCY49



ZCE06



Limit Switches

Limit Switches

Osiswitch® Compact, Metal

Universal, XCKD—Integral M12 Connector

Type of head	Plunger (mounting by the body)					
	Form B (1)	Form C (1)	Form E (1)			
Type of operator	Metal end plunger	Metal end plunger with elastomer boot	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever plunger, vertical actuation in 1 direction	Thermoplastic roller lever plunger, horiz. or vert. actuation in 1 direction
Catalog Numbers						
2-pole N/C + N/O snap action (XE2SP2151)	XCKD2110M12	XCKD2111M12	XCKD2102M12	XCKD2121M12	XCKD2127M12	XCKD2128M12
2-pole N/C + N/C snap action (XE2SP2141)	ZCD29M12 + ZCE10	ZCD29M12 + ZCE11	ZCD29M12 + ZCE02	ZCD29M12 + ZCE21	ZCD29M12 + ZCE27	ZCD29M12 + ZCE28
Weight, kg (lb)	0.190 (0.419)	0.190 (0.419)	0.195 (0.430)	0.205 (0.452)	0.200 (0.441)	0.205 (0.452)
Contact operation				(A) (B) = cam displacement (P) = positive opening point		

1. Form conforming to EN 50047. See page 408.

Characteristics

Switch actuation	On end	By 30° cam				
Type of actuation						
Maximum actuation speed	0.5 m/s (1.64 ft/s)	1 m/s (3.28 ft/s)				
Minimum force or torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	6 N (1.35 lb)		
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	18 N (4.05 lb)		
Connection	M12 5-pin connector, U _i = 60 V, I _e = 4 A maximum, I _{th} = 4 A					

Connections

Integral M12 connector

	XE2SP2151 1-2: N/C 3-4: N/O 5: ↓	XE2SP2141 1-2: N/C 3-4: N/C 5: ↓
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Dimensions






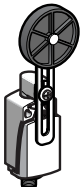


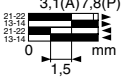
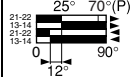
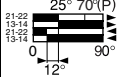
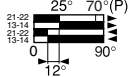
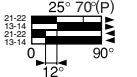
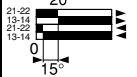

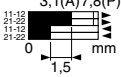
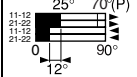
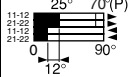
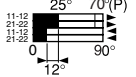
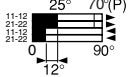

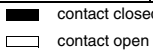
ZCD2-M12	ZCE10	ZCE11	ZCE02	ZCE21
	ZCE27	ZCE28		ZCEH0

- 2 elongated holes $\varnothing 4.3 \times 6.3$ mm (0.17 x 0.25 in.) on 22 mm (0.87 in.) centers, 2 holes $\varnothing 4.3$ mm (0.17 in.) on 20 mm (0.79 in.) centers.
- 2 x $\varnothing 3$ holes for support studs, depth 4 mm (0.16 in.).
- Mounting nut thickness 3.5 mm (0.14 in.).

Limit Switches


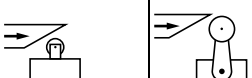


Osiswitch® Compact, Metal

Universal, XCKD—Integral M12 Connector

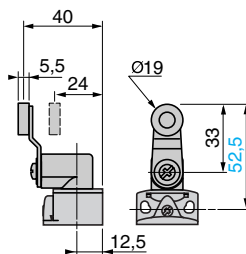
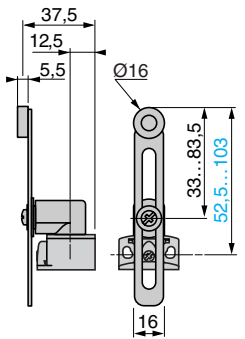
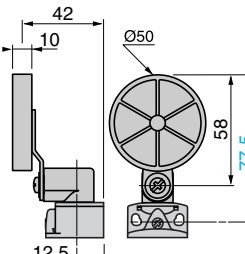
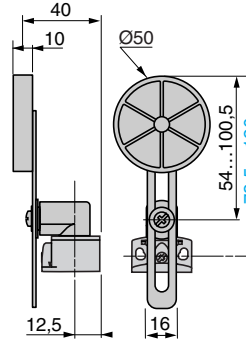
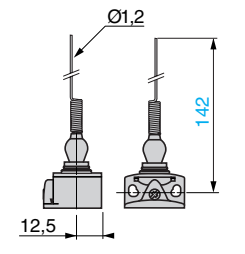
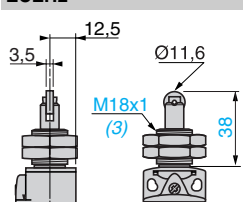
Type of head	Plunger (mounting by the head)		Rotary (mounting by the body) Form A (1)				Multi-directional
							
Type of operator	M18 with metal end plunger	M18 with steel roller plunger	Thermoplastic roller lever	Variable length thermoplastic roller lever	Thermoplastic roller lever, Ø 50 mm (1.97 in.)	Variable length thermoplastic roller lever, Ø 50 mm (1.97 in.)	Cat's whisker (2)
Catalog Numbers							
2-pole N/C + N/O snap action (XE2SP2151)	XCKD21H0M12 	XCKD21H2M12 	XCKD2118M12 	XCKD2145M12 	XCKD2139M12 	XCKD2149M12 	XCKD2106M12 
2-pole N/C + N/C snap action (XE2SP2141)	ZCD29M12 + ZCEH0 	ZCD29M12 + ZCEH2 	ZCD29M12 + ZCE01 + ZCY18 	ZCD29M12 + ZCE01 + ZCY45 	ZCD29M12 + ZCE01 + ZCY39 	ZCD29M12 + ZCE01 + ZCY49 	ZCD29M12 + ZCE06 
Weight, kg (lb)	0.235 (0.518)	0.235 (0.518)	0.220 (0.485)	0.220 (0.485)	0.220 (0.485)	0.220 (0.485)	0.185 (0.408)
Contact operation			(A) = cam displacement (P) = positive opening point				

- Form conforming to EN 50047. See page 408.
- Value taken with actuation by moving part at 100 mm (3.94 in.) from the mounting.

Characteristics

Switch actuation	On end	By 30° cam	By any moving part	
Type of actuation				
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)	
Minimum force or torque	For tripping: 15 N (3.37 lb) For positive opening: 45 N (10.12 lb)	10 N (2.25 lb) 36 N (8.09 lb)	0.1 N•m (0.89 lb-in) 0.25 N•m (2.21 lb-in)	
Connection	M12 5-pin connector, U _i = 60 V, I _e = 4 A maximum, I _{th} = 4 A			

Dimensions

ZCE01 + ZCY18	ZCE01 + ZCY45	ZCE01 + ZCY39	ZCE01 + ZCY49	ZCE06
				
	3. Mounting nut thickness 3.5 mm (0.14 in.)			

Limit Switches

Osiswitch® Compact, Plastic

Universal, XCKP—Complete Units with 1/2" NPT Cable Entry

Type of head	Plunger (mounting by the body)					
	Form B (1)	Form B (1)	Form C (1)	Form E (1)	Form E (1)	Form E (1)
Type of operator	Metal end plunger	Metal end plunger with elastomer boot	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever plunger, vertical actuation in 1 direction	Thermoplastic roller lever plunger, horiz. or vert. actuation in 1 direction
Catalog Numbers (2) (3)						
2-pole N/C + N/O snap action (XE2SP2151)	XCKP2110N12 	XCKP2111N12 	XCKP2102N12 	XCKP2121N12 	XCKP2127N12 	XCKP2128N12
2-pole N/C + N/O break before make, slow break (XE2NP2151)	XCKP2510N12 	XCKP2511N12 	XCKP2502N12 	XCKP2521N12 	XCKP2527N12 	XCKP2528N12
2-pole N/C + N/C snap action (XE2SP2141)	ZCP29 + ZCPEN12 + ZCE10 	ZCP29 + ZCPEN12 + ZCE11 	ZCP29 + ZCPEN12 + ZCE02 	ZCP29 + ZCPEN12 + ZCE21 	ZCP29 + ZCPEN12 + ZCE27 	ZCP29 + ZCPEN12 + ZCE28
2-pole N/C + N/C simultaneous, slow break (XE2NP2141)	ZCP27 + ZCPEN12 + ZCE10 	ZCP27 + ZCPEN12 + ZCE11 	ZCP27 + ZCPEN12 + ZCE02 	ZCP27 + ZCPEN12 + ZCE21 	ZCP27 + ZCPEN12 + ZCE27 	ZCP27 + ZCPEN12 + ZCE28
3-pole N/C + N/C + N/O snap action (XE3SP2141)	ZCP39 + ZCPEN12 + ZCE10 	ZCP39 + ZCPEN12 + ZCE11 	ZCP39 + ZCPEN12 + ZCE02 	ZCP39 + ZCPEN12 + ZCE21 	ZCP39 + ZCPEN12 + ZCE27 	ZCP39 + ZCPEN12 + ZCE28
3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141)	ZCP37 + ZCPEN12 + ZCE10 	ZCP37 + ZCPEN12 + ZCE11 	ZCP37 + ZCPEN12 + ZCE02 	ZCP37 + ZCPEN12 + ZCE21 	ZCP37 + ZCPEN12 + ZCE27 	ZCP37 + ZCPEN12 + ZCE28
Weight, kg (lb)	0.090 (0.198)	0.090 (0.198)	0.095 (0.209)	0.105 (0.231)	0.100 (0.220)	0.105 (0.231)
Contact operation				(A)(B) = cam displacement (P) = positive opening point	⊕ N/C contact with positive opening operation, when properly mounted and using a conforming operator	
Characteristics						
Switch actuation	On end		By 30° cam			
Type of actuation						
Maximum actuation speed	0.5 m/s (1.64 ft/s)			1 m/s (3.28 ft/s)		
Minimum force or torque	For tripping 15 N (3.37 lb)		12 N (2.70 lb)		6 N (1.35 lb)	
	For positive opening 45 N (10.12 lb)		36 N (8.09 lb)		18 N (4.05 lb)	
Cable entry (3)	1 entry tapped M16 x 1.5 mm for ISO cable entry, clamping capacity 4 to 8 mm (0.16 to 0.31 in.)					

1. Form conforming to EN 50047. See page 408.
 2. Switches with gold contacts or ring type connections: please consult your local sales office.
 3. For an entry tapped for a PG 11 conduit thread, replace N12 in the catalog number with G11. Examples: XCKP2110N12 becomes XCKP2110G11, ZCPEN12 becomes ZCPEG11.
Note: For more information, consult pages 63, 456–457.

Limit Switches

Osiswitch® Compact, Plastic

Universal, XCKP—Complete Units with 1/2" NPT Cable Entry

Type of head	Plunger (mounting by the head)		Rotary (mounting by the body)				Multi-directional	
			Form A (1)					
Type of operator	M18 with metal end plunger	M18 with steel roller plunger	Thermoplastic roller lever	Variable length thermoplastic roller lever	Thermoplastic roller lever, Ø 50 mm (1.97 in.)	Variable length thermoplastic roller lever, Ø 50 mm (1.97 in.)	Cat's whisker (4)	
Catalog Numbers (2)	XCKP21H0N12	XCKP21H2N12	XCKP2118N12	XCKP2145N12	XCKP2139N12	XCKP2149N12	XCKP2106N12	
	2-pole N/C + N/O snap action (XE2SP2151)		2-pole N/C + N/O break before make, slow break (XE2NP2151)		2-pole N/C + N/C snap action (XE2SP2141)		2-pole N/C + N/C simultaneous, slow break (XE2NP2141)	
	3-pole N/C + N/C + N/O snap action (XE3SP2141)		3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141)					
Weight, kg (lb)	0.130 (0.287)	0.130 (0.287)	0.135 (0.298)	0.145 (0.320)	0.145 (0.320)	0.155 (0.342)	0.085 (0.187)	
Contact operation			(A) = cam displacement	(P) = positive opening point				
☉ N/C contact with positive opening operation, when properly mounted and using a conforming operator								
Characteristics								
Switch actuation	On end	By 30° cam				By any moving part		
Type of actuation								
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)				1 m/s (3.28 ft/s), any direction	
Minimum force or torque	For tripping	15 N (3.37 lb)	10 N (2.25 lb)	0.1 N•m (0.89 lb-in)				0.13 N•m (1.15 lb-in)
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	0.25 N•m (2.21 lb-in)				—
Cable entry (3)	1 entry tapped M16 x 1.5 mm for ISO cable entry, clamping capacity 4 to 8 mm (0.16 to 0.31 in.)							

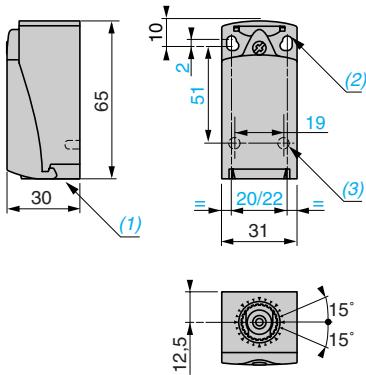
- Form conforming to EN 50047. See page 408.
 - Switches with gold contacts or ring type connections: please consult your local sales office.
 - For an entry tapped for a PG 11 conduit thread, replace N12 in the catalog number with G11. Examples: XCKP21H0N12 becomes XCKP21H0G11, ZCPEN12 becomes ZCPEG11.
 - Value taken with actuation by moving part at 100 mm (3.94 in.) from the mountings.
- Note: For more information, consult pages 63, 456–457.

Limit Switches

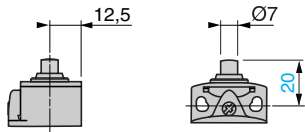
Osiswitch® Compact, Plastic

Universal, XCKP—Complete Units with 1/2" NPT Cable Entry

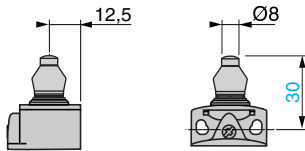
ZCP2• + ZCPEN12 / ZCP3• + ZCPEN12



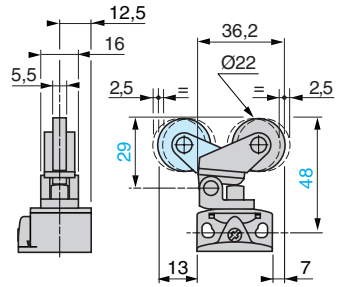
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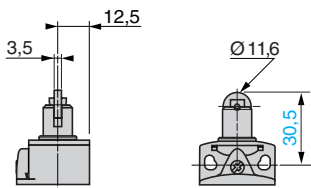
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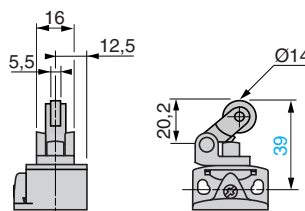
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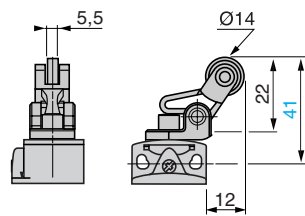
ZCE02



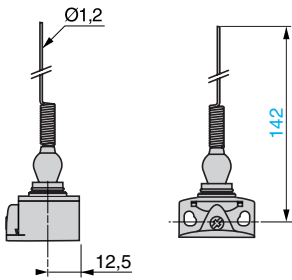
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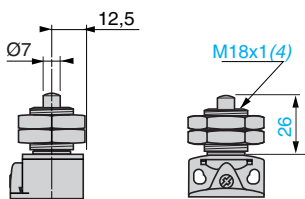
ZCE27



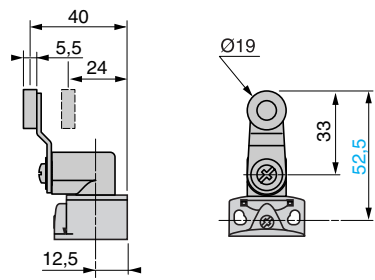
ZCE06



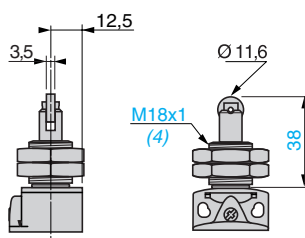
ZCEH0



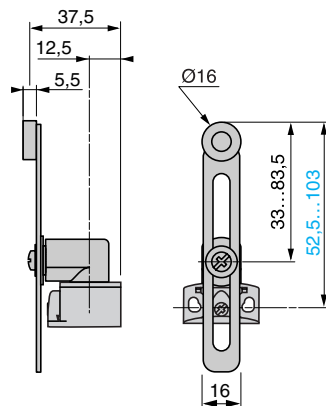
ZCE01 + ZCY18



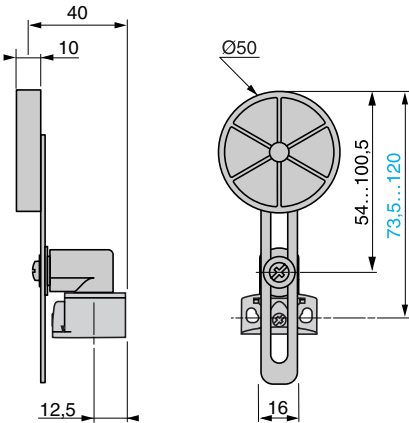
ZCEH2



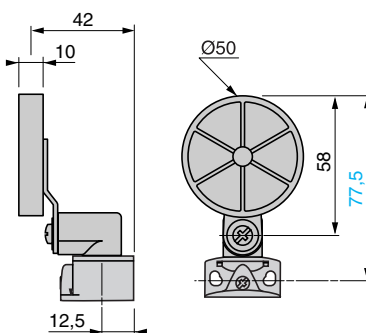
ZCE01 + ZCY45



ZCE01 + ZCY49



ZCE01 + ZCY39



1. Tapped entry for ISO M16 x 1.5 or PG 11 conduit thread.
2. 2 elongated holes Ø 4.3 x 6.3 mm (0.17 x 0.25 in.) on 22 mm (0.87 in.) centers, 2 holes Ø 4.3 mm (0.17 in.) on 20 mm (0.79 in.) centers.

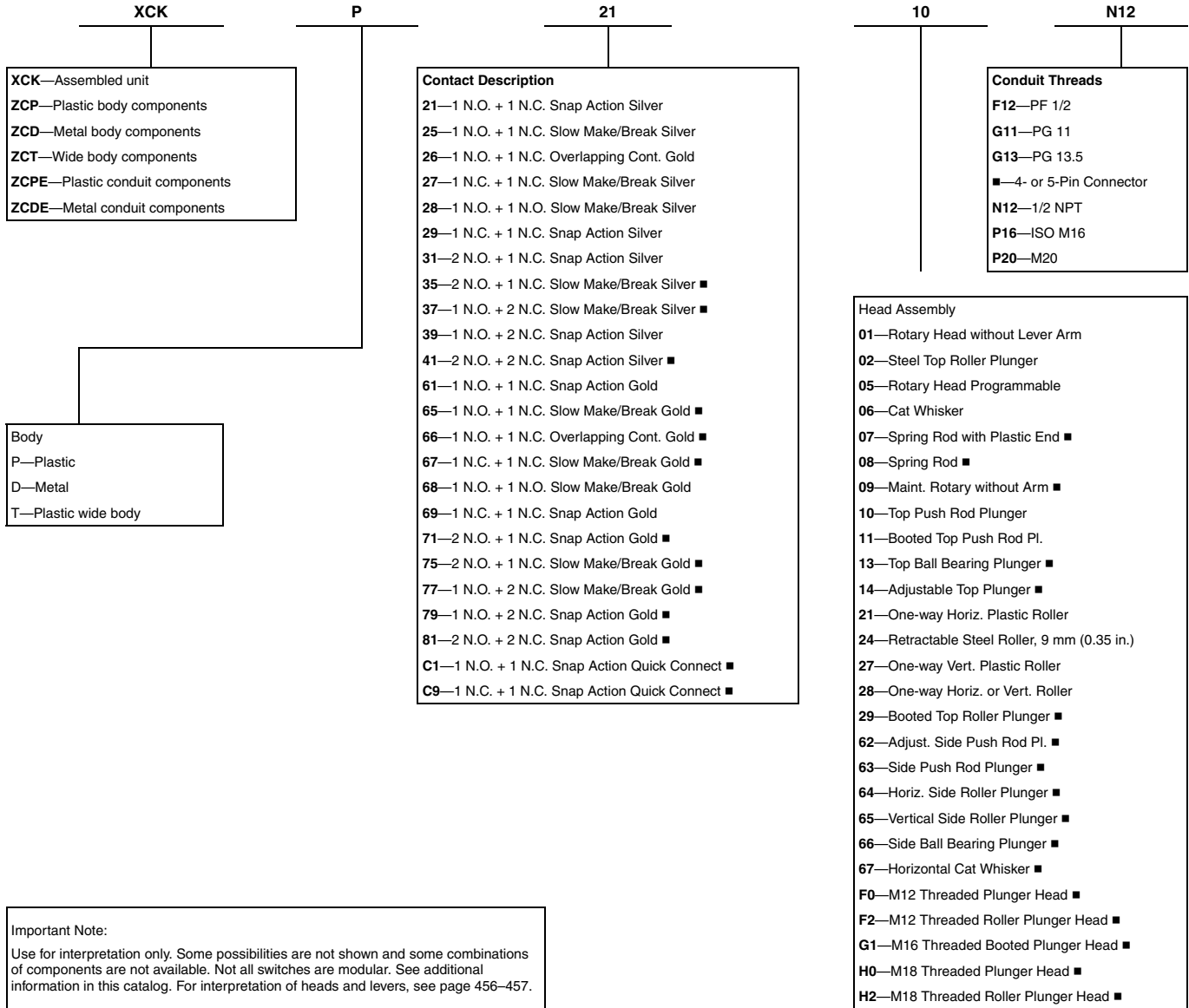
3. 2 x Ø 3 holes for support studs, depth 4 mm (0.16 in.).
4. Mounting nut thickness 3.5 mm (0.14 in.).

Limit Switches

Osiswitch® Compact, Metal and Plastic Universal, XCKD, XCKP, and XCKT

Catalog Number Interpretation

For Interpretation of the Catalog Number Only



Important Note:
Use for interpretation only. Some possibilities are not shown and some combinations of components are not available. Not all switches are modular. See additional information in this catalog. For interpretation of heads and levers, see page 456–457.

■ Call your local field sales office for availability.

Limit Switches

Osiswitch® Compact, Plastic

Universal, XCKP—Integral M12 Connector

Type of head	Plunger (mounting by the body)					
	Form B (1)		Form C (1)	Form E (1)		
Type of operator	Metal end plunger	Metal end plunger with elastomer boot	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever plunger, vertical actuation in 1 direction	Thermoplastic roller lever plunger, horiz. or vert. actuation in 1 direction
Catalog Numbers						
2-pole N/C + N/O snap action (XE2SP2151)	XCKP2110M12	XCKP2111M12	XCKP2102M12	XCKP2121M12	XCKP2127M12	XCKP2128M12
2-pole N/C + N/C snap action (XE2SP2141)	ZCP29M12 + ZCE10	ZCP29M12 + ZCE11	ZCP29M12 + ZCE02	ZCP29M12 + ZCE21	ZCP29M12 + ZCE27	ZCP29M12 + ZCE28
Weight, kg (lb)	0.100 (0.220)	0.100 (0.220)	0.100 (0.220)	0.110 (0.243)	0.110 (0.243)	0.110 (0.243)
Contact operation			(A)(B) = cam displacement (P) = positive opening point		⊖ N/C contact with positive opening operation, when properly mounted and using a conforming operator	

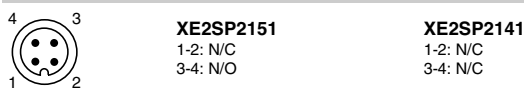
1. Form conforming to EN 50047. See page 408.

Characteristics

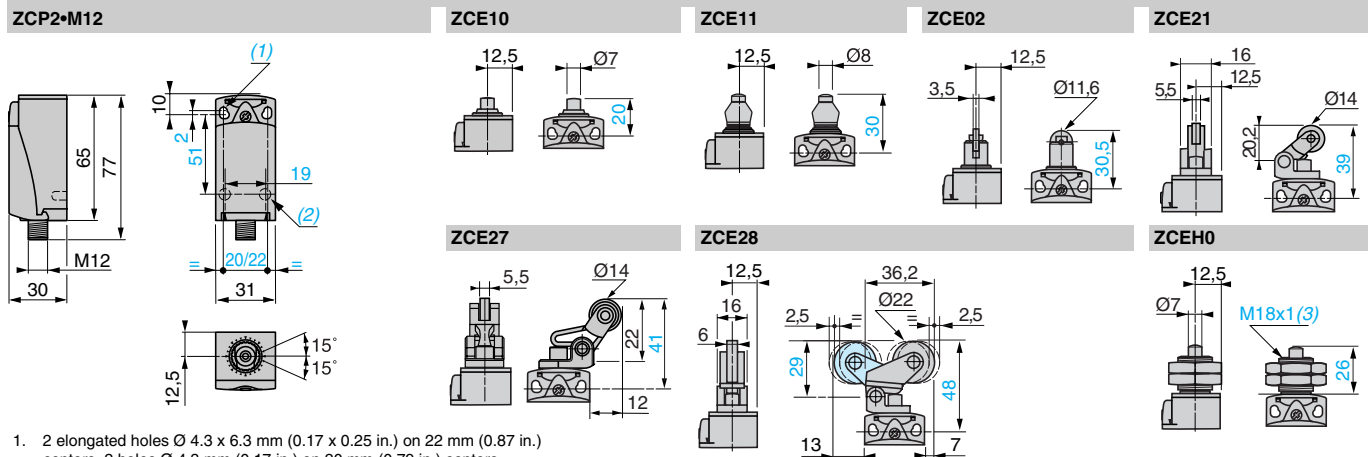
Switch actuation	On end	By 30° cam				
Type of actuation						
Maximum actuation speed	0.5 m/s (1.64 ft/s)	1 m/s (3.28 ft/s)				
Minimum force or torque	For tripping For positive opening	15 N (3.37 lb) 45 N (10.12 lb)	12 N (2.70 lb) 36 N (8.09 lb)	6 N (1.35 lb) 18 N (4.05 lb)		
Connection	M12 4-pin connector, Ui = 250 V, Ie = 3 A maximum, Ith = 3 A					

Connections

Integral M12 connector



Dimensions



- 2 elongated holes $\varnothing 4.3 \times 6.3$ mm (0.17 x 0.25 in.) on 22 mm (0.87 in.) centers, 2 holes $\varnothing 4.3$ mm (0.17 in.) on 20 mm (0.79 in.) centers.
- 2 x $\varnothing 3$ mm (0.12 in.) holes for support studs, depth 4 mm (0.16 in.).
- Mounting nut thickness 3.5 mm (0.14 in.).

Limit Switches

Osiswitch® Compact, Plastic

Universal, XCKP—Integral M12 Connector

Type of head	Plunger (mounting by the head)		Rotary (mounting by the body)				Multi-directional
			Form A (1)				
Type of operator	M18 with metal end plunger	M18 with steel roller plunger	Thermoplastic roller lever	Variable length thermoplastic roller lever	Thermoplastic roller lever, Ø 50 mm (1.97 in.)	Variable length thermoplastic roller lever, Ø 50 mm (1.97 in.)	Cat's whisker (2)
Catalog Numbers							
2-pole N/C + N/O snap action (XE2SP2151)	XCKP21H0M12 	XCKP21H2M12 	XCKP2118M126 	XCKP2145M12 	XCKP2139M12 	XCKP2149M12 	XCKP2106M126
2-pole N/C + N/C snap action (XE2SP2141)	ZCP29M12 + ZCEH0 	ZCP29M12 + ZCEH2 	ZCP29M12 + ZCE01 + ZCY18 	ZCP29M12 + ZCE01 + ZCY45 	ZCP29M12 + ZCE01 + ZCY39 	ZCP29M12 + ZCE01 + ZCY49 	ZCP29M12 + ZCE06
Weight, kg (lb)	0.140 (0.309)	0.140 (0.309)	0.140 (0.309)	0.150 (0.331)	0.155 (0.342)	0.160 (0.353)	0.090 (0.198)
Contact operation	contact closed contact open		(A) = cam displacement	(P) = positive opening point	⊕ N/C contact with positive opening operation, when properly mounted and using a conforming operator		

- Form conforming to EN 50047. See page 408.
- Value taken with actuation by moving part at 100 mm (3.94 in.) from the mountings.

Characteristics

Switch actuation	On end	By 30° cam	By any moving part	
Type of actuation				
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)	
Minimum force or torque	For tripping: 15 N (3.37 lb) For positive opening: 45 N (10.12 lb)	10 N (2.25 lb) 36 N (8.09 lb)	0.1 N•m (0.89 lb-in) 0.25 N•m (2.21 lb-in)	
Connection	M12 4-pin connector, U _i = 250 V, I _e = 3 A maximum, I _{th} = 3 A			

Dimensions

ZCE01 + ZCY18	ZCE01 + ZCY45	ZCE01 + ZCY39	ZCE01 + ZCY49	ZCE06

3. Mounting nut thickness 3.5 mm (0.14 in.).

Limit Switches

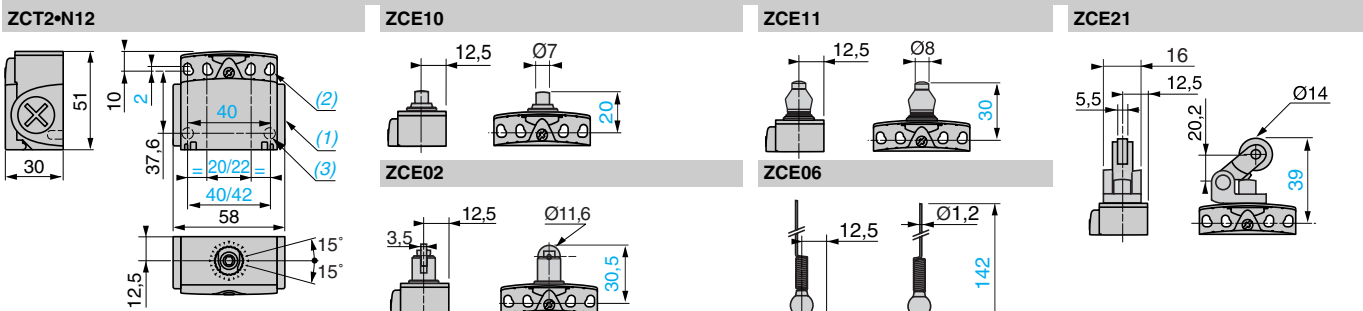
Osiswitch® Compact, Plastic

Universal, XCKT—Complete Units with Two Cable Entries and 1/2" NPT Adapter

Type of head	Plunger (mounting by the body)			Multi-directional	
	Form B (1)	Form C (1)	Form E (1)		
Type of operator	Metal end plunger	Metal end plunger with elastomer boot	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Cat's whisker (4)
Catalog Numbers (2) (3)	XCKT2110N12 ⊖	XCKT2111N12 ⊖	XCKT2102N12 ⊖	XCKT2121N12 ⊖	XCKT2106N12
2-pole N/C + N/O snap action (XE2SP3151)					
2-pole N/C + N/O break before make, slow break (XE2NP3151)	ZCT25N12 + ZCE10 ⊖	ZCT25N12 + ZCE11 ⊖	ZCT25N12 + ZCE02 ⊖	ZCT25N12 + ZCE21 ⊖	ZCT25N12 + ZCE06
2-pole N/C + N/O make before break, slow break (XE2NP3161)	ZCT26N12 + ZCE10 ⊖	ZCT26N12 + ZCE11 ⊖	ZCT26N12 + ZCE02 ⊖	ZCT26N12 + ZCE21 ⊖	ZCT26N12 + ZCE06
2-pole N/C + N/C simultaneous, slow break (XE2NP3141)	ZCT27N12 + ZCE10 ⊖	ZCT27N12 + ZCE11 ⊖	ZCT27N12 + ZCE02 ⊖	ZCT27N12 + ZCE21 ⊖	ZCT27N12 + ZCE06
2-pole N/O + N/O simultaneous, slow break (XE2NP3131)	ZCT28N12 + ZCE10	ZCT28N12 + ZCE11	ZCT28N12 + ZCE02	ZCT28N12 + ZCE21	ZCT28N12 + ZCE06
Weight, kg (lb)	0.100 (0.220)	0.100 (0.220)	0.105 (0.231)	0.115 (0.254)	0.095 (0.209)
Contact operation			(A) = cam displacement (P) = positive opening point	⊖ N/C contact with positive opening operation, when properly mounted and using a conforming operator	
Characteristics					
Switch actuation	On end	By 30° cam		By any moving part	
Type of actuation					
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1 m/s (3.28 ft/s)		1 m/s (3.28 ft/s), any direction
Minimum force or torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	6 N (1.35 lb)	0.3 N·m (2.66 lb-in)
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	18 N (4.05 lb)	—
Cable entry (3)	2 entries tapped M16 x 1.5 for ISO cable entry. Clamping capacity 4 to 8 mm (0.16 to 0.31 in.). (1 entry fitted with blanking plug).				

- Form conforming to EN 50047. See page 408.
- Switches with gold contacts or ring connections: please consult your local sales office.
- For cable entries tapped for a PG 11 conduit thread, replace N12 in the catalog number with G11. Example: XCKT2110N12 becomes XCKT2110G11.
- Value taken with actuation by moving part at 100 mm (3.94 in.) from the mountings.

Dimensions

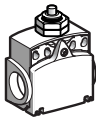
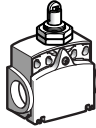

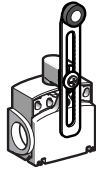
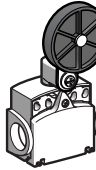
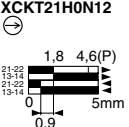
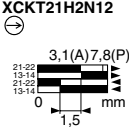
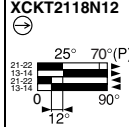
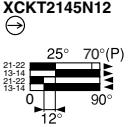
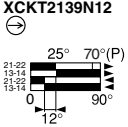








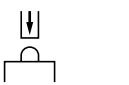
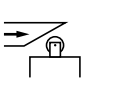
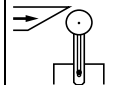


- 2 tapped entries for ISO M16 x 1.5 or PG 11 conduit thread.
- 4 elongated holes Ø 4.3 x 6.3 mm (0.17 x 0.25 in.) on 22/42 mm (0.87/1.65 in.) centers, 4 holes Ø 4.3 mm (0.17 in.) on 20/40 mm (0.79/1.57 in.) centers.
- 2 x Ø 3 holes for support studs, depth 4 mm (0.16 in.).

Limit Switches

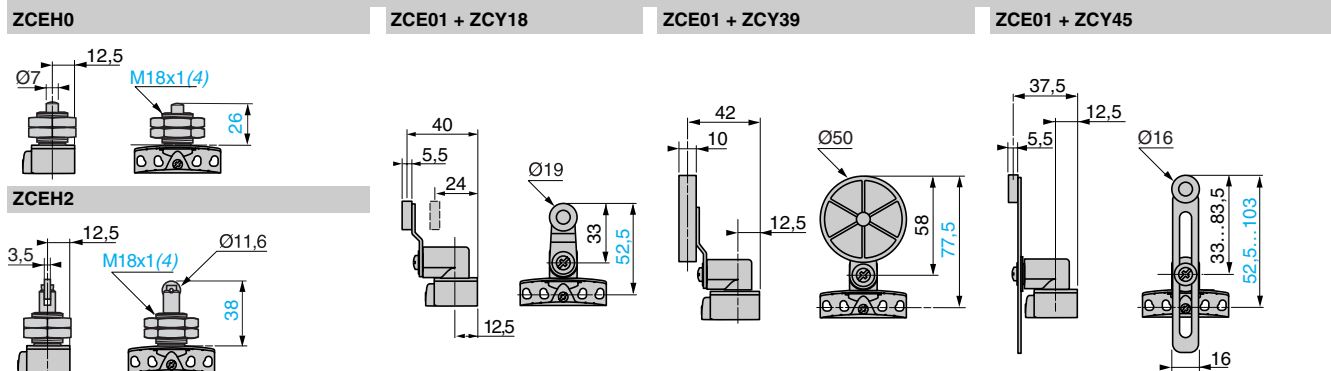
Osiswitch® Compact, Plastic

Universal, XCKT—Complete Units with Two Cable Entries and 1/2" NPT Adapter

Type of head	Plunger (mounting by the head)		Rotary (mounting by the body) Form A (1)		
					
Type of operator	M18 with metal end plunger	M18 with steel roller plunger	Thermoplastic roller lever	Variable length thermoplastic roller lever	Thermoplastic roller lever, Ø 50 mm (1.97 in.)
Catalog Numbers (2) (3)	XCKT21H0N12 	XCKT21H2N12 	XCKT2118N12 	XCKT2145N12 	XCKT2139N12 
	2-pole N/C + N/O snap action (XE2SP3151)				
	2-pole N/C + N/O break before make, slow break (XE2NP3151)				
	2-pole N/O + N/C make before break, slow break (XE2NP3161)				
	2-pole N/C + N/C simultaneous, slow break (XE2NP3141)				
	2-pole N/O + N/O simultaneous, slow break (XE2NP3131)				
Weight, kg (lb)	0.145 (0.320)	0.145 (0.320)	0.145 (0.320)	0.155 (0.342)	0.160 (0.353)
Contact operation	 contact closed  contact open		(A) = cam displacement (P) = positive opening point	 N/C contact with positive opening operation, when properly mounted and using a conforming operator	
Characteristics					
Switch actuation	On end	By 30° cam			
Type of actuation					
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)		
Minimum force or torque	For tripping	15 N (3.37 lb)	10 N (2.25 lb)	0.1 N•m (0.89 lb-in)	
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	0.25 N•m (2.21 lb-in)	
Cable entry (3)	2 entries tapped M16 x 1.5 for ISO cable entry. Clamping capacity 4 to 8 mm (0.16 to 0.31 in.) (1 entry fitted with blanking plug).				

- Form conforming to EN 50047. See page 408.
- Switches with gold contacts or ring type connections; please consult your local sales office.
- For cable entries tapped for a PG 11 conduit thread, replace N12 in the catalog number with **G11**. Example: XCKT21H0N12 becomes **XCKT21H0G11**.

Dimensions

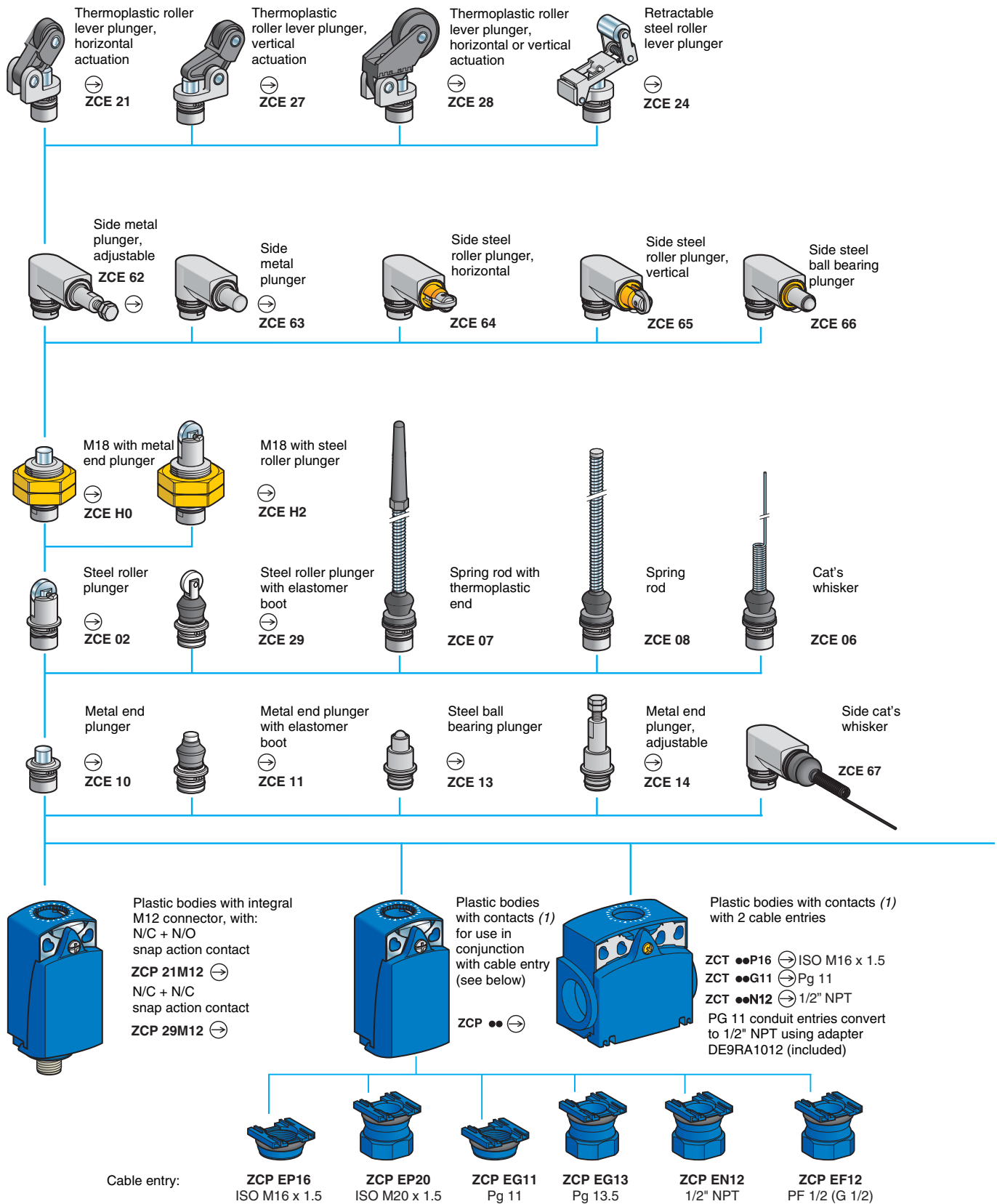


4. Mounting nut thickness 3.5 mm (0.14 in.)

Limit Switches

Osiswitch® Compact, Metal and Plastic

Universal, XCKD, XCKP, and XCKT—Modular



Limit Switches

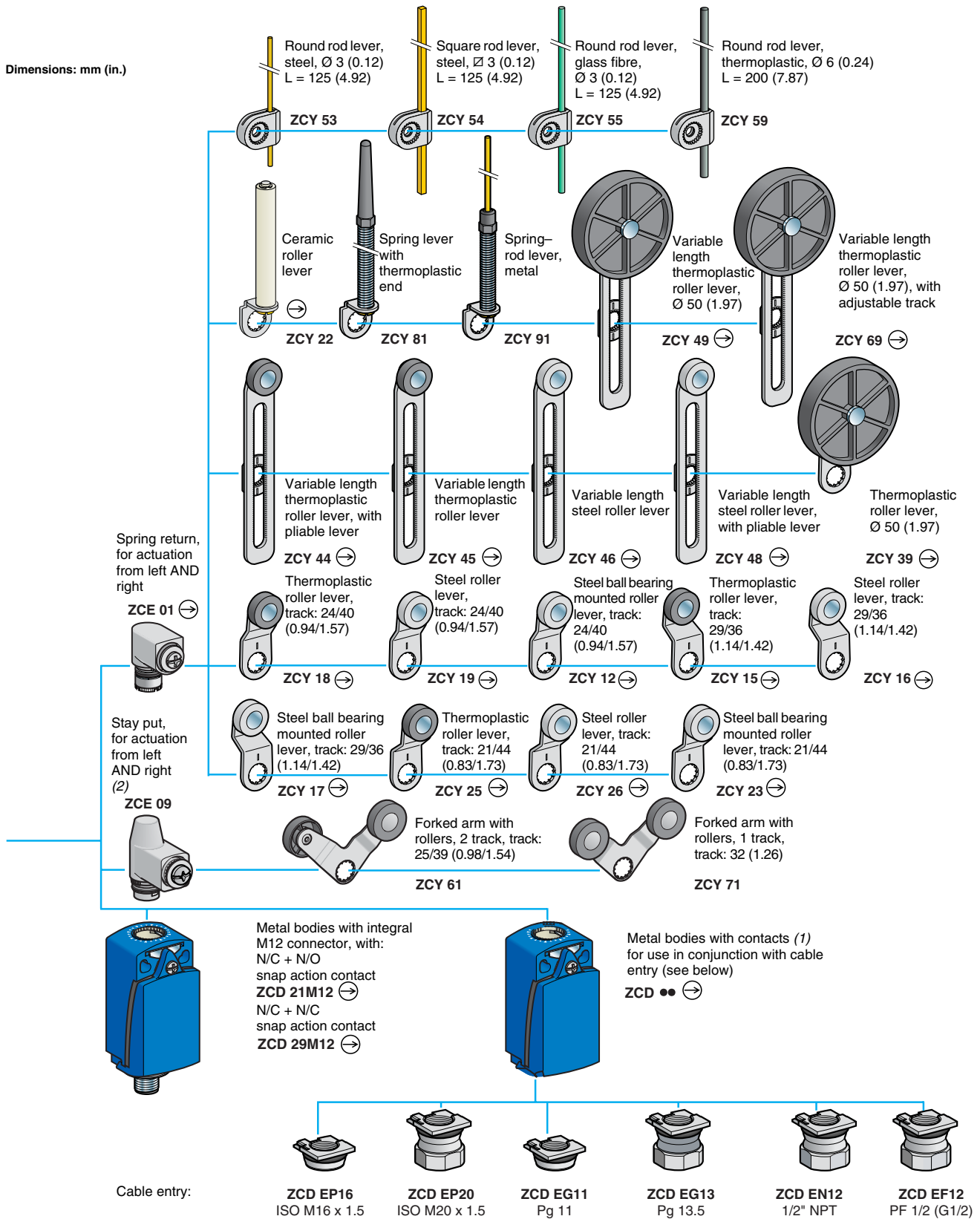
1. For further details, see page 458.
 2. Cannot be used on bodies: ZCD21, ZCP21, ZCT21, ZCD29, ZCP29, ZCD31, ZCP31, ZCD39, ZCP39, ZCD2•M12, ZCP2•M12.

Limit Switches

Osiswitch® Compact, Metal and Plastic

Universal, XCKD, XCKP, and XCKT—Modular

Dimensions: mm (in.)

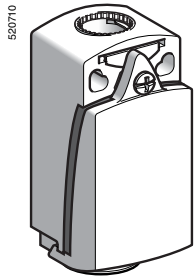


Limit Switches

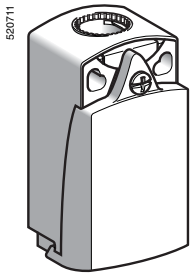
Limit Switches

Osiswitch® Compact, Metal and Plastic

Universal, XCKD, XCKP, and XCKT—Modular



ZCD**



ZCP**

Limit Switches

Bodies with contacts, types XCKD and XCKP (1)

Type of contact	Positive operation (2)	Function diagram	Body material	Catalog Number	Weight kg (lb)
2-pole					
N/C + N/O snap action (XE2SP2151)	⊖		Metal	ZCD21	0.140 (0.309)
			Plastic	ZCP21	0.070 (0.154)
N/C + N/C snap action (XE2SP2141)	⊖		Metal	ZCD29	0.140 (0.309)
			Plastic	ZCP29	0.070 (0.154)
N/C + N/O break before make, slow break (XE2NP2151)	⊖		Metal	ZCD25	0.140 (0.309)
			Plastic	ZCP25	0.070 (0.154)
N/O + N/C make before break, slow break (XE2NP2161)	⊖		Metal	ZCD26	0.140 (0.309)
			Plastic	ZCP26	0.070 (0.154)
N/C + N/C simultaneous, slow break (XE2NP2141)	⊖		Metal	ZCD27	0.140 (0.309)
			Plastic	ZCP27	0.070 (0.154)
N/O + N/O simultaneous, slow break (XE2NP2131)	—		Metal	ZCD28	0.140 (0.309)
			Plastic	ZCP28	0.070 (0.154)
3-pole					
N/C + N/O + N/O snap action (XE3SP2151)	⊖		Metal	ZCD31	0.140 (0.309)
			Plastic	ZCP31	0.070 (0.154)
N/C + N/C + N/O snap action (XE3SP2141)	⊖		Metal	ZCD39	0.140 (0.309)
			Plastic	ZCP39	0.070 (0.154)
N/C + N/C + N/O break before make, slow break (XE3NP2141)	⊖		Metal	ZCD37	0.140 (0.309)
			Plastic	ZCP37	0.070 (0.154)
N/C + N/O + N/O break before make, slow break (XE3NP2151)	⊖		Metal	ZCD35	0.140 (0.309)
			Plastic	ZCP35	0.070 (0.154)

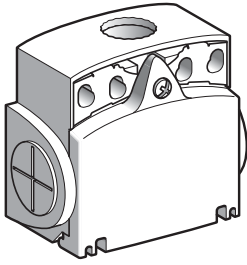
1. Bodies with gold contacts or eyelet type connections: please consult your local sales office.
 2. ⊖ : bodies with contacts assuring positive opening operation, when properly mounted and using a conforming operator.

Limit Switches

Osiswitch® Compact, Metal and Plastic

Universal, XCKD, XCKP, and XCKT—Modular

561390



ZCT***

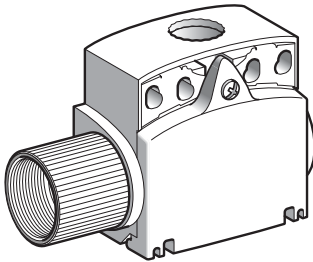
Bodies with contacts, type XCKT plastic, 2 cable entries

Type of contact	Positive operation (1)	Function diagram	Cable entries	Catalog Number	Weight kg (lb)
2-pole					
N/C + N/O snap action (XE2SP3151)	⊙		ISO M16 x 1.5	ZCT21P16	0.085 (0.187)
			PG 11	ZCT21G11	0.085 (0.187)
N/C + N/O break before make, slow break (XE2NP3151)	⊙		ISO M16 x 1.5	ZCT25P16	0.085 (0.187)
			PG 11	ZCT25G11	0.085 (0.187)
N/C + N/C simultaneous, slow break (XE2NP3141)	⊙		ISO M16 x 1.5	ZCT27P16	0.085 (0.187)
			PG 11	ZCT27G11	0.085 (0.187)
N/O + N/O simultaneous, slow break (XE2NP3131)	—		ISO M16 x 1.5	ZCT28P16	0.085 (0.187)
			PG 11	ZCT28G11	0.085 (0.187)
N/O + N/C make before break, slow break (XE2NP3161)	⊙		ISO M16 x 1.5	ZCT26P16	0.085 (0.187)
			PG 11	ZCT26G11	0.085 (0.187)

Bodies with contacts, type XCKT, plastic, 2 cable entries with 1/2" NPT adapter

Type of contact	Positive operation (1)	Function diagram	Catalog Number	Weight kg (lb)
2-pole				
N/C + N/O snap action (XE2SP3151)	⊙		ZCT21N12	0.130 (0.287)
N/C + N/O break before make, slow break (XE2NP3151)	⊙		ZCT25N12	0.130 (0.287)
N/C + N/C simultaneous, slow break (XE2NP3141)	⊙		ZCT27N12	0.130 (0.287)
N/O + N/O simultaneous, slow break (XE2NP3131)	—		ZCT28N12	0.130 (0.287)
N/O + N/C make before break, slow break (XE2NP3161)	⊙		ZCT26N12	0.130 (0.287)

561397



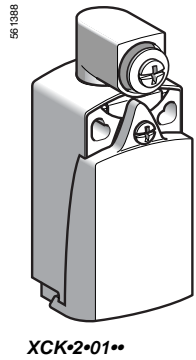
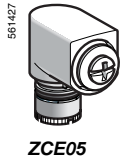
ZCT-N12

1. ⊙ : bodies with contact assuring positive opening operation, when properly mounted and using a conforming operator.

Limit Switches

Osiswitch® Compact, Metal and Plastic

Universal, XCKD, XCKP, and XCKT—Modular

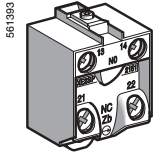


Accessories					
Description	Suitable levers for use with head	Unit catalog number	Weight kg (oz)		
Rotary head, without lever, spring return, for actuation from left AND right or left OR right (1)	ZCY12, ZCY15, ZCY16, ZCY17, ZCY18, ZCY19, ZCY22, ZCY23, ZCY25, ZCY26, ZCY39, ZCY53, ZCY54, ZCY55, ZCY81	ZCE05	0.045 (1.59)		
Tap-off terminal (for XCKT)	Sold in lots of 10	XALZ09	0.010 (0.35)		
Spacer for angular positioning of heads with adjustable levers, for values other than -90°, 0° and 90°	—	XCMZ07	0.002 (0.07)		
Adapter for 1/2" NPT conduit Converts PG 11 conduit entries to 1/2" NPT	Sold in lots of 10	DE9RA1012	0.050 (1.76)		
Bodies with contacts, type XCKP plastic, with rotary head (without operating lever)					
Type of contact	Function diagram	Positive operation (2)	Cable entry	Catalog Number	Weight kg (lb)
2-pole					
N/C + N/O snap action (XE2SP2151)		⊖	1/2" NPT	XCKP2101N12	0.115 (0.254)
		⊖	PG 11	XCKP2101G11	0.115 (0.254)
		⊖	M12 connector	XCKP2101M12	0.125 (0.276)
N/C + N/O break before make, slow break (XE2NP2151)		⊖	1/2" NPT	XCKP2501N12	0.115 (0.254)
		⊖	PG 11	XCKP2501G11	0.115 (0.254)
Bodies with contacts, type XCKD metal, with rotary head (without operating lever)					
Type of contact	Function diagram	Positive operation (2)	Cable entry	Catalog Number	Weight kg (lb)
2-pole					
N/C + N/O snap action (XE2SP2151)		⊖	1/2" NPT	XCKD2101N12	0.185 (0.408)
		⊖	PG 11	XCKD2101G11	0.185 (0.408)
		⊖	M12 connector	XCKD2101M12	0.195 (0.430)
N/C + N/O break before make, slow break (XE2NP2151)		⊖	1/2" NPT	XCKD2501N12	0.185 (0.408)
		⊖	PG 11	XCKD2501G11	0.185 (0.408)

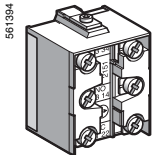
Limit Switches

Osiswitch® Compact, Metal and Plastic

Universal, XCKD, XCKP, and XCKT—Modular



XE2**21**



XE3**21**

Contact blocks with screw clamp terminals for XCKD and XCKP

Type of contact	Positive operation (1)	Function diagram	Catalog number for standard contacts	Weight kg (lb)
2-pole				
N/C + N/O snap action	⊙		XE2SP2151	0.020 (0.044)
N/C + N/C simultaneous, snap action	⊙		XE2SP2141	0.020 (0.044)
N/C + N/O break before make, slow break	⊙		XE2NP2151	0.020 (0.044)
N/O + N/C make before break, slow break	⊙		XE2NP2161	0.020 (0.044)
N/C + N/C simultaneous, slow break	⊙		XE2NP2141	0.020 (0.044)
N/O + N/O simultaneous, slow break	—		XE2NP2131	0.020 (0.044)
3-pole				
N/C + N/O + N/O snap action	⊙		XE3SP2151	0.035 (0.077)
N/C + N/C + N/O snap action	⊙		XE3SP2141	0.035 (0.077)
N/C + N/C + N/O break before make, slow break	⊙		XE3NP2141	0.035 (0.077)
N/C + N/O + N/O break before make, slow break	⊙		XE3NP2151	0.035 (0.077)

Contact blocks with screw clamp terminals for XCKT

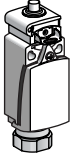

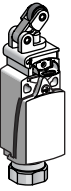
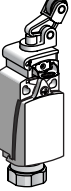
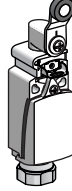
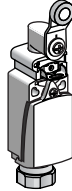
Type of contact	Positive operation (1)	Function diagram	Catalog number for standard contacts	Weight kg (lb)
2-pole				
N/C + N/O snap action	⊙		XE2SP3151	0.015 (0.033)
N/C + N/O break before make, slow break	⊙		XE2NP3151	0.015 (0.033)
N/O + N/C make before break, slow break	⊙		XE2NP3161	0.015 (0.033)
N/C + N/C simultaneous, slow break	⊙		XE2NP3141	0.015 (0.033)
N/O + N/O simultaneous, slow break	—		XE2NP3131	0.015 (0.033)

1. ⊙ : contact blocks assuring positive opening operation, when properly mounted and using a conforming operator.









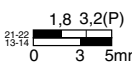
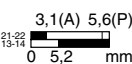
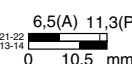
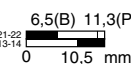
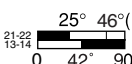
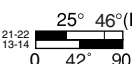
Limit Switches

Osiswitch® Compact with Manual Reset

Application, XCDR—Complete Switches, Metal, with One Cable Entry, 1/2" NPT

Type of head	Plunger (mounting by the body)				Rotary (mounting by the body)	
						
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever plunger, vertical actuation in 1 direction	Thermoplastic roller lever	Steel roller lever

Catalog numbers of complete switches with one 1/2" NPT cable entry



	XCDR2110N12	XCDR2102N12	XCDR2121N12	XCDR2127N12	XCDR2118N12	XCDR2119N12
 <p>2-pole N/C + N/O snap action (XE2SP2151)</p>	 <p>1,8 4,6(P) 0,9 5mm</p>	 <p>3,1(A) 7,8(P) 0 1,5 mm</p>	 <p>6,5(A) 15,7(P) 0 3 mm</p>	 <p>6,5(B) 15,7(P) 0 3 mm</p>	 <p>25° 70°(P) 0 12° 90°</p>	 <p>25° 70°(P) 0 12° 90°</p>
 <p>2-pole N/C + N/O break before make, slow break (XE2NP2151)</p>	 <p>1,8 3,2(P) 0 3 5mm</p>	 <p>3,1(A) 5,6(P) 0 5,2 mm</p>	 <p>6,5(A) 11,3(P) 0 10,5 mm</p>	 <p>6,5(B) 11,3(P) 0 10,5 mm</p>	 <p>25° 46°(P) 0 42° 90°</p>	 <p>25° 46°(P) 0 42° 90°</p>
Weight, kg (lb)	0.215 (0.474)	0.220 (0.485)	0.225 (0.496)	0.225 (0.496)	0.255 (0.562)	0.255 (0.562)

Catalog numbers of complete switches with one PG 13.5 cable entry






For complete switches with 1 PG 13.5 cable entry, replace N12 with G13.
Example: XCDR 2110P20 becomes XCDR 2110G13.

Catalog numbers of complete switches with one P20 cable entry

For complete switches with 1 ISO M20 x 1.5 cable entry, replace N12 with P20.
Example: XCDR 2110N12 becomes XCDR 2110P20.

Contact operation  contact closed  contact open	(A) (B) = cam displacement (P) = positive opening point	 N/C contact with positive opening operation, when properly mounted and using a conforming operator
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Characteristics

Switch actuation	On end	By 30° cam			
Type of actuation					
Maximum actuation speed	0.5 m/s (1.64 ft/s)	1 m/s (3.28 ft/s)			1.5 m/s (4.92 ft/s)
Minimum force or torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	6 N (1.35 lb)	0.1 N•m (0.89 lb-in)
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	18 N (4.05 lb)	0.25 N•m (2.21 lb-in)
Cable entry	1 entry tapped M20 x 1.5 mm for ISO cable entry, clamping capacity 7 to 13 mm (0.28 to 0.51 in.), or 1 entry tapped PG 13.5, clamping capacity 9 to 12 mm (0.35 to 0.47 in.), or 1 entry tapped for 1/2" NPT (USAS B2-1) conduit				

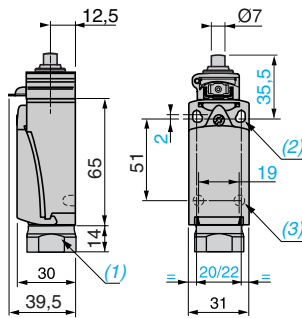
Limit Switches

Osiswitch® Compact with Manual Reset

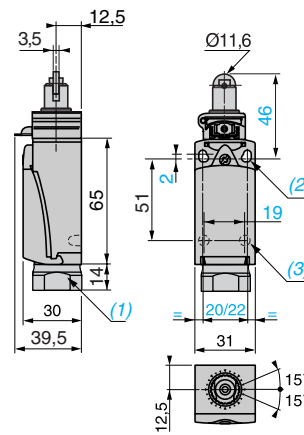
Application, XCDR—Complete Switches, Metal, with One Cable Entry, 1/2" NPT

Dimensions

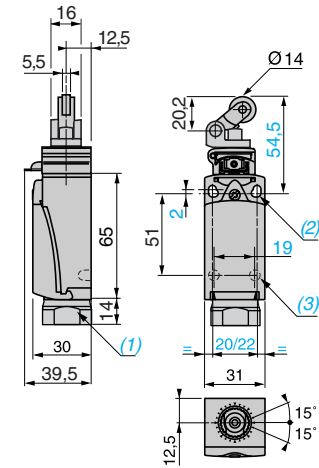
XCDR2•10***



XCDR2•02***



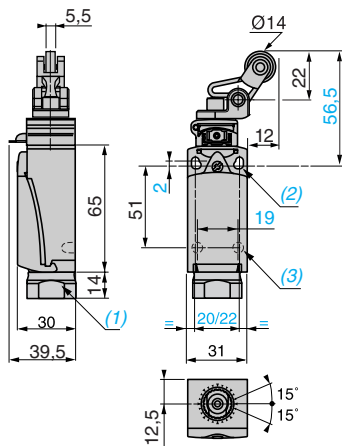
XCDR2•21***



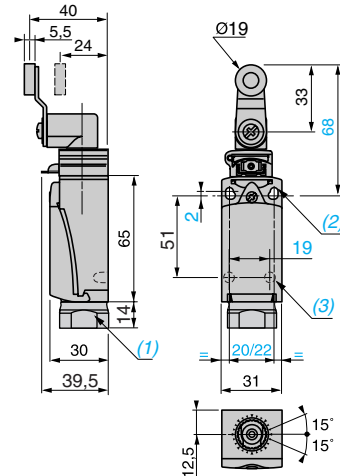
1. Tapped entry for ISO M20 x 1.5 or PG 13.5 conduit thread or 1/2" NPT conduit
- 2 elongated holes $\varnothing 4.3 \times 6.3$ mm (0.17 x 0.25 in.) on 22 mm (0.87 in.) centers, 2 holes $\varnothing 4.3$ mm (0.17 in.) on 20 mm (0.79 in.) centers
3. 2 x $\varnothing 3$ holes for support studs, depth 4 mm (0.16 in.)

Dimensions

XCDR2•27***



XCDR2•18***, XCDR2•19***

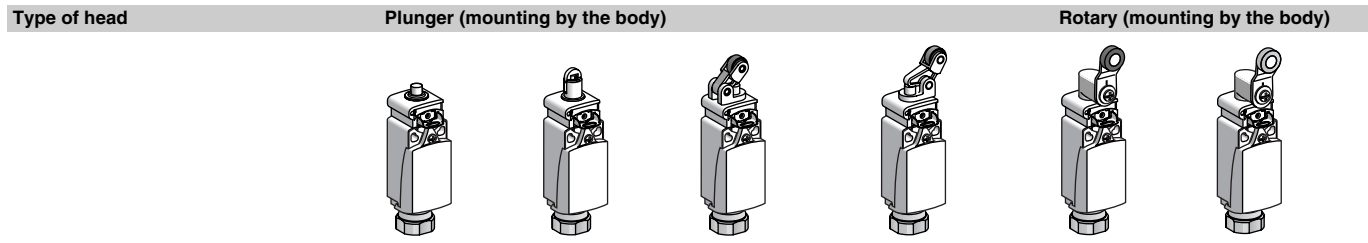


1. Tapped entry for ISO M20 x 1.5 or PG 13.5 conduit thread or 1/2" NPT conduit.
- 2 elongated holes $\varnothing 4.3 \times 6.3$ mm (0.17 x 0.25 in.) on 22 mm (0.87 in.) centers, 2 holes $\varnothing 4.3$ mm (0.17 in.) on 20 mm (0.79 in.) centers.
3. 2 x $\varnothing 3$ holes for support studs, depth 4 mm (0.16 in.).

Limit Switches

Osiswitch® Compact with Manual Reset

Application, XCPR—Complete Switches, Plastic, with One Cable Entry, 1/2" NPT



Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever plunger, vertical actuation in 1 direction	Thermoplastic roller lever	Steel roller lever
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Catalog numbers of complete switches with one 1/2" NPT cable entry

	XCPR2110N12	XCPR2102N12	XCPR2121N12	XCPR2127N12	XCPR2118N12	XCPR2119N12
 2-pole N/C + N/O snap action (XE2SP2151)	 1.8 4,6(P)	 3,1(A) 7,8(P)	 6,5(A) 15,7(P)	 6,5(B) 15,7(P)	 25° 70°(P)	 25° 70°(P)
 2-pole N/C + N/O break before make, slow break (XE2NP2151)	 1.8 3,2(P)	 3,1(A) 5,6(P)	 6,5(A) 11,3(P)	 6,5(B) 11,3(P)	 25° 46°(P)	 25° 46°(P)
 2-pole N/C + N/C snap action (XE2SP2141)	 1.8 4,6(P)	 3,1(A) 7,8(P)	 6,5(A) 15,7(P)	 6,5(B) 15,7(P)	 25° 70°(P)	—
Weight, kg (lb)	0.115 (0.254)	0.115 (0.254)	0.125 (0.276)	0.120 (0.265)	0.155 (0.342)	—

Catalog numbers of complete switches with one PG 13.5 cable entry

For complete switches with one PG 13.5 cable entry, replace N12 with G13.
 Example: XCPR 2110P20 becomes **XCPR 2110G13**.

Catalog numbers of complete switches with one P20 cable entry

For complete switches with one ISO M20 x 1.5 cable entry, replace N12 with P20.
 Example: XCPR 2110N12 becomes **XCPR 2110P20**.

Contact operation	contact closed contact open	(A) (B) = cam displacement (P) = positive opening point	N/C contact with positive opening operation, when properly mounted and using a conforming operator
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Characteristics

Switch actuation	On end	By 30° cam			
Type of actuation					
Maximum actuation speed	0.5 m/s (1.64 ft/s)	1 m/s (3.28 ft/s)			1.5 m/s (4.92 ft/s)
Minimum force or torque	For tripping: 15 N (3.37 lb) For positive opening: 45 N (10.12 lb)	12 N (2.70 lb) 36 N (8.09 lb)	6 N (1.35 lb) 18 N (4.05 lb)	0.1 N•m (0.89 lb-in) 0.25 N•m (2.21 lb-in)	
Cable entry	1 entry tapped M20 x 1.5 mm for ISO cable entry, clamping capacity 7 to 13 mm (0.28 to 0.51 in.), or 1 entry tapped PG 13.5, clamping capacity 9 to 12 mm (0.35 to 0.47 in.), or 1 entry tapped for 1/2" NPT (USAS B2-1) conduit				
Other versions	Complete switches with cable entries other than those listed above: consult your local sales office.				

Limit Switches

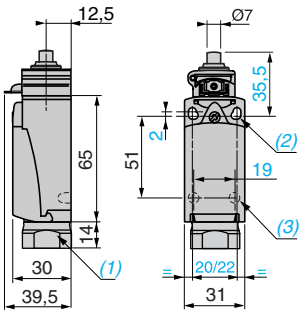
Limit Switches

Osiswitch® Compact with Manual Reset

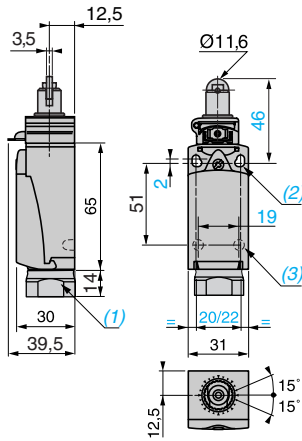
Application, XCPR—Complete Switches, Plastic, with One Cable Entry, 1/2" NPT

Dimensions

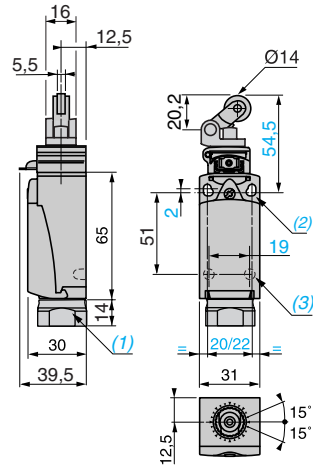
XCPR2•10***



XCPR2•02***



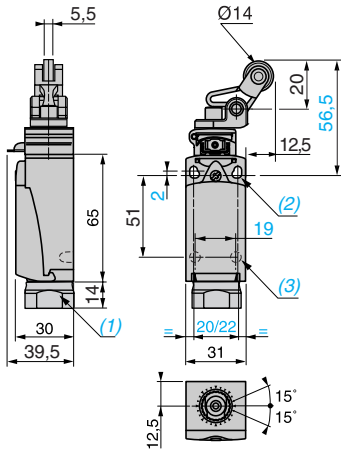
XCPR2•21***



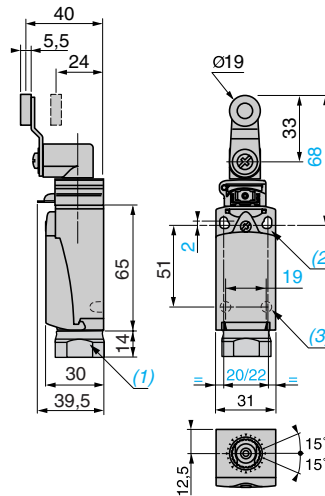
1. Tapped entry for ISO M20 x 1.5 or PG 13.5 conduit thread or 1/2" NPT conduit.
2. 2 elongated holes $\varnothing 4.3 \times 6.3$ mm (0.17 x 0.25 in.) on 22 mm (0.87 in.) centers, 2 holes $\varnothing 4.3$ mm (0.17 in.) on 20 mm (0.79 in.) centers.
3. 2 x $\varnothing 3$ holes for support studs, depth 4 mm (0.16 in.).

Dimensions

XCPR2•27***



XCPR2•18***, XCPR2•19***


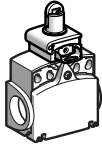

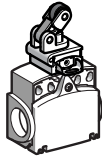

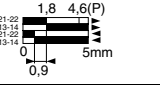

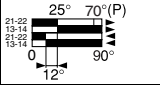
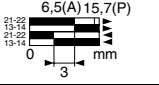

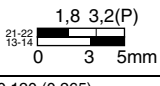
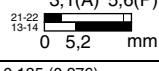
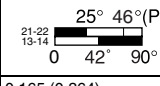



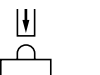

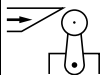



1. Tapped entry for ISO M20 x 1.5 or PG 13.5 conduit thread or 1/2" NPT conduit.
2. 2 elongated holes $\varnothing 4.3 \times 6.3$ mm (0.17 x 0.25 in.) on 22 mm (0.87 in.) centers, 2 holes $\varnothing 4.3$ mm (0.17 in.) on 20 mm (0.79 in.) centers.
3. 2 x $\varnothing 3$ holes for support studs, depth 4 mm (0.16 in.).

Limit Switches

Osiswitch® Compact with Manual Reset

Application, XCTR—Complete Switches, Plastic, with Two Cable Entries, 1/2" NPT

Type of head	Plunger (mounting by the body)			
				
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction
Catalog numbers of complete switches with two cable entries, 1/2" NPT (1)				
 <p>2-pole N/C + N/O snap action (XE2SP3151)</p>	XCTR2110N12 ⊕  1,8 4,6(P) 0,9 5mm	XCTR2102N12 ⊕  3,1(A) 7,8(P) 1,5 mm	XCTR2118N12 ⊕  25° 70°(P) 12° 90°	XCTR2121N12 ⊕  6,5(A) 15,7(P) 3 mm
	 <p>2-pole N/C + N/O break before make, slow break (XE2NP3151)</p>	XCTR2510N12 ⊕  1,8 3,2(P) 0 3 5mm	XCTR2502N12 ⊕  3,1(A) 5,6(P) 0 5,2 mm	XCTR2518N12 ⊕  25° 46°(P) 0 42° 90°
Weight, kg (lb)	0.120 (0.265)	0.125 (0.276)	0.165 (0.364)	0.135 (0.298)
1. One PG 11 to 1/2" NPT adapter and one plug included.				
Catalog numbers of complete switches with two PG 11 cable entries				
For complete switches with two PG 11 cable entries, replace N12 with G11. Example: XCTR2110N12 becomes XCTR2110G11.				
Catalog numbers of complete switches with two ISO M16 x 1.5 cable entries				
For complete switches with two ISO M16 x 1.5 cable entries, replace N12 with P16. Example: XCTR2110N12 becomes XCTR2110P16.				
Weight, kg (lb)	0.120 (0.265)	0.125 (0.276)	0.165 (0.364)	0.135 (0.298)
Contact operation	 contact closed  contact open	(A) = cam displacement (P) = positive opening point	 N/C contact with positive opening operation, when properly mounted and using a conforming operator	
Characteristics				
Switch actuation	On end	By 30° cam		
Type of actuation				
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)	1 m/s (3.28 ft/s)
Minimum force or torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	0.1 N•m (0.89 lb-in)
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	0.25 N•m (2.21 lb-in)
Cable entry (1 entry fitted with blanking plug)	2 entries tapped M16 x 1.5 mm for ISO cable entry, clamping capacity 4 to 8 mm (0.16 to 0.31 in.), or 2 entries tapped PG 11, clamping capacity 7 to 10 mm (0.28 to 0.39 in.), or 2 entries tapped for 1/2" NPT (USAS B2-1) conduit using PG 11 to 1/2" NPT adapter DE9RA1012 (1 entry fitted with adapter)			

Limit Switches

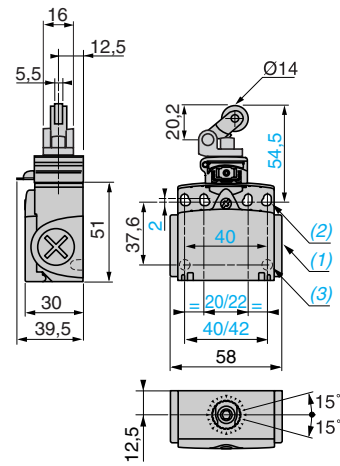
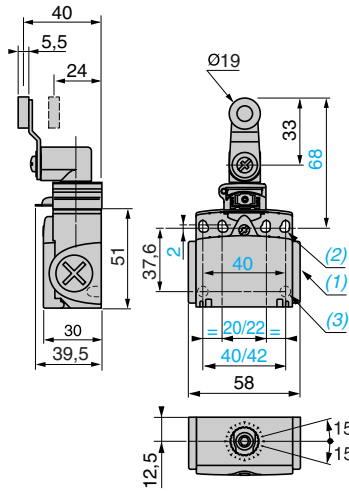
Osiswitch® Compact, Metal with Manual Reset

Application, XCDR—Complete Switches with Two Cable Entries, 1/2" NPT

Dimensions

XCTR2•18***

XCTR2•21***

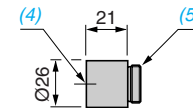
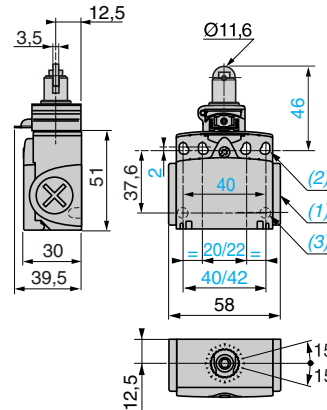
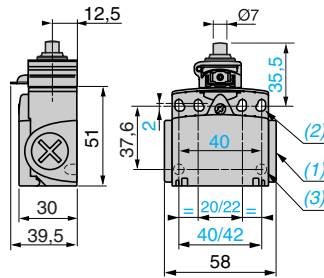


1. Tapped entry for ISO M16 x 1.5 or PG 11 conduit thread. 1/2" NPT adapter included.
2. 4 elongated holes Ø 4.3 x 6.3 mm (0.17 x 0.25 in.) on 22/42 mm (0.87/1.65 in.) centers, 4 holes Ø 4.3 mm (0.17 in.) on 20/40 mm (0.79/1.57 in.) centers.
3. 2 x Ø 3 holes for support studs, depth 4 mm (0.16 in.).

XCTR2•10***

XCTR2•02***

DE9RA1012



1. Tapped entry for ISO M16 x 1.5 or PG 11 conduit thread. 1/2" NPT adapter included.
2. 4 elongated holes Ø 4.3 x 6.3 mm (0.17 x 0.25 in.) on 22/42 mm (0.87/1.65 in.) centers, 4 holes Ø 4.3 mm (0.17 in.) on 20/40 mm (0.79/1.57 in.) centers.
3. 2 x Ø 3 holes for support studs, depth 4 mm (0.16 in.).
4. Tapped entry for 1/2" NPT conduit.
5. PG 11 threaded sleeve.

Limit Switches

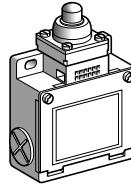
Osiswitch® Classic, Metal

XCKM, XCKL, and XCKML

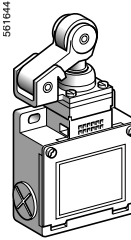
■ **XCKM**
with 3 cable entries

□ With plunger head

561643

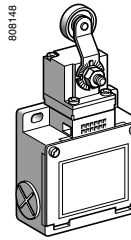


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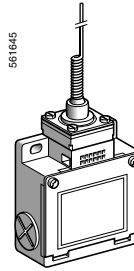


□ With rotary or multi-directional head

808148



561645

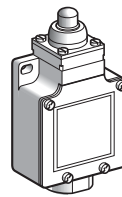


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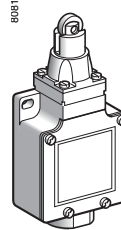
■ **XCKL**
with 1 cable entry

□ With plunger head

808140

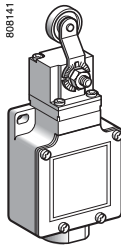


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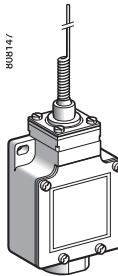


□ With rotary or multi-directional head

808141



808147

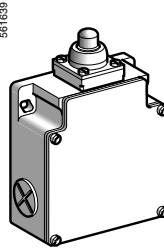


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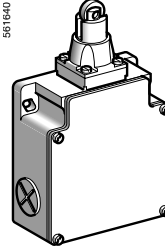
■ **XCKML**
with 3 cable entries and two 2-pole contacts

□ With plunger head

561639

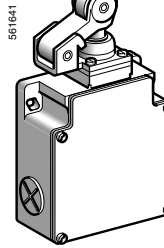


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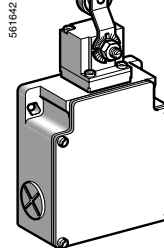


□ With rotary or multi-directional head

561641



561642



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Environmental characteristics

Conforming to standards	Products	IEC 60947-5-1, EN 60947-5-1, UL 508, CSA C22-2 n° 14
	Machine assemblies	IEC 60204-1, EN 60204-1
Product certifications	Version	UL, CSA, CCC (for XCKM)
Protective treatment	Version	Standard "TC". Special "TH"
Ambient air temperature	For operation	- 25...+70 °C (-13...+158 °F)
	For storage	- 40...+70 °C (-40...+158 °F)
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10...500 Hz)
Shock resistance	Conforming to IEC 60068-2-27	50 gn (11 ms)
Electric shock protection		Class I conforming to IEC 61140 and NF C 20-030
Degree of protection		IP 66 conforming to IEC 60529; IK 05 conforming to EN 50102
Repeat accuracy		XCKML 0.1 mm; XCKM and XCKL 0.05 mm on the tripping points, with 1 million operating cycles for head with end plunger
Cable entry or integral connector	Depending on model	XCKM : 3 tapped entries, PG 11 conduit thread (1/2" NPT adapter available), or tapped M20 XCKL : 1 tapped entry incorporating 1/2" NPT adapter XCKML : 3 tapped entries, PG 13 conduit thread (1/2" NPT adapter included), or tapped M20
Materials		Bodies: Zamak® zinc alloy Rotary heads: Zamak® zinc alloy or plastic depending on model; other heads: plastic

Limit Switches

Osiswitch® Classic, Metal

XCKM, XCKL, and XCKML

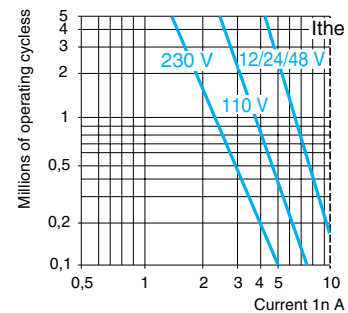
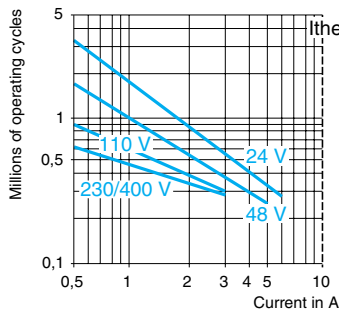
Contact block characteristics

Rated operational characteristics	XE2•P	\sim AC-15; A300 ($U_e = 240$ V, $I_e = 3$ A); $I_{the} = 10$ A \equiv DC-13; Q300 ($U_e = 250$ V, $I_e = 0,27$ A), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1
	XE3•P	\sim AC-15; B300 ($U_e = 240$ V, $I_e = 1,5$ A); $I_{the} = 6$ A \equiv DC-13; R300 ($U_e = 250$ V, $I_e = 0,1$ A), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1
Rated insulation voltage	XE2•P	$U_i = 500$ V degree of pollution 3 conforming to IEC 60947-1 $U_i = 300$ V conforming to UL 508, CSA C22-2 n° 14
	XE3•P	$U_i = 400$ V degree of pollution 3 conforming to IEC 60947-1 $U_i = 300$ V conforming to UL 508, CSA C22-2 n° 14
Rated impulse withstand voltage	XE2•P	$U_{imp} = 6$ kV conforming to IEC 60947-1, IEC 60664
	XE3•P	$U_{imp} = 4$ kV conforming to IEC 60947-1, IEC 60664
Positive operation (depending on model)		N/C contacts with positive opening operation conforming to IEC 947-5-1 Section 3, EN 60 947-5-1
Resistance across terminals		≤ 25 m Ω conforming to IEC 60255-7 category 3
Short-circuit protection	XE2•P	10 A cartridge fuse type gG (gl)
	XE3•P	6 A cartridge fuse type gG (gl)
Cabling (screw and captive cable clamp terminals)	XE2SP21•1	Clamping capacity, min: $1 \times 0,34$ mm ² , max: $2 \times 1,5$ mm ²
	XE2NP21•1	Clamping capacity, min: $1 \times 0,5$ mm ² , max: $2 \times 2,5$ mm ²
	XESP2151L and XENP2151L	Clamping capacity, min: $1 \times 0,34$ mm ² , max: $2 \times 1,5$ mm ² or $1 \times 2,5$ mm ²
	XE3NP and XE3SP	Clamping capacity, min: $1 \times 0,34$ mm ² , max: 1×1 mm ² or $2 \times 0,75$ mm ²
Minimum actuation speed		XE2SP21•1, XESP2151L and XE3SP: 0.01 m/minute (0.03 ft/minute)
		XE2NP21•1, XENP2151L and XE3NP: 6 m/minute (19.68 ft/minute)
Electrical durability		<ul style="list-style-type: none"> Conforming to IEC 60947-5-1 appendix C Utilization categories AC-15 and DC-13 Maximum operating rate: 3600 operating cycles/hour Load factor: 0,5

XE2SP21•1, XE2SP2141, XESP2151L

XE2NP21•1, XENP2151L

a.c. supply
 \sim 50/60 Hz
 \square inductive circuit



d.c. supply \equiv

Power switched in W for 5 million operating cycles

Voltage	V	24	48	120
\square	W	10	7	4

For XE2SP•151 on \sim or \equiv , the "N/C" and "N/O" contacts are simultaneously loaded to the values shown with reverse polarity.

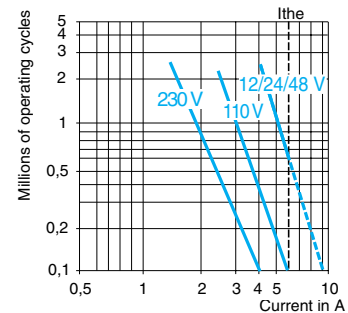
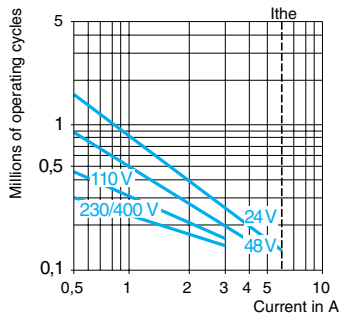
Power switched in W for 5 million operating cycles

Voltage	V	24	48	120
\square	W	13	9	7

XE3SP••••

XE3NP••••

a.c. supply
 \sim 50/60 Hz
 \square inductive circuit



d.c. supply \equiv

Power switched in W for 5 million operating cycles

Voltage	V	24	48	120
\square	W	3	2	1

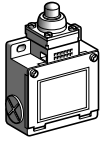
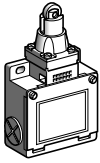
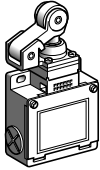
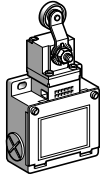
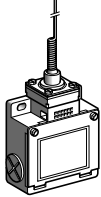









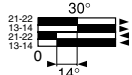


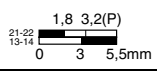

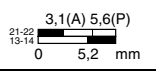

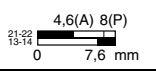

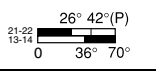
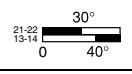




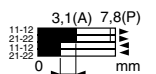



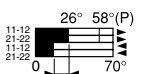
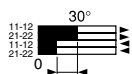


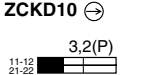

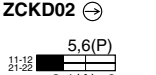



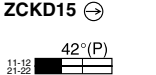



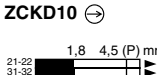

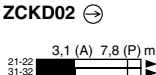

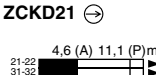





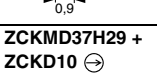

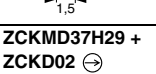

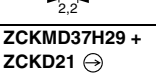

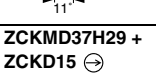
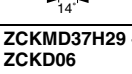








Power switched in W for 5 million operating cycles

Voltage	V	24	48	120
\square	W	4	3	2

Limit Switches

Osiswitch® Classic, Metal

XCKM—Complete Switches w/ 3 ISO M20x1.5 Cable Entries, Including One 1/2" NPT Adapter

Type of head	Plunger (mounting by the body)			Rotary (mounting by the body)	Multi-directional (mounting by the body)
					
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever (1)	Cat's whisker (4)
Catalog numbers (2) (3)					
 2-pole N/C + N/O snap action (XE2SP2151)	XCKM110H29  	XCKM102H29  	XCKM121H29  	XCKM115H29  	XCKM106H29 
 2-pole N/C + N/O break before make, slow break (XE2NP2151)	XCKM510H29  	XCKM502H29  	XCKM521H29  	XCKM515H29  	XCKM506H29 
 2-pole N/C + N/C snap action (XE2SP2141)	ZCKM9H29 + ZCKD10  	ZCKM9H29 + ZCKD02  	ZCKM9H29 + ZCKD21  	ZCKM9H29 + ZCKD15  	ZCKM9H29 + ZCKD06 
 2-pole N/C + N/C simultaneous, slow break (XE2NP2141)	ZCKM7H29 + ZCKD10  	ZCKM7H29 + ZCKD02  	ZCKM7H29 + ZCKD21  	ZCKM7H29 + ZCKD15  	ZCKM7H29 + ZCKD06 
 3-pole N/C + N/C + N/O snap action (XE3SP2141)	ZCKMD39H29 + ZCKD10  	ZCKMD39H29 + ZCKD02  	ZCKMD39H29 + ZCKD21  	ZCKMD39H29 + ZCKD15  	ZCKMD39H29 + ZCKD06 
 3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141)	ZCKMD37H29 + ZCKD10  	ZCKMD37H29 + ZCKD02  	ZCKMD37H29 + ZCKD21  	ZCKMD37H29 + ZCKD15  	ZCKMD37H29 + ZCKD06 
Weight, kg (lb)	0.250 (0.551)	0.255 (0.562)	0.300 (0.661)	0.280 (0.617)	0.250 (0.551)
Contact operation	 contact closed  contact open	(A) = cam displacement (P) = positive opening point		 N/C contact with positive opening operation, when properly mounted and using a conforming operator	
Characteristics					
Switch actuation	On end	By 30° cam		By any moving part	
Type of actuation					
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)		1 m/s (3.28 ft/s), any direction
Minimum force or torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	8 N (1.80 lb)	0.1 N•m (0.89 lb-in)
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	24 N (5.40 lb)	0.25 N•m (2.21 lb-in)
Cable entry (3)	3 entries tapped M20 x 1.5 mm for ISO cable entry, clamping capacity 7 to 13 mm (0.28 to 0.51 in.)				

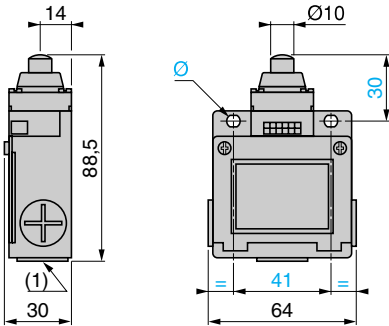
- Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
 - Switches with gold contacts or eyelet type connections: please consult your local sales office.
 - For an entry tapped for a PG 11 conduit thread, delete H29 from the end of the catalog number. Example: XCKM110H29 becomes XCKM110.
 - Value taken with actuation by moving part at 100 mm (3.94 in.) from the mounting.
- Note:** To convert XCKM110 from PG 11 to 1/2" NPT, use adapter DE9RA1012, included.

Limit Switches

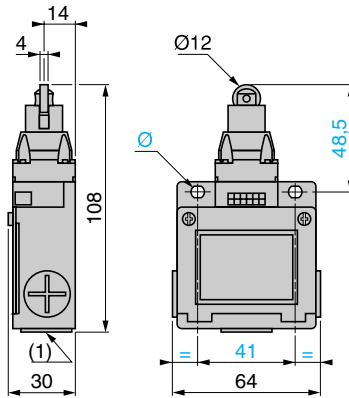
Osiswitch® Classic, Metal

XCKM—Complete Switches w/ 3 ISO M20x1.5 Cable Entries, Including One 1/2" NPT Adapter

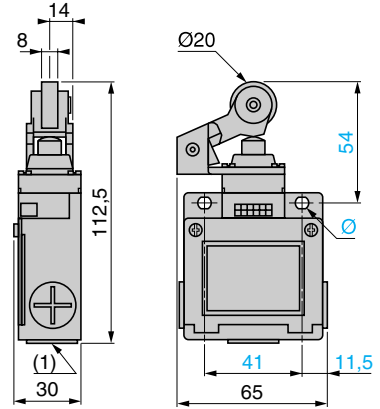
XCKM•10
ZCKMD3• + ZCKD10



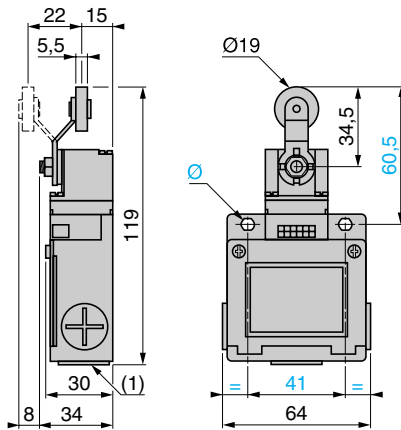
XCKM•02
ZCKMD3• + ZCKD02



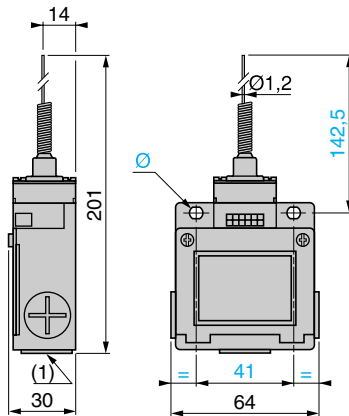
XCKM•21
ZCKMD3• + ZCKD21



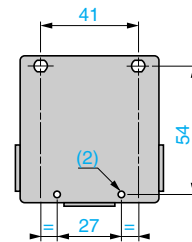
XCKM•15
ZCKMD3• + ZCKD15



XCKM•06
ZCKMD3• + ZCKD06

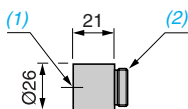


Rear view
XCKM•••, ZCKM•, ZCKMD3•



- 1. 3 tapped entries for ISO M20 x 1.5 or PG 11 conduit thread. Includes 1/2" NPT conduit adapter DE9RA1012.
- 2. 2 x Ø 4 H 11, depth 10.
- Ø: 2 elongated holes Ø 5.2 x 6.2.

Adapter for 1/2" NPT conduit
DE9RA1012



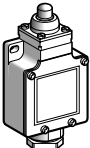
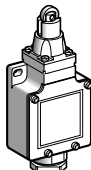
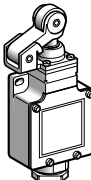
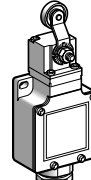
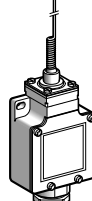

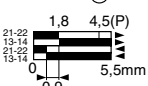
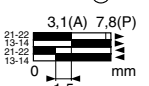

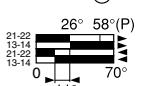
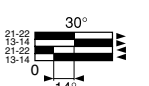

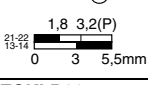
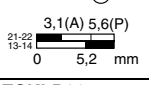
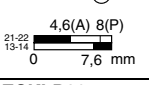
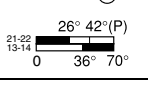
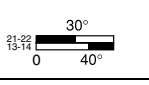

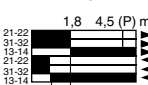
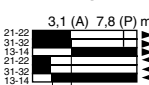
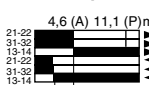

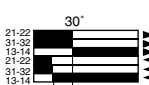


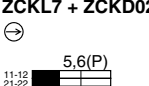
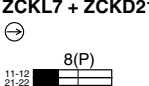
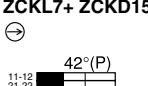


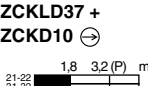
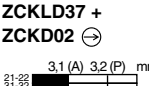
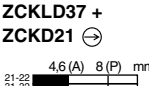
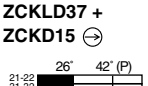
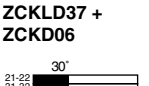







- 1. Tapped entry for 1/2" NPT conduit.
- 2. PG 11 threaded sleeve.

Limit Switches

Limit Switches

Osiswitch® Classic, Metal

XCKL—Complete Switches Incorporating Adapter for 1/2" NPT

Type of head	Plunger (mounting by the body)			Rotary (mounting by the body)	Multi-directional (mounting by the body)
					
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever (1)	Cat's whisker (2)
Catalog numbers (3)					
	2-pole N/C + N/O snap action (XE2SP2151)  XCKL110	 XCKL102	 XCKL121	 XCKL115	 XCKL106
	2-pole N/C + N/O break before make, slow break (XE2NP2151)  XCKL510	 XCKL502	 XCKL521	 XCKL515	 XCKL506
	3-pole N/C + N/C + N/O snap action (XE3SP2141)  ZCKLD39 + ZCKD10	 ZCKLD39 + ZCKD02	 ZCKLD39 + ZCKD21	 ZCKLD39 + ZCKD15	 ZCKLD39 + ZCKD06
	2-pole N/C + N/C simultaneous, slow break (XE2NP2141)  ZCKL7 + ZCKD10	 ZCKL7 + ZCKD02	 ZCKL7 + ZCKD21	 ZCKL7 + ZCKD15	 ZCKL7 + ZCKD06
	3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141)  ZCKLD37 + ZCKD10	 ZCKLD37 + ZCKD02	 ZCKLD37 + ZCKD21	 ZCKLD37 + ZCKD15	 ZCKLD37 + ZCKD06
Weight, kg (lb)	0.255 (0.562)	0.260 (0.573)	0.305 (0.672)	0.285 (0.628)	0.255 (0.562)
Contact operation	 contact closed  contact open	(A) = cam displacement (P) = positive opening point		⊖ N/C contact with positive opening operation, when properly mounted and using a conforming operator	
Characteristics					
Switch actuation	On end	By 30° cam			By any moving part
Type of actuation					
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)		1 m/s (3.28 ft/s), any direction
Minimum force or torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	8 N (1.80 lb)	0.1 N•m (0.89 lb-in)
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	24 N (5.40 lb)	0.25 N•m (2.21 lb-in)
Cable entry	1 entry incorporating metal cable entry. Clamping capacity 6 to 13.5 mm (0.24 to 0.53 in.).				

1. Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
 2. Value taken with actuation by moving part at 100 mm (3.94 in.) from the mounting.
 3. Switches with gold contacts or eyelet type connections: please consult your local sales office.

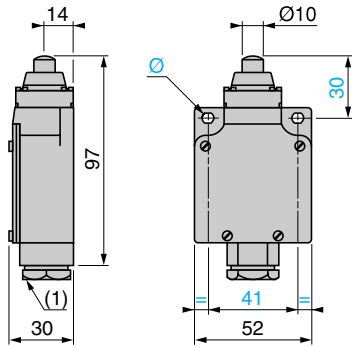
Limit Switches

Limit Switches

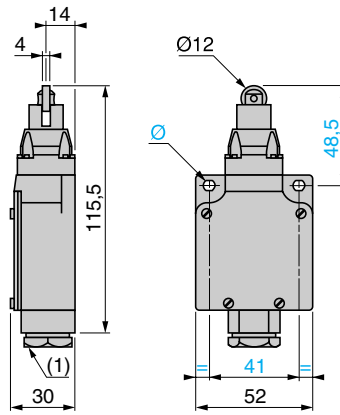
Osiswitch® Classic, Metal

XCKL—Complete Switches Incorporating Adapter for 1/2" NPT

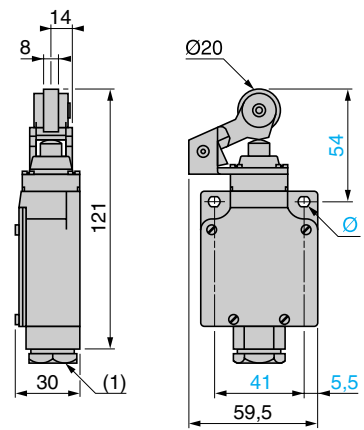
XCKL•10
ZCKL• + ZCKD10
ZCKLD3• + ZCKD10



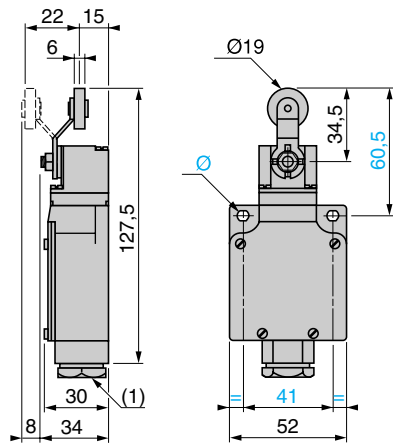
XCKL•02
ZCKL3• + ZCKD02
ZCKLD3• + ZCKD02



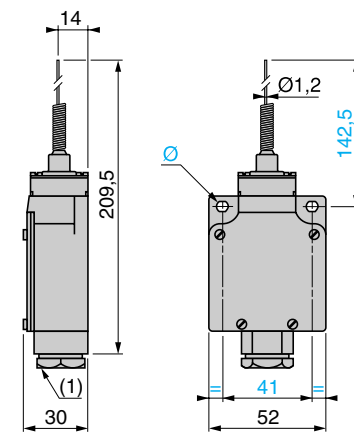
XCKL•21
ZCKL• + ZCKD21
ZCKLD3• + ZCKD21



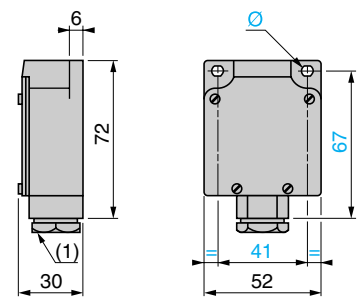
XCKL•15
ZCKL• + ZCKD15
ZCKLD3• + ZCKD15



XCKL•06
ZCKL• + ZCKD06
ZCKLD3• + ZCKD06



Body mountings

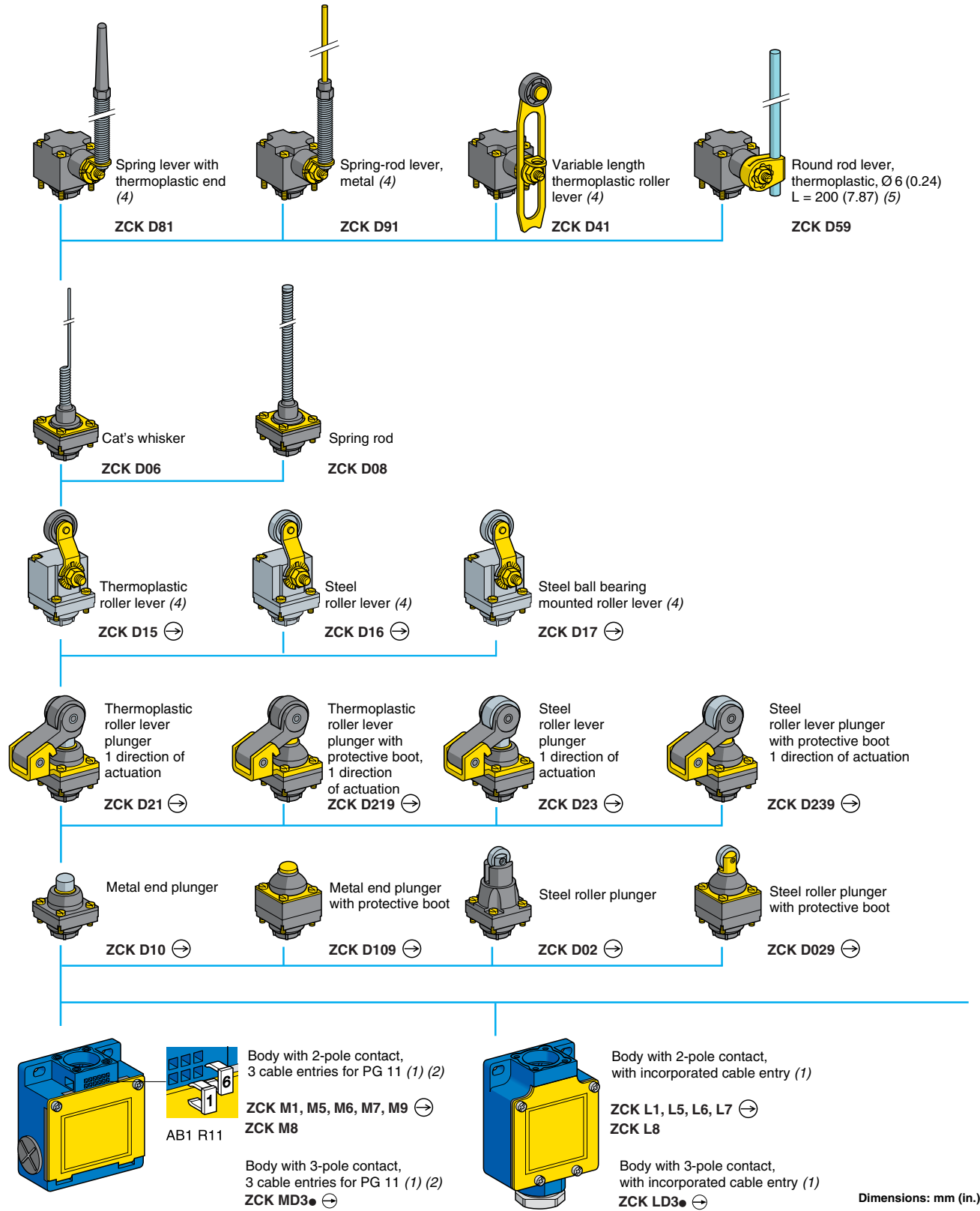


1. Incorporated cable entry.
Ø: 2 elongated holes Ø 5.2 x 6.2.

Limit Switches

Osiswitch® Classic, Metal

XCKM and XCKL—Modular



Dimensions: mm (in.)

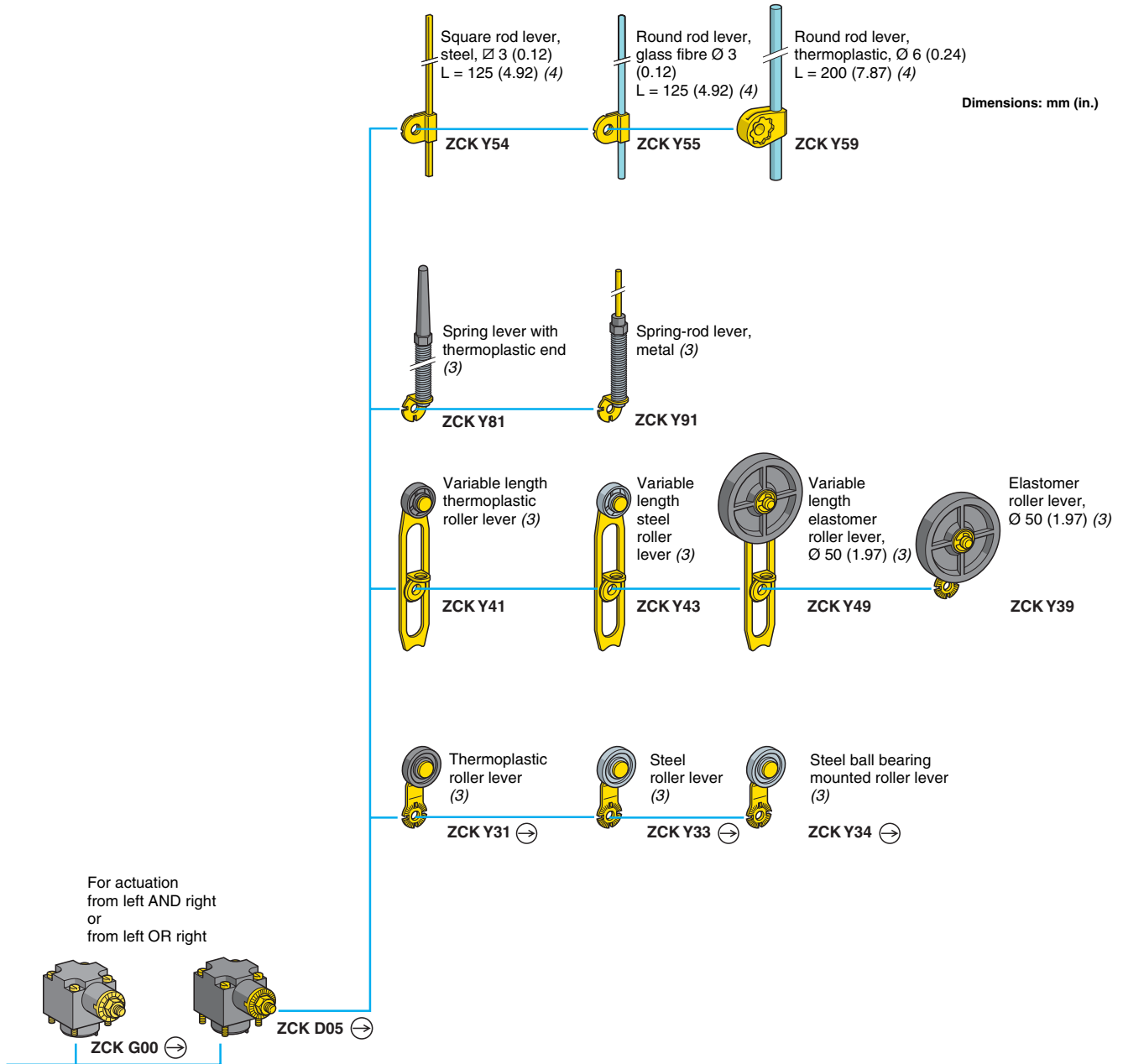
1. For further details. See page 476.
2. For 3 cable entries tapped ISO M20 x 1.5, add **H29** to the catalog number. Example: ZCKM1 becomes **ZCKM1H29**.

Limit Switches

Limit Switches

Osiswitch® Classic, Metal

XCKM and XCKL—Modular

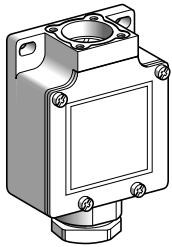
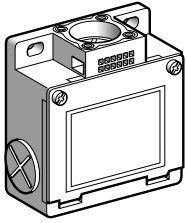


- ⊙ head assuring positive opening operation, when properly mounted and using a conforming operator.
- 3. Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
- 4. Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting.

Limit Switches

Osiswitch® Classic, Metal

XCKM and XCKL—Modular



Bodies with 2-pole contact

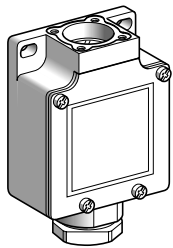
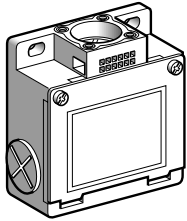
With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
For limit switches type XCKM					
N/C + N/O snap action (XE2SP2151)			1/2" NPT (2)	ZCKM1	0.210 (0.463)
			ISO M20 x 1.5	ZCKM1H29	0.210 (0.463)
N/C + N/O break before make, slow break (XE2NP2151)			1/2" NPT (2)	ZCKM5	0.210 (0.463)
			ISO M20 x 1.5	ZCKM5H29	0.210 (0.463)
N/O + N/C make before make, slow break (XE2NP2161)			1/2" NPT (2)	ZCKM6	0.210 (0.463)
			ISO M20 x 1.5	ZCKM6H29	0.210 (0.463)
N/C + N/C simultaneous, slow break (XE2NP2141)			1/2" NPT (2)	ZCKM7	0.210 (0.463)
			ISO M20 x 1.5	ZCKM7H29	0.210 (0.463)
N/O + N/O simultaneous, slow break (XE2NP2131)		—	1/2" NPT (2)	ZCKM8	0.210 (0.463)
			ISO M20 x 1.5	ZCKM8H29	0.210 (0.463)
N/C + N/C snap action (XE2SP2141)			ISO M20 x 1.5	ZCKM9H29	0.210 (0.463)
For limit switches type XCKL					
N/C + N/O snap action (XE2SP2151)			1/2" NPT	ZCKL1	0.210 (0.463)
N/C + N/O break before make, slow break (XE2NP2151)			1/2" NPT	ZCKL5	0.210 (0.463)
N/O + N/C make before make, slow break (XE2NP2161)			1/2" NPT	ZCKL6	0.210 (0.463)
N/C + N/C simultaneous, slow break (XE2NP2141)			1/2" NPT	ZCKL7	0.210 (0.463)
N/O + N/O simultaneous, slow break (XE2NP2131)		—	1/2" NPT	ZCKL8	0.210 (0.463)

- : N/C contact with positive opening operation, when properly mounted and using a conforming operator.
- 3 PG 11 tapped entries, one with metal adapter for 1/2" NPT (USASB2-1) conduit (PG 8).

Limit Switches

Osiswitch® Classic, Metal

XCKM and XCKL—Modular



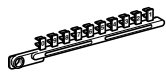
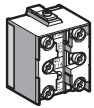
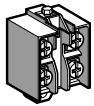
Bodies with 3-pole contact					
With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
For limit switches type XCKM					
N/C + N/O + N/O snap action (XE3SP2151)			1/2" NPT (2)	ZCKMD31	0.210 (0.463)
			ISO M20 x 1.5	ZCKMD31H29	0.210 (0.463)
N/C + N/C + N/O snap action (XE3SP2141)			1/2" NPT (2)	ZCKMD39	0.210 (0.463)
			ISO M20 x 1.5	ZCKMD39H29	0.210 (0.463)
N/C + N/C + N/O break before make, slow break (XE3NP2141)			1/2" NPT (2)	ZCKMD37	0.210 (0.463)
			ISO M20 x 1.5	ZCKMD37H29	0.210 (0.463)
N/C + N/O + N/O break before make, slow break (XE3NP2151)			1/2" NPT (2)	ZCKMD35	0.210 (0.463)
			ISO M20 x 1.5	ZCKMD35H29	0.210 (0.463)
For limit switches type XCKL					
N/C + N/O + N/O snap action (XE3SP2151)			1/2" NPT	ZCKLD31	0.210 (0.463)
N/C + N/C + N/O snap action (XE3SP2141)			1/2" NPT	ZCKLD39	0.210 (0.463)
N/C + N/C + N/O break before make, slow break (XE3NP2141)			1/2" NPT	ZCKLD37	0.210 (0.463)
N/C + N/O + N/O break before make, slow break (XE3NP2151)			1/2" NPT	ZCKLD35	0.210 (0.463)

1. : N/C contact with positive opening operation, when properly mounted and using a conforming operator.
2. 3 PG 11 tapped entries, one with metal adapter for 1/2" NPT (USASB2-1) conduit (PG 8).

Limit Switches

Osiswitch® Classic, Metal

XCKM and XCKL—Modular



Contact blocks					
Type of contact	Function diagram	For bodies	Positive operation (1)	Catalog number	Weight kg (lb)
2-pole contact					
N/C + N/O snap action		ZCKM1 ZCKL1	⊖	XE2SP2151	0.020 (0.044)
N/C + N/O break before make, slow break		ZCKM5 ZCKL5	⊖	XE2NP2151	0.020 (0.044)
N/O + N/C make before break, slow break		ZCKM6 ZCKL6	⊖	XE2NP2161	0.020 (0.044)
N/C + N/C simultaneous, slow break		ZCKM7 ZCKL7	⊖	XE2NP2141	0.020 (0.044)
N/O + N/O simultaneous, slow break		ZCKM8 ZCKL8	—	XE2NP2131	0.020 (0.044)
N/C + N/C snap action		ZCKM9	⊖	XE2SP2141	0.020 (0.044)
3-pole contact					
N/C + N/O + N/O snap action		ZCKMD31 ZCKLD31	⊖	XE3SP2151	0.035 (0.077)
N/C + N/C + N/O snap action		ZCKMD39 ZCKLD39	⊖	XE3SP2141	0.035 (0.077)
N/C + N/C + N/O break before make, slow break		ZCKMD37 ZCKLD37	⊖	XE3NP2141	0.035 (0.077)
N/C + N/O + N/O break before make, slow break		ZCKMD35 ZCKLD35	⊖	XE3NP2151	0.035 (0.077)

1. ⊖: N/C contact with positive opening operation or sub-assembly assuring positive opening operation when properly mounted and using a conforming operator.

Accessories for limit switches type XCKM

Description	Sold in lots of	Unit catalog number	Weight kg (lb)
Tap-off terminal for cabling continuity	1	XCKZ09	0.010 (0.022)
Clip-in markers (strips of 10 numbers: 0 to 9) Other markers, please consult your local sales office.	25	AB1R11	0.002 (0.004)
Other versions	Gold flashed contacts: consult your local sales office.		

Limit Switches

Osiswitch® Classic, Metal

XCKM and XCKL—Modular

Heads ZCKD10, D109 with body	ZCKM1, L1 	ZCKM5, L5 	ZCKM6, L6 	ZCKM7, L7 	ZCKM8, L8
	ZCKM9 	ZCKMD39, LD39 	ZCKMD37, LD37 	ZCKMD31, LD31 	ZCKMD35, LD35
Heads ZCKD02, D029 with body	ZCKM1, L1 	ZCKM5, L5 	ZCKM6, L6 	ZCKM7, L7 	ZCKM8, L8
	ZCKM9 	ZCKMD39, LD39 	ZCKMD37, LD37 	ZCKMD31, LD31 	ZCKMD35, LD35
Heads ZCKD21, D23, D219, D239 with body	ZCKM1, L1 	ZCKM5, L5 	ZCKM6, L6 	ZCKM7, L7 	ZCKM8, L8
	ZCKM9 	ZCKMD39, LD39 	ZCKMD37, LD37 	ZCKMD31, LD31 	ZCKMD35, LD35
Heads ZCKD15, D16, D17 with body	ZCKM1, L1 	ZCKM5, L5 	ZCKM6, L6 	ZCKM7, L7 	ZCKM8, L8
	ZCKM9 	ZCKMD39, LD39 	ZCKMD37, LD37 	ZCKMD31, LD31 	ZCKMD35, LD35
Heads ZCKD41, D59, D81, D91 with body	ZCKM1, L1 	ZCKM5, L5 	ZCKM6, L6 	ZCKM7, L7 	ZCKM8, L8
	ZCKM9 	ZCKMD39, LD39 	ZCKMD37, LD37 	ZCKMD31, LD31 	ZCKMD35, LD35
Heads ZCKD06, D08 with body	ZCKM1, L1 	ZCKM5, L5 	ZCKM6, L6 	ZCKM7, L7 	ZCKM8, L8
	ZCKM9 	ZCKMD39, LD39 	ZCKMD37, LD37 	ZCKMD31, LD31 	ZCKMD35, LD35
Contact operation		(A) = cam displacement (P) = positive opening point			

Limit Switches

Limit Switches

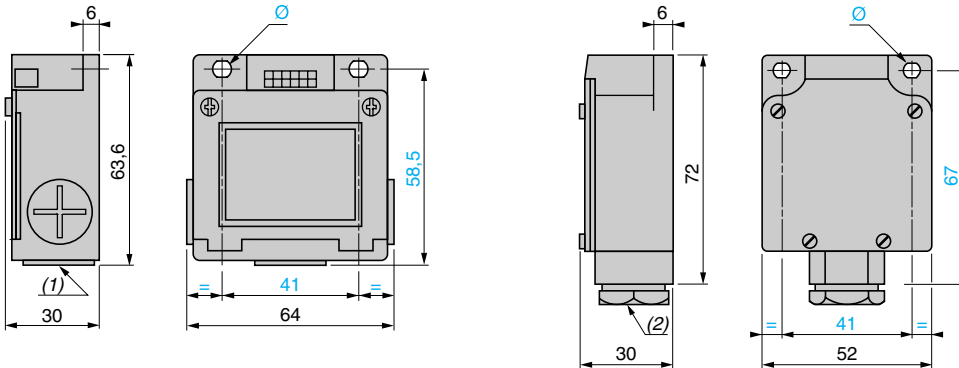
Osiswitch® Classic, Metal

XCKM and XCKL—Modular

Bodies with contacts

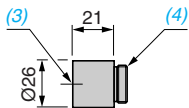
ZCKM1, M5, M6, M7, M8,
ZCKM1H29, M5H29, M6H29, M7H29, M8H29, M9H29

ZCKL1, L5, L6, L7, L8, LD3• (5)



Adapter for 1/2" NPT conduit

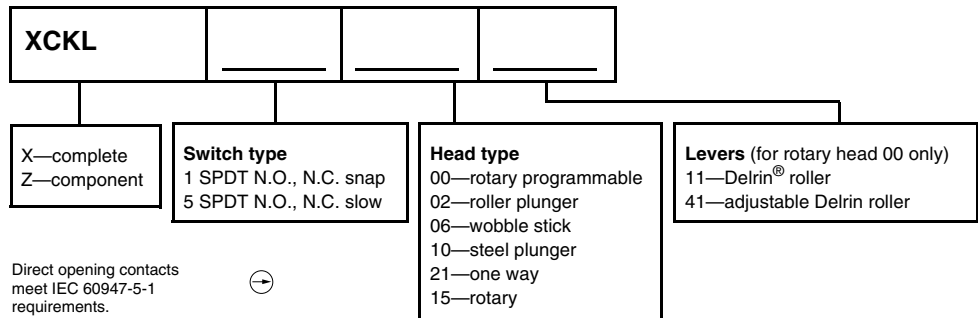
DE9RA1012



1. 3 tapped entries for ISO M20 x 1.5 or PG 11 conduit thread.
2. Incorporated cable entry.
- Ø: 2 elongated holes Ø 5.2 x 6.2.
3. Tapped entry for 1/2" NPT conduit.
4. Threaded sleeve, PG 11.
5. XCKL provided with 1/2" NPT adapter shown above, DE9RA1012.

Complete Switches

For interpreting the complete switch catalog number only



NOTE: Some combinations are not available. Use this information to interpret catalog numbers, not to create them.

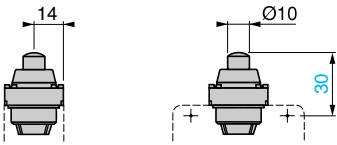
Limit Switches

Osiswitch® Classic, Metal

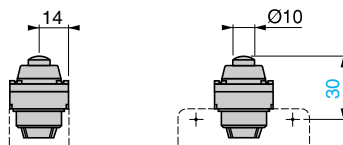
XCKM and XCKL—Modular

Plunger heads

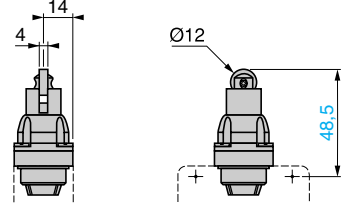
ZCKD10



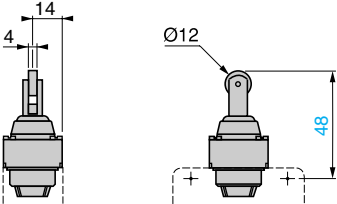
ZCKD109



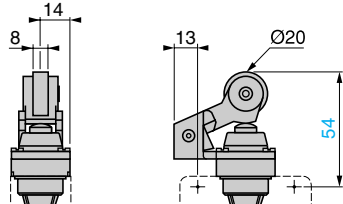
ZCKD02



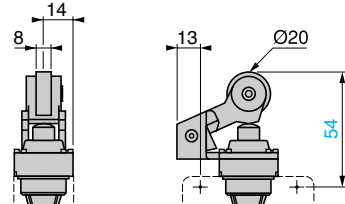
ZCKD029



ZCKD21, D23

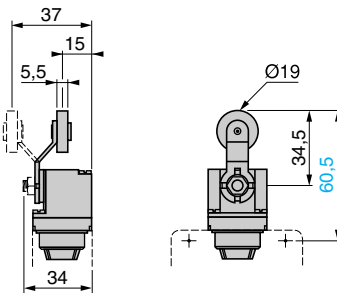


ZCKD219, D239

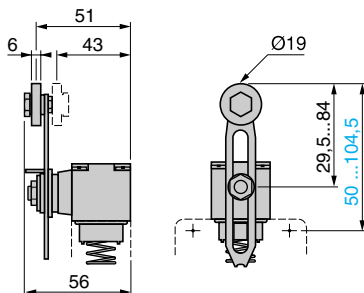


Rotary heads

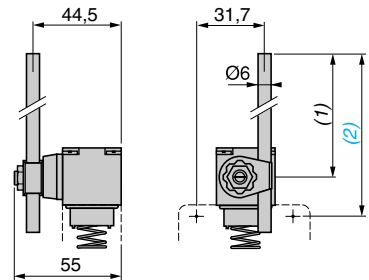
ZCKD15, D16, D17



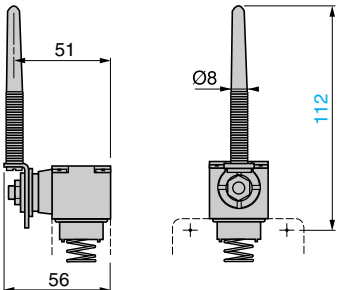
ZCKD41



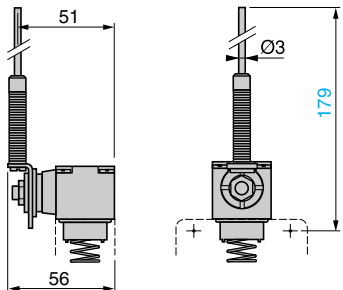
ZCKD59



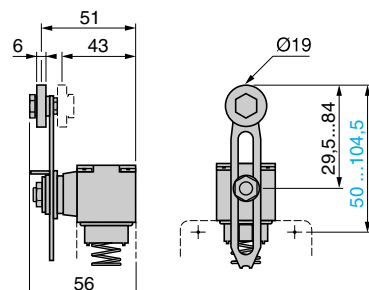
ZCKD81



ZCKD91

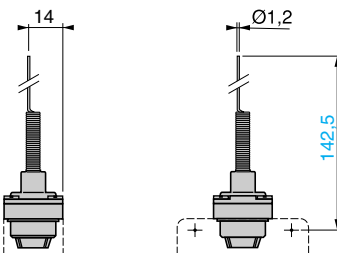


ZCKG00

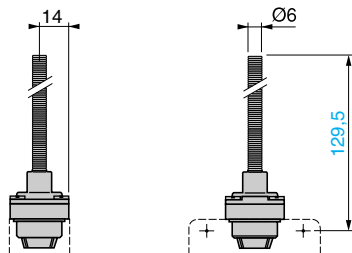


Multi-directional heads

ZCKD06



ZCKD08



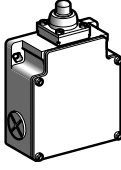
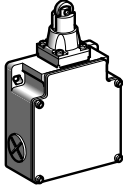
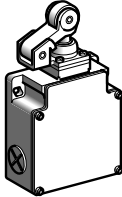
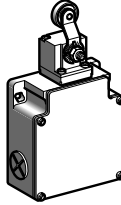




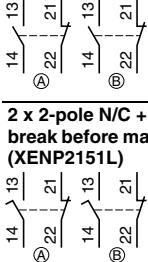
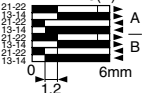
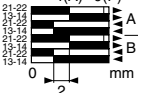
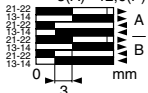
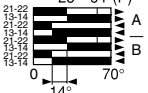




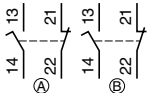








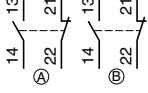
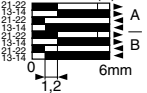
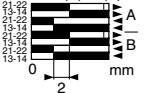
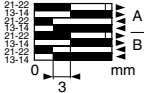
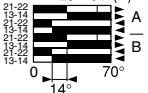




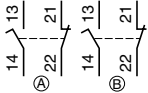


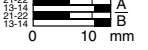








1. 190 max.
2. 215.5 max.

NOTE: operating lever spindle threaded M6.

Limit Switches

Osiswitch® Classic, Metal

XCKML, 2 x 2-Pole Contacts—Complete Switches

Type of head	Plunger (mounting by the body)			Rotary (mounting by the body)	
					
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever plunger, horizontal actuation in 1 direction	Thermoplastic roller lever (1)	
Catalog numbers (2)					
Switches with 3 entries tapped ISO M20 x 1.5					
2 x 2-pole N/C + N/O snap action (XESP2151L)	XCKML110H29 	XCKML102H29 	XCKML121H29 	XCKML115H29 	
					
2 x 2-pole N/C + N/O break before make, slow break (XENP2151L)	XCKML510H29 	XCKML502H29 	XCKML521H29 	XCKML515H29 	
					
Switches with 3 entries tapped for PG 13 conduit thread, plus adapter for 1/2" NPT					
2 x 2-pole N/C + N/O snap action (XESP2151L)	XCKML110 	XCKML102 	XCKML121 	XCKML115 	
					
2 x 2-pole N/C + N/O break before make, slow break (XENP2151L)	XCKML510 	XCKML502 	XCKML521 	XCKML515 	
					
Weight, kg (lb)	0.400 (0.882)	0.405 (0.893)	0.450 (0.992)	0.430 (0.948)	
Contact operation	 contact closed  contact open	(A) = cam displacement (P) = positive opening point	 N/C contact with positive opening operation, when properly mounted and using a conforming operator		
Characteristics					
Switch actuation	On end	By 30° cam			
Type of actuation					
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)		
Minimum force	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	8 N (1.80 lb)	0.2 N•m (1.77 lb-in)
	For positive opening	60 N (13.49 lb)	50 N (11.24 lb)	50 N (11.24 lb)	0.5 N•m (4.43 lb-in)
Cable entry	3 entries tapped ISO M20 x 1.5, clamping capacity 7 to 13 mm (0.28 to 0.51 in.); or 3 entries tapped for PG 13 conduit thread conforming to NF C 68-300 (DIN PG 13.5), clamping capacity 9 to 12 mm (0.35 to 0.47 in.) (0.35 to 0.47 in.), plus adapter for 1/2" NPT				

- Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
- Switches available with other 2-pole slow break contact blocks: N/O + N/C make before break, N/C + N/C simultaneous (with positive opening operation, when properly mounted and using a conforming operator), N/C + N/C simultaneous, please consult your local sales office.

Replacement parts

The heads of limit switches type XCKML are the same as those for types XCKM and XCKL (see heads ZCKD10, ZCKD02, ZCKD21 and ZCKD15 on page 474).

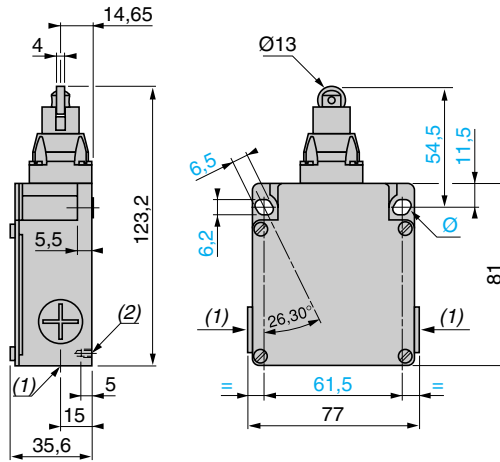
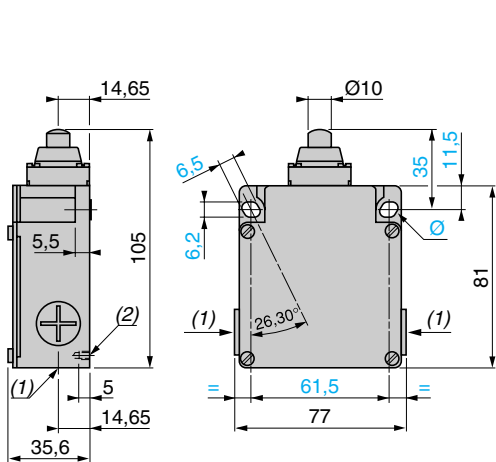
Limit Switches

Osiswitch® Classic, Metal

XCKML, 2 x 2-Pole Contacts—Complete Switches

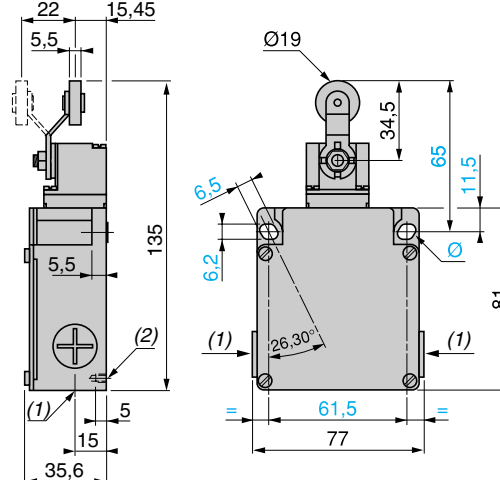
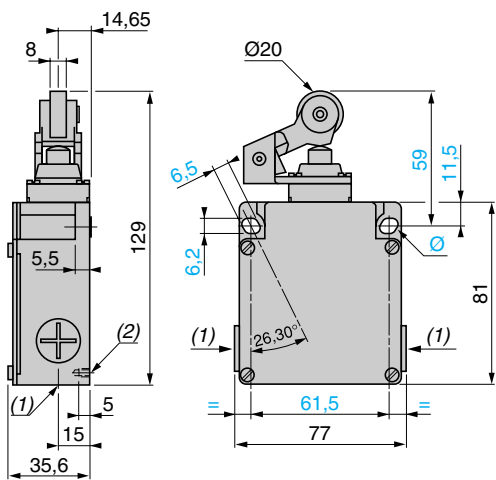
XCKML110H29, XCKML510H29, XCKML110, XCKML510

XCKML102H29, XCKML502H29, XCKML102, XCKML502



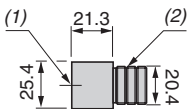
XCKML121H29, XCKML521H29, XCKML121, XCKML521

XCKML115H29, XCKML515H29, XCKML115, XCKML515



1. XCKML***H29: 3 entries tapped M20 x 1.5. XCKML***: 3 entries tapped for PG 13 conduit thread (adapter DE9RA1212 for 1/2" NPT available).
 2. 2 centering holes Ø 3.9 ± 0.2, cover mounting holes axis.
- Ø: 2 elongated holes 6.2 x 6.5, inclined at 26°30' to the vertical axis, for M5 screws.

DE9RA1212 (PG 13 to 1/2" NPT adapter)



1. Tapped entry for 1/2" NPT conduit
2. PG 13 threaded sleeve

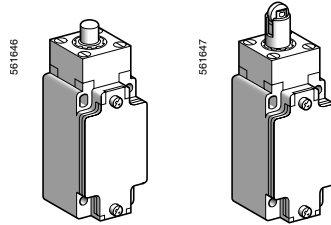
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ

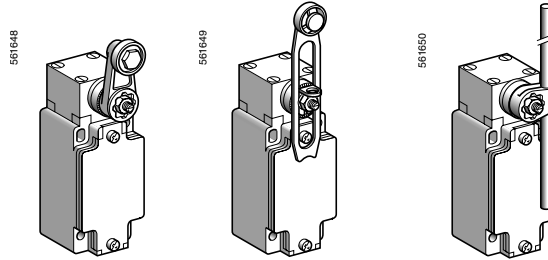
■ XCKJ
fixed, non-plug-in body with 1 cable entry

□ With head for linear movement (plunger)



Page 486

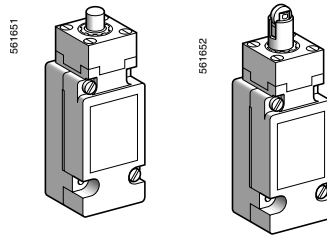
□ With head for rotary movement (lever) or multi-directional



Page 486

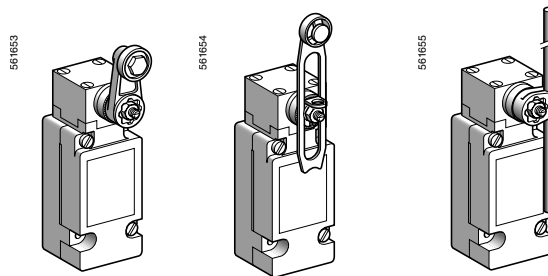
■ XCKJ
plug-in body with 1 cable entry

□ With head for linear movement (plunger)



Page 488

□ With head for rotary movement (lever)



Page 488

Environmental characteristics

Conforming to standards	Products	IEC 60947-5-1, EN 60947-5-1, UL 508, CSA C22-2 n° 14
	Machine assemblies	IEC 60204-1, EN 60204-1
Product certifications		UL, CSA, CCC
Protective treatment	Version	Standard "TC", special "TH"
Ambient air temperature	Operation	-25...+70 °C (-13...+158 °F), special sub-assemblies available for extreme temperatures: -40 °C (-40 °F) or +120 °C (248 °F)
	Storage	-40...+70 °C (-40...+158 °F)
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10...500 Hz)
Shock resistance	Conforming to IEC 60068-2-27	50 gn (11 ms)
Electric shock protection		Class I conforming to IEC 61140 and NF C 20-030
Degree of protection		NEMA Types 1, 2, 4, 12; IP 66 conforming to IEC 60529; IK 07 conforming to EN 50 102
Repeat accuracy		0.01 mm on the tripping points, with 1 million operating cycles for head with end plunger
Cable entry or integral connector	Depending on model	Tapped entry for PG 13 conduit thread, or tapped ISO M20 x 1.5 or 1/2" NPT, or M12 connector
Materials		Bodies and heads in Zamak® zinc alloy

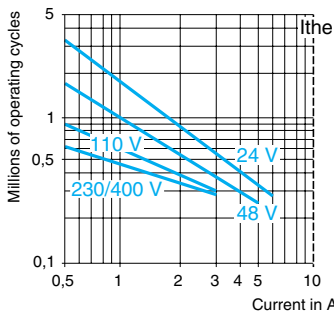
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041 XCKJ

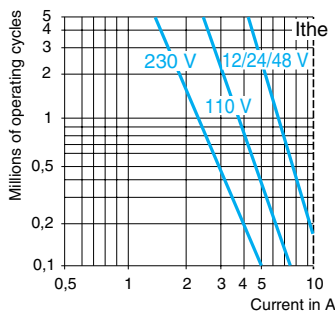
Contact block characteristics		
Rated operational characteristics	XE2•P	~ AC-15; A300 (Ue = 240 V, Ie = 3 A); Ithe = 10 A ≡ DC-13; Q300 (Ue = 250 V, Ie = 0.27 A), conforming to IEC 60947-5-1 appendix A, EN 60947-5-1
	XE3•P	~ AC-15; B300 (Ue = 240 V, Ie = 1.5 A); Ithe = 6 A ≡ DC-13; R300 (Ue = 250 V, Ie = 0.1 A), conforming to IEC 60947-5-1 appendix A, EN 60947-5-1
Rated insulation voltage	XE2•P	Ui = 500 V degree of pollution 3 conforming to IEC 60947-1 Ui = 300 V conforming to UL 508, CSA C22-2 n° 14
	XE3•P	Ui = 400 V degree of pollution 3 conforming to IEC 60947-1 Ui = 300 V conforming to UL 508, CSA C22-2 n° 14
Rated impulse withstand voltage	XE2•P	U imp = 6 kV conforming to IEC 60947-1, IEC 60664
	XE3•P	U imp = 4 kV conforming to IEC 60947-1, IEC 60664
Positive operation (depending on model)		N/C contacts with positive opening operation conforming to IEC 60947-5-1 Appendix K, EN 60947-5-1
Resistance across terminals		≤ 25 mΩ conforming to IEC 60255-7 category 3
Short-circuit protection	XE2•P	10 A cartridge fuse type gG (gl)
	XE3•P	6 A cartridge fuse type gG (gl)
Cabling (screw clamp terminals)	XE2SP21•1	Clamping capacity, min: 1 x 0.34 mm ² , max: 2 x 1.5 mm ²
	XE2NP21•1	Clamping capacity, min: 1 x 0.5 mm ² , max: 2 x 2.5 mm ²
	XCKJ plug-in and XESP20•1	Clamping capacity, min: 1 x 0.75 mm ² , max: 2 x 1.5 mm ²
	XE3NP and XE3SP	Clamping capacity, min: 1 x 0.34 mm ² , max: 1 x 1 mm ² or 2 x 0.75 mm ²
Minimum actuation speed	XE2SP21•1 and XE3SP:	0.01 m/minute (0.03 ft/minute)
	XE2NP21•1 and XE3NP:	6 m/minute (19.68 ft/minute)

- Electrical durability**
- Conforming to IEC 60947-5-1 Appendix C
 - Utilization categories AC-15 and DC-13
 - Maximum operating rate: 3600 operating cycles/hour
 - Load factor: 0.5

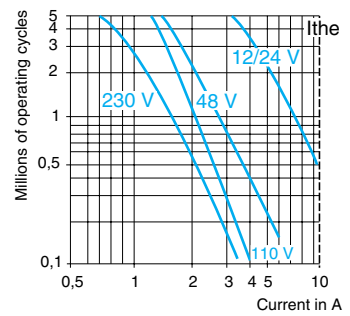
XE2SP21•1, XE2SP2141



XE2NP21•1



XCKJ plug-in, XESP20•1



d.c. supply ≡

Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	10	7	4

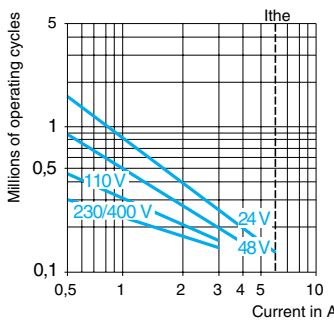
Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	13	9	7

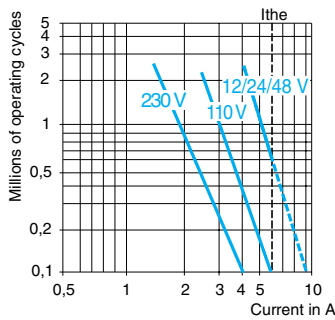
Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	10	7	4

XE3NP***



XE3SP***



a.c. supply
 ~ 50/60 Hz
 ~ inductive circuit

d.c. supply ≡

Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	3	2	1

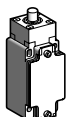
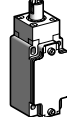

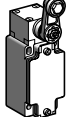
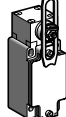

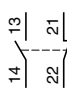
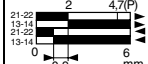




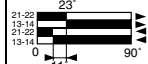
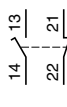
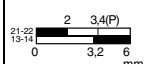
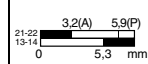
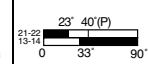
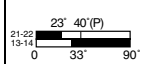
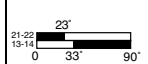
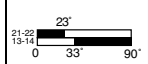
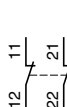

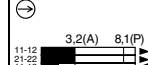

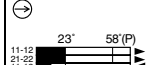
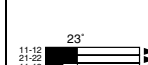
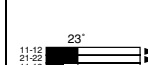
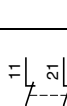
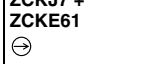
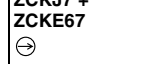
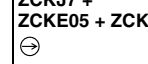
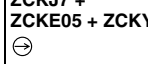
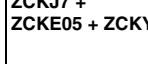
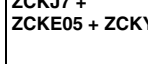
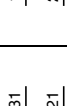
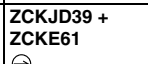
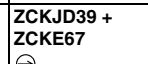
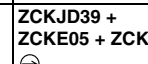
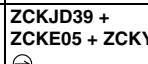
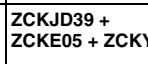
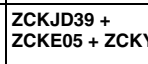
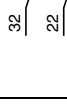
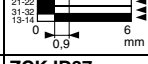








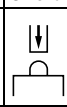
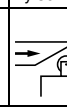
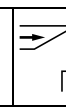
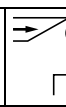
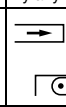
Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	4	3	2

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Complete Switches, Fixed Non-plug-in Body, 1/2" NPT Cable Entry

Type of head	Plunger (mounting by the body)			Rotary (mounting by the body) (switches supplied for actuation from left AND right)			
	Form B (1)	Form C (1)	Form A (1)			Form D (1)	
							
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever (3)	Steel roller lever (3)	Variable length thermoplastic roller lever (3)	Round thermoplastic rod lever, Ø 6 mm (0.24 in.) (3) (4)	
Catalog numbers (2)							
 2-pole N/C + N/O snap action (XE2SP2151)	XCKJ161	XCKJ167	XCKJ10511	XCKJ10513	XCKJ10541	XCKJ10559	
							
 2-pole N/C + N/O break before make, slow break (XE2NP2151)	XCKJ561	XCKJ567	XCKJ50511	XCKJ50513	XCKJ50541	XCKJ50559	
							
 2-pole N/C + N/C snap action (XE2SP2141)	ZCKJ9 + ZCKE61	ZCKJ9 + ZCKE67	ZCKJ9 + ZCKE05 + ZCKY11	ZCKJ9 + ZCKE05 + ZCKY13	ZCKJ9 + ZCKE05 + ZCKY41	ZCKJ9 + ZCKE05 + ZCKY59	
							
 2-pole N/C + N/C simultaneous, slow break (XE2NP2141)	ZCKJ7 + ZCKE61	ZCKJ7 + ZCKE67	ZCKJ7 + ZCKE05 + ZCKY11	ZCKJ7 + ZCKE05 + ZCKY13	ZCKJ7 + ZCKE05 + ZCKY41	ZCKJ7 + ZCKE05 + ZCKY59	
							
 3-pole N/C + N/C + N/O snap action (XE3SP2141)	ZCKJD39 + ZCKE61	ZCKJD39 + ZCKE67	ZCKJD39 + ZCKE05 + ZCKY11	ZCKJD39 + ZCKE05 + ZCKY13	ZCKJD39 + ZCKE05 + ZCKY41	ZCKJD39 + ZCKE05 + ZCKY59	
							
 3-pole N/C + N/C + N/O break before make, slow break (XE3NP2141)	ZCKJD37 + ZCKE61	ZCKJD37 + ZCKE67	ZCKJD37 + ZCKE05 + ZCKY11	ZCKJD37 + ZCKE05 + ZCKY13	ZCKJD37 + ZCKE05 + ZCKY41	ZCKJD37 + ZCKE05 + ZCKY59	
							
Weight, kg (lb)	0.430 (0.948)	0.455 (1.003)	0.480 (1.058)	0.490 (1.080)	0.485 (1.069)	0.485 (1.069)	
Contact operation	 contact closed  contact open		(A) = cam displacement (P) = positive opening point	 N/C contact with positive opening operation, when properly mounted and using a conforming operator			
Characteristics							
Switch actuation	On end	By 30° cam			By any moving part		
Type of actuation							
Maximum actuation speed	0.5 m/s (1.64 ft/s)	1 m/s (3.28 ft/s)	1.5 m/s (4.92 ft/s)				
Minimum force or torque	For tripping	20 N (4.50 lb)	16 N (3.60 lb)	0.25 N•m (2.21 lb-in)			
	For positive opening	50 N (11.24 lb)	40 N (8.99 lb)	0.50 N•m (4.43 lb-in)			
Cable entry	1 entry tapped 1/2" NPT for ISO cable entry, clamping capacity 9 to 12 mm (0.35 to 0.47 in.)						

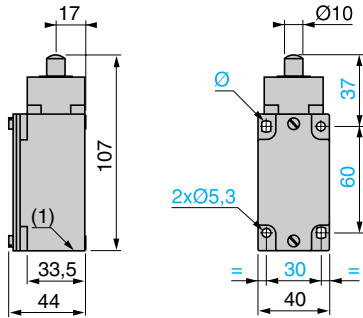
- Form conforming to EN 50041. See page 409.
- Switches with gold contacts or eyelet type connections: please consult your local sales office.
- Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever or its mounting.
- Value taken with actuation by moving part at 100 mm (3.94 in.) from the mounting.

Limit Switches

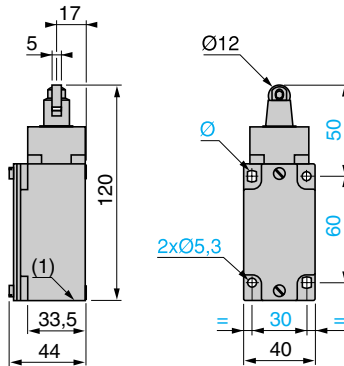
Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Complete Switches, Fixed Non-plug-in Body, 1/2" NPT Cable Entry

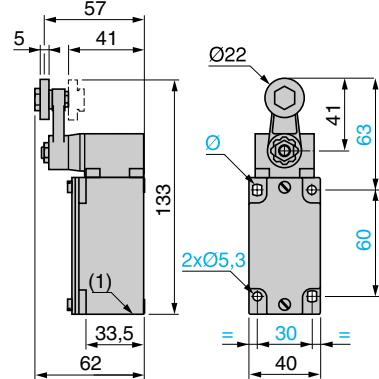
XCKJ•61
ZCKJ•+ ZCKE61



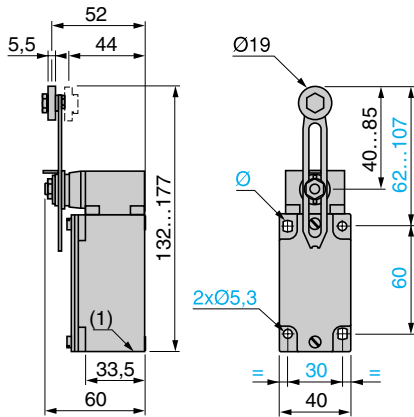
XCKJ•67
ZCKJ•+ ZCKE67



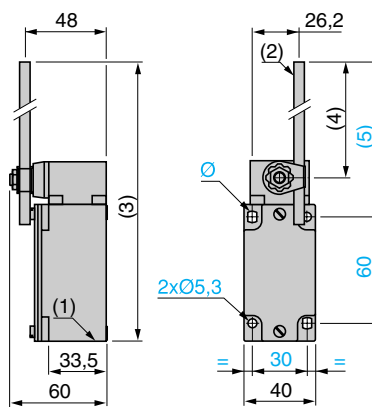
XCKJ•051•
ZCKJ•+ ZCKE05 + ZCKY11 or ZCKY13



XCKJ•0541
ZCKJ•+ ZCKE05 + ZCKY41



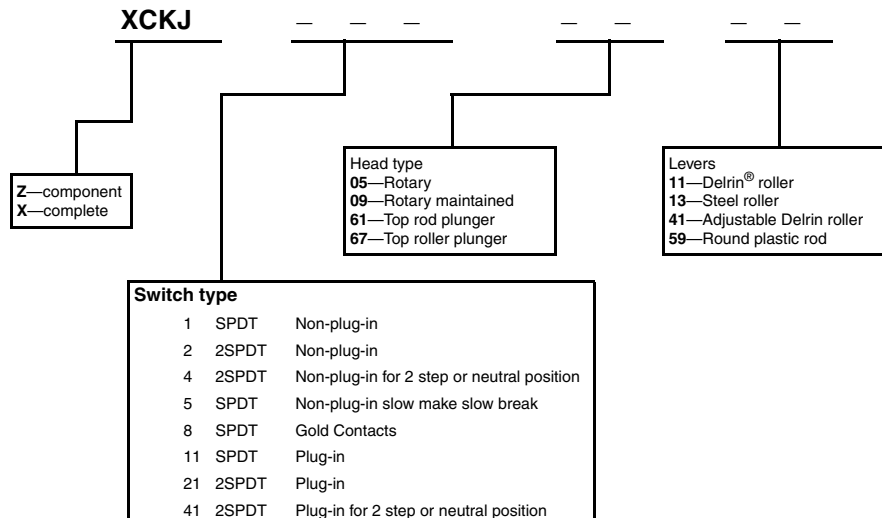
XCKJ•0559
ZCKJ•+ ZCKE05 + ZCKY59



1. 1 tapped entry for 1/2" NPT.
 2. Rod Ø 6 mm (0.24 in.), length 200 mm (7.87 in.).
 3. 282 max.
 4. 190 max.
 5. 212 max.
- Ø: 2 elongated holes Ø 5.3 x 7.3.

For Interpretation of the Complete Switch Catalog Number Only

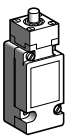
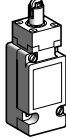

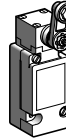
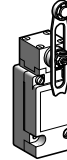
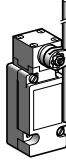

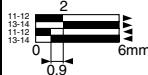
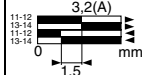
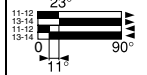
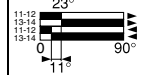
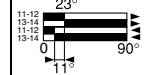
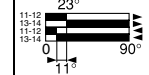
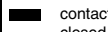
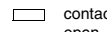


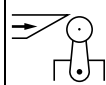
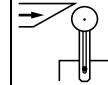

Note: See following pages for the complete switch offering



Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Complete Switches, Plug-in Body, 1/2" NPT Cable Entry

Type of head	Plunger (mounting by the body)		Rotary (mounting by the body) (switches supplied for actuation from left AND right)			
	Form B (1)	Form C (1)	Form A (1)		Form D (1)	
						
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever (3)	Steel roller lever (3)	Variable length thermoplastic roller lever (3)	Round thermoplastic rod lever, Ø 6 mm (0.24 in.) (3) (4)
Catalog numbers (2)						
 Single-pole C/O snap action	XCKJ1161	XCKJ1167	XCKJ110511	XCKJ110513	XCKJ110541	XCKJ110559
						
Weight, kg (lb)	0.430 (0.948)	0.455 (1.003)	0.480 (1.058)	0.490 (1.080)	0.485 (1.069)	0.485 (1.069)
Contact operation	 contact closed  contact open		(A) = cam displacement			
Characteristics						
Switch actuation	On end	By 30° cam			By any moving part	
Type of actuation						
Maximum actuation speed	0.5 m/s (1.64 ft/s)	1 m/s (3.28 ft/s)	1.5 m/s (4.92 ft/s)			
Minimum force or torque for tripping	20 N (4.50 lb)	16 N (3.60 lb)	0.25 N•m (2.21 lb-in)			
Cable entry	1 entry tapped for 1/2" NPT cable entry. Clamping capacity 7 to 13 mm (0.28 to 0.51 in.)					

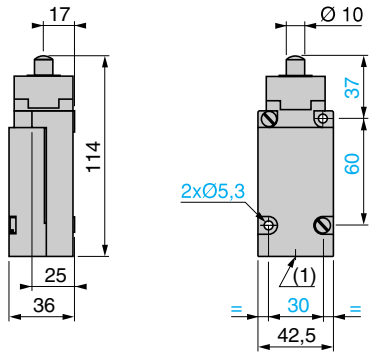
1. Form conforming to EN 50041. See page 409.
2. Switches with gold contacts: please consult your local sales office.
3. Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting or clamp.
4. Value taken with actuator operating at 100 mm (3.94 in.) from the mounting.

Limit Switches

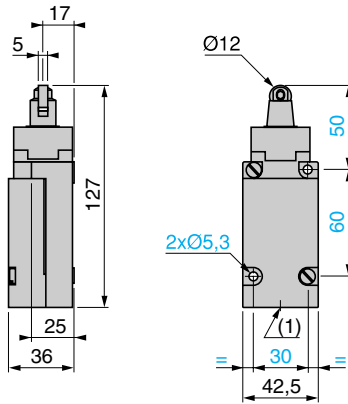
Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Complete Switches, Plug-in Body, 1/2" NPT Cable Entry

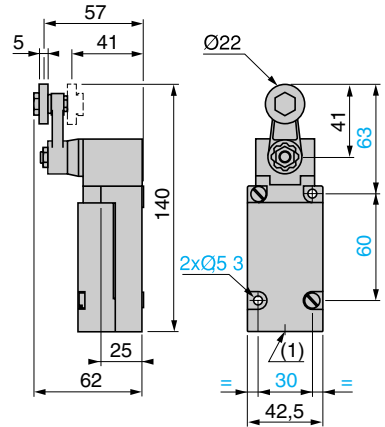
XCKJ1611



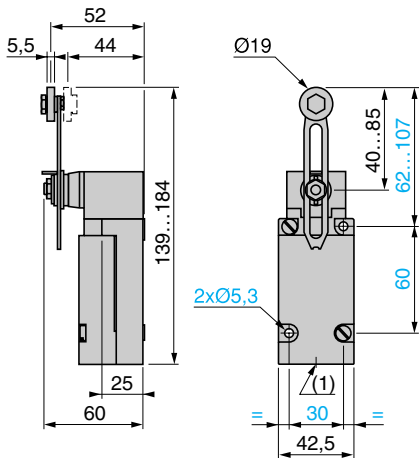
XCKJ1167



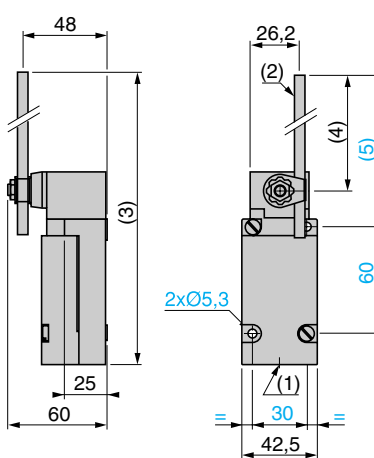
XCKJ110511, XCKJ110513



XCKJ110541



XCKJ110559

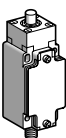
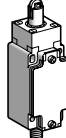
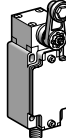
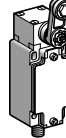

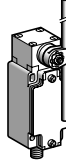

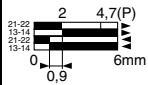
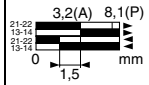
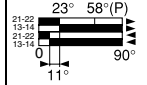
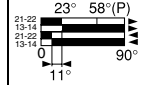
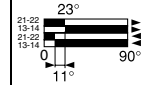
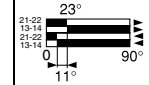
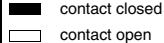








1. Tapped entry for 1/2" NPT conduit.
2. Rod Ø 6 mm (0.24 in.), length 200 mm (7.87 in.).
3. 289 max.
4. 190 max.
5. 212 max.

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Complete Switches, Fixed Non-plug-in Body, Integral M12 Connector

Type of head	Plunger (mounting by the body)		Rotary (mounting by the body) (switches supplied for actuation from left AND right)			
	Form B (1)	Form C (1)	Form A (1)			Form D (1)
						
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever (2)	Steel roller lever (2)	Variable length thermoplastic roller lever (2)	Round thermoplastic rod lever, Ø 6 mm (0.24 in.) (2) (3)
Catalog numbers (4)						
 2-pole N/C + N/O snap action (XE2SP2151)	XCKJ161D 	XCKJ167D 	XCKJ10511D 	XCKJ10513D 	XCKJ10541D 	XCKJ10559D 
	Weight, kg (lb)	0.430 (0.948)	0.455 (1.003)	0.480 (1.058)	0.490 (1.080)	0.485 (1.069)
Contact operation	 ■ contact closed □ contact open		(A) = cam displacement (P) = positive opening point			
Characteristics						
Switch actuation	On end	By 30° cam			By any moving part	
Type of actuation						
Maximum actuation speed	0.5 m/s (1.64 ft/s)	1 m/s (3.28 ft/s)	1.5 m/s (4.92 ft/s)			
Minimum force or torque	For tripping	20 N (4.50 lb)	16 N (3.60 lb)	0.25 N•m (2.21 lb-in)		
	For positive opening	50 N (11.24 lb)	40 N (8.99 lb)	0.50 N•m (4.43 lb-in)		
Connection	M12 5-pin connector, Ui = 60 V, Ie = 4 A (see suitable pre-wired female connectors below).					

- Form conforming to EN 50041. See page 409.
- Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever or its mounting.
- Value taken with actuation by moving part at 100 mm (3.94 in.) from the mounting.
- Switches with gold contacts: please consult your local sales office.

Catalog numbers of suitable pre-wired female connectors

Type of connector	Length (L)	M12 straight, 5-pin, 4 A/24 V max.	M12 elbowed, 5-pin, 4 A/24 V max.	Weight, kg (lb)
With cable, Ø 5.8 mm (0.23 in.) (4 x 0.34 mm ² + 1 x 0.5 mm ²)	2 m (6.56 ft)	XZCP1164L2	XZCP1264L2	0.115 (0.254)
	5 m (16.40 ft)	XZCP1164L5	XZCP1264L5	0.270 (0.595)
	10 m (32.8 ft)	XZCP1164L10	XZCP1264L10	0.520 (1.146)

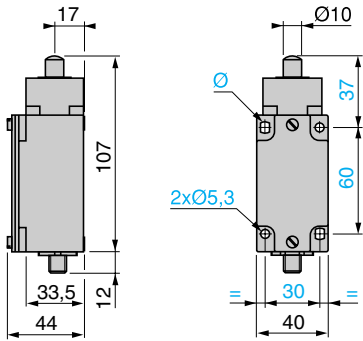
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

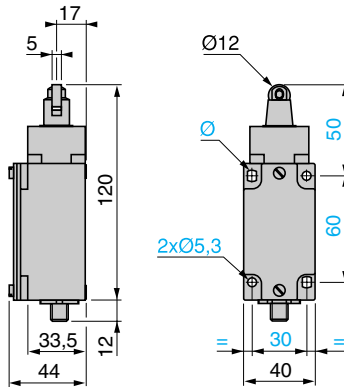
XCKJ—Complete Switches, Fixed Non-plug-in Body, Integral M12 Connector

Dimensions

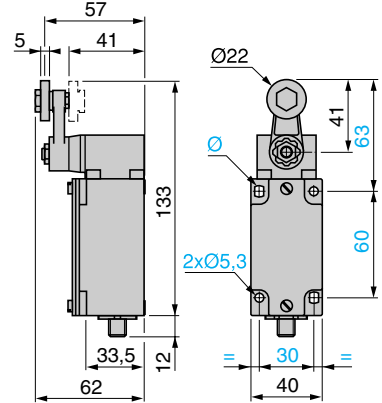
XCKJ161D



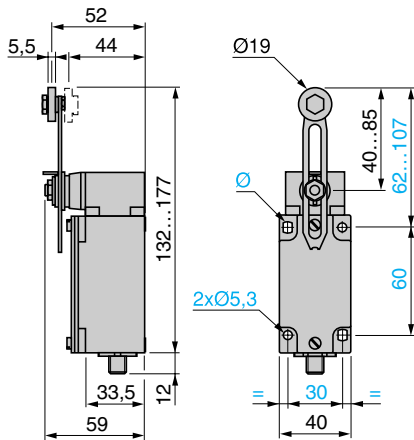
XCKJ167D



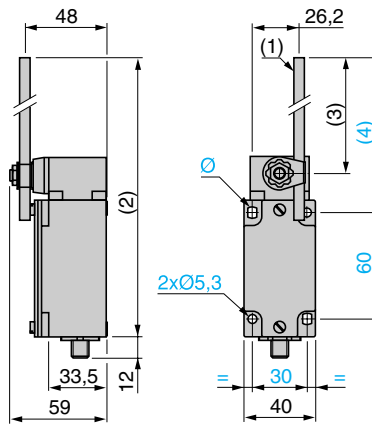
XCKJ1051•D



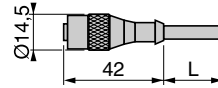
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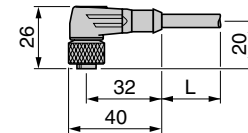
XCKJ10559D



XZCP1164L•



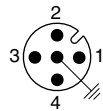
XZCP1264L•



- 1. Rod Ø 6 mm (0.24 in.), length 200 mm (7.87 in.)
- 2. 282 max.
- 3. 190 max.
- 4. 212 max.
- Ø: 2 elongated holes Ø 5.3 x 7.3
- L: Cable length 2, 5, or 10 m (6.6, 16.4, or 32.8 ft)

Connections

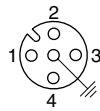
Limit switch XCKJ••••D



- 1-2 = N/C
- 3-4 = N/O
- 5 = ⊥
- 4 A / 24 V max.



Pre-wired female connector XZCP1•64L•

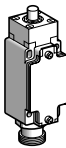
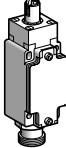
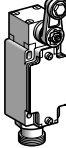
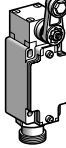
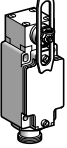
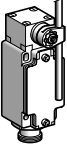

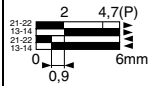
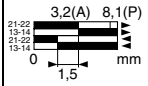
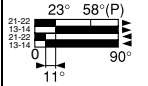
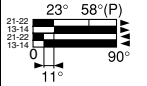
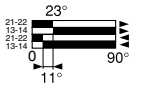
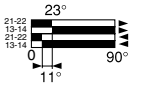











- 1 = brown
- 2 = white
- 3 = blue
- 4 = black
- 5 = ⊥ yellow/green

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Complete Switches, Fixed Non-plug-in Body, Integral 7/8" 16UN connector

Type of head	Plunger (mounting by the body)		Rotary (mounting by the body) (switches supplied for actuation from left AND right)			
	Form B (1)	Form C (1)	Form A (1)		Form D (1)	
						
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever (2)	Steel roller lever (2)	Variable length thermoplastic roller lever (2)	Round thermoplastic rod lever, Ø 6 mm (0.24 in.) (2) (3)
Catalog numbers (4)						
 2-pole N/C + N/O snap action (XE2SP2151)	XCKJ161A 	XCKJ167A 	XCKJ10511A 	XCKJ10513A 	XCKJ10541A 	XCKJ10559A 
	Weight, kg (lb)	0.430 (0.948)	0.455 (1.003)	0.480 (1.058)	0.490 (1.080)	0.485 (1.069)
Contact operation	 contact closed  contact open		(A) = cam displacement (P) = positive opening point	 N/C contact with positive opening operation, when properly mounted and using a conforming operator		
Characteristics						
Switch actuation	On end	By 30° cam			By any moving part	
Type of actuation						
Maximum actuation speed	0.5 m/s (1.64 ft/s)	1 m/s (3.28 ft/s)	1.5 m/s (4.92 ft/s)			
Minimum force or torque	For tripping	20 N (4.50 lb)	16 N (3.60 lb)	0.25 N•m (2.21 lb-in)		
	For positive opening	50 N (11.24 lb)	40 N (8.99 lb)	0.50 N•m (4.43 lb-in)		
Connection	7/8" 16UN 5-pin connector, Ui = 250 V; Ie = 6 A (see suitable pre-wired female connectors below).					

- Form conforming to EN 50041. See page 409.
- Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting or clamp.
- Value taken with actuator operating at 100 mm (3.94 in.) from the mounting.
- Switches with gold contacts: please consult your local sales office.

Catalog numbers of suitable pre-wired female connectors

Type of connector	Length (L)	7/8" 16UN straight, 5-pin, 6 A/250 V max.	Weight, kg (lb)
With cable, Ø 6.7 mm (5 x 0.5 mm ²)	2 m (6.56 ft)	XZCP1771L2	0.190 (0.419)
	5 m (16.40 ft)	XZCP1771L5	0.475 (1.047)
	10 m (32.8 ft)	XZCP1771L10	0.950 (2.094)

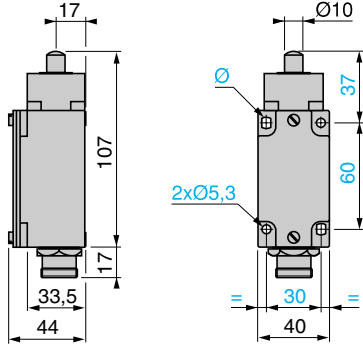
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

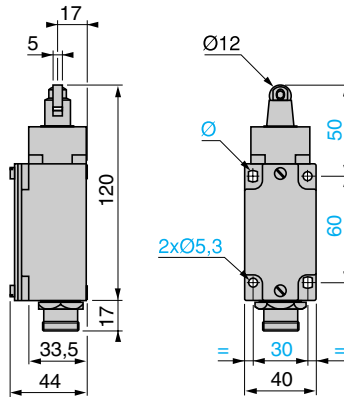
XCKJ—Complete Switches, Fixed Non-plug-in Body, Integral 7/8" 16UN connector

Dimensions

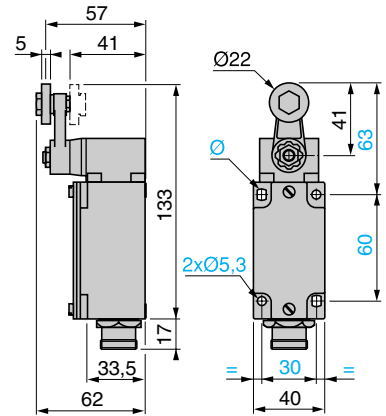
XCKJ161A



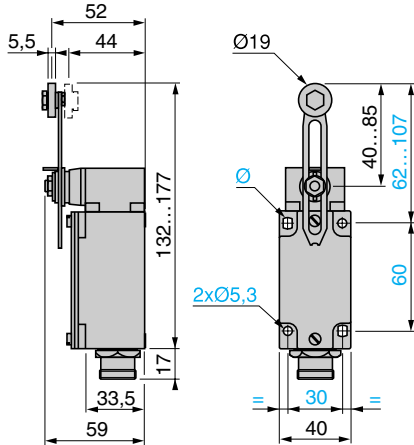
XCKJ167A



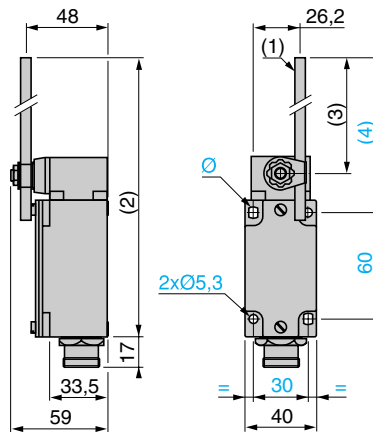
XCKJ1051•A



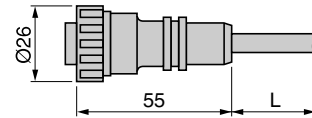
XCKJ10541A



XCKJ10559A



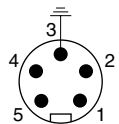
XZCP1771L•



1. Rod Ø 6 mm (0.24 in.), length 200 mm (7.87 in.)
 2. 282 max.
 3. 190 max.
 4. 212 max.
- Ø: 2 elongated holes Ø 5.3 x 7.3
L: cable length: 2, 5, or 10 m (6.6, 16.4, or 32.8 ft)

Connections

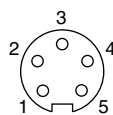
Limit switch XCKJ••••A



- 1 = 21
- 2 = 22
- 3 = \downarrow
- 4 = 14
- 5 = 13



Pre-wired female connector XZCP1771L•

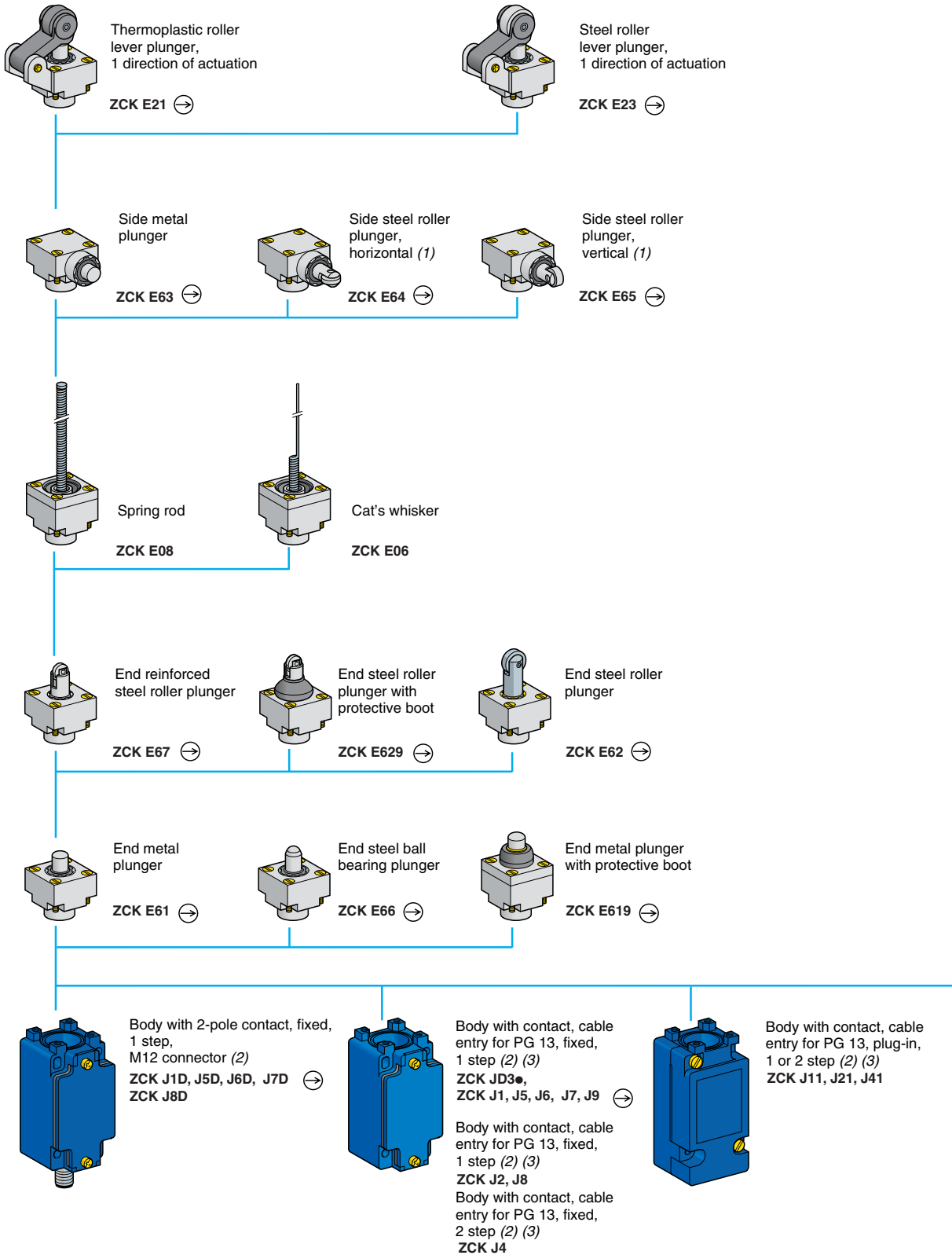


- 1 = black
- 2 = blue
- 3 = yellow/green \downarrow
- 4 = brown
- 5 = white

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies



Limit Switches

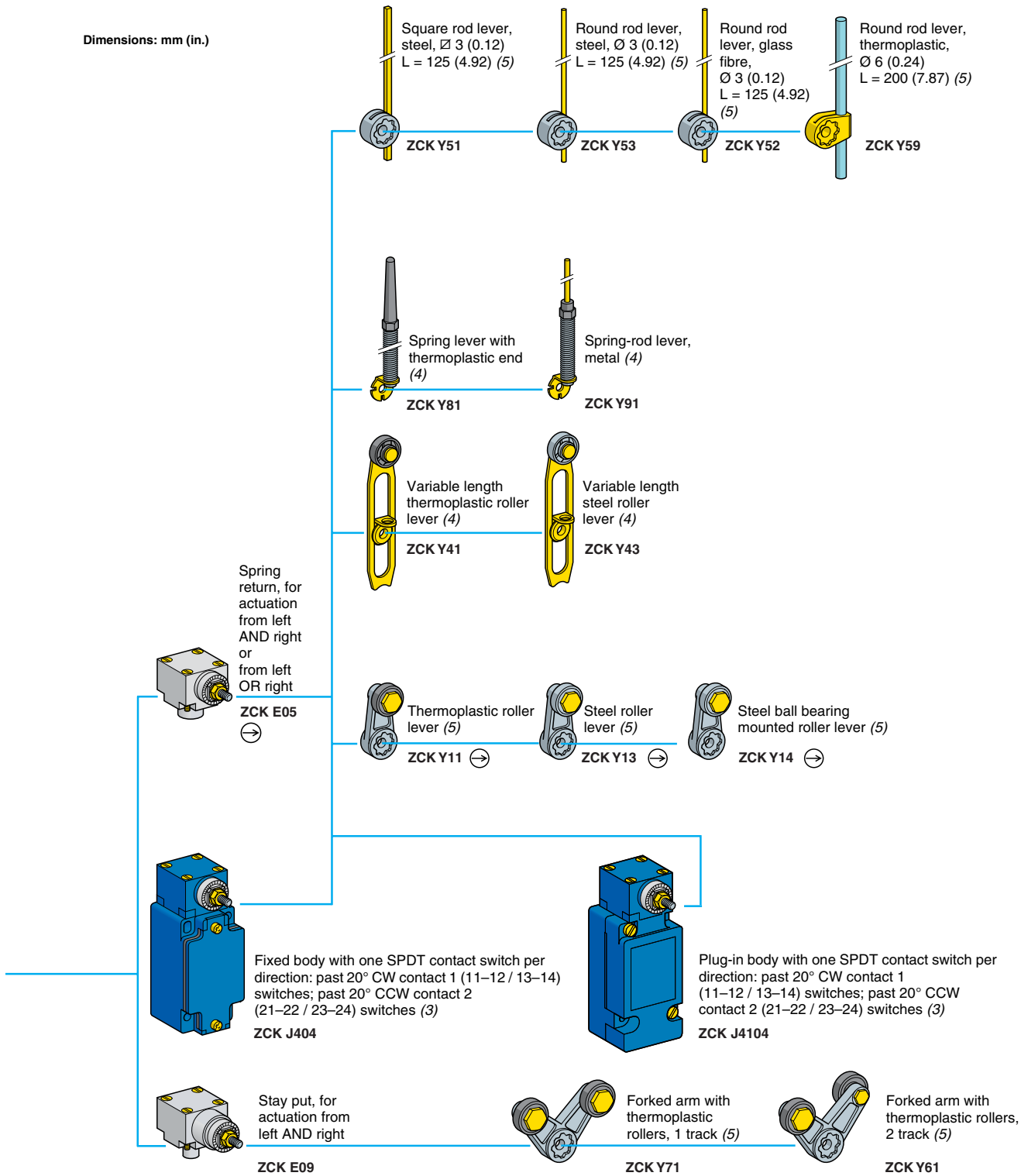
1. Cannot be used with bodies ZCKJ4 and ZCKJ41.
2. For further details, see page 496.
3. For a cable entry tapped ISO M20 x 1.5, add **H29** to the catalog number. Example: ZCKJ1 becomes **ZCKJ1H29**.
For a cable entry tapped 1/2" NPT, do not add an H code to the catalog number. Example: **ZCKJ1**.

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies

Dimensions: mm (in.)



⊕: head assuring positive opening operation, when properly mounted and using a conforming operator.

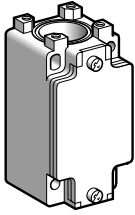
- 4. Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
- 5. Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting.

Limit Switches

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry



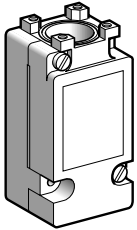
Fixed bodies with 2-pole contact						
Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
1 step	N/C + N/O snap action (XE2SP2151)		⊕	1/2" NPT	ZCKJ1	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ1H29	0.310 (0.683)
	2 C/O simultaneous, snap action (XESP2021)		-	1/2" NPT	ZCKJ2	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ2H29	0.310 (0.683)
	N/C + N/O break before make, slow break (XE2NP2151)		⊕	1/2" NPT	ZCKJ5	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ5H29	0.310 (0.683)
	N/C + N/O make before make, slow break (XE2NP2161)		⊕	1/2" NPT	ZCKJ6	0.310 (0.683)
ISO M20 x 1.5				ZCKJ6H29	0.310 (0.683)	
N/C + N/C simultaneous, slow break (XE2NP2141)		⊕	1/2" NPT	ZCKJ7	0.310 (0.683)	
			ISO M20 x 1.5	ZCKJ7H29	0.310 (0.683)	
N/O + N/O simultaneous, slow break (XE2NP2131)		-	1/2" NPT	ZCKJ8	0.310 (0.683)	
			ISO M20 x 1.5	ZCKJ8H29	0.310 (0.683)	
N/C + N/C snap action (XE2SP2141)		⊕	1/2" NPT	ZCKJ9	0.310 (0.683)	
			ISO M20 x 1.5	ZCKJ9H29	0.310 (0.683)	
2 step	2 C/O staggered, snap action (XESP2031)		-	1/2" NPT	ZCKJ4	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ4H29	0.310 (0.683)
Fixed bodies with 3-pole contact						
Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
-	N/C + N/O + N/O snap action (XE3SP2151)		⊕	1/2" NPT	ZCKJD31	0.310 (0.683)
				ISO M20 x 1.5	ZCKJD31H29	0.310 (0.683)
	N/C + N/C + N/O snap action (XE3SP2141)		⊕	1/2" NPT	ZCKJD39	0.310 (0.683)
				ISO M20 x 1.5	ZCKJD39H29	0.310 (0.683)
N/C + N/C + N/O break before make, slow break (XE3NP2141)		⊕	1/2" NPT	ZCKJD37	0.310 (0.683)	
			ISO M20 x 1.5	ZCKJD37H29	0.310 (0.683)	
N/C + N/O + N/O break before make, slow break (XE3NP2151)		⊕	1/2" NPT	ZCKJD35	0.310 (0.683)	
			ISO M20 x 1.5	ZCKJD35H29	0.310 (0.683)	

1. ⊕: N/C contact with positive opening operation, when properly mounted and using a conforming operator.

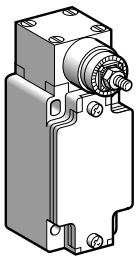
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

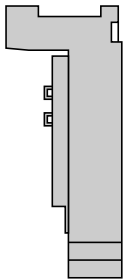
XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry



ZCKJ•1



ZCKJ404



ZCKJ0•

Plug-in bodies with contact						
Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
1 step	Single-pole C/O snap action		—	1/2" NPT	ZCKJ11	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ11H29	0.300 (0.661)
	Double-pole 2 C/O simultaneous, snap action		—	1/2" NPT	ZCKJ21	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ21H29	0.300 (0.661)
2 step	Double-pole 2 C/O staggered, snap action		—	1/2" NPT	ZCKJ41	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ41H29	0.300 (0.661)
Bodies with contact, with rotary head (without operating lever)						
Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
Fixed non-plug-in body						
Neutral position 1 from the left AND 1 from the right	One SPDT contact switch per direction: past 20° CW contact 1 (11–12 / 13–14) switches; past 20° CCW contact 2 (21–22 / 23–24) switches		—	1/2" NPT	ZCKJ404	0.455 (1.003)
				ISO M20 x 1.5	ZCKJ404H29	0.455 (1.003)
Plug-in body						
Neutral position 1 from the left AND 1 from the right	One SPDT contact switch per direction: past 20° CW contact 1 (11–12 / 13–14) switches; past 20° CCW contact 2 (21–22 / 23–24) switches		—	1/2" NPT	ZCKJ4104	0.465 (1.025)
				ISO M20 x 1.5	ZCKJ4104H29	0.465 (1.025)
Plug-in housing switch top only						
Description	For use with	Contacts	Catalog number	Weight kg (lb)		
Single-pole 1 C/O with positive opening operation	ZCKJ11	Silver	ZCKJ01	0.150 (0.331)		
Double-pole 2 C/O simultaneous with positive opening operation	ZCKJ21	Silver	ZCKJ02	0.160 (0.353)		
Double-pole 1 C/O + 1 C/O neutral position	ZCKJ41	Silver	ZCKJ04	0.160 (0.353)		

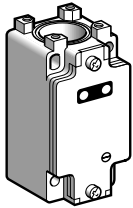
1. Ⓢ: N/C contact with positive opening operation, when properly mounted and using a conforming operator.

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry

With Indicator Light Module



Fixed non-plug-in bodies with 2-pole contact

Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
With module comprising 1 LED, 24 V$\overline{\text{---}}$						
1 step	N/C + N/O snap action (XE2SP2151)		⊕	1/2" NPT	ZCKJ120	0.320 (0.705)
	N/C + N/O break before make, slow break (XE2NP2151)		⊕	1/2" NPT	ZCKJ520	0.320 (0.705)
With module comprising 2 LEDs, 24 V$\overline{\text{---}}$						
1 step	N/C + N/O snap action (XE2SP2151)		⊕	1/2" NPT	ZCKJ121	0.320 (0.705)
				ISO M20 x 1.5	ZCKJ121H29	0.320 (0.705)
	N/C + N/O break before make, slow break (XE2NP2151)		⊕	1/2" NPT	ZCKJ521	0.320 (0.705)
				ISO M20 x 1.5	ZCKJ521H29	0.320 (0.705)
With module comprising 2 neon indicator lights, 110/120 V\sim						
1 step	N/C + N/O snap action (XE2SP2151)		⊕	1/2" NPT	ZCKJ133	0.320 (0.705)
				ISO M20 x 1.5	ZCKJ133H29	0.320 (0.705)
	N/C + N/O break before make, slow break (XE2NP2151)		⊕	1/2" NPT	ZCKJ533	0.320 (0.705)
				ISO M20 x 1.5	ZCKJ533H29	0.320 (0.705)
With module comprising 2 neon indicator lights, 220/240 V\sim						
1 step	N/C + N/O snap action (XE2SP2151)		⊕	1/2" NPT	ZCKJ134	0.320 (0.705)
				ISO M20 x 1.5	ZCKJ134H29	0.320 (0.705)
	N/C + N/O break before make, slow break (XE2NP2151)		⊕	1/2" NPT	ZCKJ534	0.320 (0.705)
				ISO M20 x 1.5	ZCKJ534H29	0.320 (0.705)

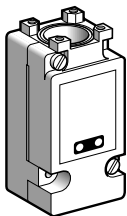
Plug-in bodies with single-pole contact

Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
With module comprising 2 LEDs, 24 V$\overline{\text{---}}$						
1 step	C/O snap action		—	1/2" NPT	ZCKJ1121	0.340 (0.750)
				ISO M20 x 1.5	ZCKJ1121H29	0.340 (0.750)
With module comprising 2 neon indicator lights, 110/120 V\sim						
1 step	C/O snap action		—	1/2" NPT	ZCKJ1133	0.340 (0.750)
				ISO M20 x 1.5	ZCKJ1133H29	0.340 (0.750)
With module comprising 2 neon indicator lights, 220/240 V\sim						
1 step	C/O snap action		—	1/2" NPT	ZCKJ1134	0.340 (0.750)
				ISO M20 x 1.5	ZCKJ1134H29	0.340 (0.750)

1. ⊕: N/C contact with positive opening operation, when properly mounted and using a conforming operator.

Indicator light module characteristics

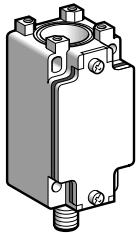
Type of indicator	1 LED or 2 LEDs	2 neon lights
Rated insulation voltage	$\overline{\text{---}}$ 50 V, conforming to IEC 60947-1	250 V \sim , conforming to IEC 60947-1
Current consumption	7 mA per LED	2.5 mA per neon
Rated operational voltage	24 V $\overline{\text{---}}$	110/120 V \sim / 220/240 V \sim
Voltage limits	20...30 V $\overline{\text{---}}$ (including ripple)	95...130 V \sim / 190...260 V \sim
Service life	100 000 hours	20 000 hours
Reverse polarity protection	Yes	—



Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in Bodies with M12 Connector



Fixed bodies with 2-pole contact					
Type	With contact block	Function diagram	Positive operation (1)	Catalog number	Weight kg (lb)
1 step	N/C + N/O snap action (XE2SP2151)		⊕	ZCKJ1D	0.320 (0.705)
	N/C + N/O break before make, slow break (XE2NP2151)		⊖	ZCKJ5D	0.320 (0.705)
	N/O + N/C make before make, slow break (XE2NP2161)		⊕	ZCKJ6D	0.320 (0.705)
	N/C + N/C simultaneous, slow break (XE2NP2141)		⊖	ZCKJ7D	0.320 (0.705)
	N/O + N/O simultaneous, slow break (XE2NP2131)		—	ZCKJ8D	0.320 (0.705)

1. N/C contact with positive opening operation, when properly mounted and using a conforming operator.

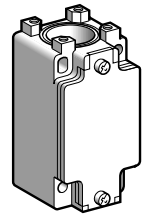
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

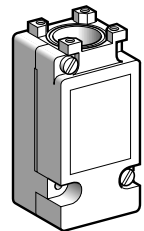
XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry

Low-Temperature Applications (–40 °F / –40 °C)

Body with contacts—For plunger or rotary head



ZCKJ1



ZCKJ11

Type	Contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
Fixed non-plug-in body						
1 step	2-pole 1 N/C + 1 N/O snap action (XE2SP2151)		⊕	1/2" NPT	ZCKJ1	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ1H29	0.310 (0.683)
	Double-pole 2 C/O simultaneous snap action (XESP2021)		—	1/2" NPT	ZCKJ2	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ2H29	0.310 (0.683)
	2-pole 1 N/C + 1 N/O break before make slow break (XE2NP2151)		⊕	1/2" NPT	ZCKJ5	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ5H29	0.310 (0.683)
	2-pole 1 N/O + 1 N/C make before break slow break (XE2NP2161)		⊕	1/2" NPT	ZCKJ6	0.310 (0.683)
			ISO M20 x 1.5	ZCKJ6H29	0.310 (0.683)	
1 step	2-pole 1 N/C + 1 N/C simultaneous slow break (XE2NP2141)		⊕	1/2" NPT	ZCKJ7	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ7H29	0.310 (0.683)
	2-pole 1 N/O + 1 N/O simultaneous slow break (XE2NP2131)		—	1/2" NPT	ZCKJ8	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ8H29	0.310 (0.683)
	2-pole 1 N/C + 1 N/C snap action (XE2SP2141)		⊕	1/2" NPT	ZCKJ9	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ9H29	0.310 (0.683)
	2 step	Double-pole 2 C/O staggered snap action (XESP2031)		—	1/2" NPT	ZCKJ4
				ISO M20 x 1.5	ZCKJ4H29	0.310 (0.683)
Plug-in body						
1 step	Single-pole 1 C/O snap action		—	1/2" NPT	ZCKJ11	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ11H29	0.300 (0.661)
1 step	Double-pole 2 C/O simultaneous snap action		—	1/2" NPT	ZCKJ21	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ21H29	0.300 (0.661)
2 step	Double-pole 2 C/O staggered snap action		—	1/2" NPT	ZCKJ41	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ41H29	0.300 (0.661)
Body with contacts—With spring return rotary head (without operating lever)						
Type	Contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
Fixed non-plug-in body						
Neutral position 1 from the left and 1 from the right	Double-pole 2 C/O staggered snap action		—	1/2" NPT	ZCKJ4046	0.455 (1.003)
				ISO M20 x 1.5	ZCKJ4046H29	0.455 (1.003)
Plug-in body						
Neutral position 1 from the left and 1 from the right	Double-pole 2 C/O staggered snap action		—	1/2" NPT	ZCKJ41046	0.465 (1.025)
				ISO M20 x 1.5	ZCKJ41046H29	0.465 (1.025)

1. ⊕ : Operating head able to guarantee positive opening operation, when properly mounted and using a conforming operator. The positive opening feature requires additional travel past the trip point. See the contact function diagrams.

Setup:
page 508

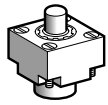
Dimensions:
page 510

Limit Switches

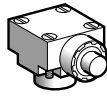
Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry

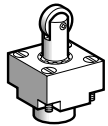
Low-Temperature Applications (−40 °F / −40 °C)



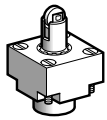
ZCKE616



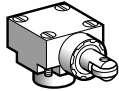
ZCKE636



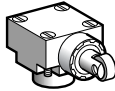
ZCKE626



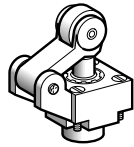
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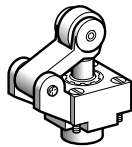
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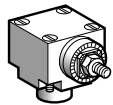
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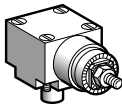
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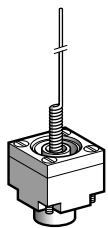
ZCKE236



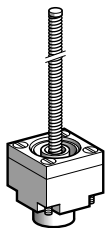
ZCKE056



ZCKE096



ZCKE066



ZCKE086

Plunger heads					
Type of operator	Compatible bodies	Max. actuation speed	Positive operation (1)	Catalog number	Weight kg (lb)
For actuation on end					
End plunger metal	ZCKJ*, ZCKJ**	0.5 m/s (1.64 ft/s)	⊖	ZCKE616	0.140 (0.309)
Side plunger metal	ZCKJ*, ZCKJ**, except ZCKJ4 and J41	0.5 m/s (1.64 ft/s)	⊖	ZCKE636	0.200 (0.441)
For actuation by 30° cam					
End roller plunger steel	ZCKJ*, ZCKJ**	1 m/s (3.28 ft/s)	⊖	ZCKE626	0.155 (0.342)
End reinforced roller plunger steel	ZCKJ*, ZCKJ**	1 m/s (3.28 ft/s)	⊖	ZCKE676	0.155 (0.342)
Side roller plunger steel	Horizontal	ZCKJ*, ZCKJ**, except ZCKJ4 and J41	⊖	ZCKE646	0.205 (0.452)
	Vertical	ZCKJ*, ZCKJ**, except ZCKJ4 and J41	⊖	ZCKE656	0.205 (0.452)
Roller lever plunger (1 direction of actuation)	Thermoplastic	ZCKJ*, ZCKJ**	⊖	ZCKE216	0.185 (0.408)
	Steel	ZCKJ*, ZCKJ**	⊖	ZCKE236	0.195 (0.430)
Rotary heads (without operating lever)					
Type	Compatible bodies	Max. actuation speed	Positive operation (1)	Catalog number	Weight kg (lb)
Spring return, actuation from left AND right or from left OR right (see page 408)	ZCKJ*, ZCKJ**	1.5 m/s (4.92 ft/s) by 30° cam	⊖	ZCKE056	0.165 (0.364)
Stay put, actuation from left AND right (see page 408)	ZCKJ1, J11 ZCKJ2, J21	1.5 m/s (4.92 ft/s)	—	ZCKE096	0.190 (0.419)
Multi-directional heads					
Type of operator	Compatible bodies	Max. actuation speed	Positive operation (1)	Catalog number	Weight kg (lb)
For actuation by any moving part					
"Cat's whisker"	ZCKJ*, ZCKJ**, except ZCKJ4 and ZCKJ41	1 m/s (3.28 ft/s) in any direction	—	ZCKE066	0.115 (0.254)
Spring rod lever	ZCKJ*, ZCKJ**, except ZCKJ4 and ZCKJ41	0.5 m/s (1.64 ft/s) in any direction	—	ZCKE086	0.125 (0.276)

1. ⊖ : Operating head able to guarantee positive opening operation, when properly mounted and using a conforming operator. The positive opening feature requires additional travel past the trip point. See the contact function diagrams.

Setup:
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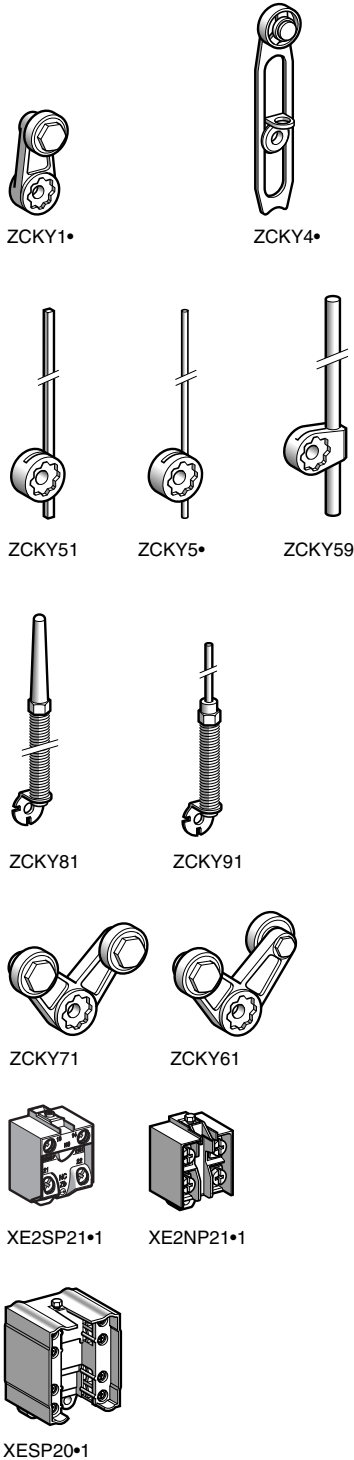
Dimensions:
page 510

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry

Low-Temperature Applications (−40 °F / −40 °C)



Operating levers for rotary heads					
Description		Positive operation (1)	Catalog number	Weight kg (lb)	
For actuation by 30° cam					
Roller lever (2)	Thermoplastic	⊖	ZCKY11	0.025 (0.055)	
	Steel	⊕	ZCKY13	0.035 (0.077)	
	Steel, ball bearing mounted	⊕	ZCKY14	0.030 (0.066)	
Variable length roller lever (3)	Thermoplastic	—	ZCKY41	0.030 (0.066)	
	Steel	—	ZCKY43	0.040 (0.088)	
For actuation by any moving part					
Square rod (2)	∅ 3 mm (0.12 in.) steel, L = 125 mm (4.92 in.)	—	ZCKY51	0.025 (0.055)	
Round rod (2)	∅ 3 mm (0.12 in.) steel, L = 125 mm (4.92 in.)	—	ZCKY53	0.025 (0.055)	
	∅ 3 mm (0.12 in.) glass fibre, L = 125 mm (4.92 in.)	—	ZCKY52	0.020 (0.044)	
	∅ 6 mm (0.24 in.) thermoplastic, L = 200 mm (7.87 in.)	—	ZCKY59	0.030 (0.066)	
Spring lever (3)		—	ZCKY81	0.020 (0.044)	
Spring metal rod lever (3)		—	ZCKY91	0.025 (0.055)	
For actuation by specific cam (for operation with ZCK-E096 head)					
Forked arm and rollers (2) thermoplastic	1 track	—	ZCKY71	0.035 (0.077)	
	2 track	—	ZCKY61	0.035 (0.077)	
2- or double-pole contact blocks					
Type	Function diagram	For body type	Positive operation (1)	Catalog number	Weight kg (lb)
1 N/C + 1 N/O snap action		ZCKJ1	⊕	XE2SP2151	0.020 (0.044)
1 N/C + 1 N/O break before make slow break		ZCKJ5	⊕	XE2NP2151	0.020 (0.044)
2 C/O simultaneous snap action		ZCKJ2	—	XESP2021	0.045 (0.099)
2 C/O staggered snap action		ZCKJ4	—	XESP2031	0.045 (0.099)
1 N/O + 1 N/C make before break slow break		ZCKJ6	⊕	XE2NP2161	0.020 (0.044)
1 N/C + 1 N/C simultaneous slow break		ZCKJ7	⊕	XE2NP2141	0.020 (0.044)
1 N/O + 1 N/O simultaneous slow break		ZCKJ8	—	XE2NP2131	0.020 (0.044)
1 N/C + 1 N/C snap action		ZCKJ9	⊕	XE2SP2141	0.020 (0.044)

- ⊕ : Operating lever able to guarantee positive opening operation, when properly mounted and using a conforming operator, or N/C contact with positive opening operation. The positive opening feature requires additional travel past the trip point. See the contact function diagrams.
- Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting or clamp.
- Adjustable throughout 360° in 5° steps.

Setup:
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Dimensions:
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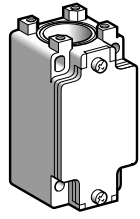
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

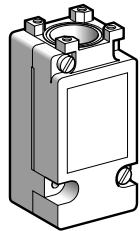
XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry

High-Temperature Applications (+248 °F /+120 °C)

Body with contacts—For plunger or rotary head



ZCKJ*



ZCKJ*15

Type	Contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
Fixed body						
1 step	2-pole 1 N/C + 1 N/O snap action (XE2SP2151)		⊕	1/2" NPT	ZCKJ1	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ1H29	0.310 (0.683)
	Double-pole 2 C/O simultaneous snap action (XESP20215)		—	1/2" NPT	ZCKJ25	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ25H29	0.310 (0.683)
	2-pole 1 N/C + 1 N/O break before make slow break (XE2NP2151)		⊕	1/2" NPT	ZCKJ5	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ5H29	0.310 (0.683)
	2-pole 1 N/O + 1 N/C make before break slow break (XE2NP2161)		⊕	1/2" NPT	ZCKJ6	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ6H29	0.310 (0.683)
	2-pole 1 N/C + 1 N/C simultaneous slow break (XE2NP2141)		⊕	1/2" NPT	ZCKJ7	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ7H29	0.310 (0.683)
	2-pole 1 N/O + 1 N/O simultaneous slow break (XE2NP2131)		—	1/2" NPT	ZCKJ8	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ8H29	0.310 (0.683)
2-pole 1 N/C + 1 N/C snap action (XE2SP2141)		⊕	1/2" NPT	ZCKJ9	0.310 (0.683)	
			ISO M20 x 1.5	ZCKJ9H29	0.310 (0.683)	
2 step	Double-pole 2 C/O break before make snap action (XESP20315)		—	1/2" NPT	ZCKJ45	0.310 (0.683)
				ISO M20 x 1.5	ZCKJ45H29	0.310 (0.683)
Plug-in body						
1 step	Single-pole 1 C/O snap action		—	1/2" NPT	ZCKJ115	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ115H29	0.300 (0.661)
	Double-pole 2 C/O simultaneous snap action		—	1/2" NPT	ZCKJ215	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ215H29	0.300 (0.661)
2 step	Double-pole 2 C/O break before make snap action		—	1/2" NPT	ZCKJ415	0.300 (0.661)
				ISO M20 x 1.5	ZCKJ415H29	0.300 (0.661)
Body with contacts—With spring return rotary head (without operating lever)						
Fixed body						
2 step 1 from the left AND 1 from the right	Double-pole 2 C/O break before make snap action		—	1/2" NPT	ZCKJ4045	0.455 (1.003)
				ISO M20 x 1.5	ZCKJ4045H29	0.455 (1.003)
Plug-in body						
2 step 1 from the left AND 1 from the right	Double-pole 2 C/O break before make snap action		—	1/2" NPT	ZCKJ41045	0.465 (1.025)
				ISO M20 x 1.5	ZCKJ41045H29	0.465 (1.025)

1. ⊕ : Operating head able to guarantee positive opening operation, when properly mounted and using a conforming operator. The positive opening feature requires additional travel past the trip point. See the contact function diagrams.

Setup:
page 510

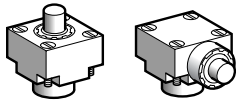
Dimensions:
page 510

Limit Switches

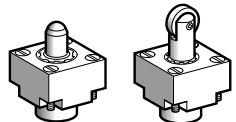
Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry

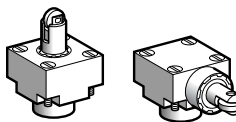
High-Temperature Applications (+248 °F /+120 °C)



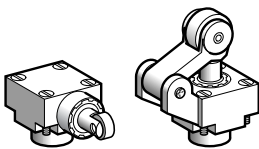
ZCKE615 ZCKE635



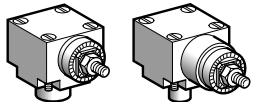
ZCKE665 ZCKE625



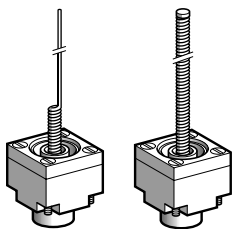
ZCKE675 ZCKE645



ZCKE655 ZCKE235



ZCKE055 ZCKE095



ZCKE065 ZCKE085

Plunger heads						
Type of operator	Compatible bodies		Max. actuation speed	Positive operation (1)	Catalog number	Weight kg (lb)
For actuation on end						
End plunger	Metal	ZCKJ1, J2, J4, ZCKJ115, J215, J415, ZCKJ5, J6, J7, J8, J9	0.5 m/s (1.64 ft/s)	⊖	ZCKE615	0.140 (0.309)
Side plunger	Metal	ZCKJ1, J2, ZCKJ115, J215, ZCKJ5, J6, J7, J8, J9	0.5 m/s (1.64 ft/s)	⊖	ZCKE635	0.200 (0.441)
For actuation by 30° cam						
End ball bearing plunger	Steel	ZCKJ1, J2, J4, ZCKJ115, J215, J415, ZCKJ5, J6, J7, J8, J9	0.1 m/s (0.33 ft/s)	⊖	ZCKE665	0.150 (0.331)
End roller plunger	Steel	ZCKJ1, J2, J4, ZCKJ115, J215, J415, ZCKJ5, J6, J7, J8, J9	1 m/s (3.28 ft/s)	⊖	ZCKE625	0.155 (0.342)
End reinforced roller plunger	Steel	ZCKJ1, J2, J4, ZCKJ115, J215, J415, ZCKJ5, J6, J7, J8, J9	1 m/s (3.28 ft/s)	⊖	ZCKE675	0.155 (0.342)
Side roller plunger	Steel Horizontal	ZCKJ1, J2, ZCKJ115, J215, ZCKJ5, J6, J7, J8, J9	0.6 m/s (1.97 ft/s)	⊖	ZCKE645	0.205 (0.452)
	Steel Vertical	ZCKJ1, J2, ZCKJ115, J215, ZCKJ5, J6, J7, J8, J9	0.6 m/s (1.97 ft/s)	⊖	ZCKE655	0.205 (0.452)
Roller lever plunger (1 direction of actuation)	Steel	ZCKJ1, J2, J4, ZCKJ115, J215, J415, ZCKJ5, J6, J7, J8, J9	1.5 m/s (4.92 ft/s)	⊖	ZCKE235	0.195 (0.430)
	Thermoplastic	ZCKJ1, J2, J4, ZCKJ115, J215, J415, ZCKJ5, J6, J7, J8, J9	1.5 m/s (4.92 ft/s)	⊖	ZCKE215	0.185 (0.408)
Rotary heads (without operating lever)						
Type	Compatible bodies		Max. actuation speed	Positive operation (1)	Catalog number	Weight kg (lb)
Spring return actuation from left AND right or from left OR right (see page 408)	ZCKJ1, J2, J4, ZCKJ115, J215, ZCKJ415, ZCKJ5, J6, J7, J8, J9		1.5 m/s (4.92 ft/s) by 30° cam	⊖	ZCKE055	0.165 (0.364)
Stay put actuation from left AND right (see page 408)	ZCKJ1, J2, ZCKJ115, J215		0.5 m/s (1.64 ft/s)	—	ZCKE095	0.190 (0.419)
Multi-directional heads						
Type of operator	Compatible bodies		Max. actuation speed	Positive operation (1)	Catalog number	Weight kg (lb)
For actuation by any moving part						
"Cat's whisker"	ZCKJ1, J2, ZCKJ115, J215, ZCKJ5, J6, J7, J8, J9		1 m/s (3.28 ft/s) in any direction	—	ZCKE065	0.115 (0.254)
Spring rod lever	ZCKJ1, J2, ZCKJ115, J215, ZCKJ5, J6, J7, J8, J9		0.5 m/s (1.64 ft/s) in any direction	—	ZCKE085	0.125 (0.276)

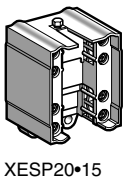
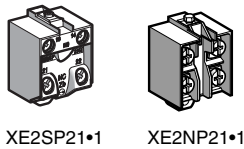
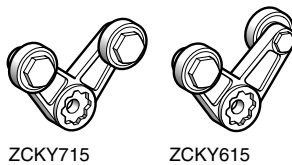
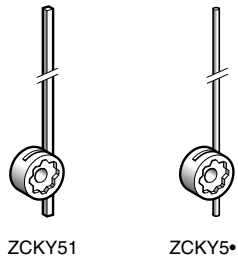
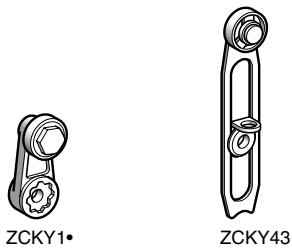
1. ⊖ : Operating head able to guarantee positive opening operation, when properly mounted and using a conforming operator. The positive opening feature requires additional travel past the trip point. See the contact function diagrams.

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies with 1/2" NPT Cable Entry

High-Temperature Applications (+248 °F /+120 °C)



Operating levers for rotary heads

Description	Positive operation (1)	Catalog number	Weight kg (lb)
For actuation by 30° cam			
Roller lever (2)	Thermoplastic	⊖	ZCKY115 0.025 (0.055)
	Steel	⊖	ZCKY13 0.035 (0.077)
	Steel, ball bearing mounted	⊖	ZCKY14 0.030 (0.066)
Variable length roller lever (3)	Thermoplastic	—	ZCKY415 0.030 (0.066)
	Steel	—	ZCKY43 0.040 (0.088)

For actuation by any moving part

Square rod (2)	∅ 3 mm (0.12 in.) Steel, L = 125 mm (4.92 in.)	—	ZCKY51 0.025 (0.055)
Round rod (2)	∅ 3 mm (0.12 in.) steel, L = 125 mm (4.92 in.)	—	ZCKY53 0.025 (0.055)
	∅ 3 mm (0.12 in.) glass fibre, L = 125 mm (4.92 in.)	—	ZCKY52 0.020 (0.044)

For actuation by specific cam (for operation with ZCK-E095 head only)

Forked arm and rollers (2) thermoplastic	1 track	—	ZCKY715 0.035 (0.077)
	2 track	—	ZCKY615 0.035 (0.077)

2- or double-pole contact blocks

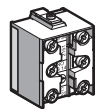
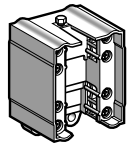
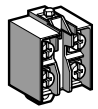
Type of operator	Function diagram	For body type	Positive operation (1)	Catalog number	Weight kg (lb)
1 N/C + 1 N/O snap action		ZCKJ1	⊖	XE2SP2151	0.020 (0.044)
1 N/C + 1 N/O break before make slow break		ZCKJ5	⊖	XE2NP2151	0.020 (0.044)
2 C/O simultaneous snap action		ZCKJ25	—	XESP20215	0.045 (0.099)
2 C/O staggered snap action		ZCKJ45	—	XESP20315	0.045 (0.099)
1 N/O + 1 N/C make before break slow break		ZCKJ6	⊖	XE2NP2161	0.020 (0.044)
1 N/C + 1 N/C simultaneous slow break		ZCKJ7	⊖	XE2NP2141	0.020 (0.044)
1 N/O + 1 N/O simultaneous slow break		ZCKJ8	—	XE2NP2131	0.020 (0.044)
1 N/C + 1 N/C snap action		ZCKJ9	⊖	XE2SP2141	0.020 (0.044)

- ⊖ : Operating head able to guarantee positive opening operation, when properly mounted and using a conforming operator. The positive opening feature requires additional travel past the trip point. See the contact function diagrams.
- Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting or clamp.
- Adjustable throughout 360° in 5° steps.

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies—Components



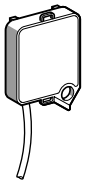
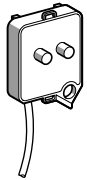
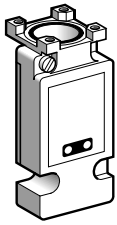
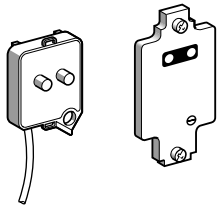
Contact blocks					
Type of contact	Function diagram	For bodies	Positive operation (1)	Catalog number	Weight kg (lb)
2-pole contact					
N/C + N/O snap action		ZCKJ1 ZCKJ1D	⊕	XE2SP2151	0.020 (0.044)
N/C + N/O break before make, slow break		ZCKJ5 ZCKJ5D	⊕	XE2NP2151	0.020 (0.044)
2 C/O simultaneous, snap action		ZCKJ2	—	XESP2021	0.045 (0.099)
2 C/O staggered, snap action		ZCKJ4	—	XESP2031	0.045 (0.099)
N/O + N/C make before break, slow break		ZCKJ6 ZCKJ6D	⊕	XE2NP2161	0.020 (0.044)
N/C + N/C simultaneous, slow break		ZCKJ7 ZCKJ7D	⊕	XE2NP2141	0.020 (0.044)
N/O + N/O simultaneous, slow break		ZCKJ8 ZCKJ8D	—	XE2NP2131	0.020 (0.044)
N/C + N/C snap action		ZCKJ9	⊕	XE2SP2141	0.020 (0.044)
3-pole contact					
N/C + N/O + N/O snap action		ZCKJD31	⊕	XE3SP2151	0.035 (0.077)
N/C + N/C + N/O snap action		ZCKJD39	⊕	XE3SP2141	0.035 (0.077)
N/C + N/C + N/O break before make, slow break		ZCKJD37	⊕	XE3NP2141	0.035 (0.077)
N/C + N/O + N/O break before make, slow break		ZCKJD35	⊕	XE3NP2151	0.035 (0.077)

1. ⊕: N/C contact with positive opening operation, when properly mounted and using a conforming operator.

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies—Components



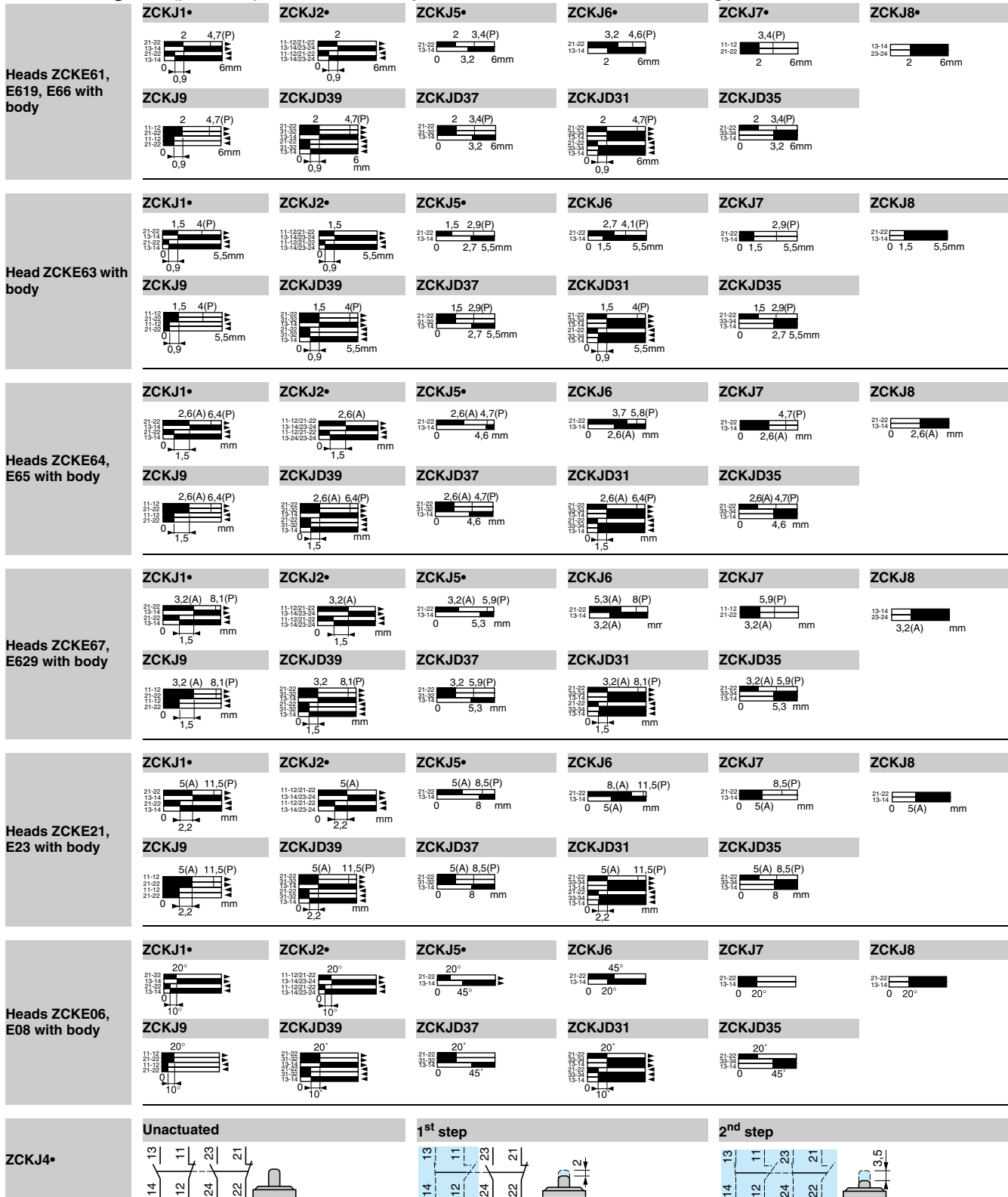
Covers + indicator light module				
For use with	Number and type of indicators	Voltage	Catalog number	Weight kg (lb)
Fixed non-plug-in body	1 LED	24 V \cdots	ZCKZ020	0.060 (0.132)
	2 LEDs	24 V \cdots	ZCKZ021	0.060 (0.132)
	2 neon lights	110/120 V \sim	ZCKZ033	0.060 (0.132)
		220/240 V \sim	ZCKZ034	0.060 (0.132)
Plug-in switch-top body with pilot lights	2 LEDs	24 V \cdots	ZCKJ0121	0.200 (0.441)
	2 neon lights	110/120 V \sim	ZCKJ0133	0.200 (0.441)
		220/240 V \sim	ZCKJ0134	0.200 (0.441)
	Indicator light modules			
For use with	Number and type of indicators	Voltage	Catalog number	Weight kg (lb)
Fixed non-plug-in body	1 LED	24 V \cdots	ZCKJ902	0.030 (0.066)
	2 LEDs	24 V \cdots	ZCKJ906	0.030 (0.066)
	2 neon lights	110/120 V \sim	ZCKJ903	0.030 (0.066)
		220/240 V \sim	ZCKJ904	0.030 (0.066)
Module with resistor for machine diagnostics				
For use with	Resistor value		Catalog number	Weight kg (lb)
Fixed non-plug-in body (XCKJ1 and ZCKJ1 only)	15 k Ω , 1/4 W		ZCKJ82A	0.030 (0.066)
Other versions	Covers + indicator light module for other supply voltages. Please consult your local sales office.			

Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies—Components

Function diagrams (positive operation assured only if the associated sub-assemblies are ⊕)



Contact operation

■ contact closed
□ contact open

(A) = cam displacement
(P) = positive opening point

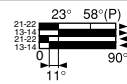
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041 XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies—Components

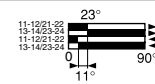
Function diagrams (positive operation assured only if the associated sub-assemblies are ⊕)

Head ZCKE05 with body

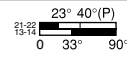
ZCKJ1•



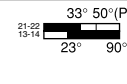
ZCKJ2•



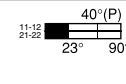
ZCKJ5•



ZCKJ6



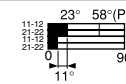
ZCKJ7



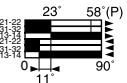
ZCKJ8



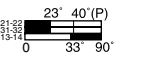
ZCKJ9



ZCKJD39



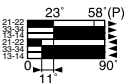
ZCKJD37



ZCKJD39

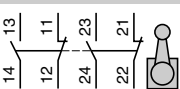


ZCKJD31

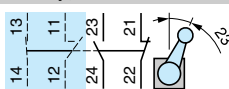


ZCKJ4•

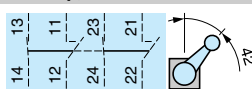
Unactuated



1st step, actuated from left or right

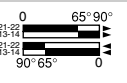


2nd step, actuated from left or right

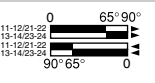


Head ZCKE09 with body

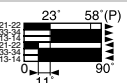
ZCKJ1•



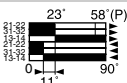
ZCKJ2•



ZCKJD31

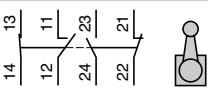


ZCKJD39

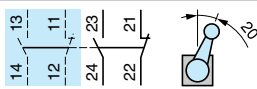


ZCKJ404, J4104 (body with head)

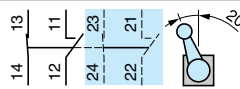
Unactuated



Actuated from left



Actuated from right



Contact operation

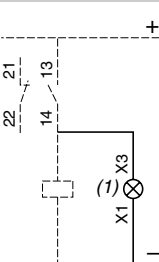
■ contact closed
□ contact open

(P) = positive opening point

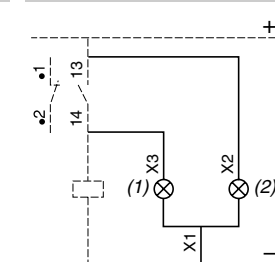
Wiring diagrams

Indicator light modules

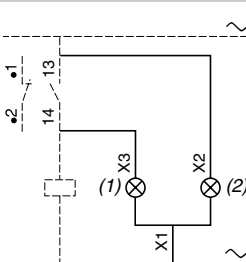
1 LED, 24 V $\overline{\text{DC}}$



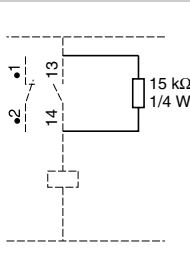
2 LEDs, 24 V $\overline{\text{DC}}$



2 neon lights, 110/120 or 220/240 V \sim

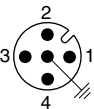


Module with resistor



1. Orange indicator
2. Green indicator

ZCKJ•D



- 1-2= N/C
- 3-4= N/O
- 5= \perp
- 4 A / 24 V max.



Limit Switches

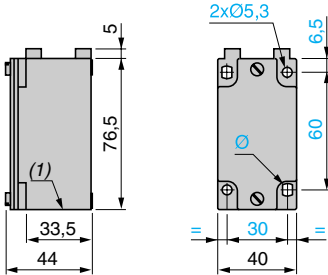
Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041

XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies—Components

Bodies

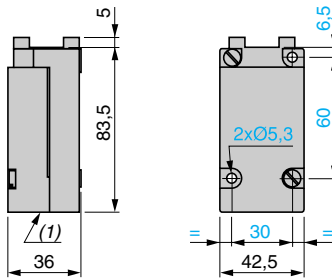
Non-plug-in

ZCKJ1, J2, J5, J4, J•2•, J•3•, J6, J7, J8, J9
ZCKJ1H29, J2H29, J5H29, J4H29, J•2•H29, J•3•H29,
J6H29, J7H29, J8H29, J9H29



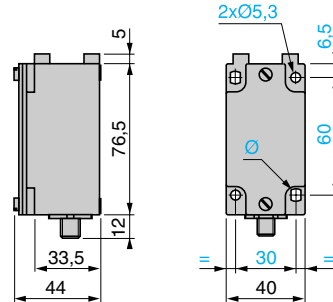
Plug-in

ZCKJ11, J21, J41, J11••
ZCKJ11H29, J21H29, J41H29, J11••H29



Non-plug-in

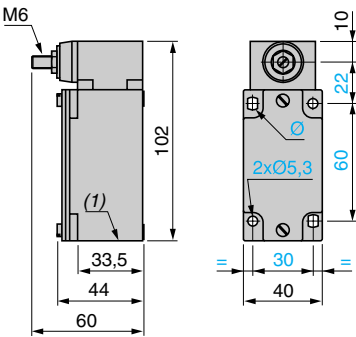
ZCKJ1D, J5D, J6D, J7D, J8D



Bodies with rotary head mounted

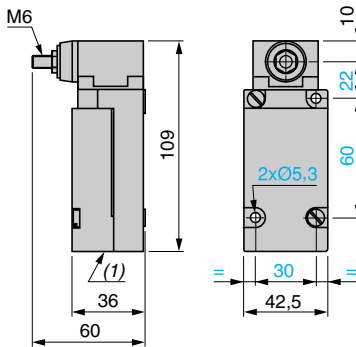
Non-plug-in

ZCKJ404, ZCKJ404H29



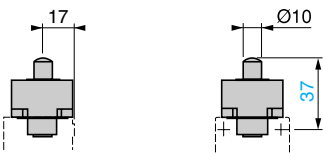
Plug-in

ZCKJ4104, ZCKJ4104H29

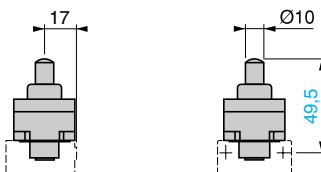


Plunger heads

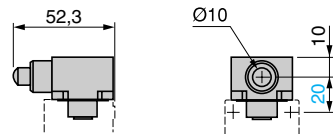
ZCKE61



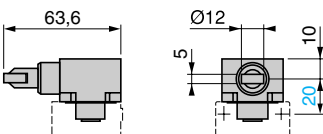
ZCKE619



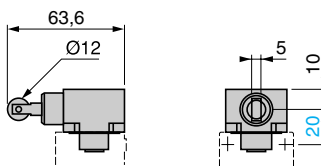
ZCKE63



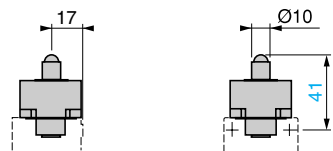
ZCKE64



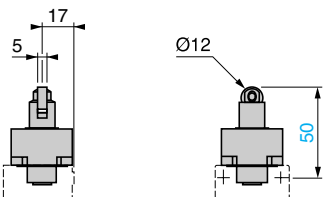
ZCKE65



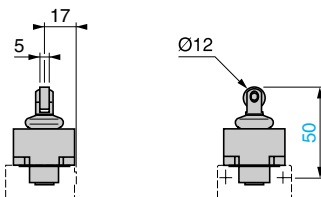
ZCKE66



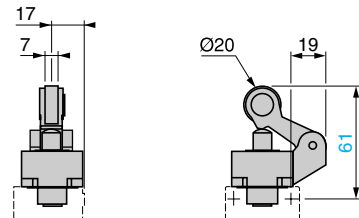
ZCKE62, ZCKE67



ZCKE629



ZCKE21, E23

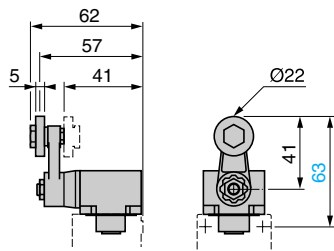


1: 1 tapped entry for 1/2" NPT.
Ø: 2 elongated holes Ø 5.3 x 7.3.

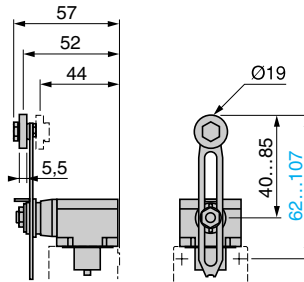
Limit Switches

Osiswitch® Classic, Metal, Conforming to CENELEC EN 50041 XCKJ—Modular, Fixed Non-plug-in or Plug-in Bodies—Components

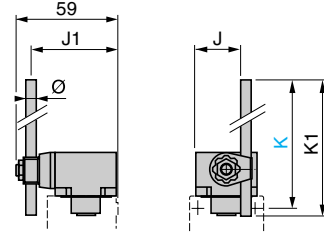
Rotary head ZCKE05 with operating lever ZCKY11, Y13, Y14



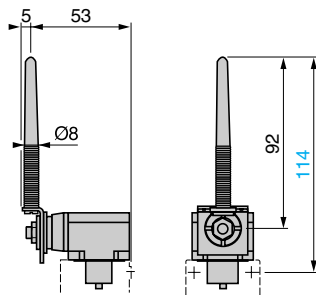
ZCKY41, Y43



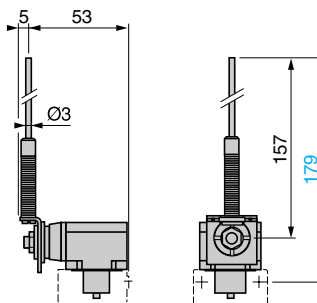
ZCKY51, Y52, Y53, Y59



ZCKY81

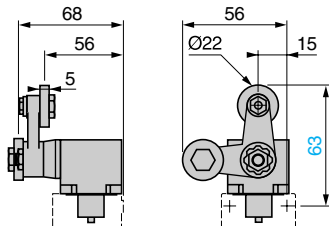


ZCKY91

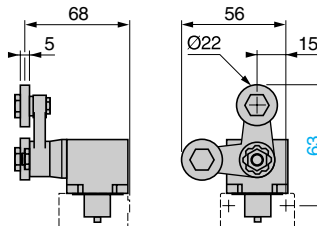


	J	J1	K max	K1	Ø
ZCKY51	20	49	137	123	Ø 3
ZCKY52	20	49	137	125	Ø 3
ZCKY53	20	49	137	125	Ø 3
ZCKY59	26.2	48	212	200	Ø 6

Rotary head ZCKE09 with operating lever ZCKY61

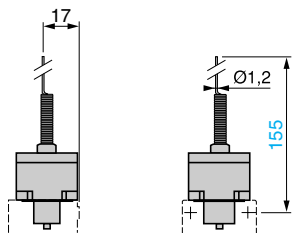


ZCKY71

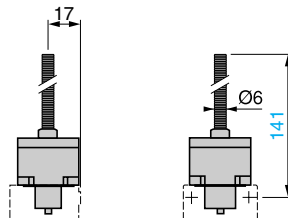


Multi-directional heads

ZCKE06



ZCKE08



NOTE: Operating lever spindle threaded M6.

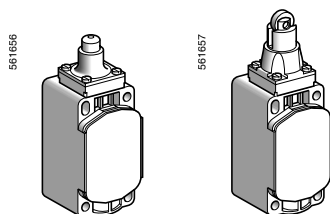
Limit Switches

Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

XCKS—Double Insulated

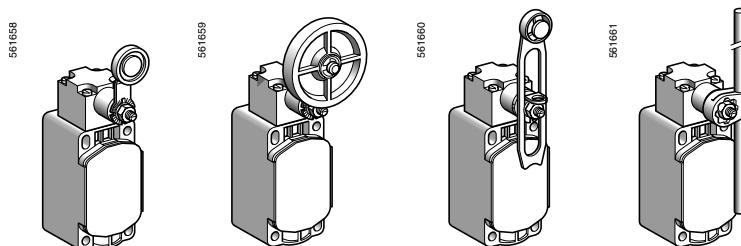
■ XCKS
fixed, non-plug-in body with 1 cable entry

□ With head for linear movement (plunger) operators



Page 514

□ With head for rotary movement (lever) operators



Page 514

Environmental characteristics

Conforming to standards	Products	IEC 60947-5-1, EN 60947-5-1, UL 508, CSA C22-2 n° 14
	Machine assemblies	IEC 60204-1, EN 60204-1
Approvals		UL, CSA, CCC
Protective treatment	Version	Standard "TC" and "TH"
Ambient air temperature	For operation	- 25...+70 °C (-13...+158 °F)
	For storage	- 40...+70 °C (-40...+158 °F)
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10...500 Hz)
Shock resistance	Conforming to IEC 60068-2-27	50 gn (11 ms)
Electric shock protection		Class II conforming to IEC 61140 and NF C 20-030
Degree of protection		IP 65 conforming to IEC 60529; IK 03 conforming to EN 50102
Repeat accuracy		0.05 mm on the tripping points, with 1 million operating cycles for head with end plunger
Cable entry	Depending on model	Tapped entry for PG 13 conduit thread, or tapped ISO M20 x 1.5, 1/2" NPT with adapter
Materials		Body and heads: plastic

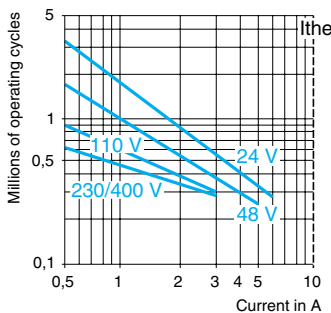
Limit Switches

Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

XCKS—Double Insulated

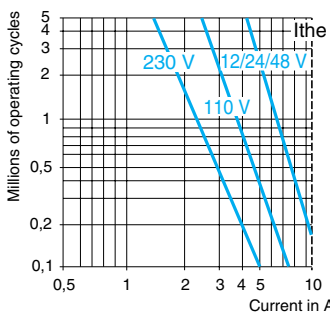
Contact block characteristics		
Rated operational characteristics	XE2•P	~ AC-15; A300 ($U_e = 240\text{ V}$, $I_e = 3\text{ A}$); $I_{the} = 10\text{ A}$ --- DC-13; Q300 ($U_e = 250\text{ V}$, $I_e = 0,27\text{ A}$), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1
	XE3•P	~ AC-15; B300 ($U_e = 240\text{ V}$, $I_e = 1,5\text{ A}$); $I_{the} = 6\text{ A}$ --- DC-13; R300 ($U_e = 250\text{ V}$, $I_e = 0,1\text{ A}$), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1
Rated insulation voltage	XE2•P	$U_i = 500\text{ V}$ degree of pollution 3 conforming to IEC 60947-1 $U_i = 300\text{ V}$ conforming to UL 508, CSA C22-2 n° 14
	XE3•P	$U_i = 400\text{ V}$ degree of pollution 3 conforming to IEC 60947-1 $U_i = 300\text{ V}$ conforming to UL 508, CSA C22-2 n° 14
Rated impulse withstand voltage	XE2•P	$U_{imp} = 6\text{ kV}$ conforming to IEC 60947-1, IEC 60664
	XE3•P	$U_{imp} = 4\text{ kV}$ conforming to IEC 60947-1, IEC 60664
Positive operation (depending on model)		N/C contacts with positive opening operation conforming to IEC 60947-5-1 Appendix K, EN 60947-5-1
Resistance across terminals		$\leq 25\text{ m}\Omega$ conforming to IEC 60255-7 category 3
Short-circuit protection	XE2•P	10 A cartridge fuse type gG (gl)
	XE3•P	6 A cartridge fuse type gG (gl)
Cabling (screw and captive cable clamp terminals)	XE2SP21•1	Clamping capacity, min.: $1 \times 0,34\text{ mm}^2$, max.: $2 \times 1,5\text{ mm}^2$
	XE2NP21•1	Clamping capacity, min.: $1 \times 0,5\text{ mm}^2$, max.: $2 \times 2,5\text{ mm}^2$
	XESP3021	Clamping capacity, min.: $1 \times 0,75\text{ mm}^2$, max.: $2 \times 1,5\text{ mm}^2$
	XE3NP and XE3SP	Clamping capacity, min.: $1 \times 0,34\text{ mm}^2$, max.: $1 \times 1\text{ mm}^2$ or $2 \times 0,75\text{ mm}^2$
Minimum actuation speed	XE2SP21•1, XESP3021 and XE3SP:	0.01 m/minute (0.03 ft/minute)
	XE2NP21•1 and XE3NP:	6 m/minute (19.68 ft/minute)
Electrical durability		<ul style="list-style-type: none"> Conforming to IEC 60947-5-1 Appendix C Utilization categories AC-15 and DC-13 Maximum operating rate: 3600 operating cycles per hour Load factor: 0.5

XE2SP21•1, XE2SP2141

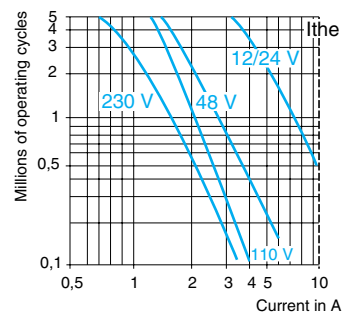


a.c. supply
 ~ 50/60 Hz
 ~ inductive circuit

XE2NP21•1



XESP3021



d.c. supply ---

Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	10	7	4

Power switched in W for 5 million operating cycles.

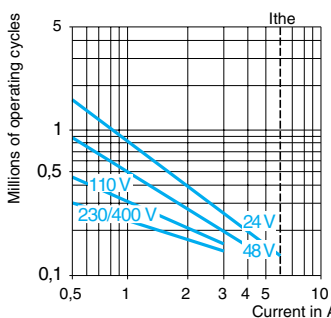
Voltage	V	24	48	120
mm	W	13	9	7

Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	10	7	4

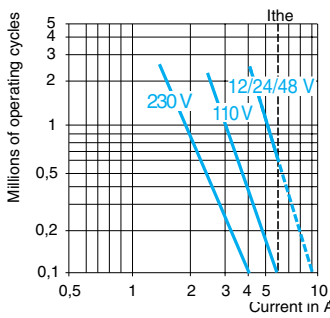
For XE2SP•151 on ~ or ---, N/C and N/O contacts simultaneously loaded to the values shown with reverse polarity.

XE3SP••••



a.c. supply
 ~ 50/60 Hz
 ~ inductive circuit

XE3NP••••



d.c. supply ---

Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	3	2	1


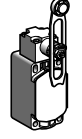
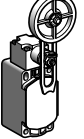















Power switched in W for 5 million operating cycles.

Voltage	V	24	48	120
mm	W	4	3	2

Limit Switches

Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

XCKS—Double Insulated, Complete Switches with 1/2" NPT Adapter Included

Type of head	Plunger (mounting by the body)			Rotary (mounting by the body)			
	Form B (1)	Form C (1)	Form A (1)				
Type of operator	Metal end plunger	Steel roller plunger	Thermoplastic roller lever (4)	Elastomer roller lever, Ø 50 mm (1.97 in.) (4)	Variable length thermoplastic roller lever (4)	Variable length elastomer roller lever, Ø 50 mm (1.97 in.) (4)	Round thermoplastic rod lever, Ø 6 mm (0.24 in.) (5) (6)
Catalog numbers (2) (3)	XCKS101	XCKS102	XCKS131	XCKS139	XCKS141	XCKS149	XCKS159
	2-pole N/C + N/O snap action (XE2SP2151)						
Weight, kg (lb)	0.095 (0.209)	0.105 (0.231)	0.145 (0.320)	0.150 (0.331)	0.155 (0.342)	0.155 (0.342)	0.150 (0.331)
Contact operation	 contact closed  contact open			(A) = cam displacement (P) = positive opening point	 N/C contact with positive opening operation, when properly mounted and using a conforming operator		
Characteristics							
Switch actuation	On end	By 30° cam				By any moving part	
Type of actuation							
Maximum actuation speed	0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)			1 m/s (3.28 ft/s)	
Minimum force or torque	For tripping For positive opening	15 N (3.37 lb) 45 N (10.12 lb)	12 N (2.70 lb) 36 N (8.09 lb)	0.15 N•m (1.33 lb-in) 0.3 N•m (2.66 lb-in)	—		
Cable entry (3)	1 entry tapped M20 x 1.5 mm for ISO cable entry, clamping capacity 7 to 13 mm (0.28 to 0.51 in.)						

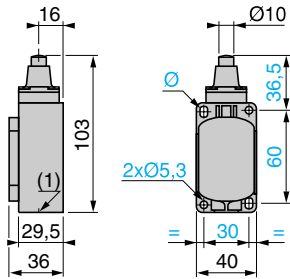
- Form conforming to EN 50041. See page 409.
- Switches with gold contacts or eyelet type connections: please consult your local sales office.
- To convert PG 13 to 1/2" NPT, use adapter DE9RA1212. For ISO M20 x 1.5, add H29 to the end of the catalog number. Example: XCKS101 becomes XCKS101H29.
- Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
- Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting.
- Value taken with actuation by moving part at 100 mm (3.94 in.) from the mounting.

Limit Switches

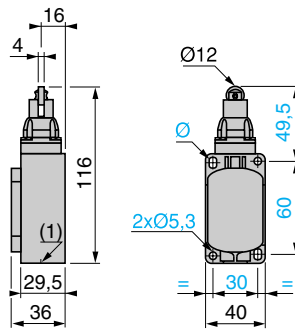
Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

XCKS—Double Insulated, Complete Switches with 1/2" NPT Adapter Included

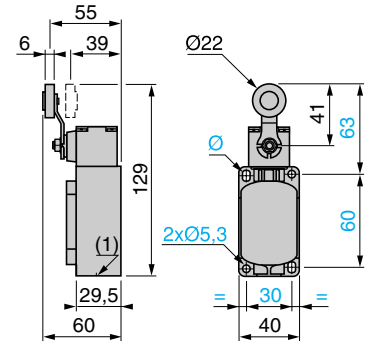
XCKS-01
ZCKS• + ZCKD01



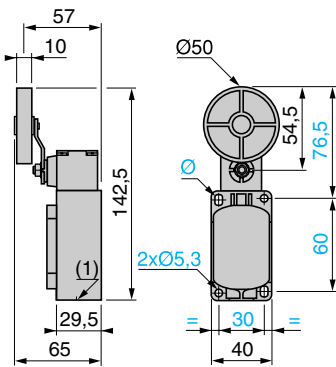
XCKS-02
ZCKS• + ZCKD02



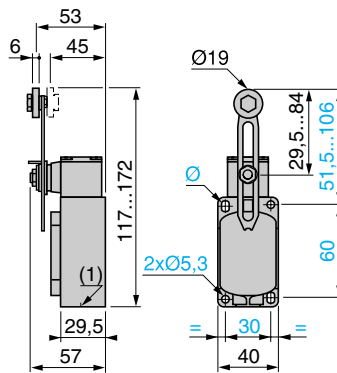
XCKS-31
ZCKS• + ZCKD31



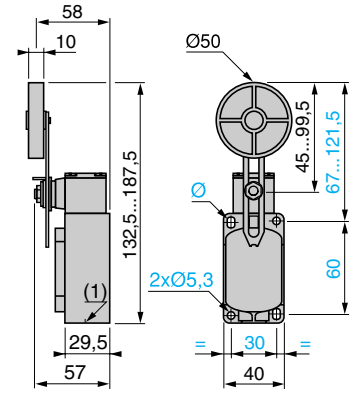
XCKS-39
ZCKS• + ZCKD39



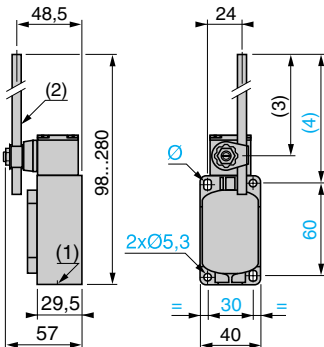
XCKS-41
ZCKS• + ZCKD41



XCKS-49
ZCKS• + ZCKD49



XCKS-59
ZCKS• + ZCKD59

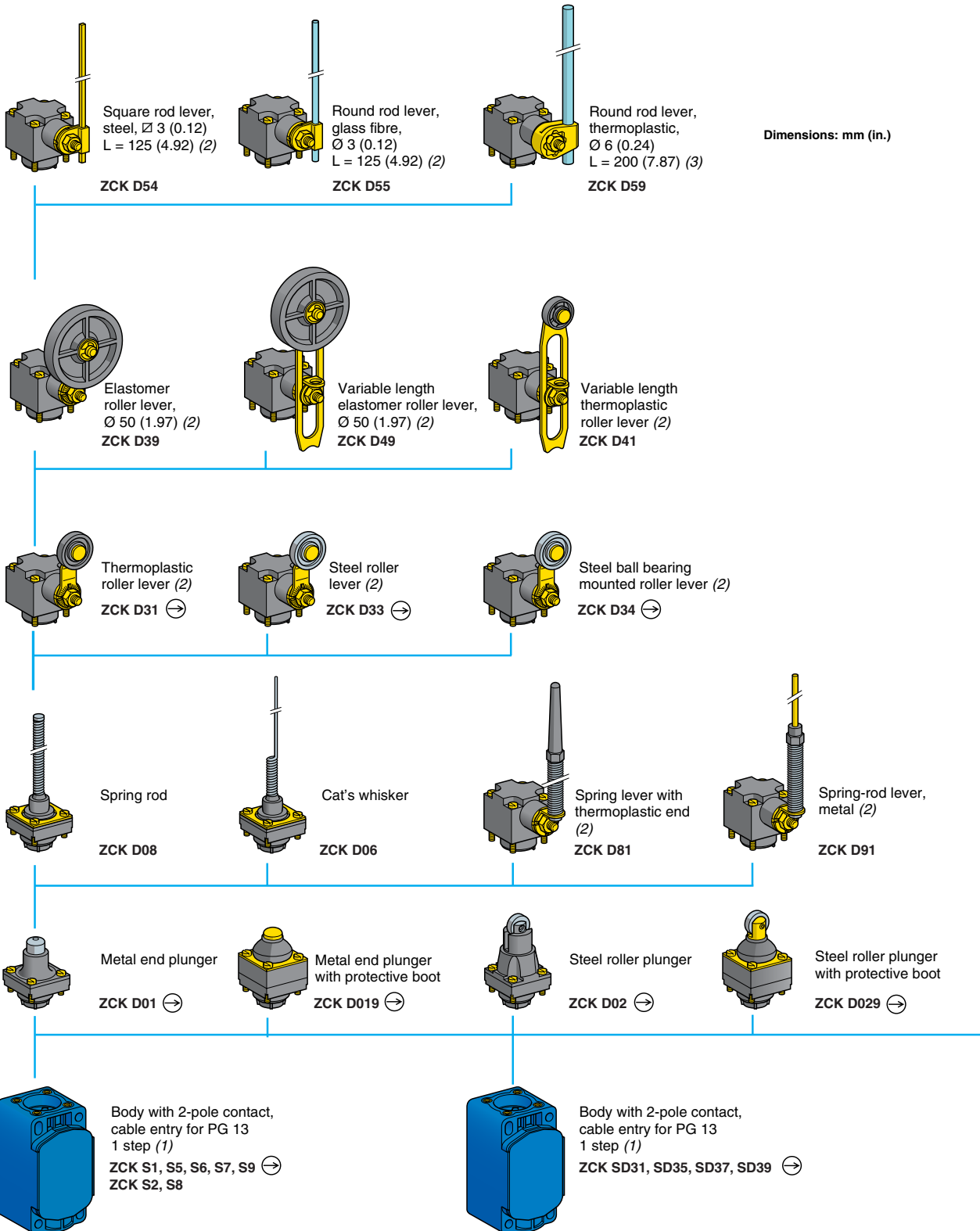


1. 1 tapped entry for PG 13 conduit thread (convertible to 1/2" NPT using adapter DE9RA1212, included); or
1 tapped entry for ISO M20 x 1.5 conduit thread (with suffix H29 added to the catalog number).
 2. Rod Ø 6 mm (0.24 in.), length 200 mm (7.87 in.)
 3. 190 max.
 4. 212 max.
- Ø: 2 elongated holes Ø 5.3 x 7.3.

Limit Switches

Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

XCKS—Double Insulated, Modular



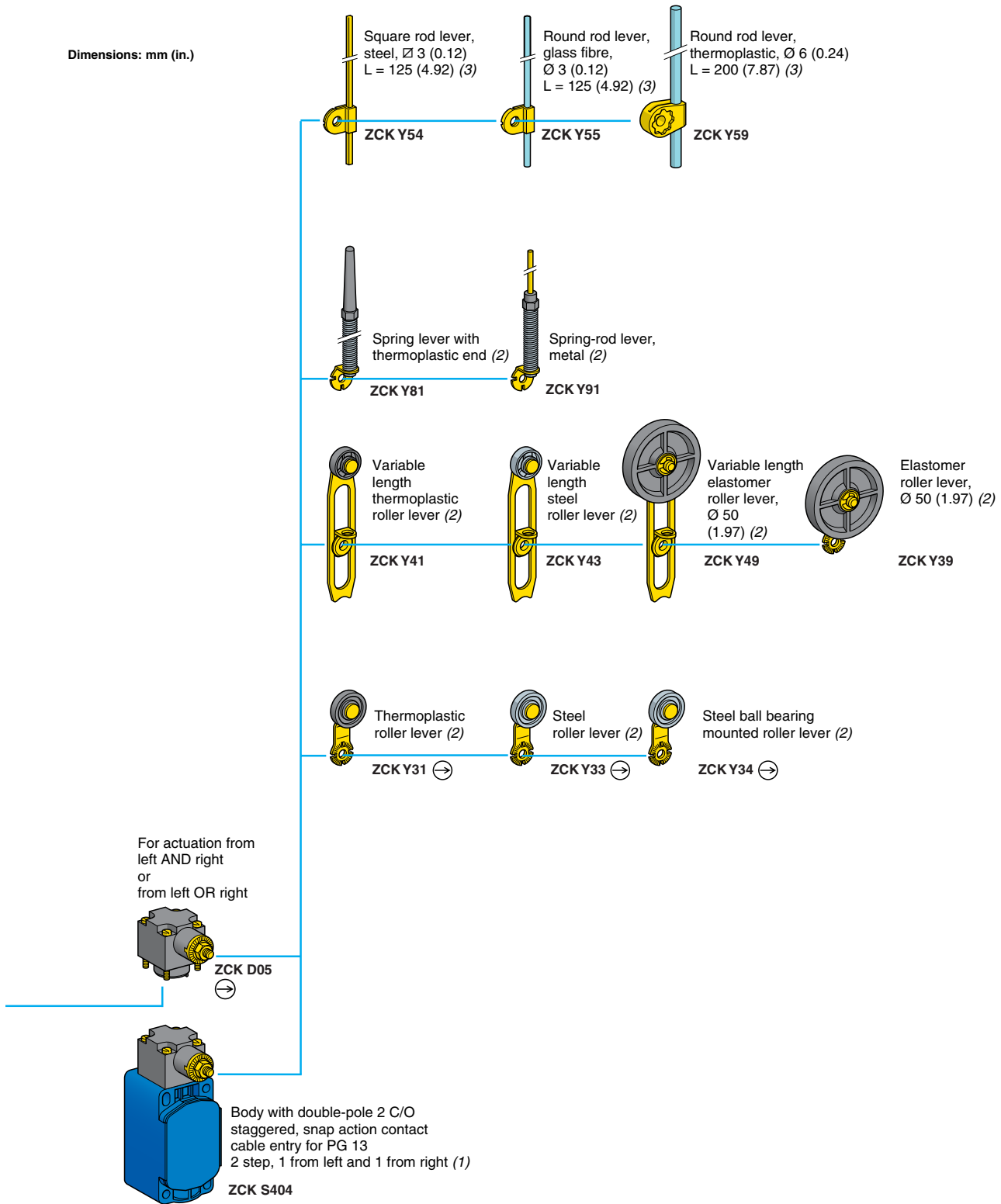
- For further details, see page 518. For a cable entry tapped ISO M20 x 1.5, add **H29** to the catalog number. Example: ZCKS1 becomes **ZCKS1H29**. To convert PG 13 to 1/2" NPT, use adapter DE9RA1212. See page 521 for dimensional drawing.
- Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
- Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting.

Limit Switches

Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

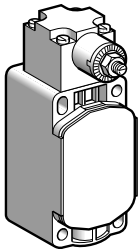
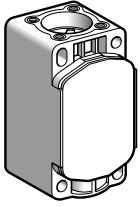
XCKS—Double Insulated, Modular

Dimensions: mm (in.)



1. For further details, see page 518. For a cable entry tapped ISO M20 x 1.5, add **H29** to the catalog number. Example: ZCKS1 becomes **ZCKS1H29**. To convert PG 13 to 1/2" NPT, use adapter DE9RA1212.
- ⊖: N/C contact with positive opening operation or head assuring positive opening operation, when properly mounted and using a conforming operator.
2. Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
3. Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting.

Limit Switches
Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041
XCKS—Double Insulated, Modular



Limit Switches

Bodies with 2-pole contact

Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
1 step	N/C + N/O snap action (XE2SP2151)		⊕	1/2" NPT	ZCKS1	0.080 (0.176)
				ISO M20 x 1.5	ZCKS1H29	0.080 (0.176)
	2 C/O simultaneous, snap action (XESP3021)		-	1/2" NPT	ZCKS2	0.080 (0.176)
				ISO M20 x 1.5	ZCKS2H29	0.080 (0.176)
	N/C + N/O break before make, slow break (XE2NP2151)		⊕	1/2" NPT	ZCKS5	0.080 (0.176)
				ISO M20 x 1.5	ZCKS5H29	0.080 (0.176)
	N/O + N/C make before make, slow break (XE2NP2161)		⊕	1/2" NPT	ZCKS6	0.080 (0.176)
ISO M20 x 1.5				ZCKS6H29	0.080 (0.176)	
N/C + N/C simultaneous, slow break (XE2NP2141)		⊕	1/2" NPT	ZCKS7	0.080 (0.176)	
			ISO M20 x 1.5	ZCKS7H29	0.080 (0.176)	
N/O + N/O simultaneous, slow break (XE2NP2131)		-	1/2" NPT	ZCKS8	0.080 (0.176)	
			ISO M20 x 1.5	ZCKS8H29	0.080 (0.176)	
N/C + N/C snap action (XE2SP2141)		⊕	1/2" NPT	ZCKS9	0.080 (0.176)	
			ISO M20 x 1.5	ZCKS9H29	0.080 (0.176)	

Bodies with double-pole contact and spring return rotary head

Without operating lever

Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
2 step 1 from left and 1 from right	2 C/O staggered, snap action		-	1/2" NPT	ZCKS404	0.150 (0.331)
				ISO M20 x 1.5	ZCKS404H29	0.150 (0.331)

Bodies with 3-pole contact and 1 cable entry

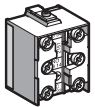
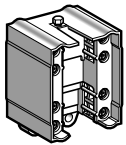
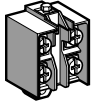
Type	With contact block	Function diagram	Positive operation (1)	Cable entry	Catalog number	Weight kg (lb)
1 step	N/C + N/O + N/O snap action (XE3SP2151)		⊕	1/2" NPT	ZCKSD31	0.080 (0.176)
				ISO M20 x 1.5	ZCKSD31H29	0.080 (0.176)
	N/C + N/C + N/O snap action (XE3SP2141)		⊕	1/2" NPT	ZCKSD39	0.080 (0.176)
				ISO M20 x 1.5	ZCKSD39H29	0.080 (0.176)
N/C + N/C + N/O break before make, slow break (XE3NP2141)		⊕	1/2" NPT	ZCKSD37	0.080 (0.176)	
			ISO M20 x 1.5	ZCKSD37H29	0.080 (0.176)	
N/C + N/O + N/O break before make, slow break (XE3NP2151)		⊕	1/2" NPT	ZCKSD35	0.080 (0.176)	
			ISO M20 x 1.5	ZCKSD35H29	0.080 (0.176)	

1. ⊕: N/C contact with positive opening operation or head assuring positive opening operation, when properly mounted and using a conforming operator.

Limit Switches

Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

XCKS—Double Insulated, Modular



Contact blocks					
Type of contact	Function diagram	For body	Positive operation (1)	Catalog number	Weight kg (lb)
2-pole contact					
N/C + N/O snap action		ZCKS1	⊕	XE2SP2151	0.020 (0.044)
N/C + N/O break before make, slow break		ZCKS5	⊕	XE2NP2151	0.020 (0.044)
2 C/O simultaneous, snap action		ZCKS2	—	XESP3021	0.045 (0.099)
N/O + N/C make before break, slow break		ZCKS6	⊕	XE2NP2161	0.020 (0.044)
N/C + N/C simultaneous, slow break		ZCKS7	⊕	XE2NP2141	0.020 (0.044)
N/O + N/O simultaneous, slow break		ZCKS8	—	XE2NP2131	0.020 (0.044)
N/C + N/C snap action		ZCKS9	⊕	XE2SP2141	0.020 (0.044)
3-pole contact					
N/C + N/O + N/O snap action		ZCKSD31	⊕	XE3SP2151	0.035 (0.077)
N/C + N/C + N/O snap action		ZCKSD39	⊕	XE3SP2141	0.035 (0.077)
N/C + N/C + N/O break before make, slow break		ZCKSD37	⊕	XE3NP2141	0.035 (0.077)
N/C + N/O + N/O break before make, slow break		ZCKSD35	⊕	XE3NP2151	0.035 (0.077)
Other versions	Gold flashed contacts: consult your local sales office.				

1. ⊕: N/C contact with positive opening operation or sub-assembly assuring positive opening operation, when properly mounted and using a conforming operator.

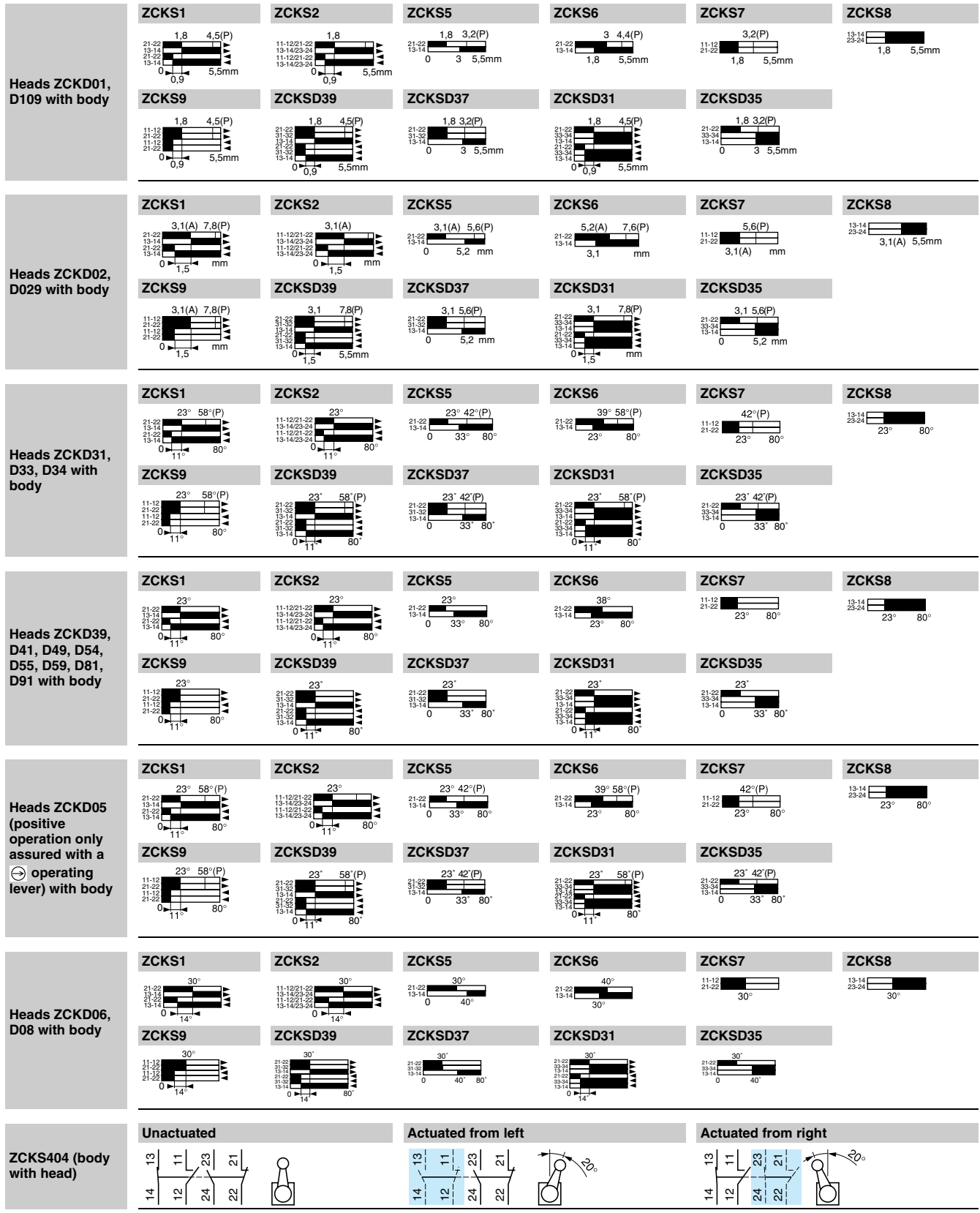
1/2" NPT Adapter

Description	Catalog number	Weight kg (lb)
PG 13 to 1/2" NPT adapter	DE9RA1212	—

Limit Switches

Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

XCKS—Double Insulated, Modular



Contact operation contact closed contact open (A) = cam displacement (P) = positive opening point

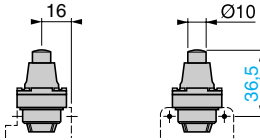
Limit Switches

Osiswitch® Classic, Plastic, Conforming to CENELEC EN 50041

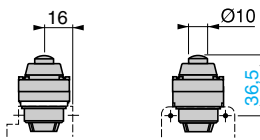
XCKS—Double Insulated, Modular

Plunger heads

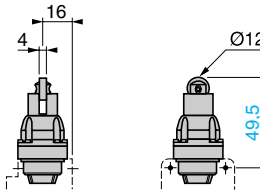
ZCKD01



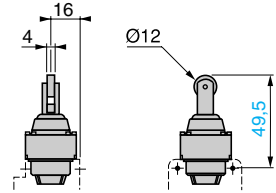
ZCKD019



ZCKD02

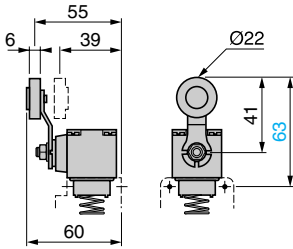


ZCKD029

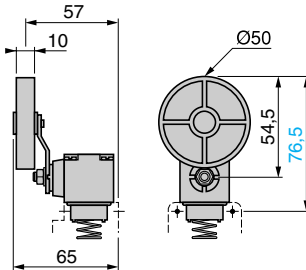


Rotary heads

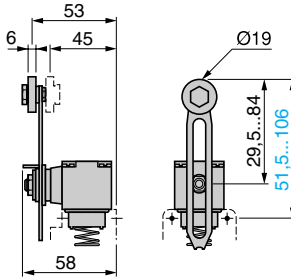
ZCKD31, D33, D34



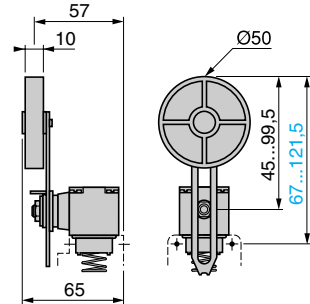
ZCKD39



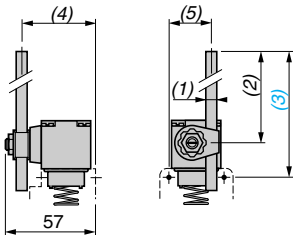
ZCKD41



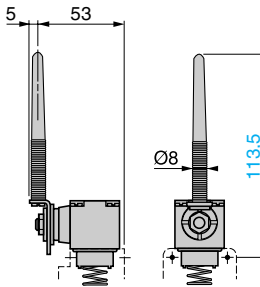
ZCKD49



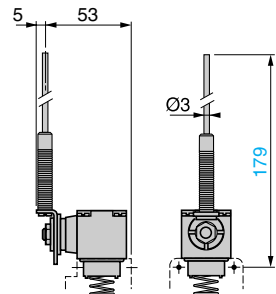
ZCKD54, D55, D59



ZCKD81



ZCKD91

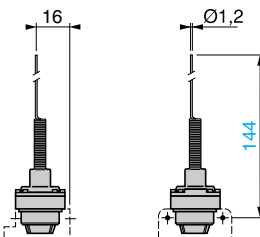


ZCK	(1) rod	(2)	(3)	(4)	(5)
D54	Ø 3, L = 125	115 max.	137 max.	49	24
D55	Ø 3, L = 125	115 max.	137 max.	49	24
D59	Ø 6, L = 200	190 max.	212 max.	46.5	26.2

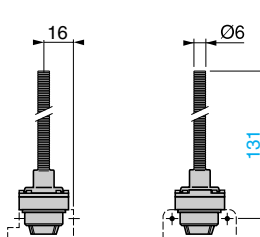
NOTE: operating lever spindle threaded M6.

Multi-directional heads

ZCKD06



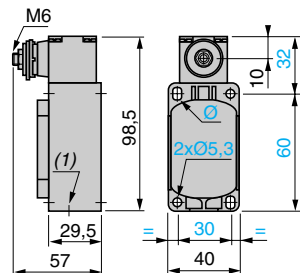
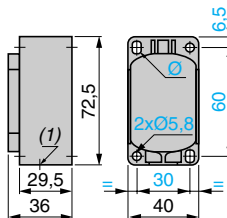
ZCKD08



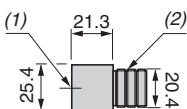
Bodies with contacts

ZCKS1, S2, S5, S6, S7, S8, S9
ZCKS1H29, S2H29, S5H29,
S6H29, S7H29, S8H29, S9H29
ZCKSD3*, SD3*H29

ZCKS404, S404H29



DE9RA1212 (PG 13 to 1/2" NPT adapter)



1. Tapped entry for 1/2" NPT conduit
2. PG 13 threaded sleeve

1. 1 tapped entry for PG 13 conduit thread (convertible to 1/2" NPT using adapter DE9RA1212); or 1 tapped entry for ISO M20 x 1.5 conduit thread (with suffix H29 added to the catalog number).
- Ø: 2 elongated holes Ø 5.3 x 7.3.

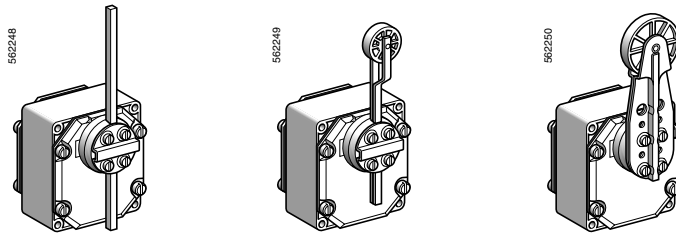
Limit Switches

Osiswitch® Classic, For Hoisting, Mechanical Handling, and Conveyer Belt Shift Monitoring

XCR and XCRT

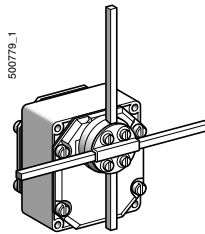
■ XCR

□ With head for rotary movement operators, spring return to off position
1 contact actuation position per direction



Page 524

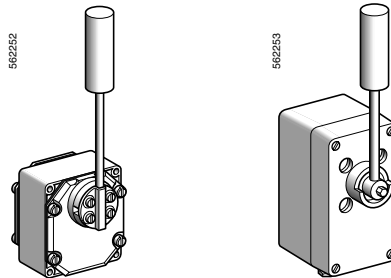
□ With head for rotary movement operators, stay put
1 contact actuation position per direction



Page 524

■ XCRT

□ With head for rotary movement operators, spring return to off position
2 contact actuation positions per direction
1 actuated at 10°, other contact actuated at 18°



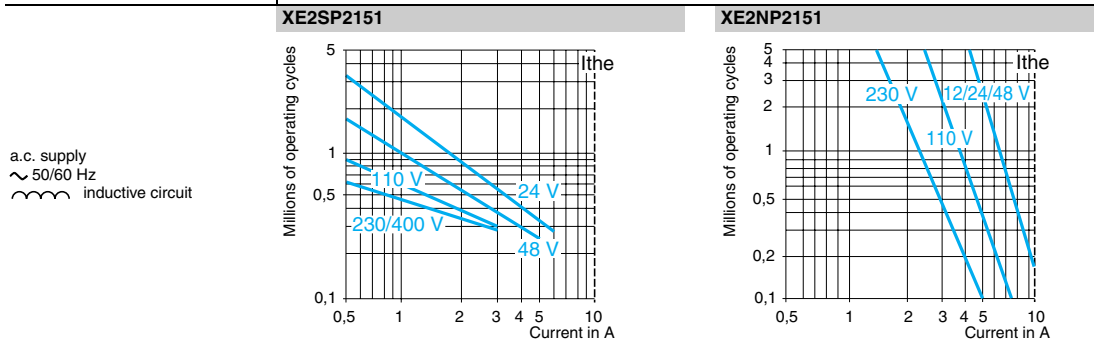
Page 526

Limit Switches

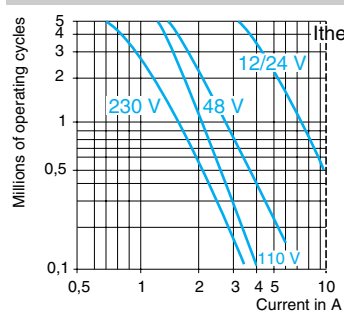
Osiswitch® Classic, For Hoisting, Mechanical Handling, and Conveyor Belt Shift Monitoring XCR and XCRT

Environmental characteristics		
Conforming to standards	Products	IEC/EN 60947-5-1, VDE 0660-200 (CSA C22-2 n° 14 for XCR), CCC (for XCR)
	Machine assemblies	IEC/EN 60204-1, NF C 79-130
Product certifications	Standard version	X CRA, B, E, F: CSA A300
	Special version	X CRA, B, E, F: CSA A300, 1/2" NPT
Protective treatment	Standard version	"TC"
Ambient air temperature		Operation: -25...+70 °C (-13...+158 °F); Storage: -40...+70 °C (-40...+158 °F)
Vibration resistance		9 gn (10...500 Hz)
Shock resistance		X CRA, B, E, F: 68 gn; X CRT: 30 gn (18 ms)
Electric shock protection		Class I conforming to IEC 60536 and NF C 20-030
Degree of protection		X CRA, B, E, F: IP 54 conforming to IEC 60529; IP 54S conforming to NF C 20-010 X CRT: IP 65 conforming to IEC 60529; IP 65S conforming to NF C 20-010
Enclosure		Metal, except X CRT315: polyester
Cable entry		Tapped entry for PG 13 (PG 13.5) conduit thread

Contact block characteristics		
Rated operational characteristics		~ AC-15; A300 (Ue = 240 V, Ie = 3 A) = DC-13; Q300 (Ue = 250 V, Ie = 0.27 A), conforming to IEC 60947-5-1 Appendix A, EN 60947-5-1
Rated insulation voltage		Ui = 500 V degree of pollution 3 conforming to IEC 60947-1 and VDE 0110, group C conforming to NF C 20-040 Ui = 300 V conforming to UL 508, CSA C22-2 n° 14
Rated impulse withstand voltage		U imp = 6 kV conforming to IEC 60947-1, IEC 60664
Positive operation (depending on model)		N/C contacts with positive opening operation to IEC 60947-5-1 Section 3, EN 60947-5-1
Resistance across terminals		≤ 25 mΩ conforming to NF C 93-050 method A or IEC 60255-7 category 3
Short-circuit protection		10 A cartridge fuse type gG (gl)
Cabling	Screw clamp terminals	XE2SP2151: Clamping capacity, min: 1 x 0.34 mm ² , max: 2 x 1.5 mm ² XE2NP2151: Clamping capacity, min: 1 x 0.5 mm ² , max: 2 x 2.5 mm ² X CRT contacts: Clamping capacity, min: 1 x 0.5 mm ² , max: 2 x 2.5 mm ²
Minimum actuation speed		XE2SP2151 and X CRT contacts: 0.01 m/minute (0.03 ft/minute), XE2NP2151: 6 m/minute (19.68 ft/minute)
Electrical durability		Conforming to IEC 60947-5-1 Appendix C Utilization categories AC-15 and DC-13 Maximum operating rate: 3600 operating cycles per hour Load factor: 0.5



XCRT contacts



d.c. supply =	Voltage	24 V	48 V	120 V
Power switched in W for 5 million operating cycles W	XE2SP2151	10	7	4
	XE2NP2151	13	9	7
	X CRT contacts	10	7	4

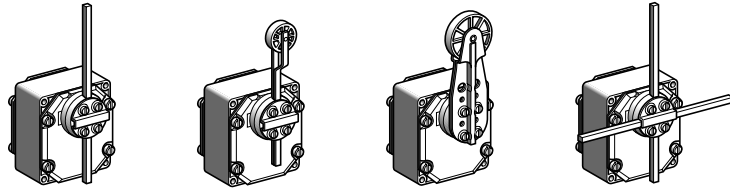
For XE2SP2151 on ~ or = N/C and N/O contacts simultaneously loaded to the values shown with reverse polarity.

Limit Switches

Osiswitch® Classic, For Hoisting and Material Handling

XCR—Complete Switches with One Cable Entry

Type of head Rotary with spring return to off position Stay put



Type of operator	Metal rod, \varnothing 6 mm (0.24 in.)	Thermoplastic roller lever	Large thermoplastic roller lever	Metal rods, \varnothing 6 mm (0.24 in.) crossed or "T" (1)
Maximum displacement	55° in each direction			90° in each direction

1. Crossed rods for XCRE*8, "T" rods for XCRF*7.

Catalog numbers of complete switches (⊖ N/C contact with positive opening operation)

<p>Two 2-pole 1 N/C + 1 N/O snap action XE2SP2151</p> <p>1st contact 2nd contact</p>	Both contacts operate in each direction	X CRA11 ⊖ 	X CRA12 ⊖ 	X CRA15 ⊖ 	X CRE18 ⊖
	1 contact operates in each direction	X CRB11 ⊖ 	X CRB12 ⊖ 	X CRB15 ⊖ 	X CRF17 ⊖
<p>Two 2-pole 1 N/C + 1 N/O break before make, slow break XE2NP2151</p> <p>1st contact 2nd contact</p>	Both contacts operate in each direction	X CRA51 ⊖ 	X CRA52 ⊖ 	X CRA55 ⊖ 	X CRE58 ⊖
	1 contact operates in each direction	X CRB51 ⊖ 	X CRB52 ⊖ 	X CRB55 ⊖ 	X CRF57 ⊖

Weight, kg (lb)	1.110	1.145	1.155	1.135
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Contact operation	contact closed contact open	(P) = positive opening point	1. 1 st contact 2. 2 nd contact
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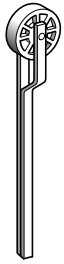
Complementary characteristics not shown under general characteristics (page 513)

Maximum actuation speed	1.5 m/s (4.92 ft/s)		
Minimum torque	For tripping	0.45 N•m (3.98 lb-in)	0.60 N•m (5.31 lb-in)
	For positive opening	0.75 N•m (6.64 lb-in)	0.70 N•m (6.20 lb-in)
Cable entry	1 entry tapped for PG 13 conduit thread conforming to NF C 68-300 (DIN PG 13.5). Clamping capacity 9 to 12 mm (0.35 to 0.47 in.). 1/2" NPT with adapter DE9RA1212.		

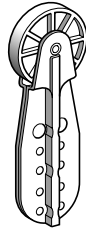
Limit Switches

Osiswitch® Classic, For Hoisting and Material Handling

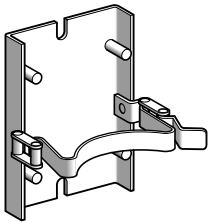
XCR—Complete Switches with One Cable Entry



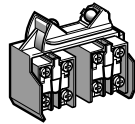
XCRZ02



XCRZ05



XCRZ09



XCRZ1•

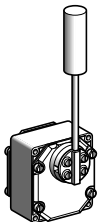
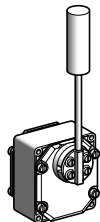
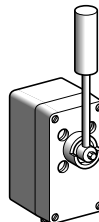
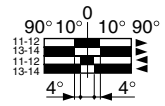
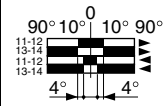
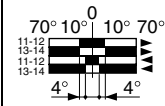
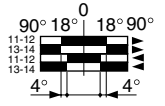
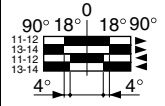
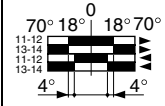
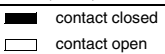
Separate components

Description	For switches	Type	Catalog number	Weight kg (lb)
Rod, \varnothing 6 mm (0.24 in.)	XCRA XCRB	L = 200 mm (7.87 in.)	XCRZ03	0.020 (0.044)
		L = 300 mm (11.81 in.)	XCRZ04	0.030 (0.066)
Roller lever thermoplastic roller	XCRA XCRB	—	XCRZ02	0.050 (0.110)
Large roller lever thermoplastic roller	XCRA XCRB	—	XCRZ05	0.090 (0.198)
Quick mounting/ release bracket	XCRA, XCRB XCRE, XCRF	—	XCRZ09	0.520 (1.146)
Contact block (2 contacts) with mounting plate	XCRA, XCRB XCRE, XCRF	2-pole 1 N/C + 1 N/O snap action	XCRZ12	0.135 (0.298)
		2-pole 1 N/C + 1 N/O break before make, slow break	XCRZ15	0.135 (0.298)
Description	Application	Sold in lots of	Unit catalog number	Weight kg (lb)
Adapter	PG 13.5 to ISO M20 x 1.5	5	DE9RA13520	0.050 (0.110)
Adapter	PG 13.5 to 1/2" NPT	5	DE9RA1212	0.050 (0.110)

Limit Switches

Osiswitch® Classic, For Conveyor Belt Shift Monitoring





XCRT—Complete Switches with One Cable Entry and 1/2" NPT Adapter Included

Type of switch	Standard	For corrosive atmospheres	
			
Features	Zinc alloy enclosure Color: industrial blue Zinc plated steel lever, spring return to off position Cam angles: 10° and 18° Maximum displacement: 90°	Zinc alloy enclosure Color: blue Stainless steel lever, spring return to off position Cam angles: 10° and 18° Maximum displacement: 90°	Glass reinforced polyester enclosure Color: grey Stainless steel lever, spring return to off position Cam angles: 10° and 18° Maximum displacement: 70°
Catalog numbers of complete switches			
2 single-pole C/O snap action	XCRT115	XCRT215	XCRT315
1 st contact			
2 nd contact			
Weight, kg (lb)	1.170 (2.579)	1.170 (2.579)	1.520 (3.351)
Contact operation			

Complementary characteristics not shown under general characteristics (page 513)

Minimum tripping torque	1.0 N•m (8.85 lb-in)
Cable entry	1 entry tapped for PG 13 conduit thread conforming to NF C 68-300 (DIN PG 13.5) Clamping capacity 9 to 12 mm (0.35 to 0.47 in.) 1/2" NPT with adapter DE9RA1212 included

Switch operation

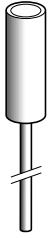
Normal position	Fault signalling	Stopping of the conveyor belt	Maximum rotation
			

Dimensions:
page 529

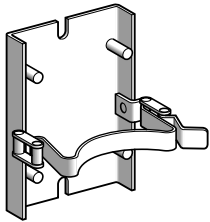
Limit Switches

Osiswitch® Classic, For Conveyor Belt Shift Monitoring

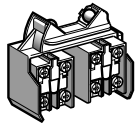
XCRT—Complete Switches with One Cable Entry and 1/2" NPT Adapter Included



XCRZ901-903



XCRZ09



XCRZ42

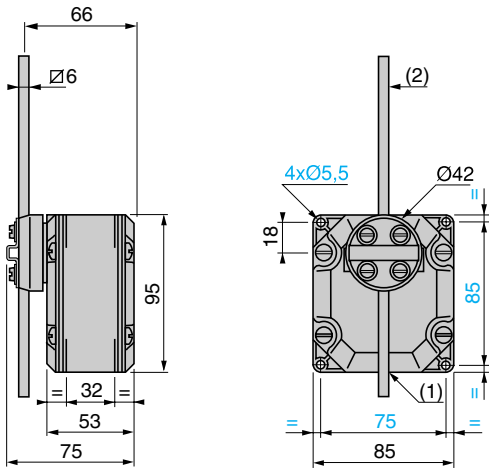
Separate components

Description	Type	For switches	Catalog number	Weight kg (lb)
Roller with lever	Zinc plated steel	XCRT115 XCRT215	XCRZ901	0.230 (0.507)
	Stainless steel	XCRT115 XCRT215	XCRZ902	0.230 (0.507)
		XCRT315	XCRZ903	0.230 (0.507)
Quick mounting/release bracket	—	XCRT115 XCRT215	XCRZ09	0.520 (1.146)
Contact block (2 contacts) with mounting plate	Single-pole C/O snap action	XCRT•15	XCRZ42	0.135 (0.298)
Description	Application	Sold in lots of	Unit catalog number	Weight kg (lb)
Adapter	PG 13.5 to ISO M20 x 1.5	5	DE9RA13520	0.050 (0.110)
Adapter	PG 13.5 to 1/2" NPT	5	DE9RA1212	0.050 (0.110)

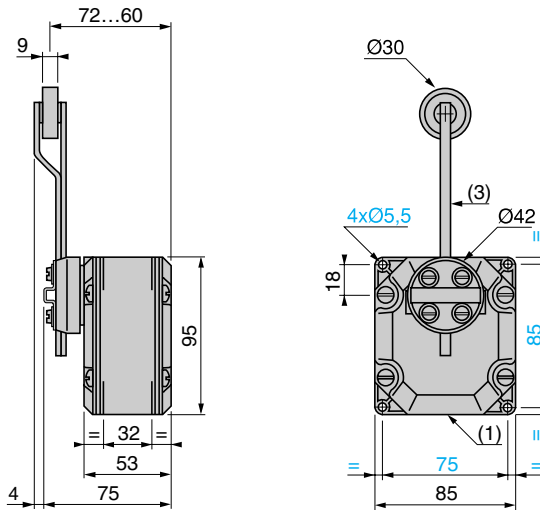
Limit Switches

Osiswitch® Classic, For Hoisting, Mechanical Handling, and Conveyor Belt Shift Monitoring XCR and XCRT

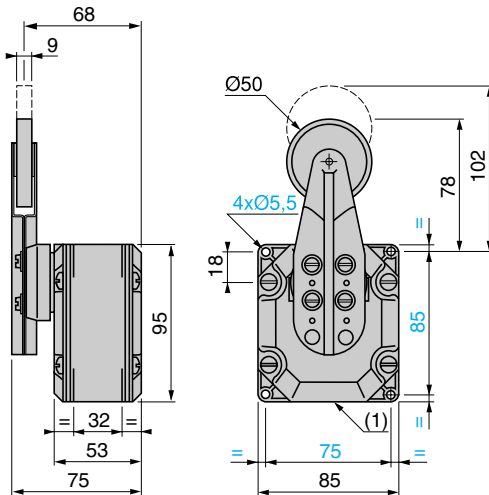
XCRA11, B11, A51, B51



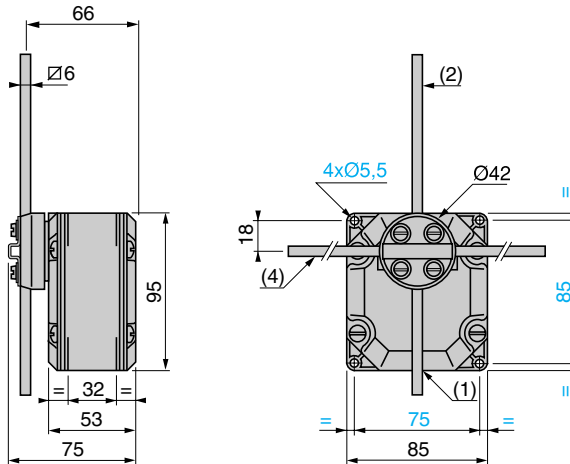
XCRA12, B12, A52, B52



XCRA15, B15, A55, B55



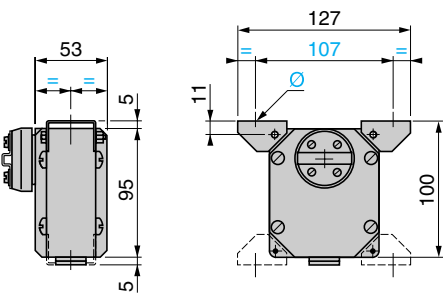
XCRE18, E58, F17, F57



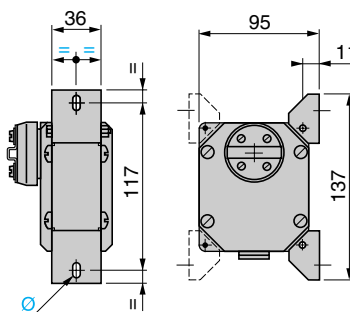
1. 1 tapped entry for PG 13 conduit thread.
2. Rod length: 200 mm (7.87 in.).
3. Rod + roller length: 160 mm (6.30 in.).
4. Rod length: 300 mm (11.81 in.) for XCRF17 and F57, 200 mm (7.87 in.) for XCR E18 and E58.

Supplementary mounting using 2 adjustable lugs (included with switch)

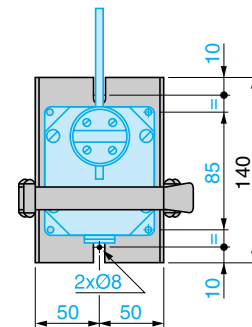
Horizontally positioned



Vertically positioned



Quick mounting/release bracket XCRZ09



Ø: 1 elongated hole Ø 6 x 8.

Characteristics:
pages 523 and 524

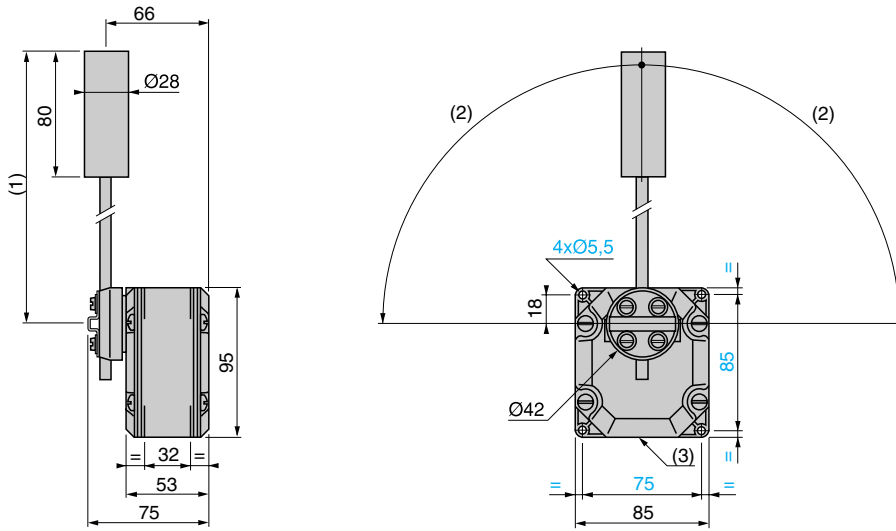
Catalog numbers:
page 524

Operation:
page 524

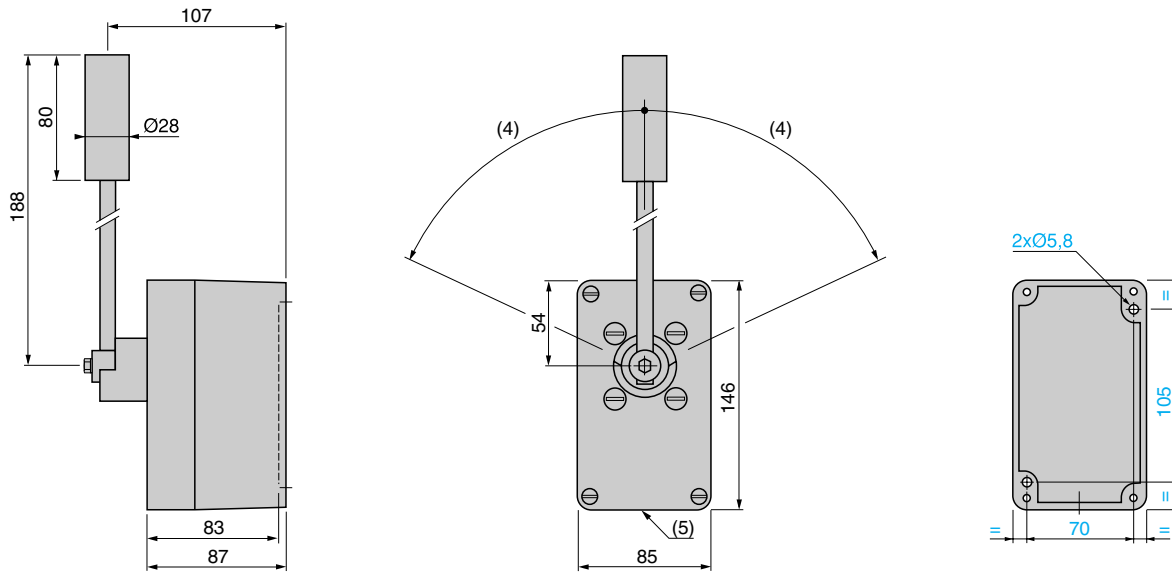
Limit Switches

Osiswitch® Classic, For Hoisting, Mechanical Handling, and Conveyor Belt Shift Monitoring XCR and XCRT

XCRT115, T215



XCRT315



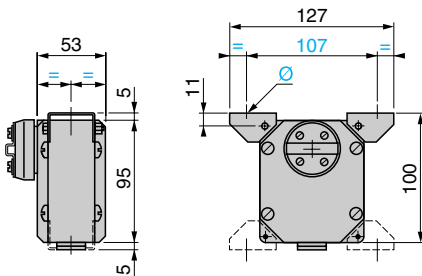
1. 200 max., 83 min.
2. 90° max.

3. 1 tapped entry for PG 13 conduit thread.
4. 70° max.

5. 1 plain entry for PG 13 conduit thread.

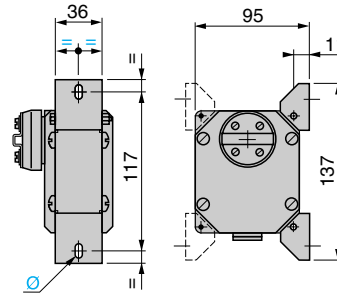
Supplementary mounting using 2 adjustable lugs (included with XCRT115 and T215)

Horizontally positioned

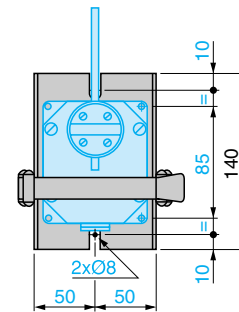


Ø: 1 elongated hole Ø 6 x 8.

Vertically positioned



Quick mounting/release bracket XCRZ09



Characteristics:
pages 523 and 526

Catalog numbers:
page 526

Operation:
page 527

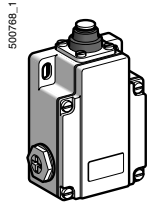
Limit Switches

Osiswitch® Classic, For Material Handling

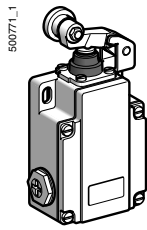
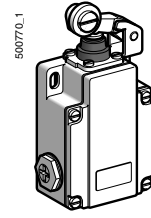
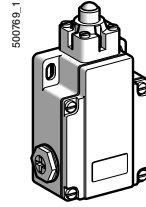
XC1AC

■ XC1AC
with slow break contacts

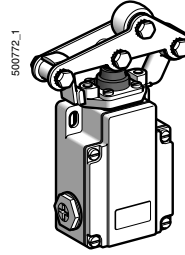
□ With head for linear movement (plunger)



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Page 532



Limit Switches

Osiswitch® Classic, For Material Handling

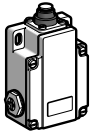
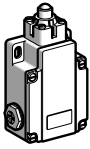


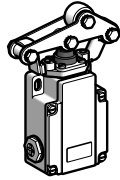
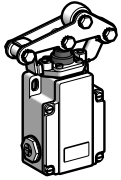

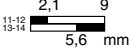
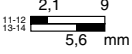
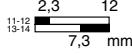
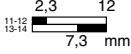
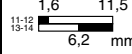
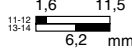

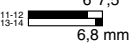
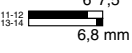
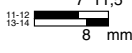
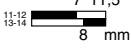
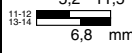
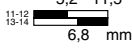



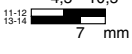
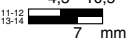
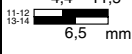
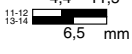








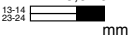
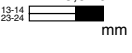

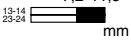



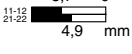
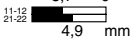
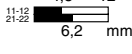
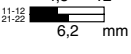

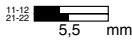



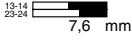
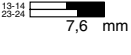
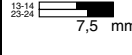
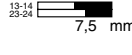
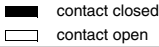
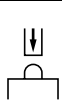
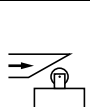
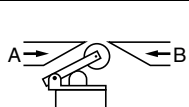
XC1AC

Environmental characteristics																																								
Conformity to standards	IEC/EN 60947-5-1, IEC 60337-1, VDE 0660-200, CSA C22-2 n° 14																																							
Product certifications	Special version CSA 600 V (ac) HD																																							
Protective treatment	Version Standard "TC", special "TH"																																							
Ambient air temperature	For operation - 25...+70 °C (-13...+158 °F)																																							
	For storage - 40...+70 °C (-40...+158 °F)																																							
Operating position	All positions																																							
Vibration resistance	9 gn (10...500 Hz) conforming to IEC 60068-2-6																																							
Shock resistance	95 gn (11 ms) conforming to IEC 60068-2-27																																							
Electric shock protection	Class I conforming to IEC 60536 and NF C 20-030																																							
Degree of protection	IP 65 conforming to IEC 60529 and NF C 20-010																																							
Mechanical durability	10 million operating cycles																																							
Cable entry	3 tapped entries for PG 13 conduit thread																																							
Contact block characteristics																																								
Conventional thermal current	10 A																																							
Rated insulation voltage	Slow break contact blocks ~ 500 V and = 600 V conforming to IEC 60947-5-1, NF C 20-040 ~ and = 600 V conforming to CSA C22-2 n° 14																																							
Resistance across terminals	≤ 8 mΩ																																							
Minimum tripping force	XC1AC1•1 : 33 N (7.42 lb); XC1AC1•6 : 23 N (5.17 lb); XC1AC1•7 : 29 N (6.52 lb)																																							
Terminal referencing	Conforming to CENELEC EN 50013																																							
Short-circuit protection	10 A cartridge fuse type gG (gl)																																							
Electrical durability	Conforming to IEC 60947-5-1 Appendix C Utilization categories AC-15 and DC-13 Maximum operating rate: 3600 operating cycles/hour Load factor: 0.5																																							
	<table border="1"> <thead> <tr> <th colspan="4">Slow break contact blocks</th> </tr> <tr> <th colspan="4">Power switched in VA</th> </tr> <tr> <th>Voltage V</th> <th>48</th> <th>110</th> <th>230</th> </tr> </thead> <tbody> <tr> <td>a.c. supply ~ 50/60 Hz ~ inductive circuit</td> <td>For 1 million operating cycles</td> <td>450</td> <td>900</td> <td>1900</td> </tr> <tr> <td></td> <td>For 3 million operating cycles</td> <td>170</td> <td>350</td> <td>430</td> </tr> <tr> <th colspan="4">Power switched in W</th> </tr> <tr> <th>Voltage V</th> <th>48</th> <th>110</th> <th>230</th> </tr> <tr> <td>d.c. supply = ~ inductive circuit</td> <td>For 1 million operating cycles</td> <td>100</td> <td>100</td> <td>95</td> </tr> <tr> <td></td> <td>For 3 million operating cycles</td> <td>35</td> <td>40</td> <td>33</td> </tr> </tbody> </table>	Slow break contact blocks				Power switched in VA				Voltage V	48	110	230	a.c. supply ~ 50/60 Hz ~ inductive circuit	For 1 million operating cycles	450	900	1900		For 3 million operating cycles	170	350	430	Power switched in W				Voltage V	48	110	230	d.c. supply = ~ inductive circuit	For 1 million operating cycles	100	100	95		For 3 million operating cycles	35	40
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	For 3 million operating cycles	35	40	33																																				

Limit Switches

Osiswitch® Classic, For Material Handling

XC1AC—Complete Switches with Slow-Break Contacts and 1/2" NPT Adapter Included

Type of head	Plunger					
						
Type of operator	End plunger	End ball bearing plunger	Roller lever	Offset roller lever	Reinforced roller lever	Roller lever on needle roller bearing
Catalog numbers of complete switches						
Single pole C/O slow break ZC1AZ11	XC1AC111	XC1AC115	XC1AC116	XC1AC118	XC1AC117	XC1AC119
						
2-pole N/C + N/O break before make, slow break ZC1AZ12	XC1AC121	XC1AC125	XC1AC126	XC1AC128	XC1AC127	XC1AC129
						
2-pole N/O + N/C make before break, slow break ZC1AZ13	XC1AC131	XC1AC135	XC1AC136	XC1AC138	XC1AC137	XC1AC139
						
2-pole N/C + N/C simultaneous, slow break ZC1AZ14	XC1AC141	XC1AC145	XC1AC146	XC1AC148	XC1AC147	XC1AC149
						
2-pole N/O + N/O simultaneous, slow break ZC1AZ15	XC1AC151	XC1AC155	XC1AC156	XC1AC158	XC1AC157	XC1AC159
						
2-pole N/C + N/C staggered, slow break ZC1AZ16	XC1AC161	XC1AC165	XC1AC166	XC1AC168	XC1AC167	XC1AC169
						
2-pole N/O + N/O staggered, slow break ZC1AZ17	XC1AC171	XC1AC175	XC1AC176	XC1AC178	XC1AC177	XC1AC179
						
Weight, kg (lb)	0.530 (1.168)	0.530 (1.168)	0.595 (1.312)	0.595 (1.312)	0.870 (1.918)	0.870 (1.918)
Contact operation						
Complementary characteristics not shown under general characteristics (page 523)						
Switch actuation	On end	By 30° cam				
Type of actuation						
Maximum actuation speed	0.5 m/s (1.64 ft/s)	Direction A: 1 m/s (3.28 ft/s); Direction B: 0.5 m/s (1.64 ft/s) (1)				
Cable entry	3 tapped entries for PG 13 (DIN PG 13.5) conduit thread, clamping capacity 9 to 12 mm (0.35 to 0.47 in.) (2 entries fitted with blanking plug) 1/2" NPT with adapter DE9RA1212					
Connection	Screw terminals. Clamping capacity: min 1 x 0.5 mm ² , max 1 x 2.5 mm ²					

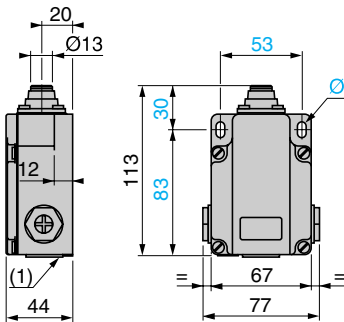
1. For a 45° cam the maximum actuation speed becomes 0.5 m/s (1.64 ft/s) and for a 15° cam, 1 m/s (3.28 ft/s).

Limit Switches

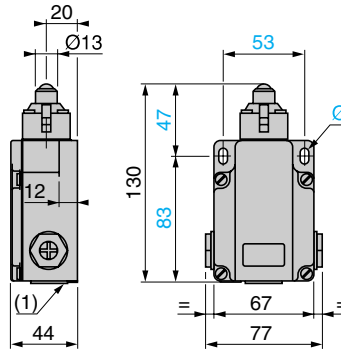
Osiswitch® Classic, For Material Handling

XC1AC—Complete Switches with Slow-Break Contacts and 1/2" NPT Adapter Included

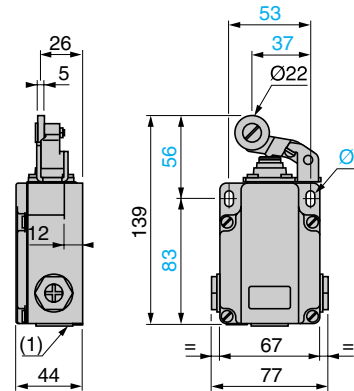
XC1AC1•1



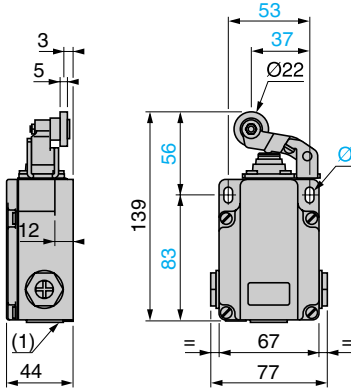
XC1AC1•5



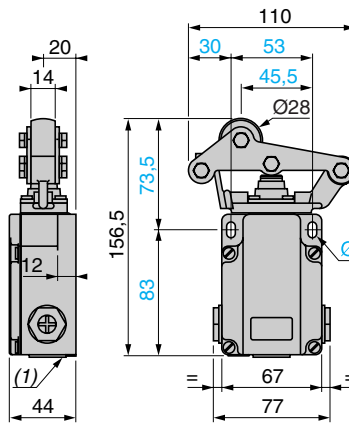
XC1AC1•6



XC1AC1•8

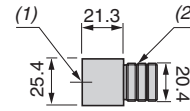


XC1AC1•7, XC1AC1•9



DE9RA1212

(PG 13 to 1/2" NPT adapter)



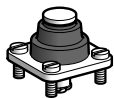
1. Tapped entry for 1/2" NPT conduit
2. PG 13 threaded sleeve

1. 3 tapped entries for PG 13 conduit thread or ISO 20 with adapter DE9RA1620.
- Ø: 2 elongated holes Ø 6.5 x 10.

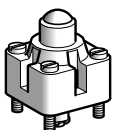
Limit Switches

Osiswitch® Classic, For Material Handling

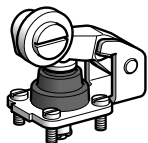
XC1AC—Renewal Parts



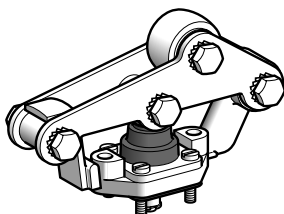
ZC1AC001



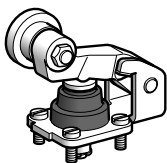
ZC1AC005



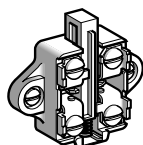
ZC1AC006



ZC1AC007
ZC1AC009



ZC1AC008



ZC1AZ1•

Plunger heads				
Type of operator	Maximum actuation speed	Type of actuation	Catalog number	Weight kg (lb)
For actuation on end				
End plunger	0.5 m/s (1.64 ft/s)		ZC1AC001	0.035 (0.077)
For actuation by 30° cam				
End ball bearing plunger	0.5 m/s (1.64 ft/s)		ZC1AC005	0.050 (0.110)
Roller lever	Direction A 1 m/s (3.28 ft/s) Direction B 0.5 m/s (1.64 ft/s)		ZC1AC006	0.100 (0.220)
Reinforced roller lever	Direction A 1 m/s (3.28 ft/s) Direction B 0.5 m/s (1.64 ft/s)		ZC1AC007	0.375 (0.827)
Offset roller lever	Direction A 1 m/s (3.28 ft/s) Direction B 0.5 m/s (1.64 ft/s)		ZC1AC008	0.100 (0.220)
Roller lever on needle roller bearing	Direction A 1 m/s (3.28 ft/s) Direction B 0.5 m/s (1.64 ft/s)		ZC1AC009	3.380 (7.452)
Contact blocks				
Type of contact	Function diagram	Catalog number	Weight kg (lb)	
C/O, single pole		ZC1AZ11	0.040 (0.088)	
N/C + N/O break before make		ZC1AZ12	0.045 (0.099)	
N/O + N/C make before break		ZC1AZ13	0.040 (0.088)	
N/C + N/C simultaneous		ZC1AZ14	0.045 (0.099)	
N/O + N/O simultaneous		ZC1AZ15	0.045 (0.099)	
N/C + N/C staggered		ZC1AZ16	0.040 (0.088)	
N/O + N/O staggered		ZC1AZ17	0.040 (0.088)	
Adapter plate				
Description	Catalog number	Weight kg (lb)		
Mounting plate (For replacing an old version type RN-67522 limit switch with an XC1AC limit switch)	ZC1AZ8	3.380 (7.452)		

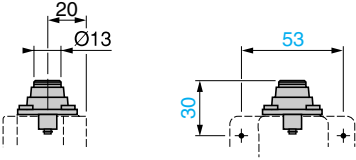
Limit Switches

Osiswitch® Classic, For Material Handling

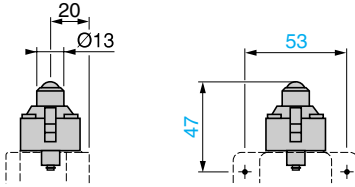
XC1AC—Renewal Parts

Dimensions

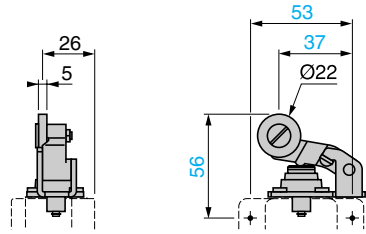
ZC1AC001



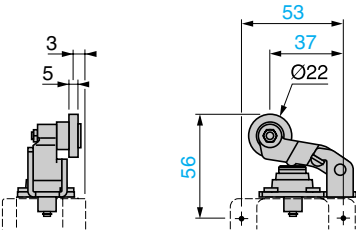
ZC1AC005



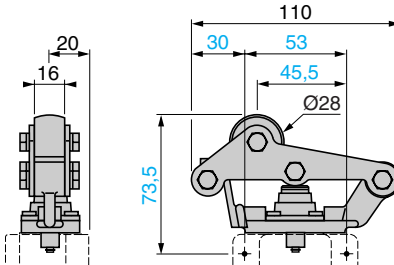
ZC1AC006



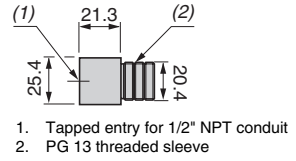
ZC1AC008



ZC1AC007, AC009



DE9RA1212
(PG 13 to 1/2" NPT adapter)



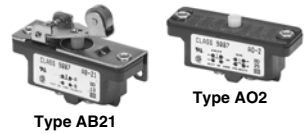
Limit Switches

Snap Action Industrial Switches

Class 9007

Industrial Snap Switches and Limit Switches without Enclosures

Industrial Snap Switches have been incorporated in many Square D® products such as timers, specialty push buttons, foot switches, operating mechanisms, door interlocks, motor control centers, position switches, and many other control products.



- **Recommended Actuator**—An adjustable actuator is recommended. If a non-adjustable actuator is used, a resilient type or a mechanical stop should be used to prevent bottoming of button mechanism.
- **Adjustable Actuator Overtravel**—Minimum recommended overtravel in both trip and reset directions is 0.015 in. (0.38 mm).
- **Non-Adjustable Actuator Total Travel**—Maximum differential limit plus 0.030 in. (0.76 mm). Example: 0.076 in. (1.9 mm) for Type AO2.
- **Non-Adjustable Actuator Total Travel**—Fully retracted—from mounting surface, at least 0.139 in. (3.5 mm) for Type AO1 and 0.160 in. (4.0 mm) for Types AO2 and CO3. Fully engaged—from mounting surface, at least 0.061 in. (1.5 mm) but not closer than 0.045 in. (1.1 mm).

Quick Make and Break

Type of Operator	Contact Arrangement •	Type	Type of Operator	Contact Arrangement •	Type	Type of Operator	Contact Arrangement •	Type
Basic Snap Switch	1 N.O. 1 N.C.	AO1	Rigid Roller Lever Type	2 N.O. 2 N.C.	CB31 (RH) ▲	Roller Plunger Type Panel Mounting Non-Oiltight	1 N.O. 1 N.C.	AP321
	1 N.C.	AO1A			CB32 (LH) ▲		1 N.C.	AP324 †
	1 N.O.	AO1B			CB41 ▲ (without Side Mtg. Bracket)		2 N.O. 2 N.C.	CP321
	1 N.O. 1 N.C.	AO2			CB33 (RH) ◆		2 N.O. 2 N.C.	CP324 †
	1 N.C.	AO6 (Plug-in)			CB34 (LH) ◆		Operator Only	AP301 *
	1 N.C.	AO2A	Rigid Roller Lever Type One Way Roller	1 N.O. 1 N.C.	AB25 (RH)	Roller Plunger Type Panel Mounting Oiltight	1 N.O. 1 N.C.	AP304 † *
	1 N.O.	AO2B		1 N.C.	AB26 (LH)		1 N.O. 1 N.C.	AP323
	2 N.O. 2 N.C.	CO3		2 N.O. 2 N.C.	CB35 (RH)		1 N.O. 1 N.C.	AP325 †
	2 N.O.	CO6 (Plug-in)	Cabinet Door Type	2 N.O. 2 N.C.	CB36 (LH)	Roller Plunger Type Panel Mounting Oiltight	2 N.O. 2 N.C.	CP323
	Two Stage 2 N.O. 2 N.C.	CO7		1 N.O. 1 N.C.	AC1		2 N.O. 2 N.C.	CP325 †
Rigid Roller Lever Type	1 N.O. 1 N.C.	AB21 (RH) ▲		2 N.O. 2 N.C.	CC1		Mushroom Button Type Panel Mounting	Operator Only
		AB22 (LH) ▲	1 N.O. 1 N.C.	AP221	1 N.O. 1 N.C.	AP222		
		AB41 ▲ (without Side Mtg. Bracket)	2 N.O. 2 N.C.	CP221	2 N.O. 2 N.C.	CP222		
		AB23 (RH) ◆	Operator Only	AP201 *	Operator Only	AP202 *		
		AB24 (LH) ◆						

- Single-pole snap switches that contain two double-break contact elements (1 N.O. and 1 N.C.) must be used on circuits of the same polarity. Two-pole snap switches contain two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double-break contact elements (1 N.O. and 1 N.C.) that must be used on circuits of the same polarity.
- † Roller turned 90° from standard (perpendicular to mounting holes).
- ▲ With 0.22 in. (5.6 mm) width roller.
- ◆ With 0.47 in. (12.0 mm) width roller.
- * For use with Type AO and CO basic switches.

Maximum Current Ratings For Control Contacts—All Types

Switch Type	Contacts	Direct Opening Contacts Meet IEC 60947-5-1 Requirements	Voltage	AC—50 or 60 Hz					Resistive 75% Power Factor	Voltage	DC		AC or DC Continuous Carrying Amperes
				Inductive 35% Power Factor				Make and Break Amperes			Inductive and Resistive Make and Break Amperes		
				Make	Break	Single Pole	Double Pole						
AO1, AC	SPDT Form Z SPST • Form X or Y	No	120	40	4800	15	1800	15	125	0.5	0.25	15	
			240	20	4800	10	2400	10	250	0.25	0.1	15	
			480	10	4800	6	2880	6	600	0.05	—	15	
			600	8	4800	5	3000	5	—	—	—	15	
			—	—	—	—	—	—	—	—	—	—	—
AW, AO2 and AO6, AB, AP	SPDT Form Z SPST • Form X or Y	No	120	40	4800	15	1800	15	125	2.0	0.5	15	
			240	20	4800	10	2400	10	250	0.5	0.2	15	
			480	10	4800	6	2880	6	600	0.1	0.02	15	
			600	8	4800	5	3000	5	—	—	—	15	
			—	—	—	—	—	—	—	—	—	—	—
AW, CO3 and CO6, CB, CC, CP	DPDT Form ZZ DPST Form AA or BB	No	120	30	3600	3	360	3	125	1.0	0.2	10	
			240	15	3600	1.5	360	1.5	250	0.3	0.1	10	
			480	7.5	3600	0.75	360	0.75	600	0.1	—	10	
			600	6	3600	0.6	360	0.6	—	—	—	10	
			—	—	—	—	—	—	—	—	—	—	—

Acceptable Wire Size 14–22 AWG
Recommended Terminal Clamp Torque 6–9 lb-in (0.7–1 N•m)



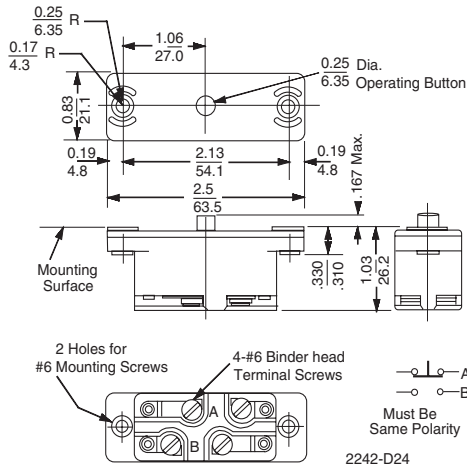
Limit Switches

Snap Action Industrial Switches

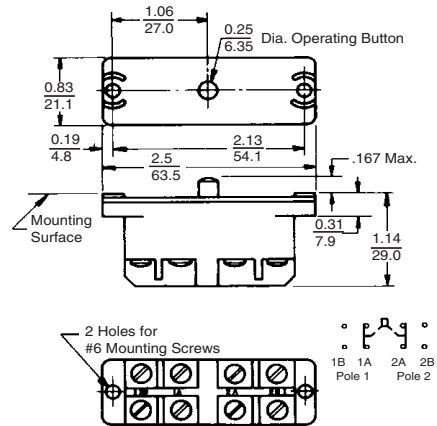
Class 9007

Approximate Dimensions and Operating Data, Types AO, CO, AP, and CP

Class 9007 Type AO, Single-Pole Snap Switch



Class 9007 Type CO, Two-Pole Snap Switch



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Operating Data, in. (mm)

	AO1, 1A, 1B	AO2, 2A, 2B
Pre-travel	0.057–0.074 (1.4–1.8)	0.057–0.074 (1.4–1.8)
Differential	0.015–0.025 (0.6–0.6)	0.035–0.046 (0.9–1.16)
Total travel	0.103–0.125 (2.6–3.2)	0.103–0.125 (2.6–3.2)
Operating force	7–11 oz (0.05–0.08 N)	10–14 oz (0.07–0.1 N)

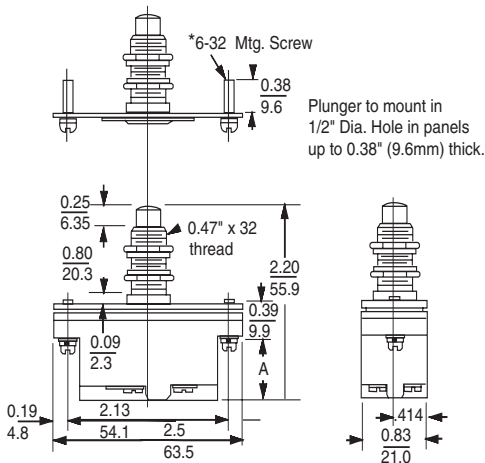
Operating Data, in. (mm)

	CO3	CO7
Pre-travel 1st stage	0.057–0.074 (1.4–1.8)	0.035–0.060 (0.9–1.5)
Pre-travel 2nd stage	—	0.060–0.085* (1.5–2.1)
Differential	0.025–0.046 (0.6–1.16)	0.010–0.020 (0.25–0.50)
Total travel	0.103–0.125 (2.6–3.2)	—
Operating force	7–12 oz (0.05–0.084 N)	7–12 oz (0.05–0.084 N)

* Separation between first and second stage trip points is 0.020–0.025 (0.5–0.6).

Note: Shipping weight of Type AO and CO is 0.25 lb (0.11 kg).

Type AP201, 221, and CP221



NOTE: Type AP221 shown.

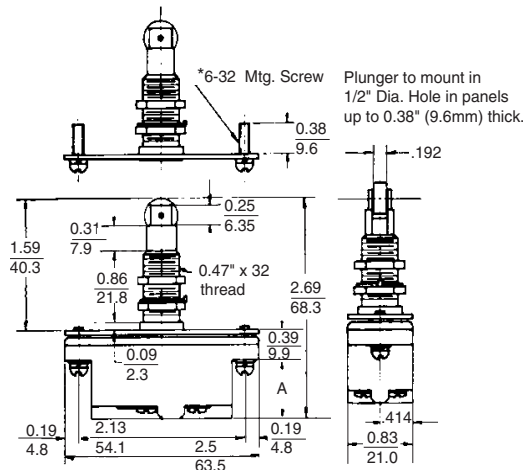
Type	Dimension A
AP221	0.70 (17.8)
CP221	0.80 (20.3)

Operating Data

	AP221	CP221
Pretravel	0.070–0.089 (1.8–2.2)	0.070–0.089 (1.8–2.2)
Differential	0.035–0.046 (0.9–1.2)	0.025–0.046 (0.9–1.2)
Overtravel	0.161–0.180 (4.1–4.6)	0.161–0.180 (4.1–4.6)
Total travel	0.231–0.269 (5.8–6.8)	0.231–0.269 (5.8–6.8)
Operating force	10–14 oz (0.07–0.1 N)	7–12 oz (0.05–0.08 N)

Note: Shipping weight 0.25 lb (0.11 kg).

Type AP301, 303, 304, 305, 321, 323, 324, 325, and CP321, 323, 324, 325



NOTE: Type AP321 shown.

Type	Dimension A
AP321, 323, 324, 325	0.70 (17.8)
CP321, 323, 324, 325	0.80 (20.3)

Operating Data

	AP321, 324	AP323, 325	CP321, 324	CP323, 325
Pretravel	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)
Differential	0.035–0.046 (0.9–1.2)	0.035–0.046 (0.9–1.2)	0.025–0.046 (0.9–1.2)	0.035–0.046 (0.9–1.2)
Total travel	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)
Operating force max.	20 oz (0.14 N)	28 oz (0.2 N)	26 oz (0.18 N)	28 oz (0.2 N)

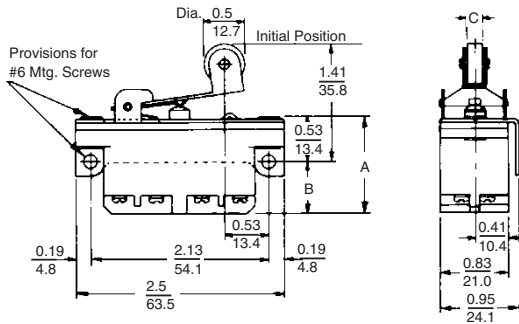
Limit Switches

Snap Action Industrial Switches

Class 9007

Approximate Dimensions and Operating Data, Types AB, CB, AC, and CC

Types AB21 through 24 and CB31 through 34



Note: Type CB31 RH mounting shown.
Type AB41 and CB41 same as above except without side mounting plates.

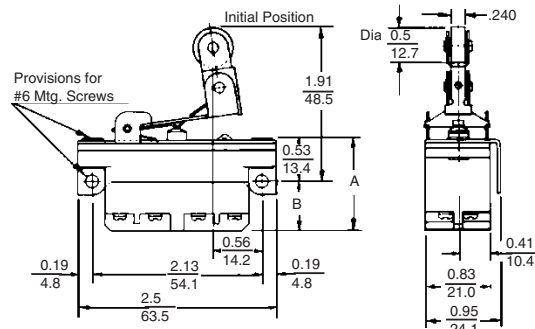
Type	Dimension		
	A	B	C
AB21, 22	1.03 (26.2)	0.5 (12.7)	0.22 (5.6)
AB23, 24	1.03 (26.2)	0.5 (12.7)	0.47 (12.0)
AB41	1.03 (26.2)	—	0.22 (5.6)
CB31, 32	1.13 (28.7)	0.59 (15.0)	0.22 (5.6)
CB33, 34	1.13 (28.7)	0.59 (15.0)	0.47 (12.0)
CB41	1.13 (28.7)	—	0.22 (5.6)

Operating Data

Pre-travel	0.16 (4.5)
Differential	0.08 (2.0)
Overtravel	0.06 (1.5)
Total travel	0.22 (5.6)
Operating force	8 oz (0.23 kg)

Note: Shipping weight 0.25 lb (0.11 kg).

Types AB25, 26 and CB35, 36



Note: Type CB35 mounting shown.

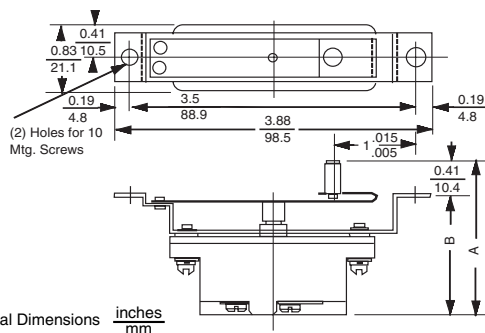
Type	Dimension		
	A	B	C
AB25, 26	1.03 (26.2)	0.5 (12.7)	0.22 (5.6)
CB35, 36	1.13 (28.7)	0.59 (15.0)	0.22 (5.6)

Operating Data

Pre-travel	0.16 (4.5)
Differential	0.08 (2.0)
Overtravel	0.06 (1.5)
Total travel	0.22 (5.6)
Operating force	8 oz (0.23 kg)

Types AC1 and CC1

Dimensions



Note: Type AC1 shown.

Type	Dimension	
	A	B
AC1	1.91 (48.5)	1.5 (38.1)
CC1	2 (50.8)	1.59 (40.4)

Note: Shipping weight 0.25 lb (0.11 kg).

Operating Data

	AC1	CC1
Pre-travel	0.16 (4.5)	0.16 (4.5)
Differential	0.05 (1.3)	0.07 (1.8)
Overtravel	0.09 (2.3)	0.09 (2.3)
Total travel	0.25 (6.4)	0.25 (6.4)
Operating force	8 oz (0.23 kg)	8 oz (0.23 kg)

Limit Switches

Miniature

Class 9007 Type MS and ML



Shown with Standard Bottom Entrance Cable



Shown with 4-Pin Micro-Connector

Description

Mini-Switch (MS) miniature switches meet the need for very small, enclosed switches with environmental sealing. A full range of styles are available, including top push plunger, parallel roller plunger, cross roller plunger, rotary lever, and omnidirectional whisker. Factory pre-wiring with industrial grade cable (type SJTO) eliminates the need to remove the cover to wire the switch. Bottom- or side-entrance cable connection is available.

Housings are rugged diecast zinc construction. Excellent sealing is achieved with an epoxy compound encapsulation of the electrical cable connections and switch housing. A Viton® O-ring seal on the plunger keeps liquids from entering the switch cavity.

Features

The heavy-duty, completely encapsulated miniature MS limit switch is intended for difficult applications such as machine tools, earth moving equipment, and general transportation. Key features include:

- Symmetrical design and top mounting holes for easy gang mounting of several switches for multiple switching
- Epoxy encapsulation sealing the pre-wired heavy duty #18 AWG SJTO cable and protecting against temporary submersion
- Single-pole double-throw (SPDT) Form C or Form Z, 1 N.O. + 1 N.C. contact
- Fine rotary lever adjustment
- Compact diecast zinc housing
- NEMA Type 6P and IP67 rated
- 10 ampere continuous current rating
- Gold contacts for low level logic switching
- Stainless steel rollers
- UL Listed and CSA Certified
- CE Marking
- Standard temperature range: -40 to +220 °F (-40 to +104 °C)

Options

- Gold crosspoint contacts
- Double-break contacts (Type ML only)
- Side-entrance cable or connectors
- Low force (top plunger models only)
- Yellow or gray SJTO cable
- 4- or 5-pin micro-connectors, AC and DC
- #16 AWG SJTO cable
- Tapped 8-32 holes on top of housing

Rotary Head

Conventional rotary limit switches have mounting holes in the base or body of the switch. In our rotary design, mounting holes are located in the head also. Cycling and stress forces are transmitted from the shaft in the head directly to the mounting bolts. The strain on the joint between the body and the head is eliminated. The result is a stronger and more rigid mounting, less subject to vibration or a weakness in the joint.

Bulkhead Mounted Mini-Switches

The MS housing is designed for multiple switching by gang mounting several switches.

Two mounting holes can be tapped in the top of each switch (except rotary lever) for #8-32 thread bolts. Switches can be readily mounted to any frame or plate by drilling holes through same to accommodate #8-32 bolts and switch plungers. Both sides of the housing are counter-bored for surface mounting.



File E42259
CCN NKCR



File LR 25490
Class 3211 03



Marking

Limit Switches

Miniature

Class 9007 Types MS and ML



Shown with Side-Entrance Cable

- 0.98 in. (25 mm) Mounting Hole Centers
- 3 ft (0.9 m) Cable, Standard
- For other available lengths, and for a list of options, see page 542.

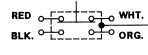
General Specifications	
Temperature range	-40 to +220 °F (-40 to +104 °C) The minimum temperatures listed are based on the absence of freezing moisture or water.
Enclosure rating	NEMA Types 1, 2, 4, 6, 6P, 12, 13, IP67
Vibration resistance	10G (75–1200 Hz)
Shock resistance	35G
Cable	#18 AWG SJTO

Contact Characteristics	
Rated thermal current	10 A (standard)
Rated insulation voltage	300 Vac and Vdc (standard)
Gold contact switching ratings	0.1 A, 24 Vdc; 0.24 VA

Type MS Circuit—Form C	Electrical Ratings/SPDT		
	Silver Contacts		Gold Contacts
1 N.O.—1 N.C.	Voltage	Make	Break
	120 AC	60 A	6 A
	240 AC	30 A	3 A
10.0 Amperes Continuous			100 mA @ 125 Vac 30 mA 28 Vdc
DC Contact Rating: 5 A (Resistance), 28 Vdc			



Type ML Circuit—Form Z	Electrical Rating/SPDT-DB Silver Contacts		
	Voltage	Make	Break
1 N.O.—1 N.C.	120 AC	60 A	6 A
	240 AC	30 A	3 A
	10.0 Amperes, Continuous		
DC Contact Rating: 5 A (Res), 28 Vdc			



Description / Functional Diagrams

Top Plunger							
MS	ML	MS	ML	MS	ML	MS	ML
Operating Force/Torque		80 oz (0.6 N)					
Contact		SPDT					
Form		Form C	Form Z	Form C	Form Z	Form C	Form Z
Contact Type		Silver MS01S0100	ML01S0100	MS06S0100	ML06S0100	MS09S0100	ML09S0100
		Gold MS01G0100	—	MS06G0100	—	MS09G0100	—

Parallel roller plunger							
MS	ML	MS	ML	MS	ML	MS	ML
Operating Force/Torque		80 oz (0.6 N)					
Contact		SPDT					
Form		Form C	Form Z	Form C	Form Z		
Contact Type		Silver MS02S0100	ML02S0100	MS07S0100	ML07S0100		
		Gold MS02G0100	—	MS07G0100	—		

Cross roller plunger							
MS	ML	MS	ML	MS	ML	MS	ML
Operating Force/Torque		80 oz (0.6 N)					
Contact		SPDT					
Form		Form C	Form Z	Form C	Form Z		
Contact Type		Silver MS03S0100	ML03S0100	MS08S0100	ML08S0100		
		Gold MS03G0100	—	MS08G0100	—		

Rotary lever, CW and CCW							
MS	ML	MS	ML	Omnidirectional—wire whisker (NEMA Types 1, 2, 12, 13 only)			
Operating Force/Torque		48 oz-in (0.3 N•m)		15 oz-in (0.1 N•m)			
Contact		SPDT					
Form		Form C	Form Z	Form C			
Contact Type		Silver MS04S0100	ML04S0100	MS05S0100			
		Gold MS04G0100	—	MS05G0100			

Limit Switches

Limit Switches

Miniature

Class 9007 Type MS and ML

Description / Functional Diagram

Booted Devices									
MS	ML	MS	ML	MS	ML	MS	ML		
Operating Force/Torque		80 oz (0.6 N)							
Contact		SPDT							
Form		Form C	Form Z	Form C	Form Z	Form C	Form Z		
Contact Type		Silver	MS10S0100	ML10S0100	MS12S0100	ML12S0100	MS13S0100	ML13S0100	
		Gold	MS10G0100	—	MS12G0100	—	MS13G0100	—	

Note: See the available options on page 542 and add the designator (up to three) to the end of the catalog number, if applicable. See the example on page 542 for conductor length selection.

Lever Arm Selection

There are many styles of levers to accommodate most industrial applications. The levers are diecast metal. The standard roller levers are available with nylon rollers and are also available with steel rollers. See the tables below. Dimensions are given as in. (mm).

Style 7 Levers—0.75 in. (19 mm) diameter, nylon or steel roller

Length		Catalog Number 0.25 (6) Wide		Catalog Number 0.5 (13) Wide		Catalog Number 0.75 (19) Wide		Catalog Number 1 (25) Wide	
in.	mm	Nylon	Steel	Nylon	Steel	Nylon	Steel	Nylon	Steel
0.875	22.23	7A2N	7A2	7B2N	7B2	7F2N	—	7J2N	—
1.375	34.93	7A3N	—	7B3N	—	7F3N	—	7J3N	—
1.5	38.10	7A1N	7A1	7B1N	—	7F1N	—	7J1N	—
1.75	44.45	7A7N	—	7B7N	—	7F7N	—	7J7N	—
2.00	50.8	7A4N	—	7B4N	—	7F4N	—	7J4N	—



Lever

Style 7X Levers—0.75 in. (19 mm) diameter, nylon or steel roller

Length		Catalog Number 0.25 (6) Wide		Catalog Number 0.5 (13) Wide		Catalog Number 0.75 (19) Wide		Catalog Number 1 (25) Wide	
in.	(mm)	Nylon	Steel	Nylon	Steel	Nylon	Steel	Nylon	Steel
.875	22.23	7XA2N	7XA2	7XB2N	7XB2	7XF2N	—	7XJ2N	—
1.375	34.93	7XA3N	—	7XB3N	—	7XF3N	—	7XJ3N	—
1.5	38.10	7XA1N	7XA1	7XB1N	—	7XF1N	—	7XJ1N	—
1.75	44.45	7XA7N	—	7XB7N	—	7XF7N	—	7XJ7N	—
2.00	50.8	7XA4N	—	7XB4N	—	7XF4N	—	7XJ4N	—

Specialty Arms and Options

Description	Length	Diameter	Width	Catalog Number
Style 7D adjustable length, metal roller	1.38 to 3.38 (35 to 85.8)	0.75 (19)	0.25 (6.35)	7D
Style 7D adjustable length, nylon roller	1.38 to 3.38 (35 to 85.8)	0.75 (19)	0.25 (6.35)	7DN
Style 7S spring nylon rod	6 (152.4)	0.3 (7.6)	—	7S
Style 7N nylon rod	5 (127)	0.3 (7.6)	—	7N
Corrosion proof (option available with nylon rollers only)—Suffix to add to the end of catalog number				S

Lever tightening torque for mounting the lever on the shaft: minimum 17 lb-in (1.9 N•m).

Limit Switches

Miniature

Class 9007 Type MS and ML

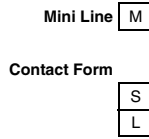
Catalog Number Interpretation and Options

For Interpretation of the Catalog Number Only

9007 M S 0 1 S 0 1 0 0



9007MS02 Shown with M12 Connector



Actuator Type

Top Push Plunger	0 1
Parallel Roller Plunger	0 2
Cross Roller Plunger	0 3
Rotary Lever CW & CCW	0 4
Omnidirectional Wire Whisker	0 5
Bushing Mounted Top Push Plunger	0 6
Bushing Mounted Parallel Roller Plunger	0 7
Bushing Mounted Cross Roller Plunger	0 8
Adjustable Top Push Plunger	0 9
Booted Top Push Plunger	1 0
Booted Parallel Roller Plunger	1 2
Booted Cross Roller Plunger	1 3

Conductor Length Options

0 0	No Cable
0 1	3 ft (0.9 m) (stranded)
0 2	6 ft (1.8 m)
0 3	9 ft (2.7 m)
0 4	12 ft (3.7 m)
0 5	18 ft (5.5 m)
1 3	33 ft (10 m)

Contact Type

S	10 A Silver Contacts (standard)
G	Gold Contacts

Examples

Option	Description
0 2	# 16 AWG SJTO Cable
0 6	Side Entrance 18-4 SJTO Cable
1 0	Gray 18-4 SJTO Cable
1 1	# 18 AWG Individual Conductors
2 1	Low Force (top plunger only) 18 oz.

◆ List options in numerically ascending order. Example: 9007MS01S030621. See other options below.

Conductor Length	Designator
No cable	00
3 ft (0.9 m)—standard	01
6 ft (1.8 m)	02
9 ft (2.7 m)	03
12 ft (3.7 m)	04
18 ft (5.5 m)	05
33 ft (10 m)	13

NOTE: For other cabling options, refer to pages 648–652.

MS Options (Does not apply to ML except where noted)	Designator
#16 AWG SJTO cable	02
Side entrance, #18 AWG SJTO cable, or Connector 12, 54, 55, 82, 84 *	06
Gray #18 AWG SJTO cable	10
#18 AWG individual conductors	11
Male 4-pin mini-connector with 3 ft (0.9 m) cable (MS only)	12
Low force (NEMA Type 1 only) 18 oz.	21
High Pre-Travel—adds 0.030	30
Male 4-pin micro-connector in housing (DC type) † (no cable) (MS only)	54
Male 5-pin micro-connector in housing (DC type) † (no cable) (ML only)	55
Tapped holes in top of plunger style housing (MS and ML)	81
Male 4-pin micro-connector in housing (AC type) (no cable) (MS only)	82
Black 18/5 SJTO Cable (ML only)	83
Male 4-pin micro-connector in housing (AC type) (no cable) (MS only)	84

■ Ex: 9007MS01S0100 with a 9 ft (2.7 m) cable becomes 9007MS01S0300. 9007MS01S0100 with side entrance becomes 9007MS01S0106.

* For side entry connectors, include 06, then 12, 54, 55, 82, or 84; otherwise the connector will come from bottom of housing. Example of catalog no. with side entrance connector: 9007MS01S000654. No cable available with 54 and 55. Option 12 is supplied with 3 ft (0.9 m) of cable.

† DC connectors are rated 3 A, 250 Vac/Vdc.

Male Plug (face) Pin-outs

Option 54 (MS only)	Option 55 (ML only)	Option 12 (MS only)	Option 82 (MS only)	Option 84 (MS only)

Limit Switches

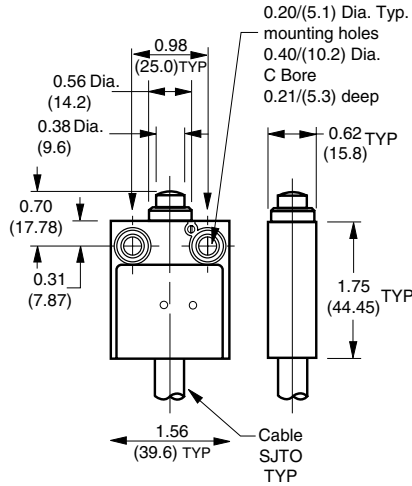
Miniature

Class 9007 Type MS and ML

Dimensions

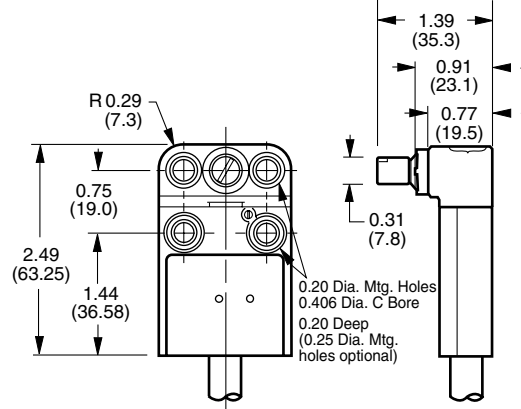
Top Push Plunger

MS01, MLO1



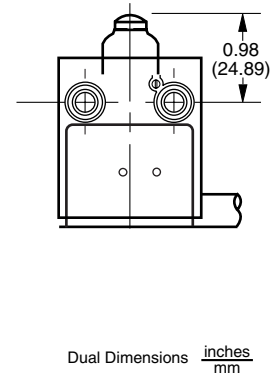
Rotary Lever

MSO4, MLO4



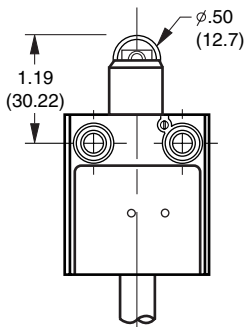
Booted Top Push Plunger with Mid-Side Entry Cable

MS10, ML10



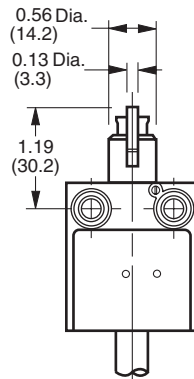
Parallel Roller Plunger

MS02, ML02



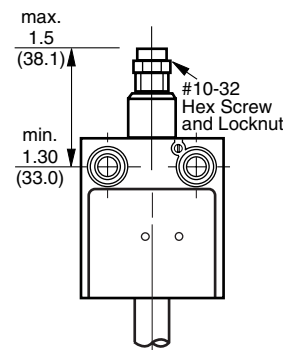
Cross Roller Plunger

MS03, ML03



Adjustable Top Push Plunger

MS09, MLO9

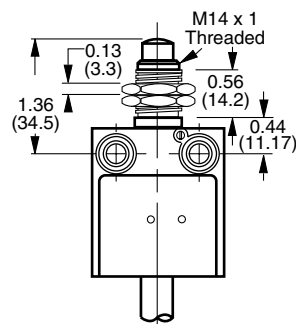


Omnidirectional

MS05, MLO5

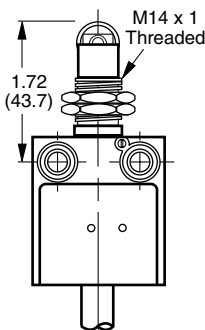
Bushing Mounted Top Push Plunger

MS06, MLO6



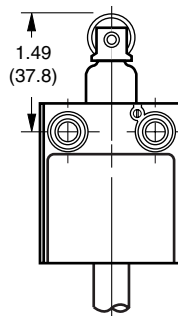
Bushing Mounted Parallel Roller Plunger

MS07, MLO7



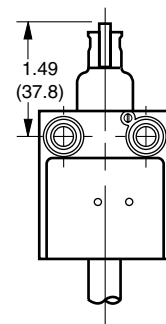
Parallel Booted Roller Plunger

MS12, ML12



Cross-Booted Roller Plunger

MS13, ML13



Limit Switches

Miniature Enclosed Reed

Class 9007 Type XA



Straight Plunger



Roller Plunger



Cross Roller Plunger

Description and Specifications

Sealed construction keeps contaminants out of the contact area, making it the ideal choice for low voltage, low current circuits used by programmable controllers.

Type XA is designed for use in applications where contact reliability, environmental immunity, small size, or low cost are required.

NOTE:

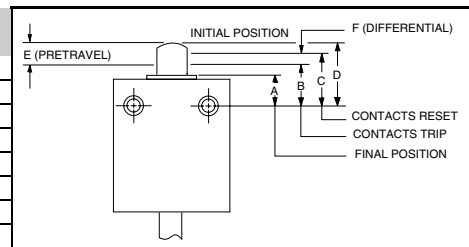
- Because reed switches are operated by a magnet, they should not be installed in areas where strong magnetic fields may be present. The devices should always be checked for proper operation after installation.
- Type XA **cannot be used in Division 2 locations** since the National Electrical Code (NEC) requires provisions for conduit connection. The Type C reed switches have this provision for conduit but the Type XA do not.

Cable Length* ft (m)	Straight Plunger		Roller Plunger		Cross Roller Plunger	
	N.O. Type	N.C. Type	N.O. Type	N.C. Type	N.O. Type	N.C. Type
3 (0.9)	XA7303E	XA7503E	XA7303D	XA7503D	XA7303DC	XA7503DC
6 (1.8)	XA7306E	XA7506E	XA7306D	XA7506D	XA7306DC	XA7506DC
9 (2.7)	XA7309E	XA7509E	XA7309D	XA7509D	XA7309DC	XA7509DC

* Other cable lengths are available. Order by changing the last two numerical digits of the Type number to the length desired.
Example: An XA7303E with 15 ft (4.5 m) of cable would become an XA7315E.

Operating Data

Dimensions in. (mm)	Top Push Rod (Type E)	Roller Plunger (Types D, DC)
Initial position (D)	0.690 (17.5)	1.190 (30.2)
Trip position (B)	0.620 (15.7)	1.120 (28.4)
Pre-travel (E)	0.07 (1.8)	0.07 (17.8)
Reset position (C) maximum	0.655 (16.6)	1.155 (29.3)
Differential (F)	0.015 (0.38)	0.015 (0.38)
Final position (A)	0.492 (12.5)	0.992 (25.2)
Total stroke	0.198 (5.0)	0.198 (5.0)
Operating force (max.)	2.75 lb (0.31 N)	2.75 lb (0.31 N)



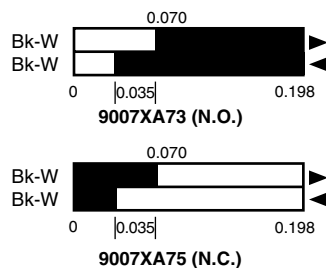
Contacts	The contact is a fully encapsulated, hermetically sealed reed, suitable for controlling solid-state loads as well as industrial relays. Switches can also be used as inputs to intrinsically safe systems. Use of a transient suppressor extends the life of the switch when used on heavy electrical loads.	
Enclosure Construction	Diecast zinc—baked, gray enamel finish. Meets NEMA Types 2, 4, 4X, 6P, 12 and 13 requirements. Oil-tight, dust-tight, water-tight, and submersible.	
Cable	SJTOWA jacketed cable with 18 gauge wire.	
Ambient Temperature	-20 to +140 °F (-28.9 to +60 °C).	
Agency Listings	UL: File E42259 CCN NKCR	CSA: File LR 25490, Class 3211 03

NOTE: The XA switch is available with a 3 ft (0.9 m) cable and 3-pin Brad Harrison male connector No. 40904 (or equivalent), Form Y190.

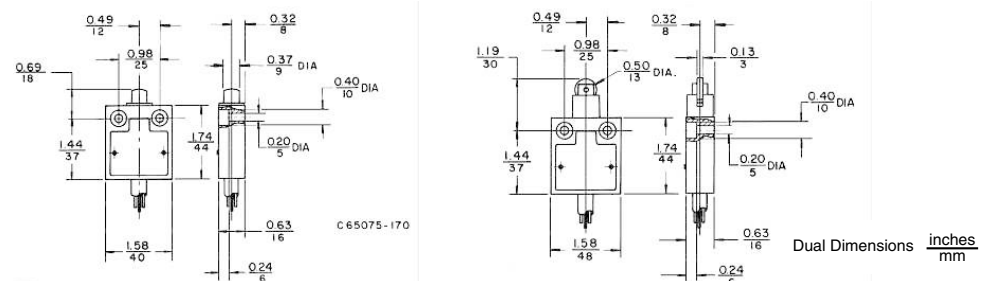
Maximum Current Ratings for Control Circuit Contacts—Type XA

AC—50/60 Hz						DC		
Volts	Inductive (35% Power Factor)			Continuous Carrying Amperes	Resistive (75% Power Factor) Make, Break, and Continuous Carrying Amperes	Volts	Resistive	
	Make		Break				Make and Break Amperes Single Throw	Continuous Carrying Amperes
	A	VA	A	VA				
120	2.0	240	0.2	24	0.5	120	0.2	0.5
240	1.0	240	0.1	24	0.5	—	—	—

Contact Diagrams



Dimensions



Limit Switches

9007AW Heavy Duty Industrial Precision, Oiltight



Lever Arm Type



Plunger Type

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Lever Arm And Plunger Types

Select Switch		Lever Arm Type Without Lever Arm. Select from CCW Operation ■	Select Operator	
Mounting	Contacts	Type	Roller Plunger Type With Micrometer Adjustment	Push Rod Plunger Type With Micrometer Adjustment
Surface Mounting Plug-in	1 N.O.—1 N.C.	AW16	AW36	AW46
	2 N.O.	‡	—	—
	2 N.C.	AW19‡	—	—
Surface Mounting Nonplug-in Standard Box	1 N.O.—1 N.C.	AW12	AW32	AW42
Surface Mounting Nonplug-in Deep Box	1 N.O.—1 N.C.	AW14	—	—
	2 N.O.—2 N.C.	AW18	AW38	—
Open Type (Without Box) Plug-in	1 N.O.—1 N.C.	AO16	AO36	—
	2 N.O.	‡	—	—
	2 N.C.	‡	—	—
Open Type (Without Box) Nonplug-in	1 N.O.—1 N.C.	AO12	—	—
	2 N.O.—2 N.C.	AO18	—	—
Flush Mounting	1 N.O.—1 N.C.	AF12	—	—

Nominal Operating Data in. (mm)	Pre-travel	5°	0.09 (2.3)	0.09 (2.3)
	Total-travel	30°	0.25 (6.3) ±0.06 (1.5) Adjustable	0.25 (6.3) ±0.06 (1.5) Adjustable
	Differential	2.5°	0.05 (1.3)	0.05 (1.3)
	Reverse Over-travel	25°	—	—
	Operating Torque or Force	2.75 lb-in (0.31 N•m)	3 lb-in (0.34 N•m)	3 lb-in (0.34 N•m)
	Repeat Accuracy	±0.002 (0.05) Linear travel of cam on 1.38 (35) lever arm	±0.001 (0.02)	±0.001 (0.02)

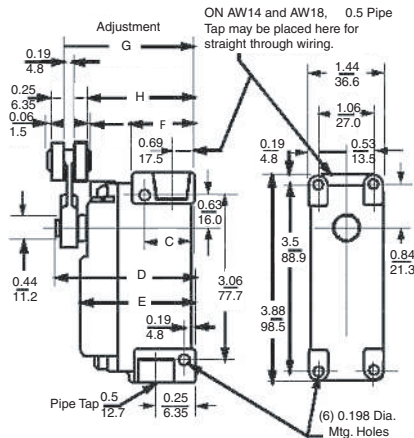
■ Field convertible to CW operation.

‡ 2 N.O. contact only when Type AW19 is operated in clockwise direction. 2 N.C. contacts only when Type AW19 is operated in counterclockwise direction.

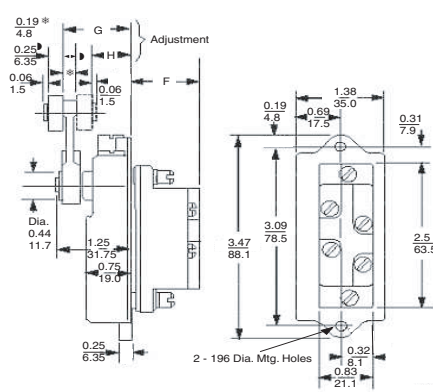
Lever arms, see page 574.

Approximate Dimensions

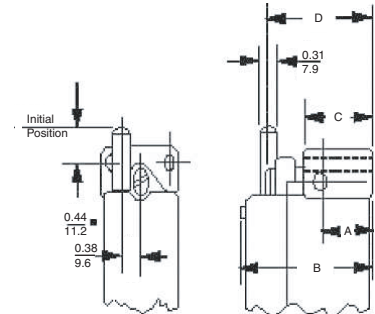
Type AW



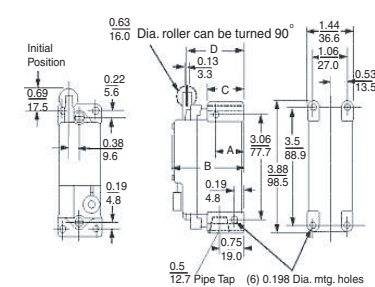
Type AO



Type AW42, 46, 48, and 49



Type AW32, 36, and 38



Type	C	D	E	F	G	H
AW12	0.31 (7.9)	2.69 (68.3)	2.19 (56)	1.16 (29.4)	2.5–2.56 (63.5–65)	2.06–2.13 (52.3–54)
AW14	—	—	—	—	—	—
AW16	1.25 (32)	3 (76)	2.5 (63.5)	1.47 (37)	2.81–2.88 (71–73)	2.38–2.44 (60–62)
AW18	—	—	—	—	—	—
AW19	—	—	—	—	—	—
AO12	—	—	—	1.03 (26)	1.06–1.13 (27–29)	0.63–0.69 (16–17.5)
AO18	—	—	—	1.13 (29)	1.06–1.13 (27–29)	0.63–0.69 (16–17.5)

Type	A	B	C	D
AW32 and AW42	0.31 (7.9)	2.22 (56)	1.16 (29.4)	1.81 (46)
AW36, 38, 46, 48, and 49	1.25 (32)	2.53 (64)	1.47 (37.3)	2.13 (5.4)

Limit Switches

Limit Switches

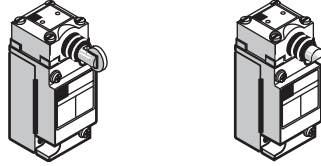
9007C Heavy Duty Industrial—Plug-in Body, Metal Standard and Compact

Standard plug-in body type with 1 cable entry (1)

The standard plug-in body types with one cable entry are also available with reed contacts

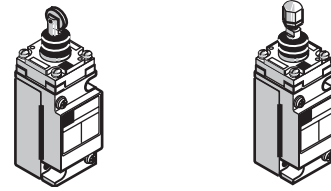
With reed contacts

With head for linear movement side plunger



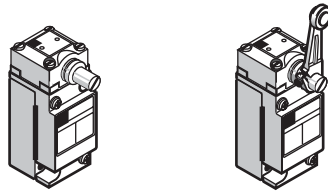
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top plunger



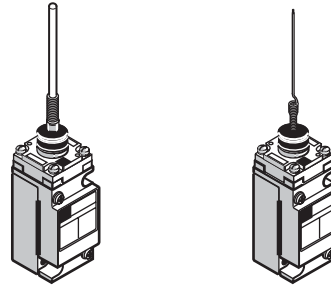
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With head for rotary movement (lever)



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With head for multi-directional movement

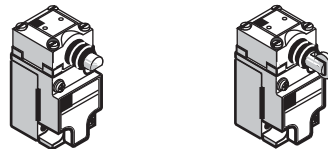


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With reed contacts

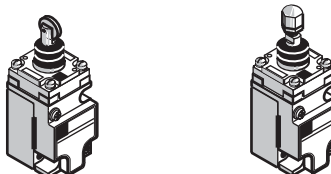
Compact plug-in body type with one cable entry (1)

With head for linear movement Side plunger



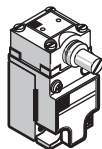
Page 556

Top plunger



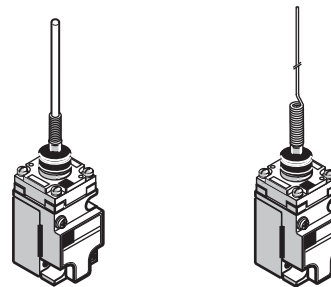
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With head for rotary movement (lever)



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With head for multi-directional movement



Page 559

1. Factory modifications: see pages 560 to 564

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Standard and Compact

Environmental characteristics		
Conforming to standards	Products	NEMA 250, EN 60947-1, EN 60947-5-1, IEC 60947, UL 508, C22-2-14-95, CE conformity documentation
Product certifications		UL, CSA, CE
Protective treatment		Epoxy powder coat (additional protection available)
Ambient air temperature	Operation	-20...+185 °F (-28.9...+85 °C), wider range available
	Storage	-20...+185 °F (-28.9...+85 °C), wider range available
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10...150 Hz, 11 ms) (Reed switch good for 18.5g only)
Shock resistance	Conforming to IEC 60068-2-27	60 gn (9 ms) 40 gn (9 ms) for reed switch
Electric shock protection	Conforming to IEC 61140	Class 0
Degree of protection	Conforming to IEC 60529	IP 67
Cable entry or connector (1)	Depending on model	1/2-14 NPT, M20 x 1.5, ISO cable entry, 5-pin mini connector, 4-pin micro connector
Materials	Bodies, heads, levers	Bodies and heads in Zamak® zinc alloy, levers and rods in zinc, steel, stainless steel, Delrin® resin.

1. A wide range of connectors are available. Contact your local field office.

Contact block characteristics		
Rated operational characteristics hard contacts -AC Voltage (top half of body)	9007CO52 (compact single)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CO54 (single pole)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CO62 (two pole)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CO66 (two pole two stage)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CO68 (two pole neutral)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
Reed switches, complete body	9007C84 (1 N.O.)	NEMA C600 (Ue = 600 V, Ie = 0.3 A); Ithe = 2.5 A
	9007C86 (1 N.C.)	NEMA C600 (Ue = 600 V, Ie = 0.3 A); Ithe = 2.5 A
Rated operational characteristics hard contacts -DC Voltage (top half of body)	9007CO52 (compact single)	NEMA Q600 (Ue = 600 V, Ie = 0.1 A); Ithe = 2.5 A
	9007CO54 (single pole)	NEMA Q600 (Ue = 600 V, Ie = 0.1 A); Ithe = 2.5 A
	9007CO62 (two pole)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
	9007CO66 (two pole two stage)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
	9007CO68 (two pole neutral)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
Reed switches, complete body	9007C84 (1 N.O.)	NEMA Q150 (Ue = 125 V, Ie = 0.55 A); Ithe = 2.5 A
	9007C86 (1 N.C.)	NEMA Q150 (Ue = 125 V, Ie = 0.55 A); Ithe = 2.5 A
Rated insulation voltage		600 V
Rated impulse withstand voltage		2,500 Vac for 1 minute for CE; 2,200 Vac for 1 minute for UL; and 2,640 Vac for 1 s for CSA
Positive opening	Special Y1561	Special Y1561 (one pole slow break only) →
Short circuit protection		10 A. Bussmann Class CC KTK-R-10 fuse non-time-delay
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum
Maximum actuation speed		15.2 mpm / 27.4 mpm (50 fpm / 90 fpm) with 45 degree cam angle, levers only
Electrical durability		1 million operating cycles

Types of contact elements

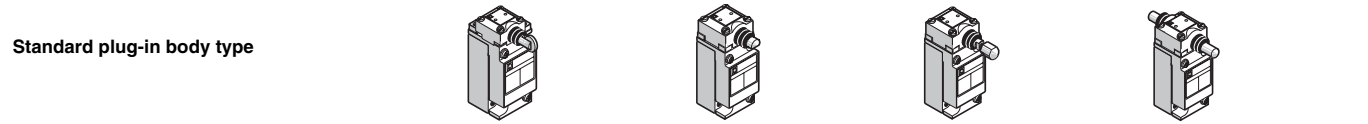
Example: 9007C54 single-pole limit switch, Form Z, same polarity

IEC 60947-5-1			NEMA			JIS		
Form	Symbol	Description	Form	Symbol	Description	Form	Symbol	Description
A		Single break	A		—	3		—
X		—						Double break
B		Single break	B		—	2		—
Y		—						Double break
C		—	C		—	1		Single break
Za		Same polarity	Z		"Same polarity" only			Double break
Zb		Electrically separate						—

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Standard Body

Type of head **Side Plunger (mounting by the body)**



Type of operator	Side roller plunger, spring return, vertical roller (1)	Side push rod plunger, spring return	Side push rod plunger, adjustable (2) spring return	Side push rod plunger, maintained contact
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Catalog numbers

1 N.O. 1 N.C. snap action 	9007C54F 	9007C54G 	9007C54GD 	9007C54H
2 N.O. 2 N.C. snap action 	9007C62F 	9007C62G 	9007C62GD 	9007C62H
2 N.O. 2 N.C. Two stage snap action 	9007C66F 	9007C66G 	9007C66GD 	
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)

Contact operation	
-------------------	--

Characteristics (nominal operating data)

Switch actuation	On end		
Type of actuation			
Pre-travel	2 mm (0.08 in.)		3.6 mm (0.14 in.)
Pre-travel two Stage	First stage	2 mm (0.08 in.)	
	First stage to second stage	0.5 mm (0.02 in.)	
Total travel	6.3 mm (0.25 in.)		
Differential	0.8 mm (0.03 in.)		
Reverse overtravel	—		
Minimum force or torque	1 pole & 2 pole	4 lb (17.8 N)	7 lb (31.1 N)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22AWG (2.05–0.644 mm ²) wires maximum		
Repeatability (linear travel of cam)	0.03 mm (0.001 in.)		—
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry		

1. Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter **H** at the end of the equivalent vertical roller version type.
 2. To lock the nut in the desired position, crimp the slot near the bottom of the nut.

Dimensions:
pages 566 to 569

Limit Switches

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Standard Body

Type of head **Top Plunger (mounting by the body)**

Standard plug-in body type



Type of operator	Top roller plunger spring return	Top push rod plunger spring return	Top push rod plunger adjustable (1) spring return	Palm operated (2)
Catalog numbers				
1 N.O. 1 N.C. snap action 	9007C54D 	9007C54E 	9007C54ED 	9007C54R (2)
2 N.O. 2 N.C. snap action 	9007C62D 	9007C62E 	9007C62ED 	9007C62R (2)
2 N.O. 2 N.C. Two stage snap action 	9007C66D 	9007C66E 	9007C66ED 	9007C66R (2)
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation				
Characteristics (nominal operating data)				
Switch actuation	On end			
Type of actuation				
Pre-travel	2 mm (0.08 in.)			
Pre-travel two Stage	First stage	2 mm (0.08 in.)		
	First stage to second stage	0.3 mm (0.01 in.)		
Total travel	6.3 mm (0.25 in.)			
Differential	0.5 mm (0.02 in.)			
Reverse overtravel	—			
Minimum force or torque	1 pole & 2 pole	3 lb (13.3 N)		7 lb (31.1 N)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)	0.03 mm (0.001 in.)			
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

- To lock the nut in the desired position, crimp the slot near the bottom of the nut.
- Does not include mushroom button. Must be ordered separately see page 573.

Dimensions:
pages 566 to 569

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Standard Body

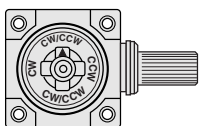
Type of head Rotary (lever arm type) (1)

Standard plug-in body type



Type of operator	Standard pre-travel, spring return	Low differential, spring return	Neutral position		Light operating torque spring return	Maintained contact
Type of direction	CW & CCW (2)	CW & CCW (2)	CW & CCW	CW & CCW	CW & CCW (2)	CW (trip) CCW (reset)
Catalog numbers						
1 N.O., 1 N.C. snap action 	9007C54B2 	9007C54A2 			9007C54N2 	9007C54C
2 N.O., 2 N.C. snap action 	9007C62B2 	9007C62A2 			9007C62N2 	9007C62C
2 N.O., 2 N.C. snap action Neutral position 			9007C68T10 	9007C68T5 		
2 N.O., 2 N.C. Two stage snap action 	9007C66B2 	9007C66A2 			9007C66N2 	
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation	contact closed		contact open			
Characteristics (nominal operating data)						
Switch actuation	By 30° cam					
Type of actuation						
Pre-travel	10°	5°	10°	5°	10°	45°
Pre-travel two stage						
First stage	10°	5°	—	—	10°	—
First stage to second stage	2.5°	1.5°	—	—	2.5°	—
Total travel	90°	—	—	—	—	90°
Differential	4°	2°	4°	2°	4°	—
Reverse overtravel	90°	—	—	—	—	—
Operating torque/force 1 pole & 2 pole	4 lb-in (0.45 N•m)				25 oz-in (0•18 N•m)	3 lb-in (0.34 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum					
Repeatability (linear travel of cam)	0.05 mm (± 0.002 in.)	0.03 mm (± 0.001 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry					

- Lever arm type must be ordered separately from pages 574 to 579.
- These devices are factory set to operate the contacts in **both** the CW and CCW directions. **Mode of operation** is field convertible to CW only or CCW only. **To order factory converted devices:** For CCW only operation, change the 2 at the end of the Type number to 1 (for example, C54B2 becomes C54B1). For CW only operation, delete the 2 at the end of the Type number (for example C54B2 becomes C54B).






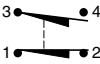
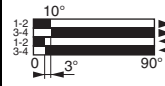
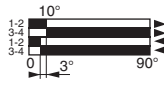
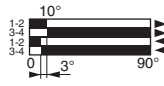
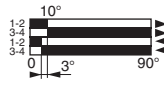
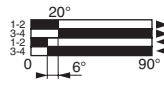
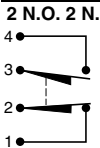
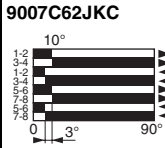
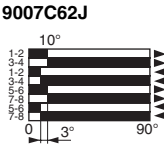
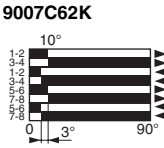
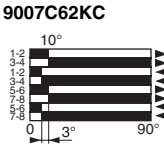
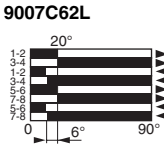
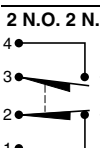
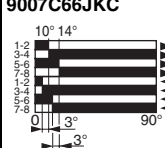
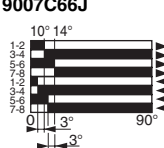
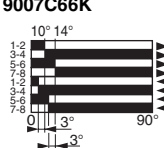
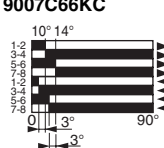
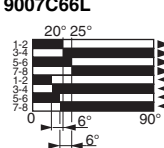





Mode of operation of the lever arm is easily convertible to clockwise or both. Simply pull out and rotate the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW.

Dimensions:
pages 566 to 569

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Standard Body

Type of head	Flexible operator (wobble stick)				
Standard plug-in body type					
Type of operator	Universal (1)	Wobble stick Delrin® extension (1)	Wobble stick wire extension (1)	Wobble stick coil spring extension (1)	Cat whisker
Catalog numbers					
1 N.O. 1 N.C. snap action 	9007C54JKC 	9007C54J 	9007C54K 	9007C54KC 	9007C54L 
2 N.O. 2 N.C. snap action 	9007C62JKC 	9007C62J 	9007C62K 	9007C62KC 	9007C62L 
2 N.O. 2 N.C. Two stage snap action 	9007C66JKC 	9007C66J 	9007C66K 	9007C66KC 	9007C66L 
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation	 contact closed  contact open				
Characteristics (nominal operating data)					
Switch actuation	Object from any direction				
Type of actuation					
Pre-travel	10° (any direction)				20°
Pre-travel two stage	10° (any direction)				20°
First stage	10° (any direction)				20°
First stage to second stage	4°				5°
Total travel	90°				
Differential	3				6°
Reverse overtravel	—				
Operating torque/force 1 pole & 2 pole	3 lb-in (0.34 N•m)				7 oz-in (0.05 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum				
Repeatability (linear travel of cam)	—				
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry				

1. Wobble stick extensions are available separately for the universal head. See page 573.

Dimensions:
pages 566 to 569

Limit Switches


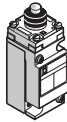
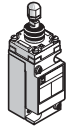
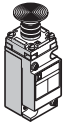

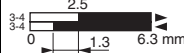
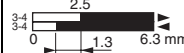



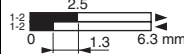
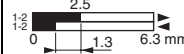

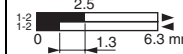



9007C Heavy Duty Industrial—Plug-in Body, Metal Standard Body—Reed Contacts

Type of head		Side Plunger (mounting by the body)			
Standard plug-in body type					
Type of operator		Side roller plunger spring return vertical roller (1)	Side push rod plunger spring return	Side push rod plunger adjustable (2) spring return	Side push rod plunger maintained contact
Catalog numbers					
1 N.O. Reed contacts snap action 		9007C84F 	9007C84G 	9007C84GD 	9007C84H
1 N.C. Reed contacts snap action 		9007C86F 	9007C86G 	9007C86GD 	9007C86H
Weight, kg (lb)		0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation		contact closed contact open			
Characteristics (nominal operating data)					
Switch actuation		On end			
Type of actuation					
Pre-travel		2.8 mm (0.110 in.)			3.6 mm (0.14 in.)
Total travel		6.3 mm (0.25 in.)			
Differential		1.8 mm (0.07 in.)			—
Reverse overtravel		—			—
Minimum force or torque 1 pole & 2 pole		4 lb (17.8 N)			7 lb (31.1 N)
Terminal wire sizes (Cabling/Screw Clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)		0.076 mm (± 0.003 in.)			—
Cable entry		1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

- Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter **H** at the end of the equivalent vertical roller version type.
- To lock the nut in the desired position, crimp the slot near the bottom of the nut.

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Standard Body—Reed Contacts

Type of head	Top Plunger (mounting by the body)			
Standard plug-in body type				
Type of operator	Top roller plunger spring return	Top push rod plunger spring return	Top push rod plunger adjustable (1) spring return	Palm operated (2)
Catalog numbers				
1 N.O. Reed contacts snap action 	9007C84D 	9007C84E 	9007C84ED 	9007C84R (2) 
1 N.C. Reed contacts snap action 	9007C86D 	9007C86E 	9007C86ED 	9007C86R (2) 
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation	 contact closed  contact open			
Characteristics (nominal operating data)				
Switch actuation	On end			
Type of actuation				
Pre-travel	2.5 mm (0.100 in.)			
Total travel	6.3 mm (0.25 in.)			
Differential	1.3 mm (0.05 in.)			
Reverse overtravel	—			
Minimum force or torque 1 pole & 2 pole	4 lb (17.8 N)			
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)	0.076 mm (± 0.003 in.)			
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

- To lock the nut in the desired position, crimp the slot near the bottom of the nut.
- Does not include mushroom button. Must be ordered separately from page 573.

Dimensions:
pages 566 to 569


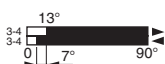


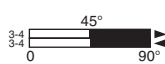

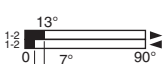
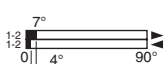
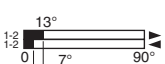
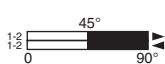
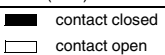
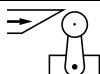
Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Standard Body—Reed Contacts

Type of head **Rotary (lever arm type) (1)**

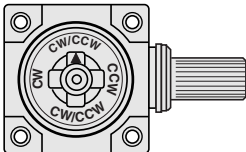
Standard plug-in body type



Type of operator	Standard pre-travel spring return	Low differential spring return	Light operating torque spring return	Maintained contact
Type of direction	CW & CCW (2)	CW & CCW (2)	CW & CCW (2)	CW (trip) CCW (reset)
Catalog numbers				
1 N.O. Reed contacts snap action 	9007C84B2 	9007C84A2 	9007C84N2 	9007C84C 
1 N.C. Reed contacts snap action 	9007C86B2 	9007C86A2 	9007C86N2 	9007C86C 
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation				
Characteristics (nominal operating data)				
Switch actuation	By 30° cam			
Type of actuation				
Pre-travel	13°	7°	13°	45°
Total travel	90°			
Differential	7°	4°	7°	—
Reverse overtravel	90°	90°	90°	—
Operating torque force 1 pole & 2 pole	4 lb-in (17.8 N•m)		25 oz-in (0.18 N•m)	3 lb-in (0.34 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)	0.15 mm (± 0.006 in.)	0.076 mm (± 0.003 in.)	0.15 mm (± 0.006 in.)	0.15 mm (± 0.006 in.)
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

- Lever arm type must be ordered separately from pages 574 to 579.
- These devices are factory set to operate the contacts in **both** the CW and CCW directions. **Mode of operation** is field convertible to CW only or CCW only. **To order factory converted devices:** For CCW only operation, change the 2 at the end of the Type number to 1 (for example, C54B2 becomes C54B1). For CW only operation, delete the 2 at the end of the Type number (for example, C54B2 becomes C54B).







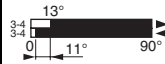
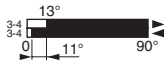
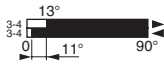
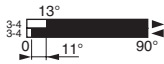
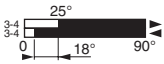

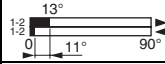
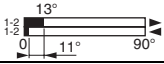
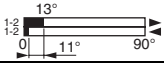
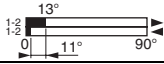
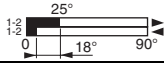



Mode of operation of the lever arm is easily convertible to clockwise or both. Simply pull out and rotate the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW.



Dimensions:
pages 566 to 569

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Standard Body—Reed Contacts

Type of head	Flexible operator (wobble stick)				
Standard plug-in body type					
Type of operator	Universal (1)	Wobble stick Delrin® extension (1)	Wobble stick wire extension (1)	Wobble stick coil spring extension (1)	Cat whisker
Catalog numbers					
1 N.O. Reed contacts snap action 	9007C84JKC 	9007C84J 	9007C84K 	9007C84KC 	9007C84L 
1 N.C. Reed contacts snap action 	9007C86JKC 	9007C86J 	9007C86K 	9007C86KC 	9007C86L 
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation	 contact closed  contact open				
Characteristics (nominal operating data)					
Switch actuation	By any moving object in any direction				
Type of actuation					
Pre-travel	13° (any direction)				25°
Total travel	90°				
Differential	11°				18°
Reverse overtravel	—				
Operating torque/force 1 pole & 2 pole	3 lb-in (0.34 N•m)				7 oz-in (0.05 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum				
Repeatability (linear travel of cam)	—				
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry				

1. Wobble stick extensions are available separately for the universal head. See page 573.
 Acceptable wire sizes: 12-22 AWG Recommended,
 Terminal clamp torque: 7 lb-in (0.80 N•m).

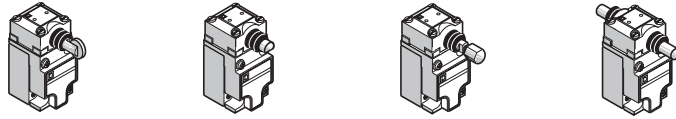
Dimensions:
 pages 566 to 569

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Compact Body

Type of head **Side Plunger (mounting by the body)**

Compact plug-in body type



Type of operator	Side roller plunger spring return vertical roller (1)	Side push rod plunger spring return	Side push rod plunger adjustable (2) spring return	Side push rod plunger maintained contact
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Catalog numbers

1 N.O. 1 N.C. snap action	9007C52F	9007C52G	9007C52GD	9007C52H

Weight, kg (lb)	0.456 (1.01)	0.445 (0.98)	0.422 (0.93)	0.568 (1.25)
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Contact operation	
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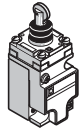
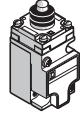
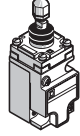
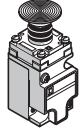
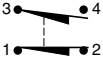
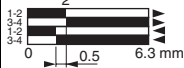
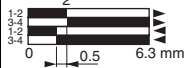
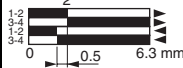
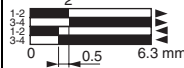



Characteristics (nominal operating data)

Switch actuation	On end		
Type of actuation			
Pre-travel	2 mm (0.08 in.)	3.6 mm (0.14 in.)	
Pre-travel two Stage	First stage	2 mm (0.08 in.)	—
	First stage to second stage	0.5 mm (0.02 in.)	—
Total travel	6.3 mm (0.25 in.)	6.3 mm (0.25 in.)	
Differential	0.8 mm (0.03 in.)	—	
Reverse overtravel	—	—	
Minimum force or torque 1 pole & 2 pole	4 lb (17.8 N)	7 lb (31.1 N)	
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum		
Repeatability (linear travel of cam)	0.03 mm (0.001 in.)	—	
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry. Prewired options available.		

- Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter H at the end of the equivalent vertical roller version type.
- To lock the nut in the desired position, crimp the slot near the bottom of the nut.

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Compact Body

Type of head	Top Plunger (mounting by the body)			
Compact plug-in body type				
Type of operator	Top roller plunger spring return	Top push rod plunger spring return	Top push rod plunger adjustable (1) spring return	Palm operated (2)
Catalog numbers				
1 N.O. 1 N.C. snap action 	9007C52D 	9007C52E 	9007C52ED 	9007C52R (2) 
Weight, kg (lb)	0.169 (0.43)	0.169 (0.43)	0.422 (0.93)	0.568 (1.25)
Contact operation	 contact closed  contact open			
Characteristics (nominal operating data)				
Switch actuation	On end			
Type of actuation				
Pre-travel	2 mm (0.08 in.)			
Pre-travel two Stage	First stage	2 mm (0.08 in.)		
	First stage to second stage	0.03 mm (0.01 in.)		
Total travel	6.3 mm (0.25 in.)			
Differential	0.5 mm (0.02 in.)			
Reverse overtravel				
Minimum force or torque 1 pole & 2 pole	3 lb (13.3 N)			
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)	0.03 mm (0.001 in.)			
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry. Prewired options available.			

- To lock the nut in the desired position, crimp the slot near the bottom of the nut.
- Does not include mushroom button. Must be ordered separately see page 573.

Dimensions:
pages 566 to 569

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Compact Body

Type of head **Rotary (lever arm type) (1)**

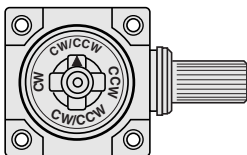
Compact plug-in body type



Type of operator	Standard pre-travel spring return	Low differential spring return	Light operating torque spring return	Maintained contact
Type of direction	CW & CCW (2)	CW & CCW (2)	CW & CCW (2)	CW (trip) CCW (reset)
Catalog numbers				
1 N.O. 1 N.C. snap action	9007C52B2	9007C52A2	9007C52N2	9007C52C
Weight, kg (lb)	0.481 (1.06)	0.481 (1.06)	0.481 (1.06)	0.481 (1.06)
Contact operation				
Characteristics (nominal operating data)				
Switch actuation	By 30° cam			
Type of actuation				
Pre-travel	10°	5°	10°	45°
Pre-travel two Stage				
First stage	10°	5°	10°	—
First stage to second stage	2.5°	1.5°	2.5°	—
Total travel	90°	90°	90°	90°
Differential	4°	2°	4°	—
Reverse overtravel	90°	90°	90°	—
Operating torque/force	4 lb-in (0.45 N•m)		25 oz-in (0.18 N•m)	3 lb-in (0.34 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)	0.05 mm (± 0.002 in.)	0.03 mm (± 0.001 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

- Lever arm type must be ordered separately from pages 574 to 579.
- These devices are factory set to operate the contacts in **both** the CW and CCW directions. **Mode of operation** is field convertible to CW only or CCW only.
To order factory converted devices: For CCW only operation, change the 2 at the end of the Type number to 1 (for example, C52B2 becomes C52B1). For CW only operation, delete the 2 at the end of the Type number (for example, C52B2 becomes C52B).

Mode of operation of the lever arm is easily convertible to clockwise or both.
Simply pull out and rotate the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW.



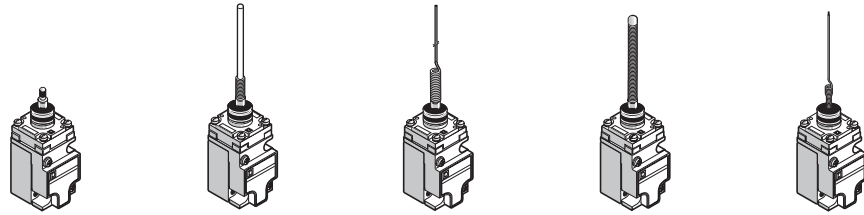
Dimensions:
pages 566 to 569

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Compact Body

Type of head **Flexible operator (wobble stick)**

Compact plug-in body type



Type of operator	Universal (1)	Wobble stick Delrin® extension (1)	Wobble stick wire extension (1)	Wobble stick coil spring extension (1)	Cat whisker
Catalog numbers					
1 N.O. 1 N.C.					
	9007C52JKC 	9007C52J 	9007C52K 	9007C52KC 	9007C52L
Weight, kg (lb)	0.468 (1.03)	0.568 (1.25)	0.540 (1.19)	0.568 (1.25)	0.468 (1.03)
Contact operation					
Characteristics (nominal operating data)					
Switch actuation	By any moving				
Type of actuation					
Pre-travel	10° (any direction)				20°
Pre-travel two stage					
First stage	10° (any direction)				20°
First stage to second stage	4°				5°
Total travel	90°				
Differential	3°				6°
Reverse overtravel	—				
Operating torque/force	3 lb-in (0.34 N•m)				7 oz-in (0.05 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum				
Repeatability (linear travel of cam)	—				
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry				

1. Wobble stick extensions are available separately for the universal head. See page 573.

Dimensions:
pages 566 to 569

Limit Switches

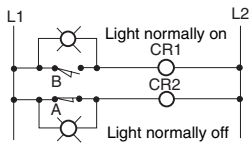
9007C Heavy Duty Industrial—Plug-in Body, Metal

Factory Modifications (Forms)

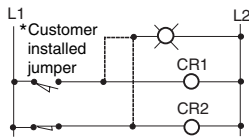


S9

Rotary head shown with S9 option



Form P5 Thru P9



Form P10

* Only one of the jumpers may be used. Pilot light is On when load is energized

Special features and modifications

Special features do not apply to 9007CR unless noted. Not field installable, except where noted.

Shaft equipped with hub for mounting larger diameter lever used with 9007T/FT limit switches

Any rotary lever arm 9007C, CF or CR switch can be furnished with an optional shaft and hub combination which will accept the lever arms normally used with 9007T and FT limit switches. To order, add S9 as suffix to the device number. For example, to order a 9007C54B2 with this modification, order as a 9007C54B2S9. For details about switches and lever arms that can be furnished with this modification, see the appropriate catalog or the Digest.

Description	Suffix to add to the device catalog number	Weight kg (lb)
Optional hub for 9007T/FT levers	S9	0.018 (0.04)

Hub only: can be field installed on rotary shaft; see accessories, page 565

Addition of LED pilot light (1)

Description	Suffix to add to the device catalog number	Weight kg (lb)
Addition of LED pilot light in parallel with N.O. contact (light normally on)	P5 (2)	0.57 (1.25)
Addition of LED pilot light in parallel with N.C. contact (light normally off)	P6 (2)	0.57 (1.25)
Addition of two LED pilot lights, one in parallel with N.O. contact (light normally on), one in parallel with N.C. contact (light normally off)	P7	0.57 (1.25)
Addition of two LED pilot lights in parallel with N.O. contacts (lights normally on)	P8 (3)	0.57 (1.25)
Addition of two LED pilot lights in parallel with N.C. contacts (lights normally off)	P9 (3)	0.57 (1.25)
Addition of one isolated LED pilot light (light on when load is energized)	P10 (4)	0.57 (1.25)

LED Pilot light, 24 to 120 V AC or DC on plug-in type switch (9007C52, C54, C62, C66, C68 or (2))

1. Bleeder circuit must be added to ensure PLC compatibility.
2. 9007C84 and C86 are available with P5 or P6 pilot lights only.
3. 9007C62, C66 or C68 only.
4. 9007C54 only. Not available with prewired receptacles.

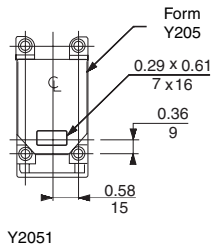
Examples of complete units with pilot lights in standard plug-in body type

Single pole	Catalog number	Weight kg (lb)
Side plunger	9007C54FP6	0.57 (1.25)
Top plunger	9007C54DP6	0.57 (1.25)
	9007C54EP6	0.57 (1.25)
Rotary	9007C54B2P6	0.57 (1.25)
Wobble stick	9007C54LP6	0.57 (1.25)
	9007C54JP6	0.57 (1.25)
Two poles		
Side plunger	9007C62FP6	0.57 (1.25)
Top plunger	9007C62DP6	0.57 (1.25)
	9007C62EP6	0.57 (1.25)
Rotary	9007C62B2P6	0.57 (1.25)
Wobble stick	9007C62LP6	0.57 (1.25)
	9007C62JP6	0.57 (1.25)

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Factory Modifications (Forms)



Special features and modifications (continued)

Special features do not apply to 9007CR unless noted. Not field installable, except where noted.

Manifold mounting

Description	Suffix to add to the device catalog number	Weight kg (lb)
Manifold mounting available on standard and compact types. Replaces existing type B installations if new hole is drilled to match knockout. Supersedes type C with form Y205. Receptacle is furnished with a wiring hole and a gasket in the base.	Y2051	0.57 (1.25)
Special chemical resistant coating (includes Viton® fluorocarbon seals—Y140, and stainless steel head and body screws) (1)	L3	0.57 (1.25)
Low temperature – lever types only: limit switch will operate in an ambient temperature range of -40 to 185 °F (standard limit switch ambient temperature range is -20 to 185 °F). Minimum temperature is based on the absence of freezing moisture or water.	Y128	0.57 (1.25)
Viton fluorocarbon gaskets and seals (1) Substitution of Viton fluorocarbon gaskets and seals on:		
Lever arm type, standard box (Viton fluorocarbon shaft seals on lever arm types as standard)	Y140	0.57 (1.25)
Lever arm type, compact box (Viton fluorocarbon shaft seals on lever arm types as standard)	Y140	0.57 (1.25)
Plunger type, standard box	Y140	0.57 (1.25)
Plunger type, compact box	Y140	0.57 (1.25)
Substitution of Viton fluorocarbon boot only on plunger type switches	Y1401	0.57 (1.25)

1. Fluorocarbon (as found in Viton seals) has been shown to resist sunlight aging problems.

Mini and micro connectors, ISO M20 (Form M11)

To order 9007C with ISO M 20 thread add the suffix M11 to the device number.

Examples of complete unit catalog numbers with ISO M20 thread in standard plug-in body type

Type of head	Catalog number	Weight kg (lb)
Single pole		
Side plunger	9007C54FM11	0.57 (1.25)
Top plunger	9007C54DM11	0.57 (1.25)
	9007C54EM11	0.57 (1.25)
Rotary	9007C54B2M11	0.57 (1.25)
Wobble stick	9007C54LM11	0.57 (1.25)
	9007C54JM11	0.57 (1.25)
Two poles		
Side plunger	9007C62FM11	0.57 (1.25)
Top plunger	9007C62DM11	0.57 (1.25)
	9007C62EM11	0.57 (1.25)
Rotary	9007C62B2M11	0.57 (1.25)
Wobble stick	9007C62LM11	0.57 (1.25)
	9007C62JM11	0.57 (1.25)

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Factory Modifications (Forms)



Y190•

Standard body shown with Y190• option

Special features and modifications (continued)

Special features do not apply to 9007CR unless noted. Not field installable, except where noted.

Pre-wired receptacle (1) (2)

Description	For use	Suffix to add to the device catalog number	Weight kg (lb)
Plug-in limit switch furnished with pre-wired mini 5-pin Brad Harrison male connector			
Single pole	For use with Brad Harrison female portable plug No.41306, 41307 or 41308 (or equal).	Y1901	0.60 (1.33)
	Same as Y1901 but with different wire color coding	Y1905	0.60 (1.33)
Tamper proof screws in complete switch only			
Single pole	Same as Y1901 but with tamper proof screws on head and body	Y1903	0.60 (1.33)
	Similar to Y1905 except for double pole device	Y19013	0.60 (1.33)

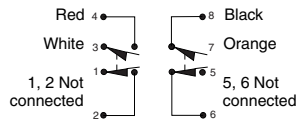
1. Plug and cable assemblies: see accessories page 565
2. Not available with P10 or for Hazardous location switches

Examples of complete unit catalog numbers with mini or micro connectors in standard plug-in body type

Type of head	Catalog number	Weight kg (lb)
Single pole, 5-pin mini connector (7/8"-16 UN-2A thread)		
Side plunger	9007C54FY1901	0.57 (1.25)
Top plunger	9007C54DY1901	0.57 (1.25)
	9007C54EY1901	0.57 (1.25)
Rotary	9007C54B2Y1901	0.57 (1.25)
Wobble stick	9007C54LY1901	0.57 (1.25)
	9007C54JY1901	0.57 (1.25)
Two poles, 9-pin mini connector (1-2/8"-16 UN-2A thread)		
Side plunger	9007C62FY19016	0.57 (1.25)
Top plunger	9007C62DY19016	0.57 (1.25)
	9007C62EY19016	0.57 (1.25)
Rotary	9007C62B2Y19016	0.57 (1.25)
Wobble stick	9007C62LY19016	0.57 (1.25)
	9007C62JY19016	0.57 (1.25)
Single pole, 5-pin micro single key (M12 x 1 thread)		
Side plunger	9007C62FY1912	0.57 (1.25)
Top plunger	9007C54DY1912	0.57 (1.25)
	9007C54EY1912	0.57 (1.25)
Rotary	9007C54B2Y1912	0.57 (1.25)
Wobble stick	9007C54LY1912	0.57 (1.25)
	9007C54JY1912	0.57 (1.25)
Single pole, 5-pin micro connector two keys (1/2"-20 UNF-2A thread)		
Side plunger	9007C54FY19019	0.57 (1.25)
Top plunger	9007C54DY19019	0.57 (1.25)
	9007C54EY19019	0.57 (1.25)
Rotary	9007C54B2Y19019	0.57 (1.25)
Wobble stick	9007C54LY19019	0.57 (1.25)
	9007C54JY19019	0.57 (1.25)



Form Y1901, Y1903



Form Y19013



Form Y1905

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Factory Modifications (Forms)



Y18**
Terminal base shown
with Y18** option

Special features and modifications (continued)

Special features do not apply to 9007CR unless noted. Not field installable, except where noted.

Potted limit (position) switch or plug-in receptacle only (1)

Description (2)			Suffix to add to the device catalog number	Weight kg (lb)
With individual wires	Single pole	With five #16 wires five ft long	Y1841	0.59 (1.30)
	Two pole	With nine #16 wires five ft long	Y1842	0.60 (1.32)
With STOWA cord	Single pole	With five conductor #16 STOWA cord eight ft long	Y1851	1.30 (2.88)
	Single pole	Same as Y1851 but with different wire color coding	Y1855	1.30 (2.88)
	Two pole	With nine conductor #16 STOWA cord eight ft long	Y1852	1.31 (2.90)
	Two pole	Same as Y1852 but with different wire color coding	Y1856	1.31 (2.90)
Tamper proof screws—complete switch only				
With individual wires	Same as Y1841 but with tamper proof screws on head and body		Y1843	0.59 (1.30)
	Same as Y1842 but with tamper proof screws on head and body		Y1844	0.60 (1.32)
With STOWA cord	Same as Y1851 but with tamper proof screws on head and body		Y1853	1.30 (2.88)
	Same as Y1852 but with tamper proof screws on head and body		Y1854	1.30 (2.88)
	Same as Y1855 but with tamper proof screws on head and body		Y1857	1.31 (2.90)
	Same as Y1856 but with tamper proof screws on head and body		Y1858	1.31 (2.90)

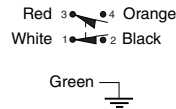
- Not for 9007CR Hazardous location devices
- Wire entry completely sealed with epoxy resin.

Dust boot (protects against abrasive dusts, dirt, grit and sand)

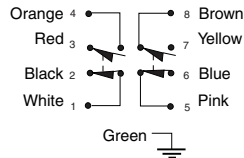
Description	Suffix to add to the device catalog number	Weight kg (lb)	
Lever type limit switch furnished with a boot around the shaft	On all 9007C and 9007CR lever type switches	Y33	0.01 (0.01)
Dust boot only	See accessories, page 565		

Wiring Diagrams

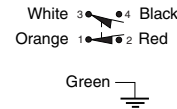
Forms Y1851 and Y1853



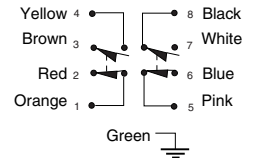
Forms Y1852 and Y1854



Forms Y1855 and Y1857



Forms Y1856 and Y1858



Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Factory Modifications (Forms)

Special features and modifications (continued)

Special features do not apply to 9007CR unless noted. Not field installable, except where noted.

Optional shafts

Description	Suffix to add to the device catalog number	Weight kg (lb)
Optional shaft, 7.8 mm (0.306 in.) diameter: To accommodate lever arms from the obsolete R.B.Denison® C limit switches. Available on all 9007C, CF, or CR limit switches	Y247	0.57 (1.25)
Optional shaft, 7.1 mm (0.28 in.) diameter: Available on all 9007C, CF, or CR limit switches	Y249	0.57 (1.25)

Switch with adapter plate

Description	Suffix to add to the device catalog number	Weight kg (lb)
Switch with adapter plate permitting substitution of any 9007C switch with standard body for any type T switch with style B base plate	Y147	—

Direct acting contacts / Positive opening contacts ☞ Y1561

One pole, normally closed, slow make-slow break, direct acting contact mechanism substituted for standard snap switch on 9007C52, C54 and CR53 devices.

This mechanism was designed for use in emergency overtravel applications. The movable contact of this basic switch unit is acted upon directly by the actuating mechanism of the limit switch and is not dependent upon the force exerted by a snap switch blade or spring to open the circuit. Because these contacts are slow make-slow break, they are best suited for applications where they are not actuated during normal operation, but only if abnormal overtravel is encountered.

Electrical contact ratings

AC—NEMA A600 maximum current—35% power factor						DC maximum current			
Volts	Make		Break		Continuous carrying A	Volts	Make or break		Continuous carrying A
	A	VA	A	VA			A	VA	
120	60	7200	6	720	10	125	1.1/0.55 (1)	138/69 (1)	5/2.5 (1)
240	30	7200	3	720	10	—	—	—	—
480	15	7200	1.5	720	10	250	0.27	67.5	2.5
600	12	7200	1.2	720	10	600	0.10	60	2.5

1. 9007C52 compact unit ratings at 125 Vdc—same ratings as 9007C54 and 9007CR53 at other voltages.

Description	Suffix to add to the device catalog number	Weight kg (lb)
Direct acting contact/positive opening contact block (slow break single pole only)	Y1561	0.566 (1.25)

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Accessories

Accessories		
Hub only		
Description	Catalog number	Weight kg (lb)
Hub can be field installed on any 9007C lever type switch, increasing the shaft diameter from 0.375–0.749 in. (9.53–19 mm), to accept levers normally used with 9007T/FT switches.	9007S9	0.02 (0.04)
Dust boot only		
Description	Catalog number	Weight kg (lb)
Dust boot can be field installed on any 9007C and CR lever type switch	9007BT3	0.01 (0.01)
Conduit seal insert (field instable)		
Description	Catalog number	Weight kg (lb)
Conduit seal fits in conduit entrance and excludes liquids		
5 hole seal	31032-488-01	0.01 (0.02)
9 hole seal	31032-815-01	0.01 (0.02)
Plug and cable assemblies		
Description	Catalog number	Weight kg (lb)
5-pin mini connecting cables (to fit certain switches with Form Y190**)		
Plug and 3 ft (0.91 m) cable	BH2053	—
Plug and 6 ft (1.83 m) cable	BH2056	—
Plug and 12 ft (3.66 m) cable	BH20512	—
Note: Other cables available. See the "Cabling" section beginning on page 625.		
Adapter—Field installable		
Description	Catalog number	Weight kg (lb)
Adapter plate kit only		
Plate plus mounting screws for substitution of any 9007C switch with standard box for any 9007T switch with style B base plate	9007BT1	0.23 (0.50)
Adapter plate		
for direct substitution of any 9007C plunger switches for 9007B plug-in plunger switches—use only if there is a problem in lining up cam tracks		
Standard body type	9007CT10 (1)	0.13 (0.28)
Compact body type	9007CT13 (2)	0.01 (0.20)
Adapter plate kit		
permitting direct substitution of any 9007C lever arm switch with standard box for any 9007AW lever arm switch	9007CT11	0.23 (0.50)
20 mm conduit connection adapter		
male 0.5 in. (12.7 mm) NPT on one end, female 0.787 in. (20 mm) on other end	9007CT12	0.01 (0.20)

1. Dimensions: 0.22 x 2.94 x 1.54 in. (5.6 x 75 x 39 mm)

2. Dimensions: 0.22 x 2.07 x 1.54 in. (5.6 x 53 x 39 mm)

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Dimensions—Standard Body

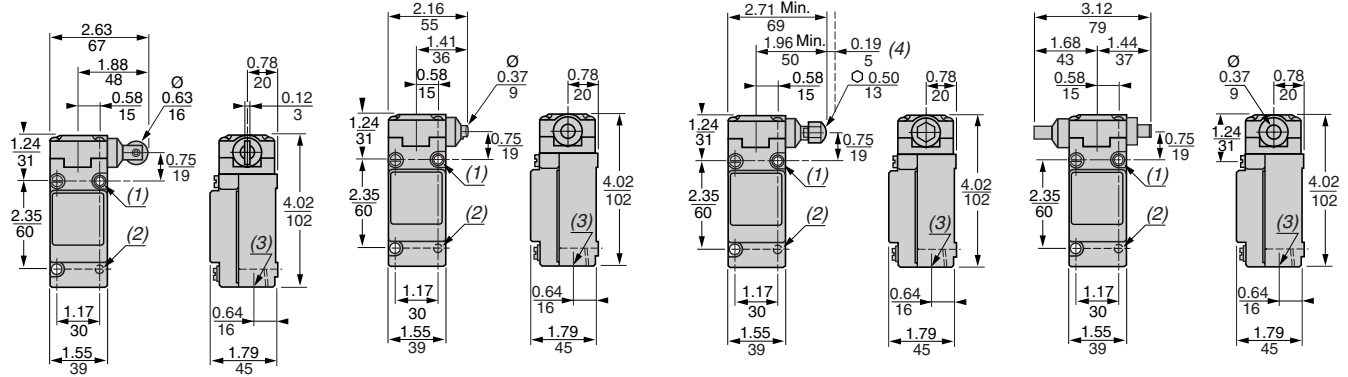
Side Plunger

9007C**F

9007C**G

9007C**GD

9007C**H



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

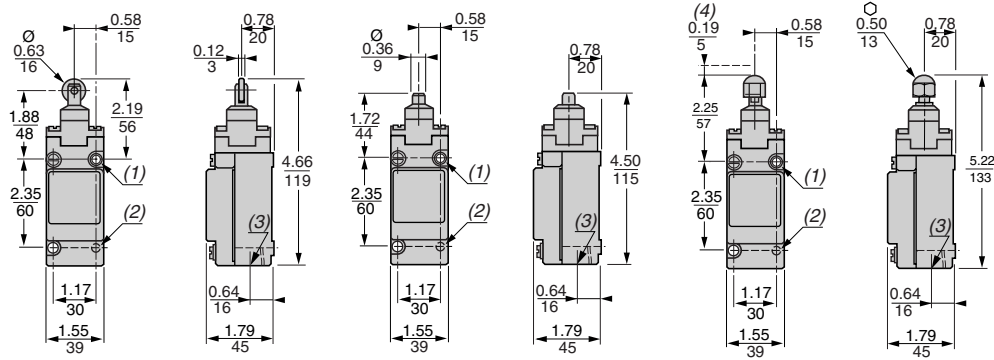
1. 2 x 0.20/5 x 0.22/6 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
3. 1/2 14 NPT.
4. Adjustable.

Top Plunger

9007C**D

9007C**E

9007C**ED



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

1. 2 x 0.20/5 x 0.22/6 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
3. 1/2 14 NPT.
4. Adjustable.

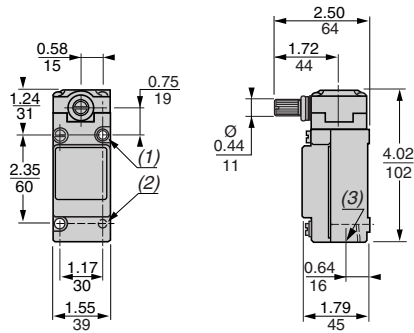
Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Dimensions—Standard Body

Rotary

9007C*** A, B, C, N, T5, T10



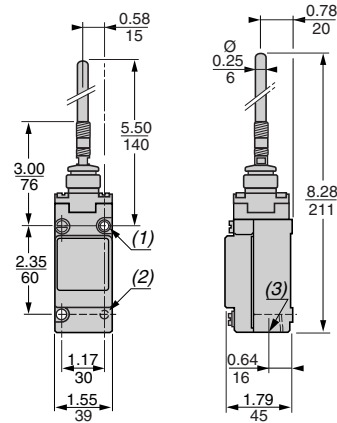
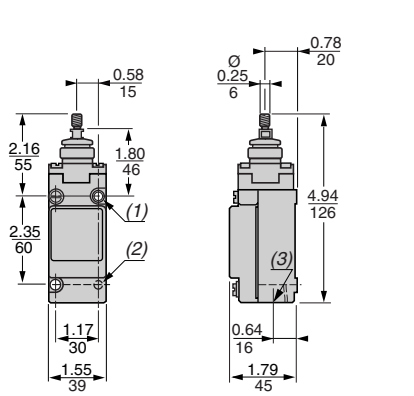
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

1. 2 x 0.20/5 x 0.22/6 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
3. 1/2 14 NPT.

Wobble stick

9007C**JKC

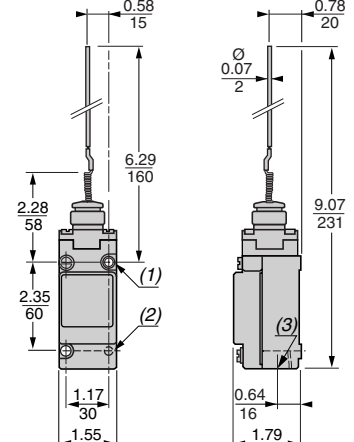
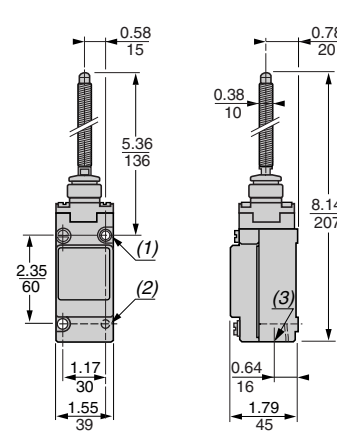
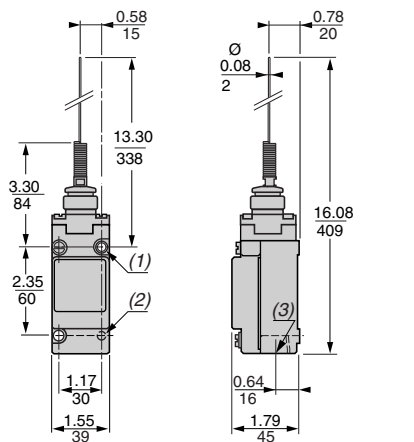
9007C**J



9007C**K

9007C**KC

9007C**L



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

1. 2 x 0.20/5 x 0.22/6 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
3. 1/2 14 NPT.

Limit Switches

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Dimensions—Compact Body

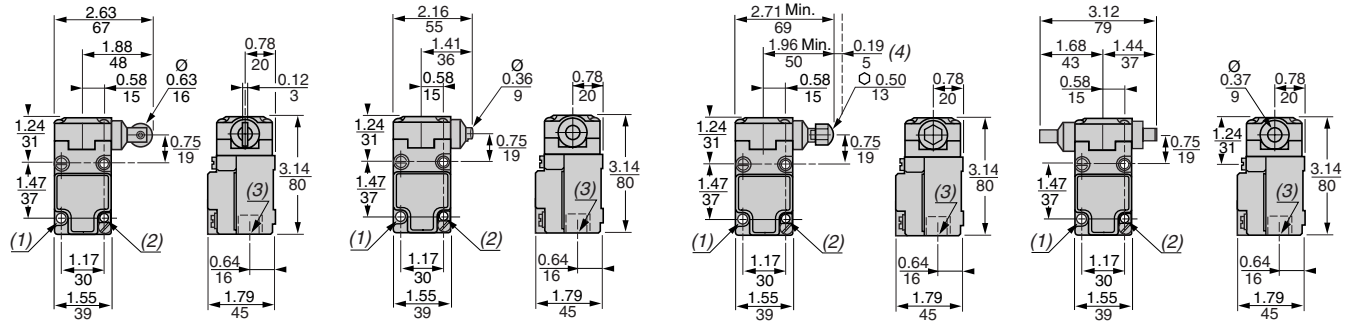
Side Plunger

9007C52F

9007C52G

9007C52GD

9007C52H



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

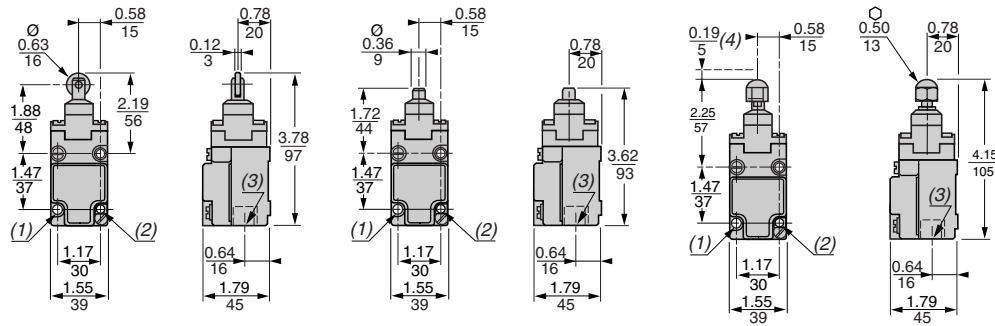
1. 2 x 0.20/5 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.20/5 DP.
3. 1/2 14 NPT.
4. Adjustable.

Top Plunger

9007C52D

9007C52E

9007C52ED



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

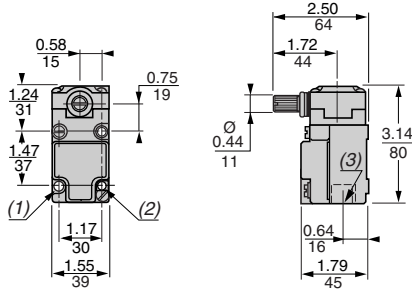
1. 2 x 0.20/5 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.20/5 DP.
3. 1/2 14 NPT.
4. Adjustable.

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Dimensions—Compact Body

Rotary

9007C52** A, B, C, N, T5, T10



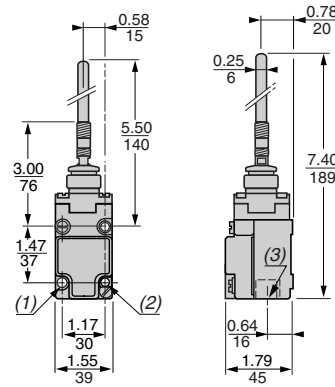
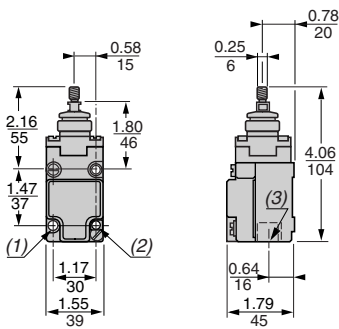
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

1. 2 x 0.20/5 x 0.22/6 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
3. 1/2 14 NPT.

Wobble stick

9007C52JKC

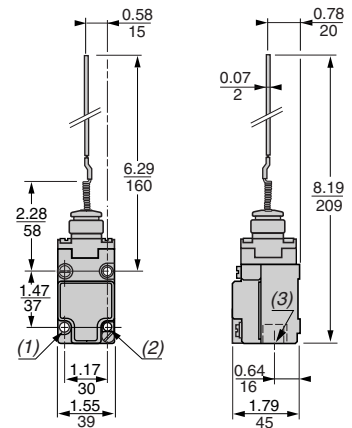
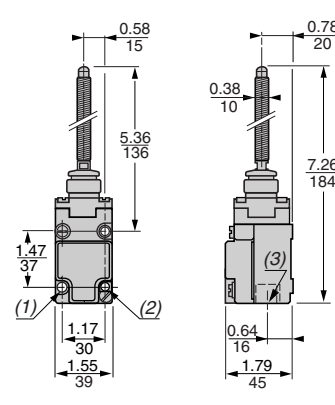
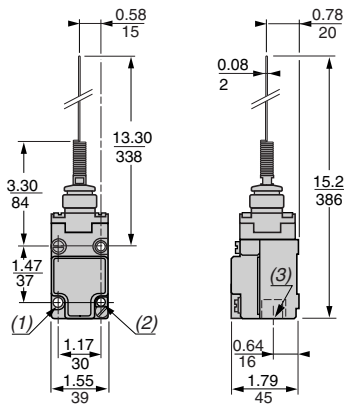
9007C52J



9007C52K

9007C52KC

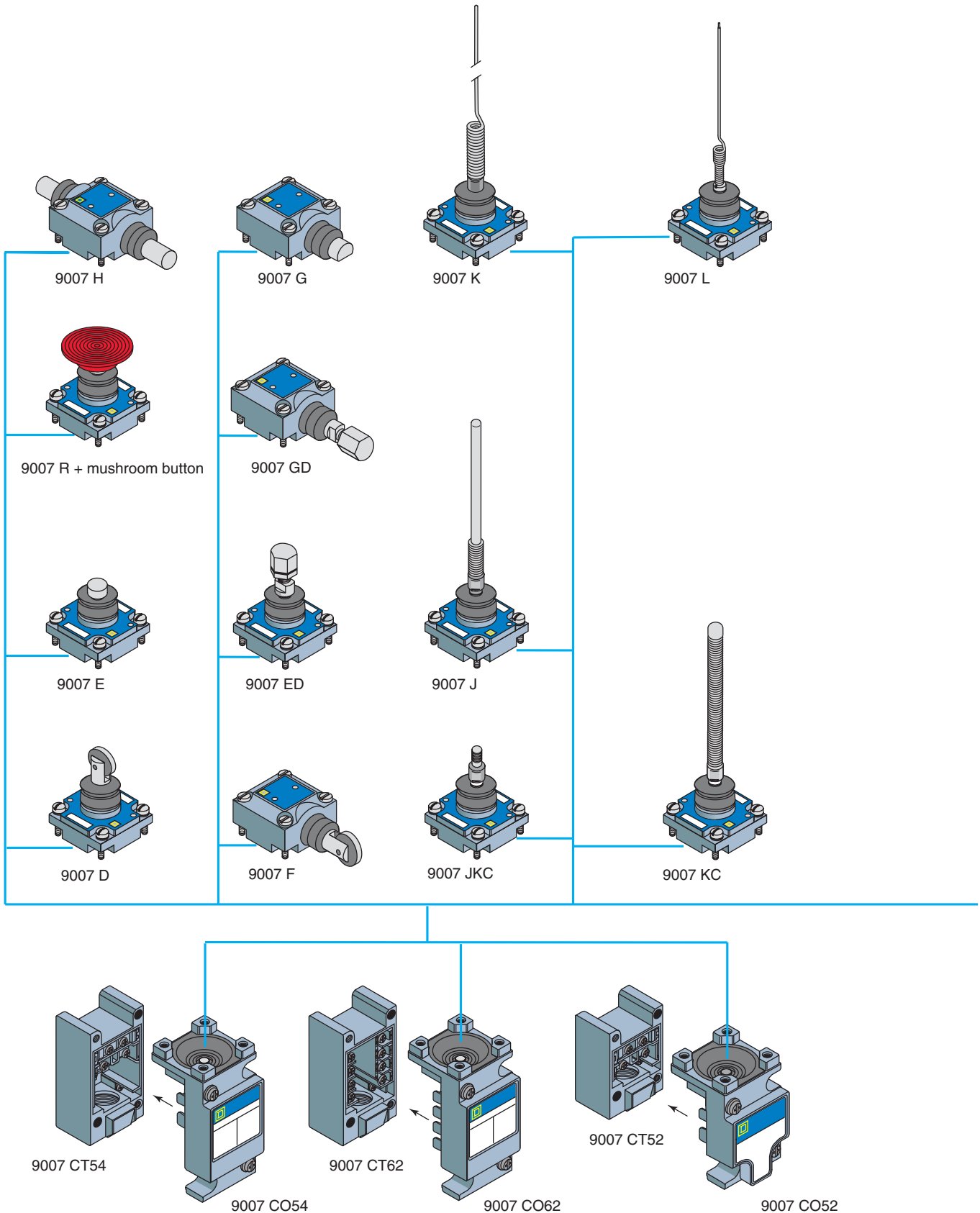
9007C52L



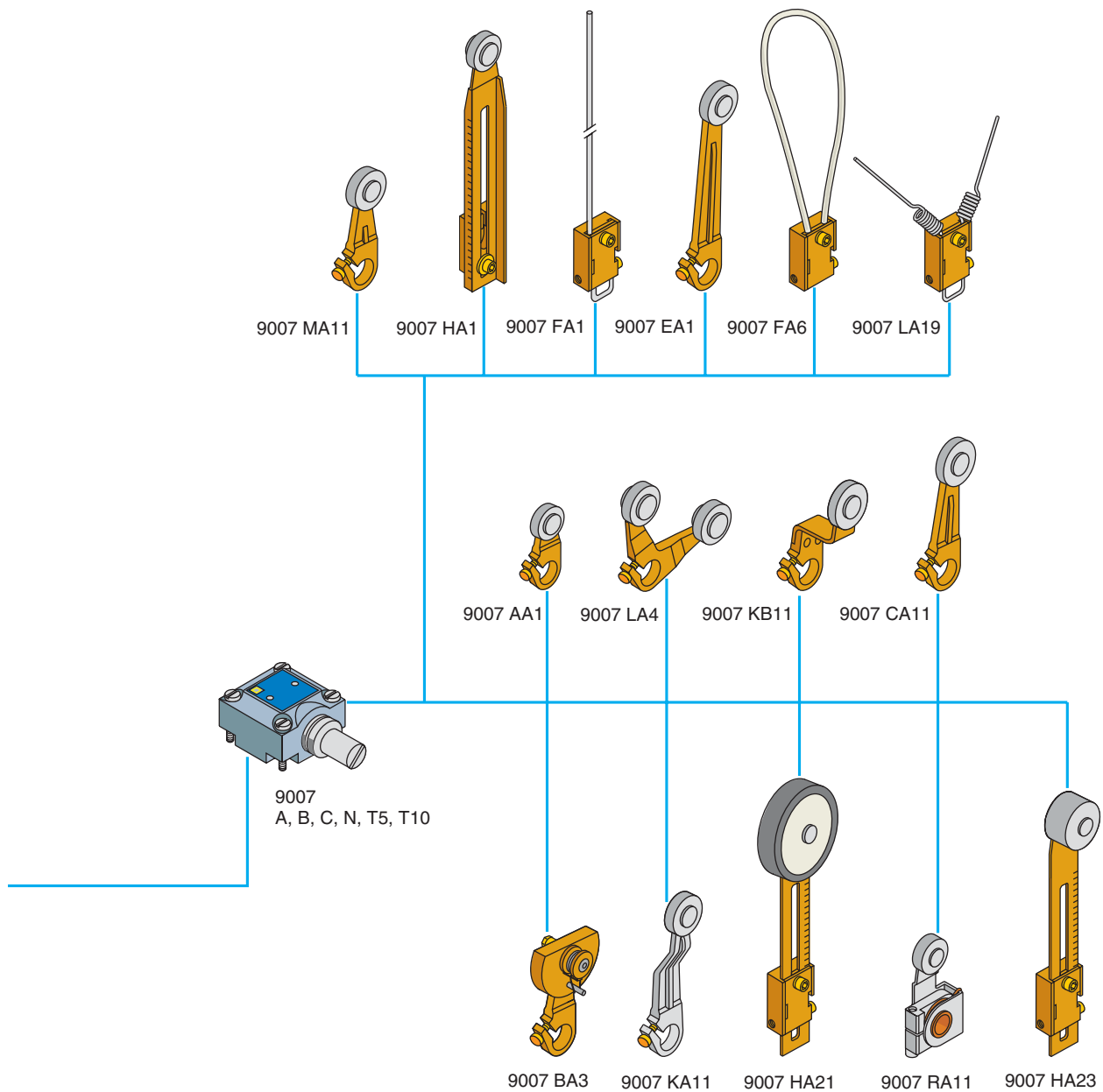
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

1. 2 x 0.20/5 x 0.22/6 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
3. 1/2 14 NPT.

Limit Switches
9007C Heavy Duty Industrial—Plug-in Body, Metal
Adaptable Sub-Assemblies



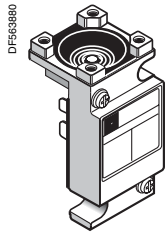
Limit Switches
9007C Heavy Duty Industrial—Plug-in Body, Metal
Adaptable Sub-Assemblies



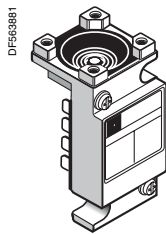
Limit Switches

Limit Switches

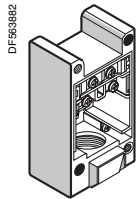
9007C Heavy Duty Industrial—Plug-in Body, Metal Adaptable Sub-Assemblies



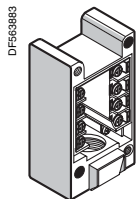
9007CO54



9007CO62



9007CT54



9007CT62

Limit Switches

Body with contacts for plunger or rotary heads Plug-in Unit (Top) with contacts

Type	Type of contact	Function diagram	Catalog number	Weight kg (lb)
For standard plug-in body type	Single pole		9007CO54	0.19 (0.42)
	Two pole		9007CO62	0.20 (0.44)
	Two stage		9007CO66	0.23 (0.50)
	Neutral position		9007CO68	0.20 (0.45)

For compact plug-in body type	Single pole		9007CO52	0.18 (0.40)
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Plug-in Receptacle (Base) with screw terminals (1)

Type	Type of contact	Function diagram	Catalog number	Weight kg (lb)
For standard plug-in body type	Single pole		9007CT54	0.22 (0.48)
	Two pole		9007CT62	0.22 (0.48)
	Neutral position		9007CT62	0.22 (0.48)
	Two stage		9007CT62	0.22 (0.48)
	Reed switches, either N/O or N/C (2)		9007CT54	0.22 (0.48)
For compact plug-in body type	Single pole		9007CT52	0.15 (0.34)

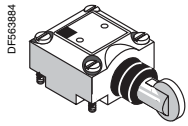
1. Acceptable wire sizes: 12-22 AWG (2.05 mm²-0.644mm²). Recommended terminal clamp torque: 7 lb-in (0.80 N•m).
2. Reed switches: plug-in switches less heads are not available as separate units. Order complete plug-in unit with a head. Example: 9007C084B2.

Dimensions:
page 580

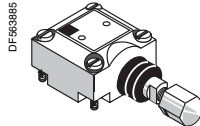
Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

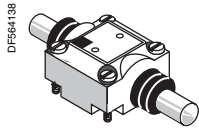
Adaptable Sub-Assemblies



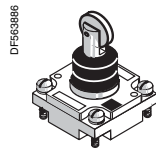
9007F



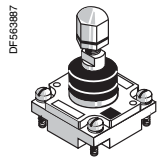
9007GD



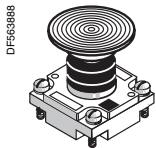
9007H



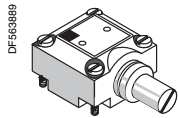
9007D



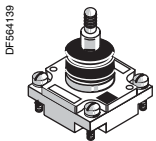
9007ED



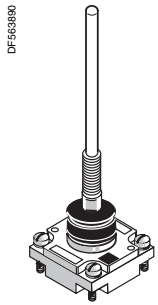
9007R + mushroom button



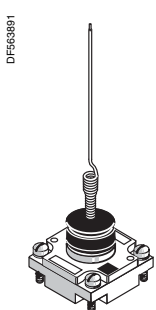
9007C



9007JKC



9007J



9007L

Heads for linear, rotary and multi-directional movements

Side plunger heads

Type of operator	Catalog number	Weight kg (lb)
Side roller plunger, spring return, vertical roller (1)	9007F	0.16 (0.36)
Side push rod plunger, spring return	9007G	0.15 (0.34)
Side push rod plunger, adjustable spring return	9007GD	0.16 (0.36)
Side push rod plunger, maintained contact	9007H	0.16 (0.36)

Top plunger heads

Type of operator	Catalog number	Weight kg (lb)
Top roller plunger, spring return	9007D	0.12 (0.26)
Top push rod plunger, spring return	9007E	0.11 (0.24)
Top push rod plunger, adjustable spring return	9007ED	0.12 (0.27)
Palm operated turret head without mushroom button	9007R	0.13 (0.28)
Mushroom button see Accessories (below)		

Rotary heads (without lever arm type)

Type of operator	Type of direction	Catalog number	Weight kg (lb)
Standard pre-travel spring return	CW & CCW	9007B	0.19 (0.41)
Low differential spring return	CW & CCW	9007A	0.19 (0.41)
Neutral position	CW & CCW	9007T10	0.16 (0.36)
Standard pre-travel spring return			
Neutral position	CW & CCW	9007T5	0.16 (0.36)
Low differential spring return			
Extra light operating torque spring return	CW (trip) CCW (reset)	9007N	0.18 (0.40)
Maintained contact		9007C	0.19 (0.41)

Multi-directional head

Type of operator	Catalog number	Weight kg (lb)
Universal (2)	9007JKC	0.19 (0.41)
Wobble stick, Delrin® extension (2)	9007J	0.20 (0.43)
Wobble stick, wire extension (2)	9007K	0.26 (0.57)
Wobble stick, coil spring extension (2)	9007KC	0.22 (0.48)
Cat whisker	9007L	0.17 (0.37)

Accessories

Description	Diameter in. (mm)	Color	Catalog number	Weight kg (lb)
Mushroom button for palm operated turret head	1.38 (35)	Black	2358C6G3	0.03 (0.06)
		Red	2358C6G2	0.03 (0.06)
		Green	2358C6G6	0.03 (0.06)
		Yellow	2358C6G8	0.03 (0.06)
	2.25 (57.2)	Black	—	—
		Red	2358C22G3	0.05 (0.10)
		Green	2358C22G6	0.05 (0.10)
		Yellow	2358C22G8	0.05 (0.10)
Description (2)	Type of extension	Catalog number	Weight kg (lb)	
Wobble stick extensions for the universal head	Delrin® extension	9007WJ	0.01 (0.03)	
	Wire extension	9007WK	0.01 (0.02)	
	Coil spring extension	9007WKC	0.02 (0.04)	

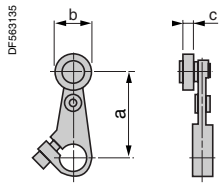
- Field convertible to horizontal.
- Acceptable wire sizes: 12-22 AWG (2.05 mm²-0.644mm²).
Recommended terminal clamp torque: 7 lb-in (0.80 N•m).

Dimensions:
page 580

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Lever Arms for Rotary Heads



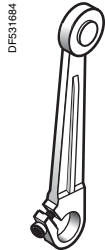
a: Length of lever arm
b: Roller diameter
c: Roller width



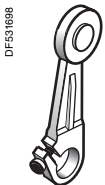
9007AA1



9007MA11



9007EA1



9007CA11

Cast zinc lever arms with standard roller

Lever arms with steel roller (1)

Arm	Steel roller		Catalog number	Weight kg (lb)
	Length (a) in. (mm)	Diameter (b) in. (mm)		
0.88 (22)		0.25 (6.3)	9007AA1	0.02 (0.05)
		0.63 (16)	9007AA2	0.03 (0.07)
1.38 (35)	0.75 (19)	0.25 (6.3)	9007BA11	0.03 (0.07)
		0.63 (16)	9007BA12	0.05 (0.10)
	0.63 (16)	0.25 (6.3)	9007BA1	0.03 (0.07)
		0.63 (16)	9007BA2	0.04 (0.08)
1.5 (38)	0.75 (19)	0.25 (6.3)	9007MA11	0.03 (0.07)
		0.63 (16)	9007MA12	0.05 (0.11)
	0.63 (16)	0.25 (6.3)	9007MA1	0.03 (0.06)
		0.63 (16)	9007MA2	0.05 (0.10)
2 (51)	0.75 (19)	0.25 (6.3)	9007CA11	0.04 (0.08)
		0.63 (16)	9007CA12	0.05 (0.12)
	0.63 (16)	0.25 (6.3)	9007CA1	0.04 (0.08)
		0.63 (16)	9007CA2	0.05 (0.10)
2.5 (63.5)	0.75 (19)	0.25 (6.3)	9007DA11	0.05 (0.10)
		0.63 (16)	9007DA12	0.06 (0.13)
	0.63 (16)	0.25 (6.3)	9007DA1	0.04 (0.08)
		0.63 (16)	9007DA2	0.05 (0.11)
3 (76)	0.75 (19)	0.25 (6.3)	9007EA11	0.05 (0.10)
		0.63 (16)	9007EA12	0.06 (0.14)
	0.63 (16)	0.25 (6.3)	9007EA1	0.04 (0.09)
		0.63 (16)	9007EA2	0.06 (0.14)

Lever arms with nylon roller

Arm	Nylon roller		Catalog number	Weight kg (lb)
	Length (a) in. (mm)	Diameter (b) in. (mm)		
0.88 (22)		0.25 (6.3)	9007AA8	0.02 (0.05)
		0.63 (16)	9007AA17	0.03 (0.07)
1.38 (35)	0.75 (19)	0.25 (6.3)	9007BA18	0.03 (0.07)
		0.63 (16)	9007BA8	0.05 (0.10)
	1 (25.4)	0.25 (6.3)	9007BA17	0.05 (0.11)
		0.63 (16)	9007BA4	0.03 (0.06)
1.5 (38)	0.75 (19)	0.25 (6.3)	9007BA13	0.05 (0.10)
		0.63 (16)	9007MA18	0.03 (0.06)
	0.63 (16)	0.25 (6.3)	9007MA18	0.05 (0.10)
		0.63 (16)	9007MA17	0.05 (0.10)
2 (51)	1 (25.4)	0.25 (6.3)	9007MA4	0.05 (0.10)
		0.63 (16)	9007MA13	0.05 (0.12)
	0.75 (19)	0.25 (6.3)	9007MA18	0.05 (0.10)
		0.63 (16)	9007CA18	0.05 (0.10)
2.5 (63.5)	0.63 (16)	0.25 (6.3)	9007CA8	0.03 (0.06)
		0.63 (16)	9007CA17	0.03 (0.07)
	1 (25.4)	0.25 (6.3)	9007CA4	0.05 (0.12)
		0.63 (16)	9007CA13	0.06 (0.14)
3 (76)	0.75 (19)	0.25 (6.3)	9007DA18	0.03 (0.07)
		0.63 (16)	9007DA8	0.06 (0.13)
	1 (25.4)	0.25 (6.3)	9007DA17	0.06 (0.13)
		0.63 (16)	9007DA4	0.06 (0.14)
3 (76)	0.75 (19)	0.25 (6.3)	9007DA13	0.07 (0.15)
		0.63 (16)	9007EA18	0.04 (0.08)
	0.63 (16)	0.25 (6.3)	9007EA8	0.06 (0.14)
		0.63 (16)	9007EA17	0.07 (0.16)
1 (25.4)	0.25 (6.3)	9007EA4	0.07 (0.15)	
	0.63 (16)	9007EA13	0.08 (0.17)	

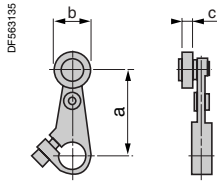
1. Material is hardened, oil-impregnated, sintered iron.

Dimensions:
page 581

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Lever Arms for Rotary Heads



a: Length of lever arm
b: Roller diameter
c: Roller width

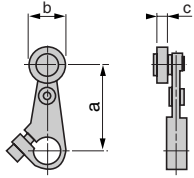
Cast zinc lever arms (continued)				
Lever arms with ball bearing roller				
Arm	Ball bearing roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
0.88 (22)	0.69 (17.5)	0.25 (6.3)	9007AA9	0.04 (0.09)
1.38 (35)	0.69 (17.5)	0.25 (6.3)	9007BA9	0.04 (0.09)
1.5 (38)	0.69 (17.5)	0.25 (6.3)	9007MA9	0.04 (0.09)
2 (51)	0.69 (17.5)	0.25 (6.3)	9007CA9	0.04 (0.09)
2.5 (63.5)	0.69 (17.5)	0.25 (6.3)	9007DA9	0.04 (0.09)
3 (76)	0.69 (17.5)	0.25 (6.3)	9007EA9	0.04 (0.09)
Lever arms with roller on opposite side to standard				
Lever arm	Roller on opposite side		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
0.88 (22)	0.63 (16)	0.25 (6.3)	9007AA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007AA6	0.04 (0.09)
1.38 (35)	0.75 (19)	0.25 (6.3)	9007BA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007BA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007BA6	0.04 (0.09)
1.5 (38)	0.75 (19)	0.25 (6.3)	9007MA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007MA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007MA6	0.04 (0.09)
2 (51)	0.75 (19)	0.25 (6.3)	9007CA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007CA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007CA6	0.04 (0.09)
2.5 (63.5)	0.75 (19)	0.25 (6.3)	9007DA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007DA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007DA6	0.04 (0.09)
	0.75 (19)	0.25 (6.3)	9007EA15	0.04 (0.09)
3 (76)	0.63 (16)	0.25 (6.3)	9007EA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007EA6	0.04 (0.09)
Lever arms with roller countersunk roller pin				
Arm	Roller (countersunk roller pin)		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
1.5 (38)	0.75 (19)	0.25 (6.3)	9007MA31	0.03 (0.07)
2 (51)	0.75 (19)	0.25 (6.3)	9007CA31	0.04 (0.08)
2.5 (63.5)	0.75 (19)	0.25 (6.3)	9007DA31	0.04 (0.09)
Lever arms with cable operated with eyebolt (I.D.) instead of roller				
Arm	Cable		Catalog number	Weight kg (lb)
Length in. (mm)	Length in. (mm)			
1.5 (38)	0.38 (9.6)		9007MA22	0.05 (0.10)

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Lever Arms for Rotary Heads

DF563135



a: Length of lever arm
b: Roller diameter
c: Roller width

Flat steel lever arms with standard roller (1)				
Arm	Roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
Lever arms with steel roller				
0.88 (22)	0.63 (16)	0.25 (6.3)	9007AA1S	0.01 (0.03)
	0.63 (16)	0.63 (16)	9007AA2S	0.01 (0.03)
1.38 (35)	0.63 (16)	0.25 (6.3)	9007BA1S	0.01 (0.03)
	0.63 (16)	0.63 (16)	9007BA2S	0.01 (0.03)
2 (51)	0.63 (16)	0.25 (6.3)	9007CA1S	0.03 (0.07)
	0.63 (16)	0.63 (16)	9007CA2S	0.04 (0.08)
2.5 (63.5)	0.63 (16)	0.25 (6.3)	9007DA1S	0.04 (0.08)
	0.63 (16)	0.63 (16)	9007DA2S	0.04 (0.08)
3 (76)	0.63 (16)	0.25 (6.3)	9007EA1S	0.04 (0.08)
	0.63 (16)	0.63 (16)	9007EA2S	0.04 (0.08)
Lever arms with nylon roller				
1.38 (35)	1 (25.4)	0.25 (6.3)	9007BA4S	0.01 (0.03)
1.5 (38)	0.75 (19)	0.25 (6.3)	9007MA18S	0.01 (0.03)
2 (51)	1 (25.4)	0.25 (6.3)	9007CA4S	0.03 (0.07)
2.5 (63.5)	1 (25.4)	0.25 (6.3)	9007DA4S	0.04 (0.08)
3 (76)	1 (25.4)	0.25 (6.3)	9007EA4S	0.04 (0.08)
Lever arms without roller				
0.88 (22)	—	—	9007AA0S	
1.38 (35)	—	—	9007BA0S	0.01 (0.02)
2 (51)	—	—	9007CA0S	0.03 (0.06)
2.5 (63.5)	—	—	9007DA0S	0.03 (0.07)
3 (76)	—	—	9007EA0S	0.03 (0.07)

1. Material is hardened, oil-impregnated, sintered iron.

90° Forked cast zinc lever arms					
Arm	Roller position	Roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)		Diameter (b) in. (mm)	Width (c) in. (mm)		
Lever arms with steel roller					
1.5 (38)	Rollers on same side	0.75 (19)	0.25 (6.3)	9007LA4	0.05 (0.12)
		0.63 (16)	0.25 (6.3)	9007LA1	0.07 (0.15)
	R.H. Roller on opposite side	0.75 (19)	0.25 (6.3)	9007LA5	0.05 (0.12)
		0.63 (16)	0.25 (6.3)	9007LA2	0.07 (0.15)
	L.H. Roller on opposite side	0.75 (19)	0.25 (6.3)	9007LA6	0.05 (0.12)
		0.63 (16)	0.25 (6.3)	9007LA3	0.07 (0.15)
Lever arms with nylon rollers					
1.5 (38)	Rollers on same side	0.75 (19)	0.25 (6.3)	9007LA16	0.04 (0.09)
		1 (25.4)		9007LA10	0.06 (0.14)
	R.H. Roller on opposite side	0.75 (19)	0.25 (6.3)	9007LA17	0.04 (0.09)
		1 (25.4)		9007LA11	0.06 (0.14)
	L.H. Roller on opposite side	0.75 (19)	0.25 (6.3)	9007LA18	0.04 (0.09)
		1 (25.4)		9007LA12	0.06 (0.14)
Lever arms with ball bearing rollers					
1.5 (38)	Rollers on same side	0.69 (17.5)	0.25 (6.3)	9007LA7	0.11 (0.25)
	R.H. Roller on opposite side	0.69 (17.5)	0.25 (6.3)	9007LA8	0.11 (0.25)
	L.H. Roller on opposite side	0.69 (17.5)	0.25 (6.3)	9007LA9	0.11 (0.25)

DF531682



9007LA4

Limit Switches

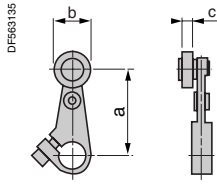
Dimensions:
page 581

576

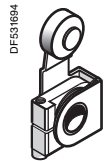
Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

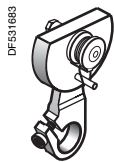
Lever Arms for Rotary Heads



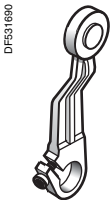
a: Length of lever arm
b: Roller diameter
c: Roller width



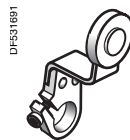
9007RA11



9007BA3



9007KA11



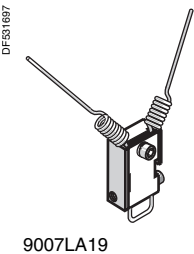
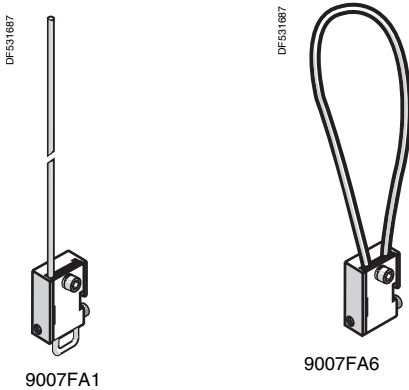
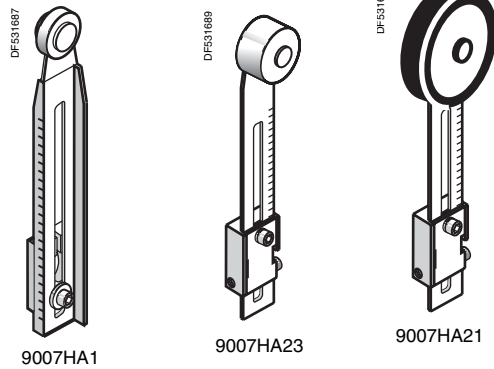
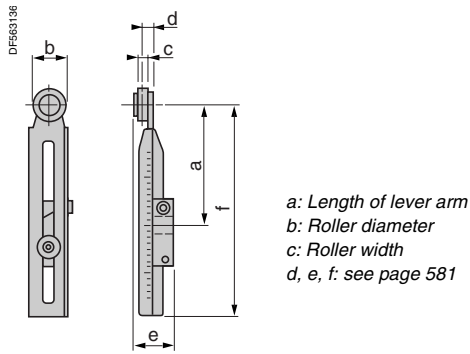
9007KB11

One-way lever arm					
Arm		Steel roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)		Diameter (b) in. (mm)	Width (c) in. (mm)		
Lever arm with standard roller					
1.5 (38)		0.75 (19)	0.25 (6.3)	9007RA11	0.05 (0.12)
Lever arm with nylon roller					
1.5 (38)		0.75 (19)	0.25 (6.3)	9007RA18	0.05 (0.12)
Lever arm with ball bearing roller					
1.5 (38)		0.69 (17.5)	0.25 (6.3)	9007RA9	0.05 (0.12)
Lever arm with rod type					
5 (127)		—	—	9007FA2	0.05 (0.12)
One-way cast zinc roller lever arm					
Arm		Roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)		Diameter (b) in. (mm)	Width (c) in. (mm)		
Cast arm with steel roller					
1.38 (35)		1.25 (32)	0.25 (6.3)	9007BA3	0.07 (0.15)
1.5 (38)		1.25 (32)	0.25 (6.3)	9007MA3	0.10 (0.23)
2 (51)		1.25 (32)	0.25 (6.3)	9007CA3	0.12 (0.27)
2.5 (63.5)		1.25 (32)	0.25 (6.3)	9007DA3	0.12 (0.27)
3 (76)		1.25 (32)	0.25 (6.3)	9007EA3	0.13 (0.29)
Flat steel arm with steel roller					
1.38 (35)		1.25 (32)	0.25 (6.3)	9007BA3S	0.07 (0.15)
2 (51)		1.25 (32)	0.25 (6.3)	9007CA3S	0.10 (0.23)
2.5 (63.5)		1.25 (32)	0.25 (6.3)	9007DA3S	0.12 (0.27)
3 (76)		1.25 (32)	0.25 (6.3)	9007EA3S	0.13 (0.29)
Offset type cast zinc lever arm					
Offset lever arm		Roller		Catalog number	Weight kg (lb)
Length in. (mm)	Offset	Diameter in. (mm)	Width in. (mm)		
Offset cast zinc arm with steel roller					
2 (51)	0.44 (11)	0.63 (16)	0.25 (6.3)	9007KA1	0.04 (0.08)
		0.63 (16)	0.63 (16)	9007KA2	0.04 (0.08)
		0.75 (19)	0.25 (6.3)	9007KA11	0.04 (0.09)
		0.75 (19)	0.63 (16)	9007KA12	0.05 (0.12)
1.5 (38)	0.88 (22)	0.75 (19)	0.25 (6.3)	9007KB11	0.04 (0.10)
		0.75 (19)	0.25 (6.3)	9007KB15	0.04 (0.10)
Offset cast zinc arm with ball bearing roller					
2 (51)	0.44 (11)	0.69 (17.5)	0.25 (6.3)	9007KA9	0.04 (0.10)
Offset cast zinc arm with nylon roller					
2 (51)	0.44 (11)	0.75 (19)	0.25 (6.3)	9007KA18	0.04 (0.10)
		0.75 (19)	1 (25.4)	9007KA21	0.04 (0.10)

Dimensions:
page 581

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Lever Arms for Rotary Heads



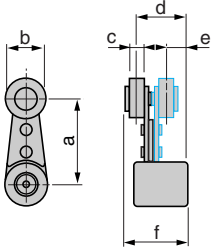
Adjustable length lever arm				
Lever arm	Roller		Catalog number	Weight kg (lb)
Dimensions length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
Adjustable length arm with steel roller				
Non-bendable, adjustable from 0.88 (22) to 4 (101)	0.63 (16)	0.25 (6.3)	9007HA1	0.05 (0.12)
	0.63 (16)	0.63 (16)	9007HA2	0.07 (0.14)
Bendable, adjustable from 0.88 (22) to 4 (101)	0.63 (16)	0.25 (6.3)	9007HA5	0.06 (0.14)
	0.63 (16)	0.63 (16)	9007HA6	0.04 (0.18)
Adjustable length arm with nylon roller				
Non-bendable, adjustable from 0.88 (22) to 4 (101)	0.63 (16)	0.25 (6.3)	9007HA4	0.05 (0.12)
	1 (25.4)	0.63 (16)	9007HA22	0.06 (0.13)
Bendable, adjustable from 0.88 (22) to 4 (101)	0.63 (16)	0.25 (6.3)	9007HA8	0.06 (0.14)
	1.0 (16)	0.63 (16)	9007HA23	0.07 (0.16)
	2 (51)	0.25 (6.3)	9007HA26	0.08 (0.17)
Adjustable length arm with ball bearing roller				
Non-bendable, adjustable from 0.88 (22) to 4 (101)	0.69 (17.5)	0.25 (6.3)	9007HA24	0.06 (0.13)
Bendable, adjustable from 0.88 (22) to 4 (101)	0.69 (17.5)	0.25 (6.3)	9007HA25	0.07 (0.16)
Adjustable length arm with ball Delrin® roller				
Bendable, adjustable from 0.88 (22) to 4 (101)	1.63 (41)	0.25 (6.3)	9007HA20	0.07 (0.16)
Adjustable length arm with rubber tire roller				
Bendable, adjustable from 0.88 (22) to 4 (101)	2.13 (54)	0.5 (12.7)	9007HA21	0.10 (0.22)
Adjustable length arm without roller				
Non-bendable, adjustable from 0.88 (22) to 4 (101)	—	—	9007HA0	0.15 (0.33)
Bendable, adjustable from 0.88 (22) to 4 (101)	—	—	9007HA9	0.11 (0.25)
Rod type lever arm				
Description	Length		Catalog number	Weight kg (lb)
Rod	in. (mm)			
Stainless steel rod	10 (254)		9007FA1	0.07 (0.15)
Spring rod, steel	12 (304)		9007FA3	0.07 (0.15)
Spring rod, Delrin®	12 (304)		9007FA5	0.07 (0.15)
Looped Delrin rod arm	—		9007FA6	0.05 (0.11)
90° forked rod				
Spring rods, steel	2.5 (63.5)		9007LA19	0.06 (0.13)

Dimensions:
page 581

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal

Lever Arms for Rotary Heads



a: Length of lever arm
 b: Roller diameter
 c: Roller width
 d, e: see page 581

360° angular adjustable lever arm

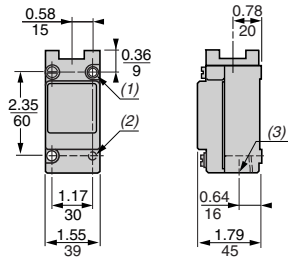
360° angular adjustable lever arm		Roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Roller (1) position	Diameter (b) in. (mm)	Width (c) in. (mm)		
Lever arms with steel roller					
0.88 (22)	Roller outside	0.63 (16)	0.25 (6.3)	9007AA1M	0.09 (0.20)
	Roller inside	0.63 (16)	0.25 (6.3)	9007AA5M	0.09 (0.20)
1.38 (35)	Roller outside	0.75 (19)	0.25 (6.3)	9007AA11M	0.09 (0.20)
	Roller outside	0.63 (16)	0.25 (6.3)	9007BA1M	0.09 (0.22)
	Roller inside	0.63 (16)	0.25 (6.3)	9007BA5M	0.10 (0.22)
1.5 (38)	Roller outside	0.75 (19)	0.25 (6.3)	9007BA11M	0.10 (0.22)
	Roller outside	0.63 (16)	0.25 (6.3)	9007MA1M	0.11 (0.24)
	Roller inside	0.63 (16)	0.25 (6.3)	9007MA5M	0.11 (0.24)
2 (51)	Roller outside	0.75 (19)	0.25 (6.3)	9007MA11M	0.11 (0.24)
	Roller outside	0.63 (16)	0.25 (6.3)	9007CA1M	0.11 (0.24)
	Roller inside	0.63 (16)	0.25 (6.3)	9007CA5M	0.11 (0.24)
2.5 (63.5)	Roller outside	0.75 (19)	0.25 (6.3)	9007CA11M	0.11 (0.25)
	Roller outside	0.63 (16)	0.25 (6.3)	9007DA1M	0.11 (0.25)
	Roller inside	0.63 (16)	0.25 (6.3)	9007DA5M	0.12 (0.27)
3 (76)	Roller outside	0.75 (19)	0.25 (6.3)	9007DA11M	0.12 (0.27)
	Roller outside	0.63 (16)	0.25 (6.3)	9007EA1M	0.12 (0.27)
	Roller inside	0.63 (16)	0.25 (6.3)	9007EA5M	0.12 (0.27)
	Roller outside	0.75 (19)	0.25 (6.3)	9007EA11M	0.13 (0.29)
Lever arms with nylon roller					
0.88 (22)	Roller outside	0.63 (16)	0.25 (6.3)	9007AA8M	0.09 (0.20)
		0.75 (19)	0.25 (6.3)	9007AA18M	0.09 (0.20)
1.38 (35)	Roller outside	0.63 (16)	0.25 (6.3)	9007BA8M	0.11 (0.25)
		0.75 (19)	0.25 (6.3)	9007BA18M	0.11 (0.25)
1.5 (38)	Roller outside	0.63 (16)	0.25 (6.3)	9007MA8M	0.10 (0.23)
		0.75 (19)	0.25 (6.3)	9007MA18M	0.11 (0.25)
2 (51)	Roller outside	0.63 (16)	0.25 (6.3)	9007CA8M	0.12 (0.27)
		0.75 (19)	0.25 (6.3)	9007CA18M	0.12 (0.27)
2.5 (63.5)	Roller outside	0.63 (16)	0.25 (6.3)	9007DA8M	0.12 (0.27)
		0.75 (19)	0.25 (6.3)	9007DA18M	0.12 (0.27)
3 (76)	Roller outside	0.63 (16)	0.25 (6.3)	9007EA8M	0.12 (0.26)
		0.75 (19)	0.25 (6.3)	9007EA18M	0.12 (0.27)
Lever arms with ball bearing roller					
0.88 (22)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007AA9M	0.10 (0.23)
1.38 (35)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007BA9M	0.11 (0.24)
1.5 (38)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007MA9M	0.19 (0.26)
2 (51)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007CA9M	0.19 (0.26)
2.5 (63.5)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007DA9M	0.12 (0.27)
3 (76)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007EA9M	0.13 (0.28)

1. Roller can be changed in the field from roller outside to roller inside position or vice versa.

Limit Switches

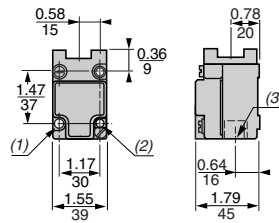
9007C Heavy Duty Industrial—Plug-in Body, Metal Bodies and Heads, Dimensions

Body Standard



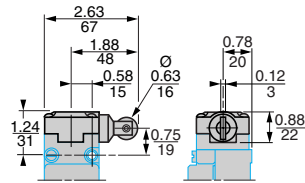
- Dual dimensions: $\frac{\text{in.}}{\text{mm}}$
- 2 x 0.20/5 x 0.22/6 HLS.
 - 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
 - 1/2 14 NPT.

Compact

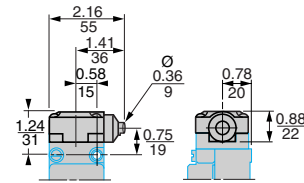


- Dual dimensions: $\frac{\text{in.}}{\text{mm}}$
- 2 x 0.20/5 HLS.
 - 2 x 10-24 Tapped HLS Back Mtg 0.20/5 DP.
 - 1/2 14 NPT.

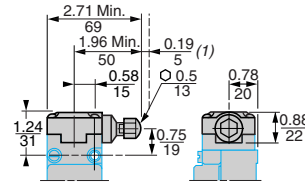
Side plunger heads 9007F



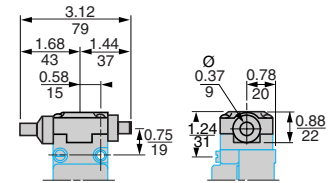
9007G



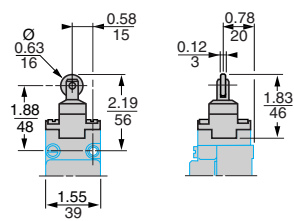
9007GD



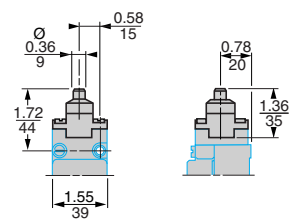
9007H



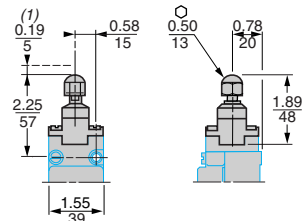
Top plunger heads 9007D



9007E

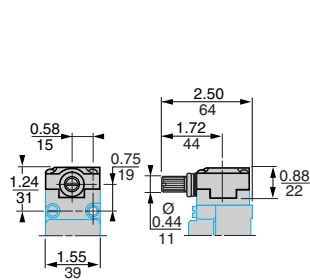


9007ED

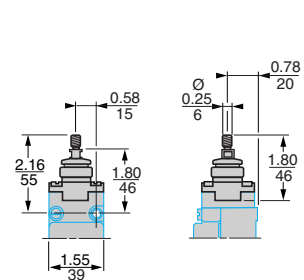


- Adjustable

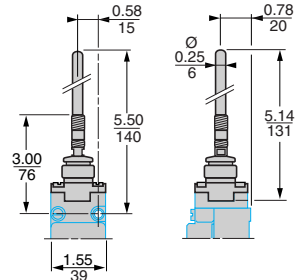
Rotary heads 9007C



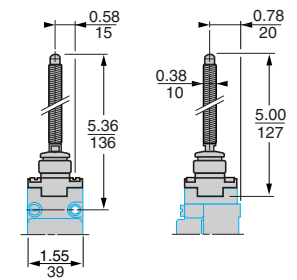
Multi-directional heads 9007JKC



9007J

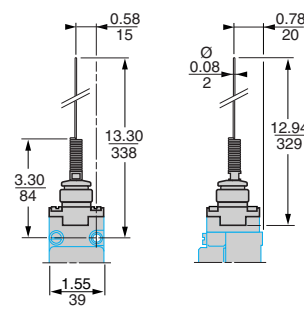


9007KC

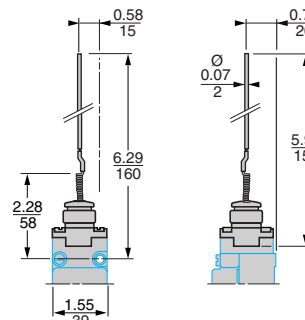


Multi-directional heads (continued)

9007K



9007L



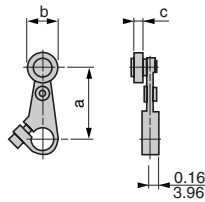
Catalog numbers:
pages 572 and 573

Limit Switches

9007C Heavy Duty Industrial—Plug-in Body, Metal Lever Arms for Rotary Heads, Dimensions

Lever arms

9007AA**, BA**, CA**, DA**, EA**, FA**, KA**, LA**, MA**, RA**

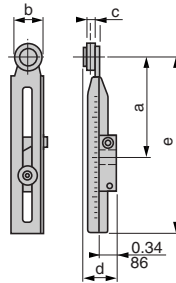


a: Length of lever arm
b: Roller diameter
c: Roller width

a, b, c: pages 574 to 577

Adjustable length lever arms

9007HA* and 9007HA***

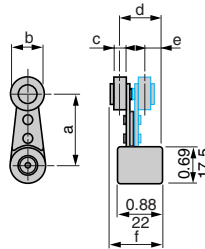


a: Length of lever arm
b: Roller diameter
c: Roller width
d = 0.38/10
e = 4.38/111

a, b, c: page 578

360° angular adjustable lever arms

9007AA**M, 9007BA**M, 9007CA**M, 9007DA**M, 9007EA**M, 9007MA**M



a: Length of lever arm
b: Roller diameter
c: Roller width
d = 0.84/21
e = 0.38/10
f = 1.05/27

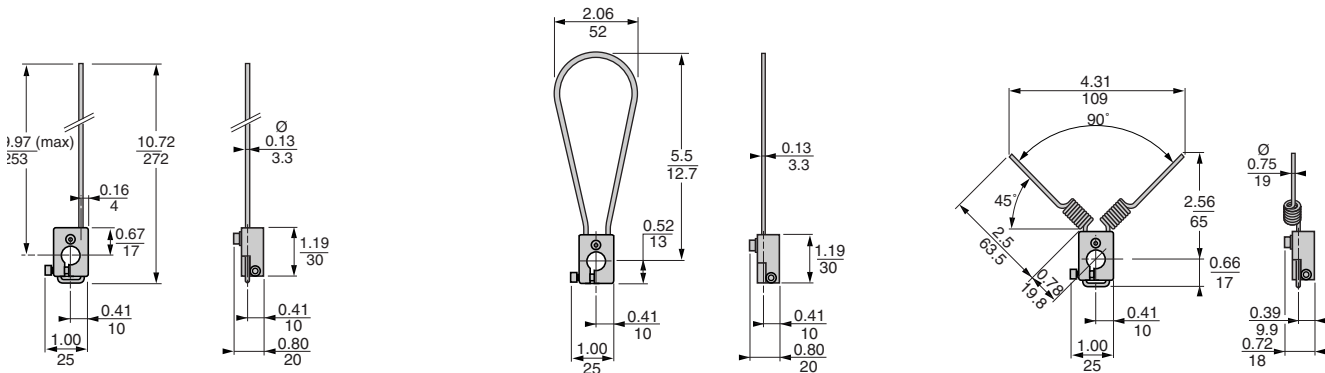
a, b, c: page 579

Rod type lever arms

9007FA1

9007FA6

9007LA19



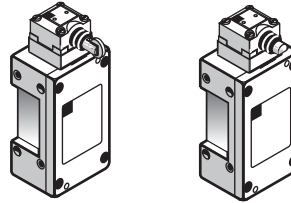
Catalog numbers:
pages 574 to 579

Limit Switches

9007C Heavy Duty Industrial—Non-Plug-in Body, Metal Hazardous Location

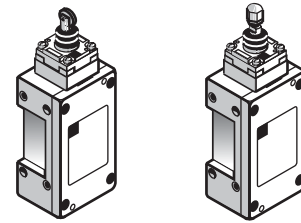
Hazardous Non-Plug-in Body Type (1)

With head for linear movement
side plunger



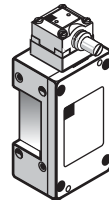
Page 584

top plunger



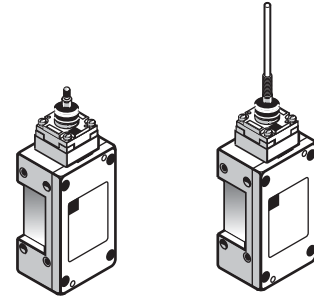
Page 585

With head for rotary movement (lever)



Page 586

With head for multi-directional movement



Page 587

1. Factory modifications: see pages 560 to 564.

Application Information—Hazardous Locations

Classification of hazardous locations

Hazardous locations are those areas that **may** have flammable gases or combustible dusts present in quantities sufficient to produce an explosive or ignitable mixture. These gases, dusts, may always be present or may only be present in abnormal situations. The National Electrical Code (NEC) describes these areas in Articles 500 through 503 and divides them into three types of categories: Class, Group, Division.

- **Classes**

The *Classes* (I, II, III) differentiate between the type of hazardous materials: I is for gases, II is for dusts, and III is for fibers.

- **Groups**

The *Groups* (A, B, C, D, E, F, and G) further subdivide each class according to the relative explosive force of the materials. Group A atmosphere is acetylene which has a higher explosive force than Group B (which may contain hydrogen, for example); and Group B has a higher explosive force than Group D, etc.

- **Divisions**

The *Divisions* (1 and 2) refer to the presence of these hazardous gases and dusts. Division 1 areas can have these gases or dusts present **at all times** under **normal operating conditions** in an ignitable concentration. Division 2 areas **only** have **ignitable concentrations** of dusts or gases present during **abnormal conditions**, such as machine failures or container breakage.

The table below summarizes the classifications described above.

Summary of Classification Chart

Class	Division	Group
I. Gas	1. Hazard May Exist May Exist In Atmosphere Under Normal Operating Conditions	A. Acetylene B. Manufactured Gases Containing Hydrogen C. Petrochemicals (e.g. ethylene) D. Petrochemicals (e.g. alcohol)
	2. Potential Hazard A. May be present in atmosphere only under abnormal circumstances.	A. Acetylene B. Manufactured Gases Containing Hydrogen C. Petrochemicals (e.g. ethylene) D. Petrochemicals (e.g. alcohol)
II. Dust	1. Hazard May Exist May Exist In Atmosphere Under Normal Operating Conditions	E. Conductive and Combustible Dust (Resistivity $\leq 10^5$ ohms/cm) F. Carbonaceous Dusts (Resistivity $> 10^2$ ohm/cm but < 108 ohm/cm) G. Non-Conductive Combustible Dust (Resistivity $> = 105$ ohms/cm)
	2. Potential Hazard A. May be present in atmosphere only under abnormal circumstances.	G. Non-Conductive Combustible Dust (Resistivity $> = 105$ ohms/cm)
III. Fibers	1. Production Areas	Easily Ignitable Fibers
	2. Handling and Storage Areas	Easily Ignitable Fibers

Limit Switches

9007C Heavy Duty Industrial—Non-Plug-in Body, Metal Hazardous Location

Environmental characteristics		
Conforming to standards	Products	NEMA 250, EN 60947-1, EN 60947-5-1, IEC 60947, UL 508, C22-2-14-95, CE conformity documentation
	Machine assemblies	IEC 60204-1
Product certifications		UL, CSA, CE
Protective treatment		Epoxy powder coat
Ambient air temperature (Lever/rotary head)	Operation	-20...+185 °F (-29...+85 °C), wider range available
	Storage	-20...+185 °F (-29...+85 °C), wider range available
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10...150 Hz, 11 ms) (C86F switch good for 18.5g only)
Shock resistance	Conforming to IEC 60068-2-27	60 gn (9 ms) 40 gn (9 ms) for reed switch
Electric shock protection	Conforming to IEC 61140	Class 0
Degree of protection	Conforming to IEC 60529	IP 67
Cable entry or connector	Depending on model	1/2-14 NPT, M20 X 1.5, ISO cable entry, 5-pin mini connector, 4-pin micro connector
Materials	Bodies, heads, levers	Bodies in aluminum, heads in Zamak® zinc alloy, levers and rods in zinc, steel, stainless steel, Delrin® resin.
Contact block characteristics		
Rated operational characteristics hard contacts -AC Voltage	9007CR53 (single pole)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CR61 (two pole)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CR65 (two pole two stage)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CR67 (two pole neutral)	NEMA A600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
Rated operational characteristics hard contacts -DC Voltage	9007CR53 (single pole)	NEMA Q600 (Ue = 600 V, Ie = 0.1 A); Ithe = 2.5 A
	9007CR61 (two pole)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
	9007CR65 (two pole two stage)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
	9007CR67 (two pole neutral)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
Rated insulation voltage		600 V
Rated Impulse Withstand Voltage		2,500 Vac for 1 minute for CE; 2,200 Vac for 1 minute for UL; and 2,640 Vac for 1 s for CSA
Positive Opening	Special Y1561	Special Y1561 (one pole slow break only) ⊖
Short Circuit Protection		10 A Bussmann Class CC KTK-R-10 fuse non-time-delay
Terminal wire sizes (Cabling/Screw Clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum
Maximum Actuation Speed		50 fpm / 90 fpm (15.2 m/min / 27.4 m/min) with 45 degree cam angle, levers only
Electrical Durability		1 million operating cycles

Types of contact elements

IEC 60947-5-1			NEMA			JIS		
Form	Symbol	Description	Form	Symbol	Description	Form	Symbol	Description
A		Single break	A		—	3		—
X		—						Double break
B		Single break	B		—	2		—
Y		—						Double break
C		—	C		—	1		Single break
Za		Same polarity	Z		"Same polarity" only			Double break
Zb		Electrically separate						Double break

Limit Switches

9007C Heavy Duty Industrial—Non-Plug-in Body, Metal Hazardous Location

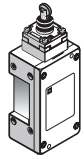
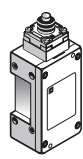
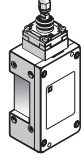
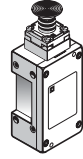
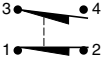








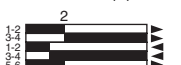
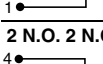
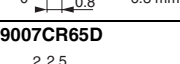
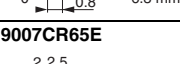
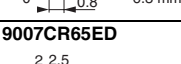
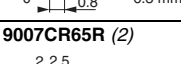



Type of head		Side Plunger (mounting by the body)			
Hazardous location non-plug-in body type					
Type of operator		Side roller plunger spring return vertical roller (1)	Side push rod plunger spring return	Side push rod plunger adjustable (2) spring return	Side push rod plunger maintained contact
Catalog numbers					
1 N.O. 1 N.C. snap action 		9007CR53F 	9007CR53G 	9007CR53GD 	9007CR53H
2 N.O. 2 N.C. snap action 		9007CR61F 	9007CR61G 	9007CR61GD 	9007CR61H
2 N.O. 2 N.C. Two stage snap action 		9007CR65F 	9007CR65G 	9007CR65GD 	
Weight, kg (lb)		1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)
Contact operation					
Characteristics (nominal operating data)					
Switch actuation		On end			
Type of actuation					
Pre-travel		2 mm (0.08 in.)			3.6 mm (0.14 in.)
Pre-travel two Stage		First stage		2 mm (0.08 in.)	
		First stage to second stage		0.5 mm (0.02 in.)	
Total travel		6.3 mm (0.25 in.)			
Differential		0.8 mm (0.03 in.)			
Reverse overtravel		—			
Minimum force or torque 1 pole & 2 pole		4 lb (17.8 N)			7 lb (31.1 N)
Terminal wire sizes (Cabling/Screw Clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)		0.03 mm (0.001 in.)			—
Cable entry		1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

1. Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter H at the end of the equivalent vertical roller version type.
2. To lock the nut in the desired position, crimp the slot near the bottom of the nut.

Dimensions:
pages 588 and 589

Limit Switches

9007C Heavy Duty Industrial—Non-Plug-in Body, Metal Hazardous Location

Type of head	Top Plunger (mounting by the body)			
Hazardous location non-plug-in body type				
Type of operator	Top roller plunger spring return	Top push rod plunger spring return	Top push rod plunger adjustable (1) spring return	Palm operated (2)
Catalog numbers				
1 N.O. 1 N.C. snap action 	9007CR53D 	9007CR53E 	9007CR53ED 	9007CR53R (2) 
2 N.O. 2 N.C. snap action 	9007CR61D 	9007CR61E 	9007CR61ED 	9007CR61R (2) 
2 N.O. 2 N.C. Two stage snap action 	9007CR65D 	9007CR65E 	9007CR65ED 	9007CR65R (2) 
Weight, kg (lb)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)
Contact operation	 contact closed  contact open			
Characteristics (nominal operating data)				
Switch actuation	On end			
Type of actuation				
Pre-travel	2 mm (0.08 in.)			
Pre-travel two Stage	First stage	2 mm (0.08 in.)		
	First stage to second stage	0.3 mm (0.01 in.)		
Total travel	6.3 mm (0.25 in.)			
Differential	0.5 mm (0.02 in.)			
Reverse overtravel	—			
Minimum force or torque	1 pole & 2 pole	3 lb (13.3 N)		7 lb (31.1 N)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)	0.03 mm (0.001 in.)			
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

- To lock the nut in the desired position, crimp the slot near the bottom of the nut.
- Does not include mushroom button. Must be ordered separately see page 573.

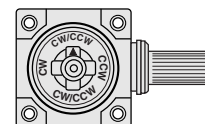
Dimensions:
pages 588 and 589

Limit Switches

9007C Heavy Duty Industrial—Non-Plug-in Body, Metal Hazardous Location

Type of head	Rotary (lever arm type) (1)					
Hazardous location non-plug-in body type						
Type of operator	Standard pre-travel spring return	Low differential spring return	Neutral position		Light operating torque spring return	Maintained contact
Type of direction	CW & CCW (2)	CW & CCW (2)	CW & CCW	CW & CCW	CW & CCW (2)	CW (trip) CCW (reset)
Catalog numbers						
1 N.O. 1 N.C. snap action	9007CR53B2 	9007CR53A2 			9007CR53N2 	9007CR53C
2 N.O. 2 N.C. snap action	9007CR61B2 	9007CR61A2 			9007CR61N2 	9007CR61C
2 N.O. 2 N.C. snap action Neutral position			9007CR67T10 	9007CR67T5 		
2 N.O. 2 N.C. two stage snap action	9007CR65B2 	9007CR65A2 			9007CR65N2 	
Weight, kg (lb)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)
Contact operation	■ contact closed		□ contact open			
Characteristics (nominal operating data)						
Switch actuation	By 30° cam					
Type of actuation						
Pre-travel	10°	5°	10°	5°	10°	45°
Pre-travel two stage						
First stage	10°	5°	—	—	10°	—
First stage to second stage	2.5°	1.5°	—	—	2.5°	—
Total travel	90°					90°
Differential	4°	2°	4°	2°	4°	—
Reverse overtravel	90°					—
Operating torque/force 1 pole & 2 pole	4 lb-in (0.45 N•m)				25 oz-in (0.18 N•m)	3 lb-in (0.34 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum					
Repeatability (linear travel of cam)	0.05 mm (± 0.002 in.)	0.03 mm (± 0.001 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry					

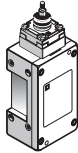
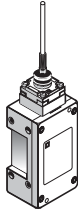
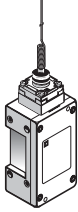
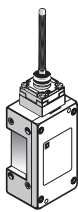
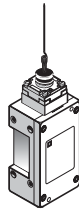
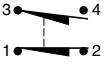
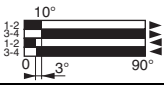
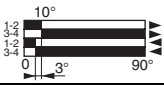
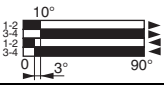
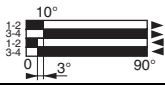
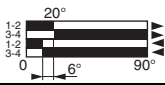
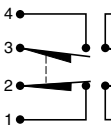
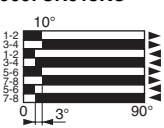
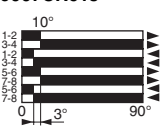
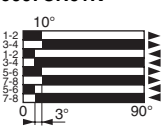
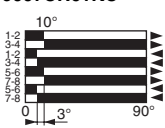
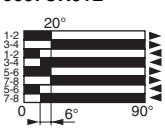
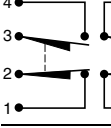
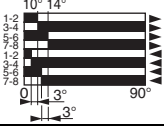
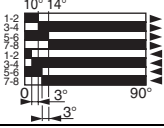
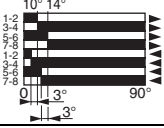
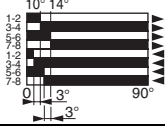
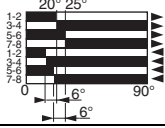



- Lever arm type must be ordered separately from page 574 to 577.
- These devices are factory set to operate the contacts in **both** the CW and CCW directions. **Mode of operation** is field convertible to CW only or CCW only.
To order factory converted devices: For CCW only operation, change the 2 at the end of the Type number to 1 (for example: C54B2 becomes C54B1). For CW only operation, delete the 2 at the end of the Type number (for example, C54B2 becomes C54B).
 Mode of operation of the lever arm is easily convertible to clockwise or both.
 Simply pull out and rotate the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW.



Dimensions:
pages 588 and 589

Limit Switches

9007C Heavy Duty Industrial—Non-Plug-in Body, Metal Hazardous Location

Type of head	Flexible operator (wobble stick)				
Hazardous location non-plug-in body type					
Type of operator	Universal (1)	Wobble stick Delrin® extension (1)	Wobble stick wire extension (1)	Wobble stick coil spring extension (1)	Cat whisker
Catalog numbers					
1 N.O. 1 N.C. snap action 	9007CR53JKC 	9007CR53J 	9007CR53K 	9007CR53KC 	9007CR53L 
2 N.O. 2 N.C. snap action 	9007CR61JKC 	9007CR61J 	9007CR61K 	9007CR61KC 	9007CR61L 
2 N.O. 2 N.C. Two stage snap action 	9007CR65JKC 	9007CR65J 	9007CR65K 	9007CR65KC 	9007CR65L 
Weight, kg (lb)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)
Contact operation	 contact closed  contact open				
Characteristics (nominal operating data)					
Switch actuation	By any moving object from any direction				
Type of actuation					
Pre-travel	10° (any direction)				20°
Pre-travel two-stage					
First stage	10° (any direction)				20°
First stage to second stage	4°				5°
Total travel	90°				
Differential	3				6°
Reverse overtravel	—				
Operating torque/force	3 lb-in (0.34 N•m)				7 oz-in (0.05 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum				
Repeatability (linear travel of cam)	—				
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry				

1. Wobble stick extensions are available separately for the universal head or as replacements for complete devices (see page 573)

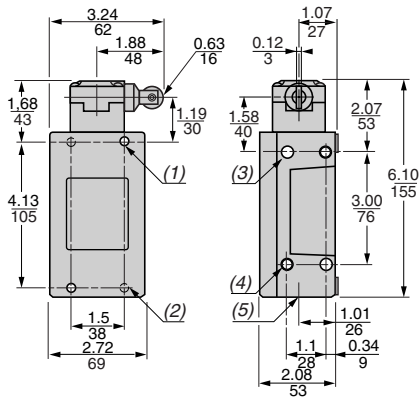
Dimensions:
pages 588 and 589

Limit Switches

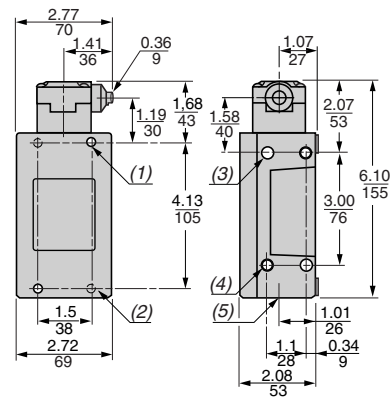
9007C Heavy Duty Industrial—Non-Plug-in Body, Metal Hazardous Location—Dimensions

Side Plunger

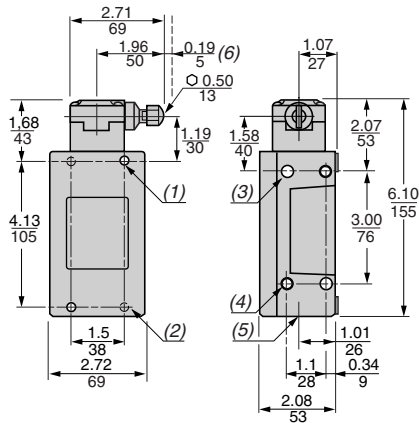
9007C••F



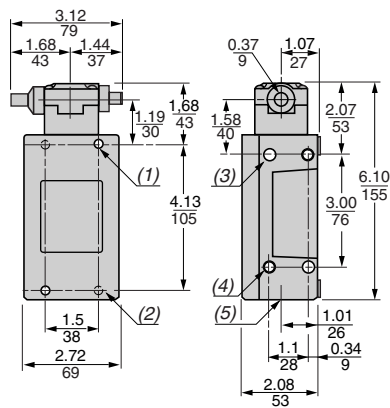
9007C••G



9007C••GD



9007C••H

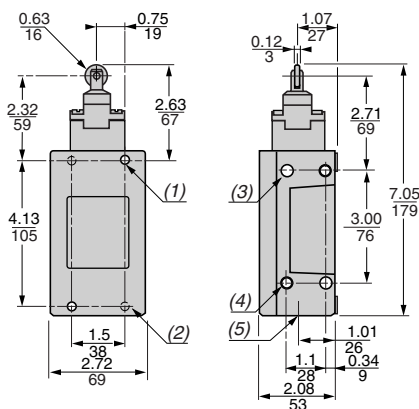


1. 2 x 0.277, front Mtg. holes.
2. 2 x 0.63/16 1/4-20 DP UNC-2B back mounting holes.
3. 2 x 0.26/7 dia. holes.
4. 2 1/4-20 UNC-2B, both sides 0.32/8 DP.
5. 1/2 or 3/4 NPT.
6. Adjustable.

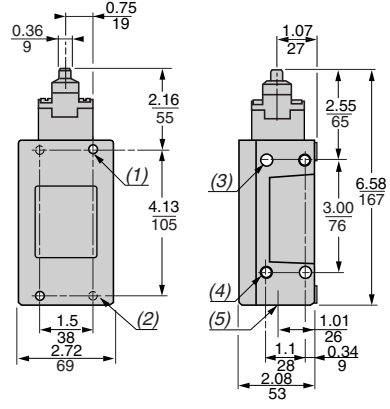
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

Top Plunger

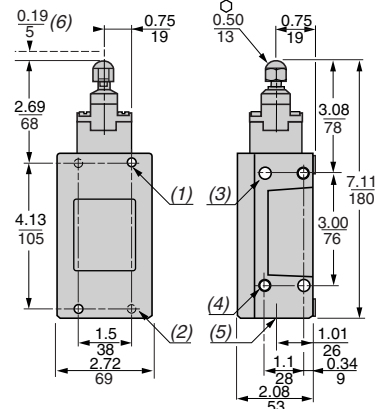
9007C••D



9007C••E



9007C••ED



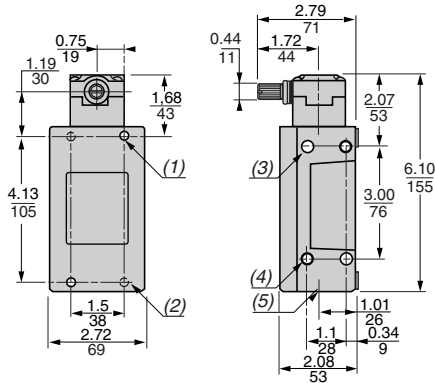
1. 2 x 0.277, front Mtg. holes.
2. 2 x 0.63/16 1/4-20 DP UNC-2B back mounting holes.
3. 2 x 0.26/7 dia. holes, back Mtg. holes.
4. 2 1/4-20 UNC-2B, both sides 0.32/8 DP.
5. 1/2 or 3/4 NPT.
6. Adjustable.

Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

Limit Switches

9007C Heavy Duty Industrial—Non-Plug-in Body, Metal Hazardous Location—Dimensions

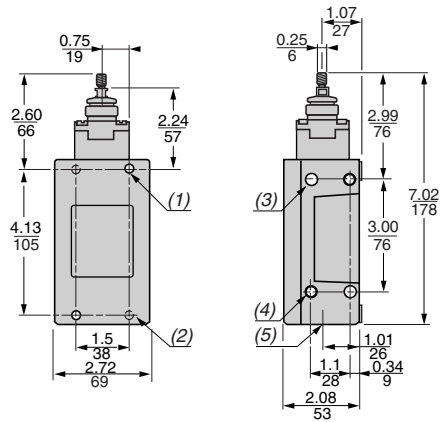
Rotary 9007C***



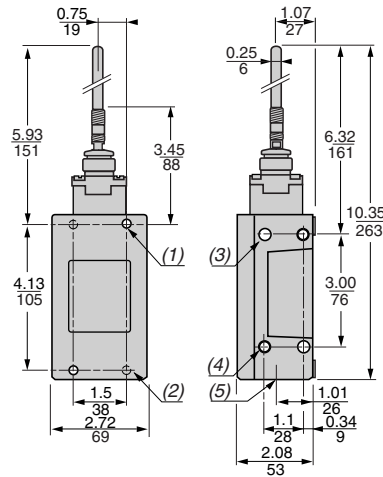
1. 2 x 0.2777, front Mtg holes.
2. 2 x 0.63/16 1/4-20 DP UNC-2B back mounting holes.
3. 2 x 0.2677 dia. holes, back Mtg. holes.
4. 2 1/4-20 UNC-2B, both sides 0.32/8 DP.
5. 1/2 or 1/4 NPT.

Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

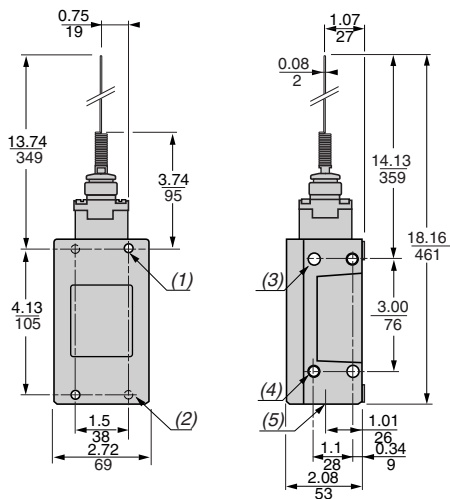
Wobble stick 9007C**JKC



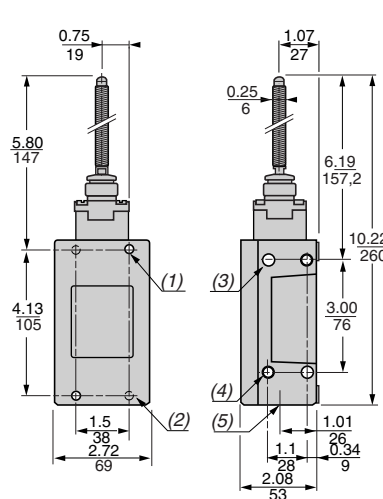
9007C**J



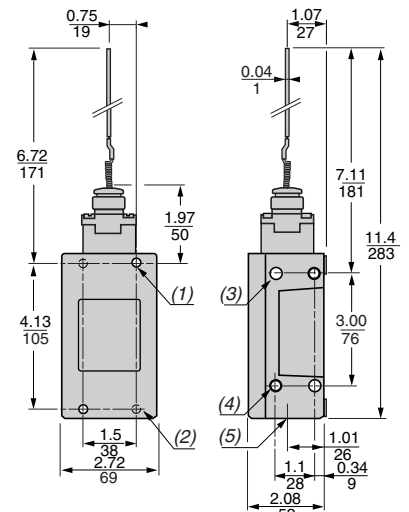
9007C**K



9007C**KC



9007C**L



1. 2 x 0.2777, front Mtg holes.
2. 2 x 0.63/16 1/4-20 DP UNC-2B back mounting holes.
3. 2 x 0.2677 dia. holes, back Mtg. holes.
4. 2 1/4-20 UNC-2B, both sides 0.32/8 DP.
5. 1/2 or 1/4 NPT.

Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

Limit Switches

9007C Heavy Duty Industrial

Technical Information

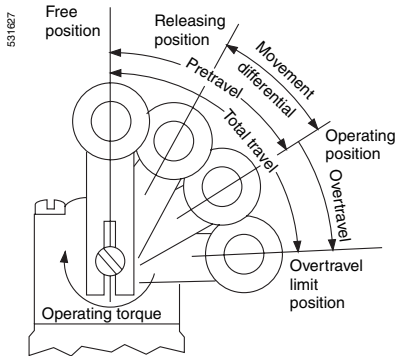


Figure 1: Rotary lever type

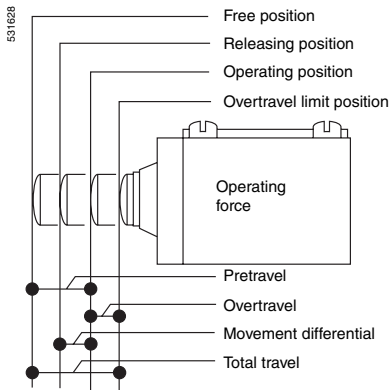


Figure 2: Linear (or Plunger) type

Glossary

CCW—Counterclockwise only (for lever types).

CW—Clockwise only (for lever types).

Differential—The movement differential or differential is the distance or angle from the operating position to the releasing position.

Free or normal position—Free or normal position is the initial position of the actuator when there is no external force (other than gravity) applied on the actuator.

Neutral position—Lever operated switch with a minimum of two contacts. One contact changes state only when lever moves CW. The second contact changes state only when the lever moves CCW. (The center position is the free position.)

Operating position—Operating position is the position of the actuator at which the contacts change state.

Overtravel—Overtravel is the distance or angle through which the actuator moves when traveling from the operating position to the overtravel limit position.

Pre-travel—Pre-travel is the distance or angle through which the actuator moves from the free position to the position at which the contacts change state, the operating position.

Release position—Release position is that position of the actuator at which the contacts change state from the operated contact position to the normal contact position.

Release torque—Release torque is the value to which the torque on the actuator must be reduced to allow the contacts to change state from the operated position to the normal contact position.

Actuator-lever—An actuator is the mechanism of the switch or enclosure which, when moved as intended, will operate the contacts.

Maintained contact limit switch—A maintained contact limit switch is a switch which remains in a given condition until actuated to another condition, which is also maintained until further actuation.

Momentary contact limit switch—A momentary contact limit switch is a switch which returns from the operated condition to its free or normal circuit condition when the actuating force is removed.

N.C.—Normally closed contact, when the switch mechanism is at its free or normal position.

N.O.—Normally open contact, when the switch mechanism is at its free or normal position.

Operating torque—Operating torque (force) is the minimum torque (force) value which must be applied to the actuator to cause the contacts to change state.

Overtravel limit position—Overtravel limit position is that position of the actuator beyond which further overtravel would cause damage to the switch or actuator.

Repeatability—Repeatability is the ability to consistently maintain the original operating characteristics. Measured by the difference between the operating position of a new switch and of the same after 1 million operations.

Total travel—Total travel is the sum of the pre-travel and overtravel.

Travel—Movement of the actuator from its free or normal position when force is applied. (See pre-travel and over travel.)

Limit Switches

9007C Heavy Duty Industrial

Technical Information

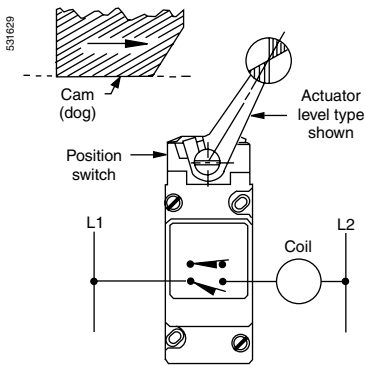


Figure 3—Limit switch

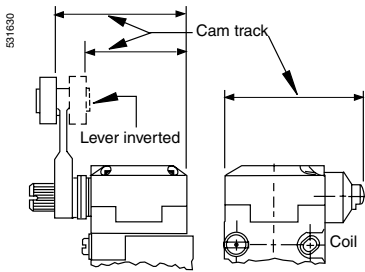


Figure 4—Cam track dimension

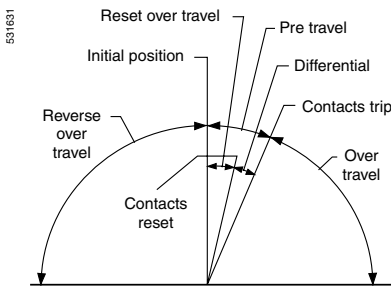


Figure 5—Contact travel

Glossary (continued)

Definition of limit switch terms

There are many terms common to position switches that are not used with other control devices. Before proceeding further, definitions of the commonly used terms should be understood as these terms will be used throughout this document.

Limit switch—A device that converts a mechanical motion into an electrical control signal.

Actuator—The mechanism of a limit switch that operates the contacts, i.e., lever arm, plunger, wobble stick.

Cam—A machine part or component that applies force to the switch actuator causing it to move as intended. Also known as “dog”.

Cam track dimension—The distance from the switch mounting surface to some point on the roller or actuator.

Differential—The distance that the limit switch actuator moves, from the trip point to the reset point of the contacts.

Direct-acting/positive opening contacts—Normally closed contacts that are moved directly by the operating shaft. They are slow make-slow break contacts and have a shorter life than snap action contacts due to longer arcing times. In general, these should only be used where movement of actuator must break welded contacts, as in a crane safety limit switch. (Snap action positive opening contacts are available in the Telemecanique® XCKJ limit switch.)

Maintained contacts—Contacts that remain in the tripped position until the return travel of the cam moves the switch actuator back and resets the contacts.

Neutral (free or normal) position limit switch—A lever arm type switch with two sets of contacts. One set operates when the shaft is rotated clockwise; the other operates when the shaft is rotated counterclockwise.

Operating force—The force required to move limit switch actuator to cause the contacts to change state.

Overtravel—The distance that the position switch actuator may move beyond the trip point, (see figure 5) without damage to the switch.

Pole—The number of moveable contacts in a switching mechanism. A single pole device may be 1 N.O., 1 N.C. or 1 N.O. and 1 N.C. with a single set of moveable contacts is used to bridge those stationary contacts. A double or two pole switch has two moveable contacts.

Positive break contacts—Normally closed contacts with a special mechanism to ensure opening. Can be snap acting positive break or direct acting slow make, slow break type. The slow break direct acting type is not recommended for high cycle applications due to shorter life.

Pre-travel—The distance that the limit switch actuator must move to trip the contacts.

Reed contacts—A mechanism consists of a set of contacts hermetically sealed in a glass envelope and actuated by a magnet attached to the operator. This sealed construction keeps contaminants out of the contact area, making the reed switch ideal for low voltage, low current circuits such as programmable controllers.

Reset point—The position of the actuator at which the contacts return to the normal position.

Snap action contacts—Contacts that move rapidly to open or closed position and are relatively independent of cam speed. Because of shorter arcing times, snap acting contacts have longer contact life than slow make and break contacts and should be used where fast moving cams are encountered or where good repeat accuracy is required.

Spring return—Contacts that return to their original position when the actuating force is removed.

Definition

Slow break contacts—The speed of transfer of the moveable contacts depends on the speed of the operator. The amount of travel of the moveable contacts is also dependent on the amount of travel by the operator. Slow make and break contacts have the same trip and reset points, and do not have the differential travel common to snap switches.

Snap action contacts—The speed of transfer of the moveable contacts is not dependent on the speed of the operator. The amount of travel of the moveable contacts is also not dependent on the amount of travel by the operator. The movement of the moveable contacts are determined by a preset travel, after this point is reached, the contacts will trip. Snap action contacts have different trip and reset points, the difference is identified as “differential.”

Flexible operators—Flexible resilient or elastic operators, i.e., wobble sticks, do not ensure direct opening/positive opening action.

Isolated contacts—Single-pole double-throw (SPDT) contacts with four terminals which have two isolated contact bars mechanically linked. No polarity restrictions apply. Different (isolated) power supplies can also be applied.

Same polarity—Single-pole double throw (SPDT) contacts with four terminals that require the supply to be applied with the same polarity (i.e., L1 or +) on the same side of the contact bar. Two different supplies are not allowed in this configuration. (The loads should always be on the same side of the contact bar.)

Direct opening contact (also known as positive opening contacts)—A normally closed contact element coupled with the switch actuator via a non-resilient (non-elastic) member so that full contact opening is obtained when the actuator is moved through the direct opening travel by applying a direct opening force. The contact element will shear open in the event of sticking contacts or broken springs. Proper fusing of the control circuit is required. Direct opening contacts meet IEC 60947-5-1 requirements.

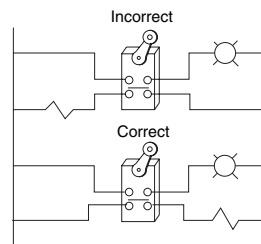
Direct opening travel (also known as positive opening travel)—Minimum travel from the actuator free position to the position where the direct opening operation is completed. Usually longer than the normal pre-travel.

Reed contacts—Contact mechanism consists of a set of contacts hermetically sealed in a glass envelope and actuated by a magnet attached to the operator. This sealed construction keeps contaminants out of the contact area, making the reed switch the ideal switch for low voltage, low current circuits such as programmable controllers.

NOTE: Because reed switches are operated by a magnet, they should not be installed in areas where strong magnetic fields may be present. The devices should always be checked for proper operation after installation.

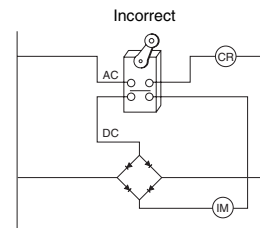
Polarity

Opposite polarities should not be connected to the contacts of one limit switch unless the limit switch is specifically designed for such service (isolated contacts—no polarity). See page 593.



Power sources

Power from different sources should not be connected to the contacts of one limit switch unless the switch is specifically designed for such service (isolated contacts—no polarity).



Limit Switches

9007C Heavy Duty Industrial

Technical Information

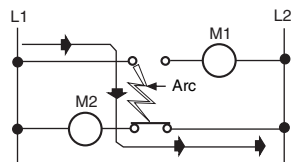
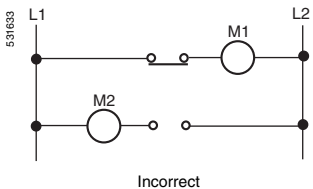
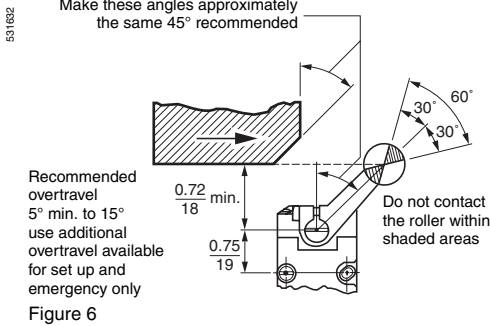


Figure 7—Contacts connected to opposite polarities. Line to line short (bold line) can occur through arc drawn when contacts operate

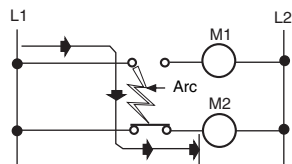
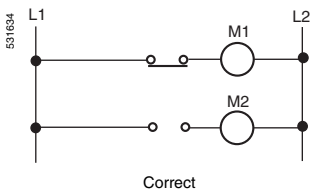


Figure 8—Contacts connected to same polarity. Line to line short cannot occur when contacts operate

Overriding Cams

The cam trailing edge on overriding cams must also be considered for maximum switch life (see figure 6). Lever arm snap back causes shock loads which reduce switch life. Also, with reversing cams the trailing edge becomes a leading edge on the return stroke. The overtravel of the limit switch should not be exceeded, but 5° minimum to 15° travel past the trip point is recommended. Additional travel should only be used for set up and emergencies. Cam design procedures for limit switches with other than lever arm actuators vary from switch type to switch type and are discussed along with other limit switch application design suggestions in additional literature "Proper Application of Limit Switches" (SM444).

Contacts

- Make sure the electrical load is within limit switch contact ratings.
- The single pole, double throw contacts of a snap switch used in a limit switch should not be used on opposite polarities. When load M1 is connected between the contact and line L2, and load M2 is connected between the other contact and line L1 (figure 7), a line-to-line short (bold line) can occur through the arc, which may be drawn as the contacts operate. When contacts are connected to the same polarity (figure 8), this line-to-line short cannot occur.
- The same result can occur if different power sources are connected to the single-pole, double-throw contacts of a snap switch.
- With limit switches having reed contacts, some form of transient protection should be used. This protects the small contacts from damaging surges and increases contact life.

Coolant

- When possible, avoid mounting limit switches where they will be constantly exposed to coolant, chips, etc. Although designed for such applications, switches last longer when not exposed to these contaminants.
- Make sure cover screws are tightened to ensure a good oiltight seal.
- When possible, avoid using fire-resistant coolants of the phosphate ester type. Equipment exposed to these coolants requires special seals and gaskets. Viton® fluoroelastomer, resistant to these types of coolants, is the standard shaft seal material on Type C lever arm types. If required, all gaskets, as well as boots on plunger types, can be furnished in Viton material.

Recommendations for Conduit Installation

Limit switch leakage is often traced to the conduit system. Coolant or condensation in the conduit line can enter the switch through the conduit entry. Oil tightness depends on the condition of the conduit connection and seal. Recommendations for installing conduit to position switches are as follows:

- To ensure an oiltight seal, use thread sealant and a conduit seal or a sealing bushing around the conduit fitting. Otherwise, the fitting probably will leak.
- Limit switches should be installed with the conduit end down whenever possible.
- If condensation or moisture is present inside the conduit, a Square D® conduit seal can be inserted into the conduit entry. The conduit fitting can then be connected in the normal manner. Thread sealant and a sealing bushing must still be used.
- Often a junction box fills with coolant and/or condensation, which backs up into the position limit through the conduit. A simple solution is to drill a hole in the bottom of the junction box to allow the liquid to drain out.
- If conduit leakage is severe, pre-wired and potted position limit (Forms Y184• and Y185•) should be used. The switches are pre-wired with either individual wires or multiconductor STOWA cord, and the receptacle is sealed with a potting material.
- The Square D limit switch is available with a pre-wired male plug receptacle. The connector provides an effective oiltight seal when used with the appropriate female connector cord.

Limit Switches

9007C Heavy Duty Industrial

Technical Information

Terminal Identification

European (IEC) contact terminals marking

Single pole	Double pole	
	1 st pole	2 nd pole
11-12	11-12	21-22
13-14	13-14	23-24
11-12	11-12	21-22
13-14	13-14	23-24

Each terminal is marked with 2 digits: First digit indicates the pole (circuit). The second digit indicates the type of contact:

_1-_2 is N.C., _3-_4 is N.O.

i.e.: 11-12, 21-22 are N.C. 13-14, 23-24 are N.O.

Example of European Terminal Markings:

For switch elements without isolated contacts:

11-12 Is the N.C. contact of pole No. 1, 13-14 Is the N.O. contact of pole No. 2

For switch elements with isolated contacts:

13-14 Is the N.O. contact of pole No. 1, 21-22 Is the N.C. contact of pole No. 2

Example of US Terminal Markings

Single pole	Double pole	
	1 st pole	2 nd pole
1-2	1-2	5-6
3-4	3-4	7-8
1-2	1-2	5-6
3-4	3-4	7-8

Each contact terminal is marked with one digit, i.e., 1-2, 3-4, 5-6,7-8.

Example of US Terminal Markings:

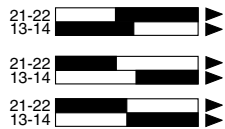
For most snap switch elements (isolated contacts not usually on US manufactured switches):

1-2 is the N.C. contact of pole No. 1,

3-4 is the N.O. contact of pole No. 1

5-6 is the N.C. contact of pole No. 2,

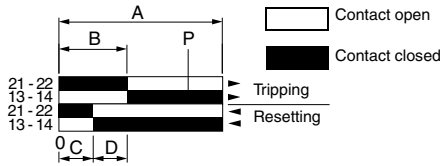
7-8 is the N.O. contact of pole No. 2



Make-before-break (overlapping) SPDT: the normally open contact closes before the normally closed contact opens.

Break-before-make (offset) SPDT: the normally closed contact opens before the normally open contact closes.

Simultaneous make and break SPDT: the normally closed contact opens at the same time as the normally open contact closes.



A = Maximum travel of the operator in mm or degrees.

B = Tripping travel of the contact.

C = Resetting travel of contact.

D = B-C = Differential travel.

P = Point from which positive opening is assured.

NOTE: The arrows indicate direction of actuation clockwise (CW) and return for simplicity reasons. For counterclockwise (CCW) only direction of actuation is reversed.

Wiring diagrams

Form A
SPST-NO



Form B
SPST-NC



Form C
SPDT



Form AA
DPST-NO



Form BB
DPST-NC



Form CC
DPDT



Form X
SPST-NO-DB



Form Y
SPST-NC-DB



Form Zb
SPDT isolated contacts



Form Z
DPDT-DB



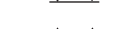
Form XX
DPST-NO-DB



Form YY
DPST-NC-DB



Form ZZ
DPDT-DB



Limit Switches

9007C Heavy Duty Industrial Cam Design

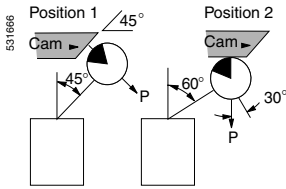


Figure 1A cam design for speeds up to 50 fpm

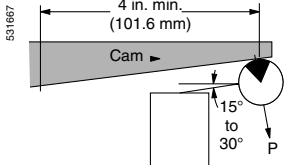


Figure 1B cam design for speeds from 50 to 200 fpm (15.2 to 60.9 mpm).

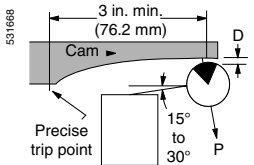


Figure 1C cam design for speeds from 200 to 400 fpm (60.9 to 121.9 mpm).

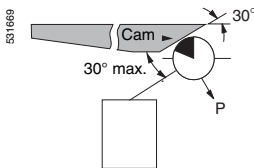


Figure 2

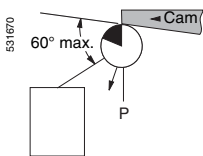


Figure 3

Application information

Excessive impact from improperly designed actuating systems is without question the leading cause of premature failure of the electromechanical limit switch. At slow speed, impact is rarely troublesome, but as speed increases, impact applied to the switch becomes a critical problem. In today's higher speed machines, therefore, it is important to give proper consideration to correctly designed actuating systems. These recommendations are designed to assist you in obtaining greater life from your limit switches. The black sector in the roller indicates the recommended design limits of the angle of pressure shown in the illustrations as "P". Three main design and installation considerations are:

- The pressure applied by the actuating mechanism to switch operating lever should approximate direction of lever rotation with a variation not to exceed 30°.
- Since the angle of pressure changes drastically with rotation of the lever, the cam must be designed for proper pressure angles at all positions of the lever travel.
- The switch operating levers should be positioned as nearly parallel with the leading edges of the cams as possible.

Considering these three factors:

- The cam in Figure 1A is satisfactory for speeds up to 50 fpm (15.2 mpm)
- The cam in Figure 1B is suitable for speeds up to 200 fpm (60.9 mpm) (nonuniform acceleration of switch lever)
- The cam in Figure 1C is satisfactory for speeds up to 400 fpm (121.9 mpm) (uniform or other controlled acceleration)

Designing proper pressure angles for overriding cams for electromechanical limit switches

Don't underestimate the importance of adjusting the cams and operating levers in electromechanical limit switches to provide the proper pressure angles in every travel position. Without the means to control the angle of pressure or the limit of override, the operating lever may spring back with damaging results. *Lever flyback usually causes double pulsing of the contacts, and places additional stresses on the mechanical system of the limit switch.* The excessive impacts absorbed from inadequately designed actuating devices eventually leads to abnormal wear and premature failure of the limit switch.

By looking closely at the actuating angles of the cam surface, designers and engineers can obtain the maximum operating life from electromechanical limit switches. The following recommendations help provide a workable knowledge of proper lever and cam angles—and how they are applied to secure optimum conditions:

- Actuating cam on machinery or slide should provide a trailing edge so that upon overriding the operating lever will not snap back.
- During the approach phase, **the pressure angle of the cam should not vary from the lever angle more than 30°.**
- On the override phase, **the angle of the trailing edge of the cam to the lever should be no more than 60°.**

If these guidelines are followed, the switch operating levers will always be approximately parallel with the leading edges of the actuating surfaces or cams.

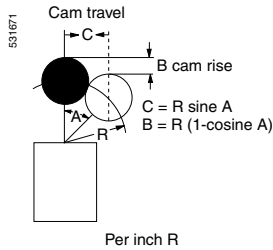
Figure 2 shows leading edge of cam about to depress and actuate the electromechanical limit switch. The black sector of the roller indicates the recommended design limits of the angle of pressure shown in drawings as "P".

Figure 3 shows operating lever roller following the trailing edge of the cam on the override cycle. Unless a one-way lever is used, the cam will operate the switch on the return cycle.

Limit Switches

9007C Heavy Duty Industrial

Linear/Angular Lever Travel



Application information (continued)

The table below can assist the designer of machine tools and conveyors, the plant engineer, or the maintenance personnel responsible for keeping this equipment in a satisfactory operating condition.

The design engineer will find the table useful in making trouble-free cam layouts. For example, if the recommended operating travel for a switch is between 15° and 30°, use the table to figure cam rise and travel. This aids in determining what type of cam to design, its dimensions, etc.

The plant engineer can use the table to determine where to position levers on replacement switches or revamped circuitry to operate existing cams. The engineer can also use the table to position the lever in proper relationship to the cam, and to find out whether switches and cams are installed properly to obtain maximum switch life.

All dimensions in the table are for 1 in. (25.4 mm) levers. If you use longer levers, multiply the figures by the increased lever length. For example, for a 2 in. (50.8 mm) lever, use the multiplier 2.

All limit switches have a recommended operating travel and for best performance should be installed within these limits. (1)

Dual dimensions: in. (mm)

A	B	C	A	B	C
1°	0.0002 (0.005 mm)	0.017 (0.43 mm)	46°	0.305 (7.7 mm)	0.719 (18.2 mm)
2°	0.0006 (0.015 mm)	0.035 (0.89 mm)	47°	0.318 (8.1 mm)	0.731 (18.6 mm)
3°	0.0014 (0.035 mm)	0.052 (1.3 mm)	48°	0.331 (8.4 mm)	0.743 (18.9 mm)
4°	0.002 (0.05 mm)	0.070 (1.8 mm)	49°	0.344 (8.7 mm)	0.755 (19.2 mm)
5°	0.004 (0.101 mm)	0.087 (2.2 mm)	50°	0.357 (9.0 mm)	0.766 (19.4 mm)
6°	0.005 (0.127 mm)	0.105 (2.6 mm)	51°	0.371 (9.4 mm)	0.777 (19.7 mm)
7°	0.007 (0.178 mm)	0.122 (3.1 mm)	52°	0.384 (9.7 mm)	0.788 (20.0 mm)
8°	0.010 (0.254 mm)	0.139 (3.5 mm)	53°	0.398 (10.1 mm)	0.799 (20.3 mm)
9°	0.012 (0.304 mm)	0.156 (4.0 mm)	54°	0.412 (10.4 mm)	0.809 (20.5 mm)
10°	0.015 (0.381 mm)	0.174 (4.4 mm)	55°	0.426 (11.0 mm)	0.819 (20.8 mm)
11°	0.018 (0.457 mm)	0.191 (4.8 mm)	56°	0.441 (11.2 mm)	0.829 (21.0 mm)
12°	0.022 (0.559 mm)	0.208 (5.3 mm)	57°	0.455 (11.5 mm)	0.839 (21.3 mm)
13°	0.026 (0.660 mm)	0.225 (5.7 mm)	58°	0.468 (12.3 mm)	0.857 (21.7 mm)
14°	0.030 (0.762 mm)	0.242 (6.1 mm)	59°	0.485 (12.3 mm)	0.857 (21.7 mm)
15°	0.034 (0.863 mm)	0.259 (6.6 mm)	60°	0.500 (12.7 mm)	0.866 (22 mm)
16°	0.039 (0.990 mm)	0.276 (7.2 mm)	61°	0.515 (13.1 mm)	0.875 (22.2 mm)
17°	0.044 (1.12 mm)	0.292 (7.4 mm)	62°	0.531 (13.5 mm)	0.883 (22.4 mm)
18°	0.049 (1.24 mm)	0.309 (7.8 mm)	63°	0.546 (14.0 mm)	0.891 (22.6 mm)
19°	0.054 (1.37 mm)	0.326 (8.3 mm)	64°	0.562 (14.3 mm)	0.899 (22.8 mm)
20°	0.060 (1.52 mm)	0.342 (8.7 mm)	65°	0.577 (14.6 mm)	0.906 (23.0 mm)
21°	0.066 (1.67 mm)	0.358 (9.1 mm)	66°	0.593 15.0 (mm)	0.914 (23.2 mm)
22°	0.073 (1.85 mm)	0.375 (9.5 mm)	67°	0.609 15.5 (mm)	0.921 (23.4 mm)
23°	0.079 (2.00 mm)	0.391 (9.9 mm)	68°	0.625 (16.0 mm)	0.927 (23.5 mm)
24°	0.086 (2.2 mm)	0.407 (10.3 mm)	69°	0.642 (16.3 mm)	0.934 (23.7 mm)
25°	0.094 (2.38 mm)	0.423 (10.7 mm)	70°	0.658 (16.7 mm)	0.940 (23.9 mm)
26°	0.101 (2.56 mm)	0.438 (11.1 mm)	71°	0.674 (17.1 mm)	0.946 (24.0 mm)
27°	0.109 (2.77 mm)	0.454 (11.5 mm)	72°	0.691 (17.5 mm)	0.951 (24.1 mm)
28°	0.117 (2.9 mm)	0.469 (12 mm)	73°	0.708 (18.0 mm)	0.956 (24.3 mm)
29°	0.125 (3.17 mm)	0.485 (12.3 mm)	74°	0.724 (18.4 mm)	0.961 (24.4 mm)
30°	0.134 (3.40 mm)	0.500 (12.7 mm)	75°	0.741 (19.0 mm)	0.966 (24.5 mm)
31°	0.143 (3.6 mm)	0.515 (13.1 mm)	76°	0.758 (19.2 mm)	0.970 (24.6 mm)
32°	0.152 (3.9 mm)	0.530 (13.4 mm)	77°	0.775 (20.0 mm)	0.974 (24.7 mm)
33°	0.161 (4.1 mm)	0.545 (14.0 mm)	78°	0.792 (20.1 mm)	0.978 (24.8 mm)
34°	0.171 (4.3 mm)	0.559 (14.2 mm)	79°	0.809 (20.5 mm)	0.982 (24.9 mm)
35°	0.181 (4.6 mm)	0.574 (14.6 mm)	80°	0.826 (21.0 mm)	0.985 (25.0 mm)
36°	0.191 (4.8 mm)	0.588 (15 mm)	81°	0.844 (21.4 mm)	0.988 (25.1 mm)
37°	0.201 (5.1 mm)	0.602 (15.3 mm)	82°	0.861 (21.8 mm)	0.990 (25.1 mm)
38°	0.212 (5.4 mm)	0.616 (15.6 mm)	83°	0.878 (22.3 mm)	0.993 (25.2 mm)
39°	0.223 (5.7 mm)	0.629 (16.0 mm)	84°	0.895 (22.7 mm)	0.995 (25.3 mm)
40°	0.234 (6.0 mm)	0.643 (16.3 mm)	85°	0.913 (23.2 mm)	0.996 (25.3 mm)
41°	0.245 (6.2 mm)	0.656 (16.6 mm)	86°	0.930 (23.6 mm)	0.9976 (25.3 mm)
42°	0.257 (6.5 mm)	0.669 (17.0 mm)	87°	0.948 (24.0 mm)	0.9986 (25.4 mm)
43°	0.269 (6.8 mm)	0.682 (17.3 mm)	88°	0.965 (24.5 mm)	0.9994 (25.4 mm)
44°	0.281 (7.1 mm)	0.695 (17.6 mm)	89°	0.983 (25.0 mm)	0.9999 (25.4 mm)
45°	0.293 (7.4 mm)	0.707 (18 mm)	90°	1.000 (25.4 mm)	1.000 (25.4 mm)

1. Refer to document SM444R1 for additional information regarding Cam speed and angles.

Limit Switches

9007C Heavy Duty Industrial

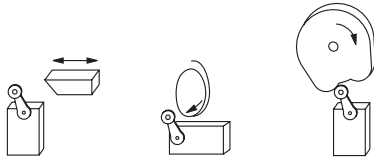
Installation Considerations

Lever Actuators

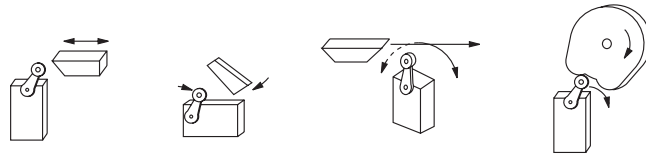
For limit switches with lever actuators, the actuating force should be applied as nearly perpendicular to the lever as practical and perpendicular to the shaft axis about which the lever rotates.

Lever Actuators

Correct



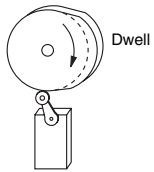
Incorrect



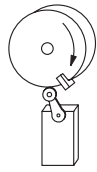
Dwelling Requirements

Where relatively fast motions are involved, the cams should be so designed that the limit switch will be held operated long enough to operate relays, valves, etc.

Correct

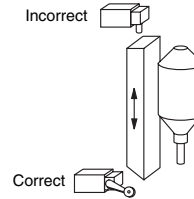
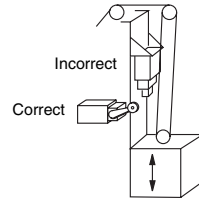


Incorrect

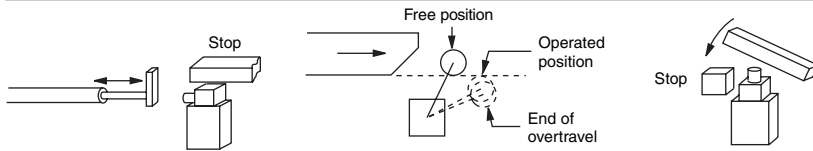


Overtravel limitations

Operating mechanisms for limit switches should be so designed that, under any operating or emergency conditions, the limit switch is not operated beyond its overtravel limit position. A limit switch should not be used as a mechanical stop.



Correct



Limit Switches

9007T and FT Severe Duty Mill and Foundry Switches

Conforming to NEMA A600 and UL508

Description

9007T Mill Switches

Use the 9007T Mill switches instead of other limit switches in the following applications:

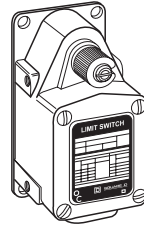
- Where the current load exceeds the typical heavy duty limit switch contact rating of 10 A and falls within the range of up to 20 A continuous.
- Where an operating sequence is required that is not possible on other limit switches. Fifteen sequences are available. Universal type has twelve different operating sequences with CW only, CCW only and neutral position. Standard type has three operating sequences with CW and CCW operation.
- Where higher reset forces are required due to foreign material interfering with lever arm operation, or where long heavy arms must reset against gravity.

9007FT Foundry Switches

The 9007FT Foundry switches are for use in foundries or mills where the applications described above are required, and where falling foundry sand or similar material could build up and jam the operating mechanism. The shaft has a dust boot and extends from the switch case, preventing sand build up around the shaft. The devices can withstand hot falling sand up to 300° F (149° C.).

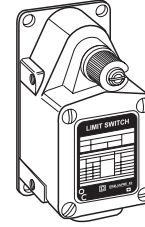
9007 (convertible sequence)

9007T Mill Switches



Page 600

9007FT Foundry Switches



Page 602

Application Information

Type T — Ideal for applications requiring extra heavy duty contact ratings, or higher operating and reset forces. Rugged mechanical construction with several different operating sequences in one basic switch.

Type FT — Designed specifically for rough foundry application. The shaft is entirely beyond the switch case to prevent jamming of the lever arm due to build up of sand. A dust boot is furnished as standard to further prevent sand packing and allow free movement of the lever arm. An extra long shaft bearing makes the switch extremely rugged and able to handle the rough applications encountered in foundries, mills, machine tool and similar industries. The switch will withstand hot falling sand up to 300° F (149° C).

Type T and FT

Enclosure — Oil-tight, dust-tight, water-tight, drip-tight meets NEMA Types 2, 4, and 13 requirements. Die cast zinc construction.

Operating Sequences — Fifteen sequences available. Universal type has 12 different operating sequences with CW only, CCW only, and neutral position operation. Standard type has three operating sequences with CW and CCW operation. Various sequences will give quick make and break, spring return with maintained contact, or slow make and break. Most sequences are convertible by removing the base plate and adjusting the positioning plate and/or latches

Ambient Temperature Range — 10° F (-12.2° C) to 185° F (85° C) ambient at full rated load, up to 220° F (104° C) ambient with single coil load.

Lever Arm — Die cast zinc construction with hardened, oil-impregnated, sintered iron rollers.

Conduit — 0.5 in. standard / 20 mm optional—Form M11

Mounting — Four baseplates provide end or side mounting holes and/or manifold mounting. All mounting holes are 0.25 in. (6.35 mm) diameter. Two tapped holes on each side of switch allows side mounting.

Contacts — SPDT¹ double break and three point double throw single break. Silver contact tips. Phenolic contact block. Nylon liner. Polarity must be the same on double throw contacts.

1. Single pole, double throw.

Limit Switches

9007T and FT Severe Duty Mill and Foundry Switches

Conforming to NEMA A600 and UL508

Environmental characteristics	
Conforming to standards	UL508
Product certifications	UL Listed, CSA Certified, CE Marked
Protective treatment	Corrosion resistant gray paint
Ambient air temperature	-10 to +185 °F (-23 to +85 °C) Housing can withstand falling sand at +300 °F (+149 °C)
Vibration resistance	10G (10–55 Hz)
Shock resistance	30G
Electric shock protection	Class 0
Degree of protection	NEMA Types 1, 2, 4, 12, 13, IP65, 66, 67
Cable entry or connector	1/2" NPT (metric available)
Materials	Cast zinc

Contact block characteristics		
Rated operational characteristics hard contacts	AC Voltage	NEMA A600 Ithe = 20 A 20 A Resistive and continuous
Rated operational characteristics hard contacts	DC Voltage	NEMA P 600 Ithe = 20 A 20 A Resistive and continuous
Rated insulation voltage		600 V
Rated impulse withstand voltage		2,500 Vac for 1 minute for CE, 2,200 Vac for 1 minute for UL, and 2,640 Vac for 1 minute for CSA
Positive opening		No
Short circuit protection		20 A Bussmann Class CC KTK-R-20 fuse, non-time-delay
Terminal wire sizes (Cabling/Screw Clamp)		12 – 22 AWG (3.31 mm ² – 0.326 mm ²) wire max.
Maximum actuation speed		15.2 mpm / 27.4 mpm (50 fpm / 90 fpm) with 45° Cam angle, levers only

Maximum current ratings for control circuit contacts												
Contacts	AC							DC				
	Volts	Inductive 35% Power Factor				Continuous Carrying Amperes	Resistive 75% Power Factor		Volts	Inductive and Resistive		Continuous Carrying Amperes
		Make		Break			Make, Break and Continuous Carrying Amperes			Make and Break Amperes		
	Amperes	VA	Amperes	VA		Make	Break		Single Throw	Double Throw		
SPDT Quick Make and Break	120	150	18,000	20	2400	20	20	20	120	5.0	°	20
	240	75	18,000	12.5	3000	20	20	20	250	1.0	°	20
	480	37.5	18,000	6.25	3000	20	20	20	600	0.2	°	20
	600	30	18,000	5	3000	20	20	20				
All Slow Make and Break	120	60	7200	6	720	20	10	20	—	—	—	—
	240	30	7200	3	720	20	10	20	—	—	—	—
	480	15	7200	1.5	720	20	10	20	—	—	—	—
	600	12	7200	1.2	720	20	10	20	—	—	—	—

Characteristics for material and ratings comparisons — standard switches		
	9007 Type T/FT	Type L (R. B. Denison® LoXswitch™)
Body material	Cast zinc	Cast aluminum
Cover material	Cast zinc	Aluminum
Base plate material	Steel with zinc plating	Steel with chromate plating
Shaft seal material	Nitrile	PVC
Contact block material	Phenolic	Glass filled nylon
Moveable contact material	Fine silver on copper backing	Coin Silver on steel backing
Stationary contact material	Fine silver on copper backing	90/10 AgCdO on copper backing
Low ambient temperature rating	-10° F	0° F
High ambient temperature at full rating	180° F	200° F
Enclosure rating	NEMA Types 1, 2, 4, 12 and 13	NEMA Types 1, 4 and 13
Vibration resistance	10G (10–150 Hz)	40G max (10-150 Hz)

♦ Many switches are available with higher or lower temperature limits by selecting special versions or special options. See page 621.


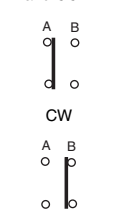
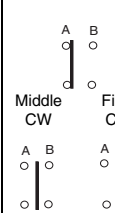
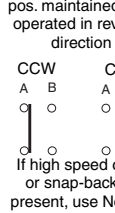
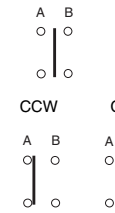
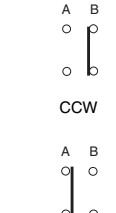
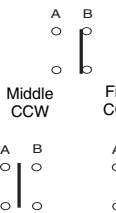
Limit Switches

9007T Severe Duty Mill Switches

Universal Operating Sequences

Universal Catalog Numbers

Base Plate







Surface Mounted	A	9007TUA1	9007TUA2	9007TUA3	9007TUA4	9007TUA5	9007TUA6
	B	9007TUB1	9007TUB2	9007TUB3	9007TUB4	9007TUB5	9007TUB6
	C	9007TUC1	9007TUC2	9007TUC3	9007TUC4	9007TUC5	9007TUC6
	D	9007TUD1	9007TUD2	9007TUD3	9007TUD4	9007TUD5	9007TUD6
	No. 1	No. 2	No. 3 ④	No. 4	No. 5	No. 6	
	SPDT Spring Return CW Only	SPDT Spring Return CW Only	SPDT Maintained Contact	SPDT Spring Return Neutral Position	SPDT Spring Return CCW Only	SPDT Spring Return CCW Only	
	Initial position and CCW 	Initial position and CCW 	Spring return of arm to initial pos. Contact pos. maintained until operated in reverse direction CCW CW 	Initial position 	Initial position and CW 	Initial position and CW 	

Characteristics

Nominal Operating Data


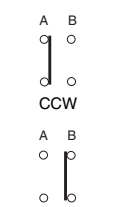
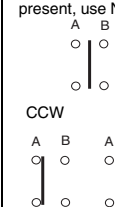
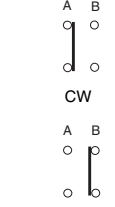
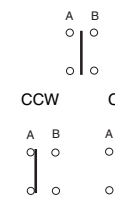
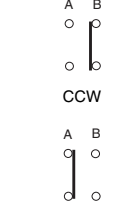
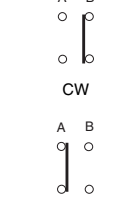
Pre-travel ①	14°	Int. Pos. 9°, Final 16°	7°	6°	14°	Int. Pos. 9°, Final 16°
Total travel	88°	88°	81°	81°	88°	88°
Differential	12°	5°	7°	5°	12°	5°
Operating torque	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)
Repeat accuracy ②	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)

To convert sequences, remove base plate, position plate and latches. Reassemble positioning plate and latches as shown.

						
Weight lb (kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)

Universal Catalog Numbers (continued)

Base Plate






Surface Mounted	A	9007TUA7	9007TUA8	9007TUA9	9007TUA10	9007TUA11	9007TUA12
	B	9007TUB7	9007TUB8	9007TUB9	9007TUB10	9007TUB11	9007TUB12
	C	9007TUC7	9007TUC8	9007TUC9	9007TUC10	9007TUC11	9007TUC12
	D	9007TUD7	9007TUD8	9007TUD9	9007TUD10	9007TUD11	9007TUD12
	No. 7	No. 8 ④	No. 9	No. 10	No. 11	No. 12	
	SPDT Maintained	SPDT Maintained Neutral Position	SPDT Spring Return Slow Make, Slow Break	SPDT Spring Return Slow Make, Slow Break	SPDT Spring Return Slow Make, Slow Break	SPDT Spring Return Slow Make, Slow Break	SPDT Maintained
	If high speed cam or snap-back present, use No. 12 	Initial position If high speed cam or snap-back is present, use No. 12 	Initial position and CCW 	Initial position 	Initial position and CW 	CCW 	

Characteristics

Nominal Operating Data

Pre-travel ①	10°	6°	12°	3°	12°	45°
Total travel	85°	81°	87°	81°	87°	90°
Differential	12°	10°	0°	0°	0°	0°
Operating torque	2.5 lb-in (0.28 N•m)	2.5 lb-in (0.28 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	8 lb-in (0.9 N•m)
Repeat accuracy ②	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)

To convert sequences, remove base plate, position plate and latches. Reassemble positioning plate and latches as shown.

						Not adjustable
Weight lb (kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)

Footnotes: see page 601

Dimensions:
pages 606 to 609

Interpretation of Catalog Numbers:
page 623

Base Plates:
pages 605 and 606

600

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09/2007

Limit Switches

9007T Severe Duty Mill Switches

Standard Operating Sequences

Standard Catalog Numbers

Base Plate

Surface
Mounted



A	9007TSA1	9007TSA2	9007TSA3		
B	9007TSB1	9007TSB2	9007TSB3		
C	9007TSC1	9007TSC2	9007TSC3		
D	9007TSD1	9007TSD2	9007TSD3		
No. 1		No. 2		No. 3	
SPDT Spring Return CW & CCW		SPDT Spring Return CW & CCW		SPDT Spring Return CW & CCW Slow Make, Slow Break	
Initial position A B ○ ○ ○ ○ CW and CCW A B ○ ○ ○ ○		Initial position A B ○ ○ ○ ○ CW and CCW Middle Final A B A B ○ ○ ○ ○ ○ ○ ○ ○		Initial position A B ○ ○ ○ ○ CW and CCW A B ○ ○ ○ ○	

Characteristics (nominal operating data)

Switch actuation	By 30° cam		
Type of actuation			
Pre-travel ①	14°	Int. Pos. 9°, Final 16°	9°
Total travel	89°	89°	89°
Differential	12°	Int. Pos. 5.5°, Final 7.5°	5°
Reverse overtravel	N/A (future availability)	N/A (future availability)	N/A (future availability)
Operating torque/force 1 pole & 2 pole	10 lb-in (1.13 N•m)	10 lb-in (1.13 N•m)	10 lb-in (1.13 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	#12–22 AWG (3.31–0.326 mm ²)	#12–22 AWG (3.31–0.326 mm ²)	#12–22 AWG (3.31–0.326 mm ²)
Repeatability ② (linear travel of cam)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)
Cable entry (metric available)	1/2" NPT	1/2" NPT	1/2" NPT
Weight lb (kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)

① The pre-travel listed may vary up to 5° additional for universal switches or up to 2° additional for standard switches due to free travel of lever arm at initial position.

② Linear travel of cam on 1.5 in. (38.1mm) lever arm.

③ Remove spring from the positioning plate.

④ Sequence 3, 7, and 8 devices are available but are not recommended where high speed cams or lever arm snap-back is present. The application should be checked and No. 12 sequences substituted where possible.

Note: For Type FT foundry switches, change the "T" at the beginning of the equivalent Type number above to "FT" (Example: FTUB1). See page 602.


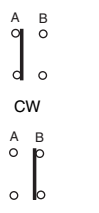
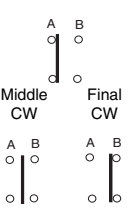
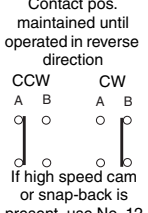
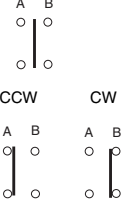
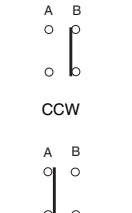
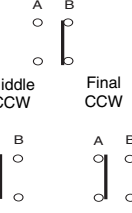
Limit Switches

9007FT Severe Duty Foundry Switches

Universal Operating Sequences

Universal Catalog Numbers

Base Plate







Surface Mounted	A	9007FTUA1	9007FTUA2	9007FTUA3	9007FTUA4	9007FTUA5	9007FTUA6
	B	9007FTUB1	9007FTUB2	9007FTUB3	9007FTUB4	9007FTUB5	9007FTUB6
C	9007FTUC1	9007FTUC2	9007FTUC3	9007FTUC4	9007FTUC5	9007FTUC6	9007FTUC6
D	9007FTUD1	9007FTUD2	9007FTUD3	9007FTUD4	9007FTUD5	9007FTUD6	9007FTUD6
	No. 1	No. 2	No. 3 ④	No. 4	No. 5	No. 6	
	SPDT Spring Return CW Only	SPDT Spring Return CW Only	SPDT Maintained Contact	SPDT Spring Return Neutral Position	SPDT Spring Return CCW Only	SPDT Spring Return CCW Only	
	Initial position and CCW 	Initial position and CCW 	Spring return of arm to initial pos. Contact pos. maintained until operated in reverse direction CCW CW 	Initial position 	Initial position and CW 	Initial position and CW 	

Characteristics

Nominal Operating Data


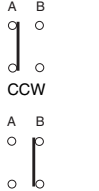
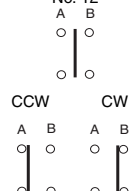
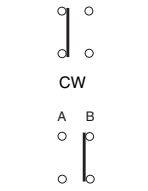
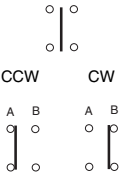
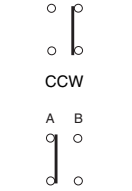
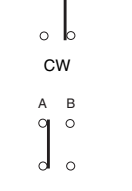
Pre-travel ①	14°	Int. Pos. 9°, Final 16°	7°	6°	14°	Int. Pos. 9°, Final 16°
Total travel	88°	88°	81°	81°	88°	88°
Differential	12°	5°	7°	5°	12°	5°
Operating torque	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)
Repeat accuracy ②	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)

To convert sequences, remove base plate, position plate and latches. Reassemble positioning plate and latches as shown.

						
Weight lb (kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)

Universal Catalog Numbers (continued)

Base Plate






Surface Mounted	A	9007FTUA7	9007FTUA8	9007FTUA9	9007FTUA10	9007FTUA11	9007FTUA12
	B	9007FTUB7	9007FTUB8	9007FTUB9	9007FTUB10	9007FTUB11	9007FTUB12
C	9007FTUC7	9007FTUC8	9007FTUC9	9007FTUC10	9007FTUC11	9007FTUC12	9007FTUC12
D	9007FTUD7	9007FTUD8	9007FTUD9	9007FTUD10	9007FTUD11	9007FTUD12	9007FTUD12
	No. 7	No. 8 ④	No. 9	No. 10	No. 11	No. 12	
	SPDT Maintained	SPDT Maintained Neutral Position	SPDT Spring Return Slow Make, Slow Break	SPDT Spring Return Slow Make, Slow Break	SPDT Spring Return Slow Make, Slow Break	SPDT Maintained	
	If high speed cam or snap-back present, use No. 12 	Initial position If high speed cam or snap-back present, use No. 12 	Initial position and CCW 	Initial position 	Initial position and CW 	CCW 	

Characteristics

Nominal Operating Data

Pre-travel ①	10°	6°	12°	3°	12°	45°
Total travel	85°	81°	87°	81°	87°	90°
Differential	12°	10°	0°	0°	0°	0°
Operating torque	2.5 lb-in (0.28 N•m)	2.5 lb-in (0.28 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	12 lb-in (1.35 N•m)	8 lb-in (0.9 N•m)
Repeat accuracy ②	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)

To convert sequences, remove base plate, position plate and latches. Reassemble positioning plate and latches as shown.

						Not adjustable
Weight lb (kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)

Footnotes: see page 603

Dimensions:
pages 606 to 609

Interpretation of Catalog Numbers:
page 623

Limit Switches

9007FT Severe Duty Foundry Switches

Standard Operating Sequences

Standard Catalog Numbers

Base Plate

Surface
Mounted



A	9007FTSA1	9007FTSA2	9007FTSA3		
B	9007FTSB1	9007FTSB2	9007FTSB3		
C	9007FTSC1	9007FTSC2	9007FTSC3		
D	9007FTSD1	9007FTSD2	9007FTSD3		
No. 1		No. 2		No. 3	
Single Pole Double Throw Spring Return CW & CCW		Single Pole Double Throw Spring Return CW & CCW		Single Pole Double Throw Spring Return CW & CCW Slow Make Slow Break	
Initial position CW and CCW 		Initial position CW and CCW Middle Final 		Initial position CW and CCW 	

Characteristics (nominal operating data)

Switch actuation	By 30° cam		
Type of actuation			
Pre-travel ①	14°	Int. Pos. 9°, Final 16°	9°
Total travel	89°	89°	89°
Differential	12°	Int. Pos. 5.5°, Final 7.5°	5°
Reverse overtravel	N/A (future availability)	N/A (future availability)	N/A (future availability)
Operating torque/force 1 pole & 2 pole	10 lb-in (1.13 N•m)	10 lb-in (1.13 N•m)	10 lb-in (1.13 N•m)
Terminal wire sizes (Cabling/Screw Clamp)	#12–22 AWG (3.31–0.326 mm ²)	#12–22 AWG (3.31–0.326 mm ²)	#12–22 AWG (3.31–0.326 mm ²)
Repeatability ② (linear travel of cam)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)
Cable entry (metric available)	1/2" NPT	1/2" NPT	1/2" NPT
Weight lb (kg)	2.57 lb. (1.17 kg)	2.57 lb. (1.17 kg)	2.57 lb. (1.17 kg)

① The pre-travel listed may vary up to 5° additional for universal switches or up to 2° additional for standard switches due to free travel of lever arm at initial position.

② Linear travel of cam on 1.5 in. (38.1mm) lever arm.

③ Remove spring from the positioning plate.

④ Sequence 3, 7, and 8 devices are available but are not recommended where high speed cams or lever arm snap-back is present. The application should be checked and No. 12 sequences substituted where possible.

Note: Type FT Foundry Switches are obtained by changing the "T" at the beginning of the equivalent type number to "FT" (Example: FTUB1).

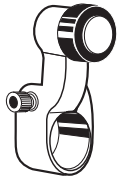
Limit Switches

9007T and FT Severe Duty Mill and Foundry Switches

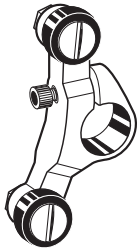
Lever Arms and Renewal Parts



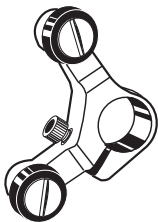
Standard Roller



Offset Type



120° Forked



90° Forked

Standard Roller

Arm		Steel Roller		Catalog Number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller Position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	Optional	0.25 (6.3)	9007B1	0.17 (0.077)
1.5 (38.1)	1.0 (25.4)	Optional	0.25 (6.3)	9007B2	0.19 (0.086)
1.5 (38.1)	1.38 (35)	Optional	0.25 (6.3)	9007B3	0.23 (0.104)
2.5 (63.5)	0.75 (19)	Optional	0.25 (6.3)	9007B7	0.25 (0.113)
2.5 (63.5)	1.0 (25.4)	Optional	0.25 (6.3)	9007B8	0.25 (0.113)
2.5 (63.5)	1.38 (35)	Optional	0.25 (6.3)	9007B9	0.27 (0.122)
1.5 (38.1)	0.75 (19)	Optional	0.5 (12.7)	9007B12	0.34 (0.154)
1.5 (38.1)	1.0 (25.4)	Optional	0.5 (12.7)	9007B13	0.34 (0.154)
1.5 (38.1)	1.38 (35)	Optional	0.5 (12.7)	9007B14	0.42 (0.191)
5 (127)	0.75 (19)	Optional	0.25 (6.3)	9007B19	1.00 (0.454)
2.88 (73.1)	0.75 (19)	No roller	—	9007B21	0.20 (0.091)
2.5 (63.5)	0.75 (19)	Optional	0.5 (12.7)	9007B22	0.22 (0.100)
2.5 (63.5)	1.0 (25.4)	Optional	0.5 (12.7)	9007B23	0.28 (0.127)
2.5 (63.5)	1.38 (35)	Optional	0.5 (12.7)	9007B24	0.36 (0.163)
Adjustable ⁽¹⁾	0.75 (19)	Optional	0.25 (6.3)	9007R18	0.50 (0.227)
Adjustable ⁽¹⁾	1.0 (25.4)	Optional	0.25 (6.3)	9007R19	0.50 (0.227)
Adjustable ⁽¹⁾	1.38 (35)	Optional	0.25 (6.3)	9007R20	0.50 (0.227)

1. Does not include lever arm clamp or rod. If lever arm clamp is required, use 9007R16 or R17.

Offset Type (for obtaining different cam track dimensions)

Arm		Steel Roller		Catalog Number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller Position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	Inside offset	0.25 (6.3)	9007C1	0.50 (0.227)
1.5 (38.1)	1.0 (25.4)	Inside offset	0.25 (6.3)	9007C2	0.50 (0.227)
1.5 (38.1)	1.38 (35)	Inside offset	0.25 (6.3)	9007C3	0.50 (0.227)
1.5 (38.1)	0.75 (19)	Outside offset	0.25 (6.3)	9007D1	0.18 (0.082)
1.5 (38.1)	1.0 (25.4)	Outside offset	0.25 (6.3)	9007D2	0.18 (0.082)
1.5 (38.1)	1.38 (35)	Outside offset	0.25 (6.3)	9007D3	0.18 (0.082)
1.88 (48)	0.75 (19)	Outside offset	0.25 (6.3)	9007E4	0.20 (0.091)
1.88 (48)	1.0 (25.4)	Outside offset	0.25 (6.3)	9007E5	0.27 (0.122)
1.88 (48)	1.38 (35)	Outside offset	0.25 (6.3)	9007E6	0.27 (0.122)
1.88 (48)	0.75 (19)	Inside offset	0.25 (6.3)	9007F4	0.30 (0.136)
1.88 (48)	1.0 (25.4)	Inside offset	0.25 (6.3)	9007F5	0.30 (0.136)
1.88 (48)	1.38 (35)	Inside offset	0.25 (6.3)	9007F6	0.30 (0.136)

120° Forked (for maintained contact lever arm type switches)

Arm		Steel Roller		Catalog Number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller Position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	Same side	0.25 (6.3)	9007J1	0.31 (0.141)
1.5 (38.1)	1.0 (25.4)	Same side	0.25 (6.3)	9007J2	0.40 (0.181)
1.5 (38.1)	0.75 (19)	LH on opp. side	0.25 (6.3)	9007K1	0.50 (0.227)
1.5 (38.1)	1.0 (25.4)	LH on opp. side	0.25 (6.3)	9007K2	0.50 (0.227)
1.5 (38.1)	0.75 (19)	RH on opp. side	0.25 (6.3)	9007N1	0.66 (0.299)
1.5 (38.1)	1.0 (25.4)	RH on opp. side	0.25 (6.3)	9007N2	0.70 (0.316)

90° Forked (for maintained contact lever arm type switches)

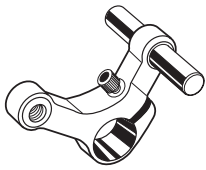
Arm		Steel Roller		Catalog Number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller Position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	Same side	0.25 (6.3)	9007X1	0.30 (0.136)
1.5 (38.1)	1.0 (25.4)	Same side	0.25 (6.3)	9007X2	0.40 (0.181)
1.5 (38.1)	0.75 (19)	RH on opp. side	0.25 (6.3)	9007Y1	0.50 (0.227)
1.5 (38.1)	1.0 (25.4)	RH on opp. side	0.25 (6.3)	9007Y2	0.50 (0.227)
1.5 (38.1)	0.75 (19)	LH on opp. side	0.25 (6.3)	9007Z1	0.66 (0.299)
1.5 (38.1)	1.0 (25.4)	LH on opp. side	0.25 (6.3)	9007Z2	0.70 (0.316)

Dimensions:
pages 606 to 609

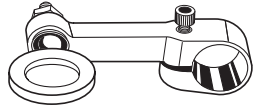
Limit Switches

9007T and FT Severe Duty Mill and Foundry Switches

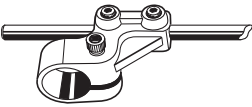
Lever Arms and Renewal Parts



With Reset



Cable Operated



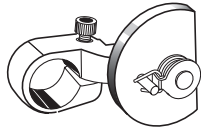
Rod Type
(rod not included)



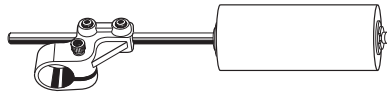
Ball Bearing Type



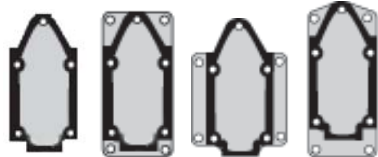
Weld-On Type



1-Way Roller Type



Conveyor Side Guide
(use with 9007R16 or R17)



Style A Style B Style C Style D

Base Plates

Cable operated					
Arm	Steel roller	Roller		Catalog Number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller Position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	None	None	9007Y3	—
2.5 in. (63.5mm) long with eyebolt 0.25 (6.3mm) I.D. instead of roller.				9007B27	—
Rod Type (used on conveyor systems or where unusual shapes are required)					
Adjustable	0.75 (19)	0.19 (4.8)	None	9007R16	0.18 (0.081)
Adjustable	0.75 (19)	0.25 (6.3)	None	9007R17	0.18 (0.081)
1. Rod not included 2. Key stock not included					
Ball Bearing Type (for abrasive dust areas or with high speed cams)					
1.5 (38.1)	0.75 (19)	Center	0.28 (7.1)	9007B16	0.15 (0.068)
Weld-On Type (used where a special operator is required to weld to lever)					
3.5 (89)	0.75 (19)	None	None	9007G10	0.50 (0.227)
One Way Roller Type (used with reversible cams for one way operations)					
1.5 (38.1)	0.75 (19)	Outside offset	0.25 (6.3)	9007D4	0.64 (0.290)
Conveyor Side Guide					
8.44 in. (214.3) long with 1.5 in. (38.1) dia. 3.75 in. (95.2) Delrin® roller				9007R21	1.63 (0.739)
8.44 in. (214.3) long with 0.88 in. (22.3) dia. 3.75 in. (95.2) Delrin roller				9007R22	1.42 (0.644)

Separate Base Plates (2)			
Style	Mounting Holes	Catalog Number	Weight lb (kg)
A	None (1)	2934D32G1	—
B	End	2934D14G1	0.34 (0.154)
C	Side	2934D33G1	0.42 (0.191)
D	End	2934D34G1	0.36 (0.163)


- No mounting holes in base plate. Side mounting holes in switch case must be used.
- Acceptable wire sizes 14–18 AWG (2.08–0.823 mm²); recommended terminal clamp torque 13–16 lb-in. (1.46–1.80 N•m).

Optional Conduit Threads		
Description	Catalog Number	Weight lb (kg)
Metric		
M20 - 20mm (per B.S. 4568)	M11	—
Example: 9007TUB4M11		

Three Point Contacts — Ordering Information

Select Type number of desired contact operating sequence for standard contact switch.

Change the letter following "T" or "FT" as shown below.

Change:	U to Y	Contact Configuration Changes
For example: TUB1 changes to TYB1 TSB1 changes to TKB1	S to K	From: 

Limit Switches

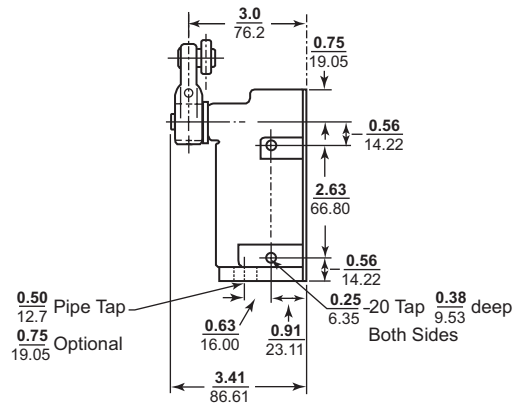
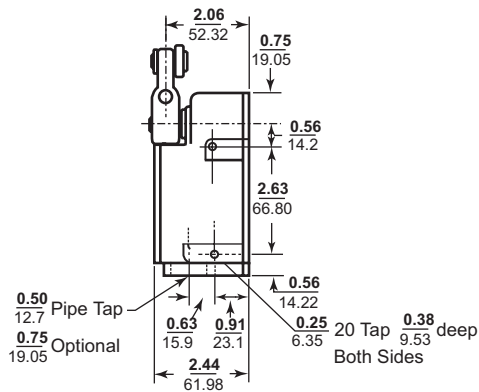
9007T and FT Severe Duty Mill and Foundry Switches

Dimensions

Surface Mounting

Type T

Type FT



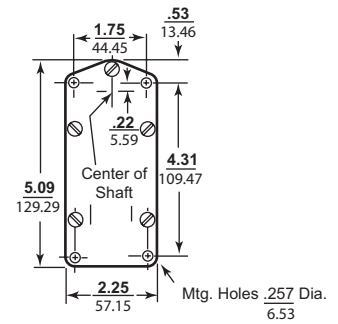
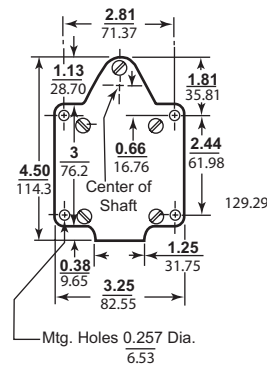
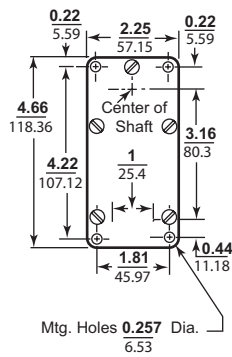
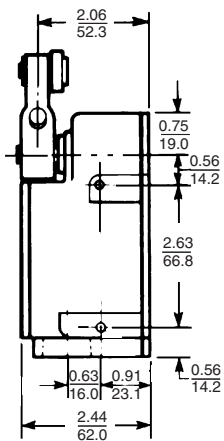
Base Plates

Style A

Style B

Style C

Style D



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

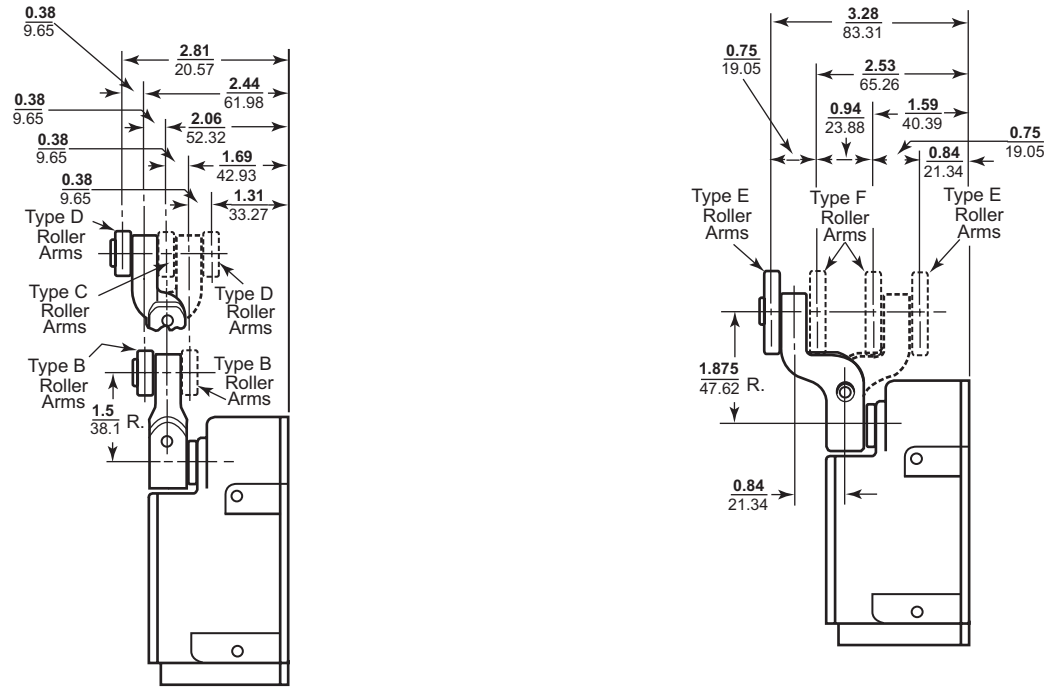
Limit Switches

9007T and FT Severe Duty Mill and Foundry Switches

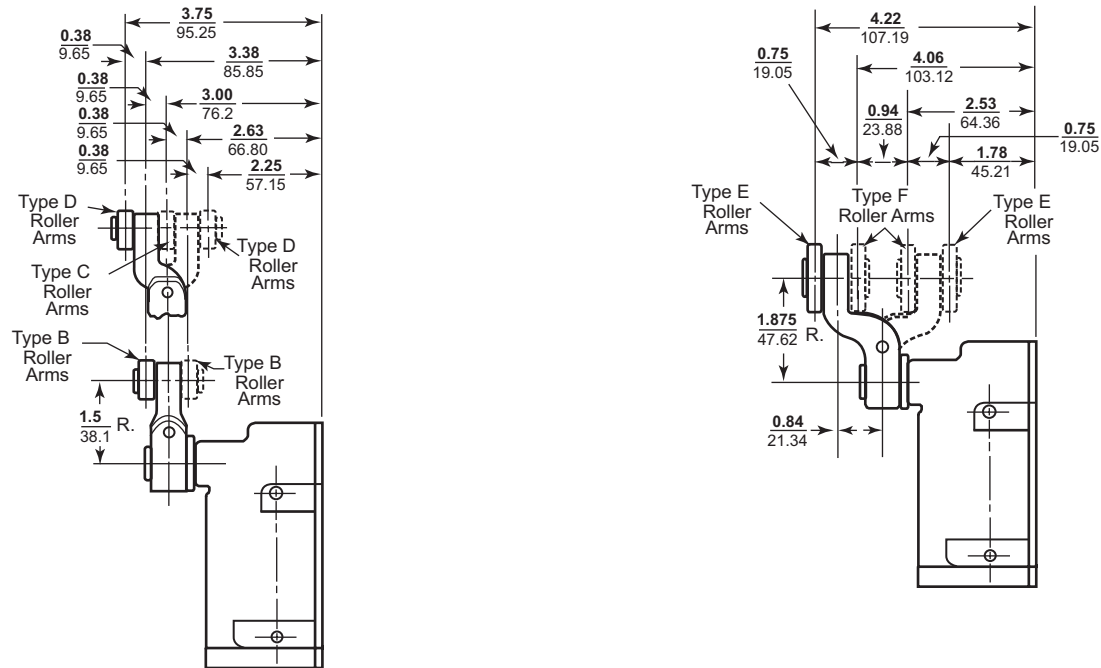
Dimensions

CAM Track Dimensions

Type T



Type FT



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

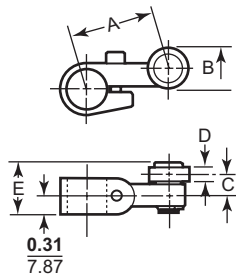
Limit Switches

9007T and FT Severe Duty Mill and Foundry Switches

Dimensions

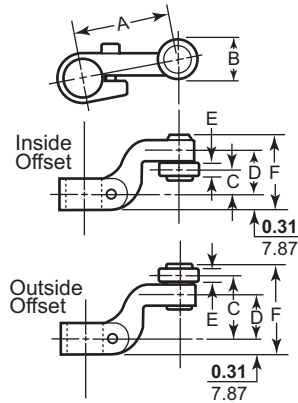
Type T and FT Lever Arms

Standard Roller

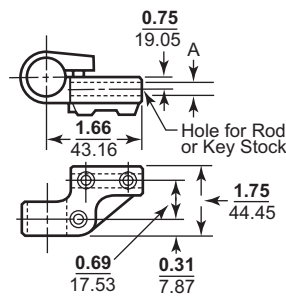


For dimension A refer to page 12.

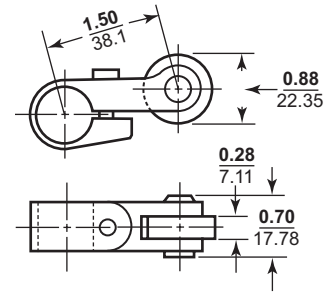
Offset Type



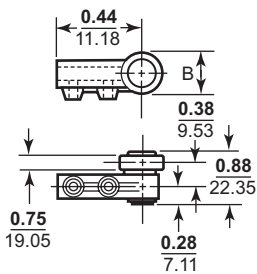
Adjustable Length Rod Type



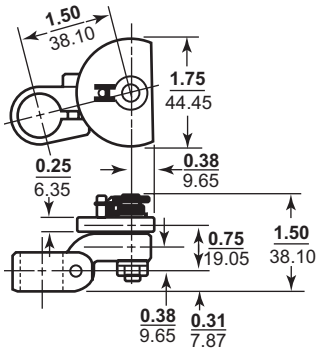
Ball Bearing Roller Type B16



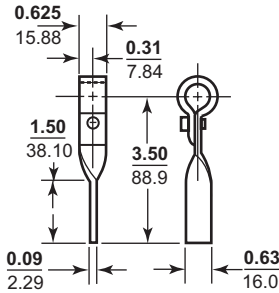
Roller Arm for use with Type R17



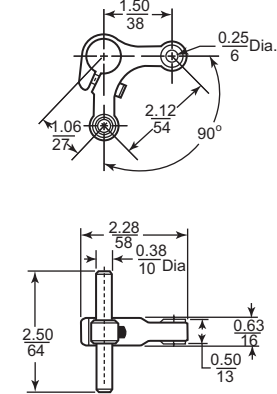
1-Way Roller Type D4



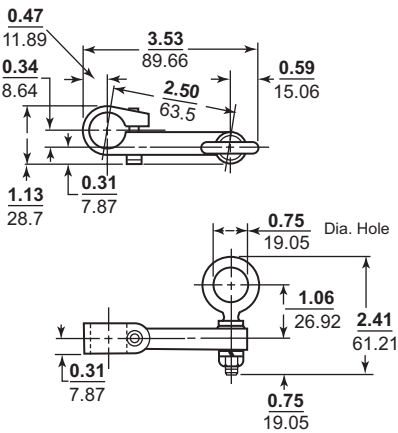
Weld-On Arm Type G10



Cable Operated with Reset Type Y3



Cable Operated Type B27



Limit Switches

NOTE: All levers on this page can be used on Type C limit switches by installing the 9007S9 hub.

Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

Limit Switches

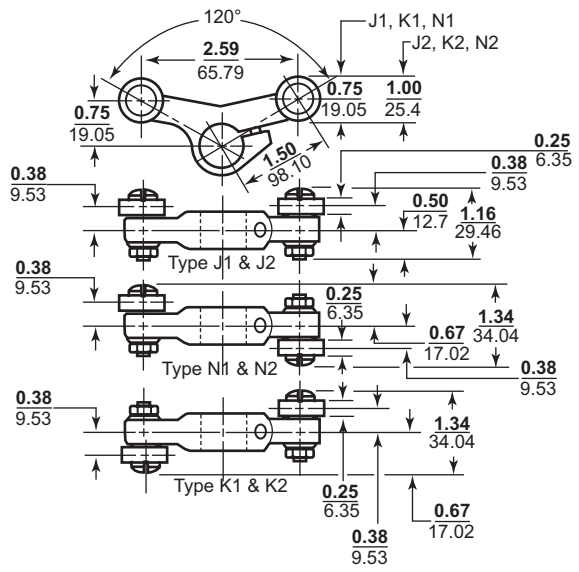
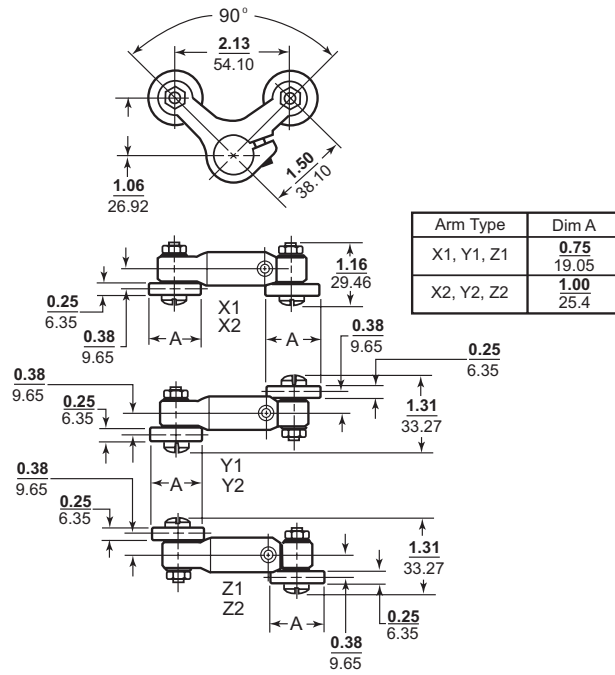
9007T and FT Severe Duty Mill and Foundry Switches

Dimensions

Type T and FT Lever Arms (continued)

90° Forked

120° Forked



Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches L100, L300 Mill and Foundry Switches, L140, L2153 Cable Pulls, L529 Belt Conveyor

Conforming to NEMA A600 and UL508

Description

L100W Switches ♦

Use the L100W Mill switches instead of other limit switches in the following applications:

- Where the current load exceeds the typical heavy duty limit switch contact rating of 10 A and falls within the range of up to 20 A continuous.
- Where an operating sequence is required that is not possible on other limit switches (35 choices with the L switches).
- Where higher reset forces are required due to foreign material interfering with lever arm operation, or where long heavy arms must reset against gravity.

♦ L switches are not preceded by 9007. They are known as the R.B.Denison® Loxswitch™ L, and include conveyor belt and slack cable pull switches in the product offering.

L300W Switches

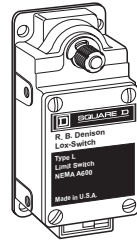
The L300W Foundry switches are for use in foundries or mills where the applications described above are required, and where falling foundry sand or similar material could build up and jam the operating mechanism. The shaft has a dust boot and extends from the switch case, preventing sand buildup around the shaft. The devices can withstand hot falling sand up to 300° F (149° C).

Features L100, L300, L140, L2153, L525

- Captive cover screws.
- Heavy duty snap action mechanism prevents teasing or false contact opening.
- Positive trip action prevents the lever from slipping around the 0.5 in. (12.7 mm) shaft even if not properly tightened.
- High current capability. 20 A maximum continuous.
- Isolated (no polarity) double and triple circuits with double break (throw) action.
- Wide 0.25 in. (6.3 mm) contact gap ensures very high shock and vibration resistance.
- Easy-to-access contacts allow for easy inspection and replacement.
- Stamped contact configuration number for easy identification even if the switch is painted.
- Many contact arrangements to solve difficult applications.
- Model L300 is an extra heavy duty version for very aggressive environments.
 - The booted shaft design prevents penetration of foreign materials such as sand, dust, or grit between the shaft and the bushing.
 - Heavy duty stainless steel springs and hardened spring operators permit longer life under extreme lever fly-back and high impact.
 - Same parameters as L100 models, except that the distance between the back of the switch and the lever is increased by 0.34 in. (8.6 mm).
- Two and three circuits in CW, CCW, neutral position, spring return and maintained, snap action or slow-make slow-break, two steps (L525) are available.
- Two circuit models can be CW or CCW field converted.
- Wide range of options: high shock and vibration, with gold contact, low or very high temperature.
- 0.5 in. (12.7 mm) NPT conduit entrance standard on 2-pole models (5 wires max.).
- 0.75 in. (19 mm) NPT conduit entrance standard on 3-pole models (7 wires max.).

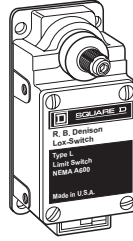
L100, L300 Switches (fixed sequence)

L100 Mill



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L300 Foundry

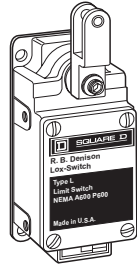


Page 614

- Model L300 is an extra heavy duty version for very aggressive environments
 - The booted shaft design prevents penetration of foreign materials such as sand, dust, or grit between the shaft and the bushing.
 - Heavy duty stainless steel springs and hardened spring operators permit longer life under extreme lever fly-back and high impact.
 - Same parameters as L100 models, except that the distance between the back of the switch and the lever is increased by 0.34 in. (8.6 mm).

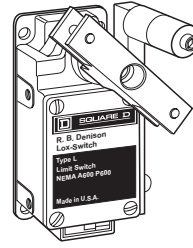
Cable Pulls (fixed sequence)

L140 Mill and Foundry



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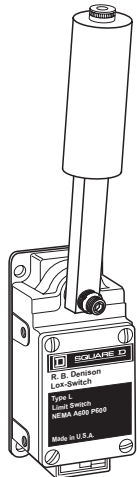
L2153 Mill and Foundry



Page 616

Belt Conveyors

L525 Mill and Foundry



Page 617

Conveyor belt limit switches are ideal for policing the lateral movement of belt conveyors. When the conveyor belt shifts, it contacts the switch roller and a 12° movement of the lever transfers the first set of contacts. This set is usually wired to initiate a warning alarm system to alert the worker that the belt is moving off the rollers. Further lateral movement of the belt, causing the lever to move another 8°, trips the second set of contacts. These contacts are normally wired to the conveyor drive system, and when actuated, stop the system—minimizing damage to the conveyor, or loss of material on the belt.

Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches L100, L300 Mill and Foundry Switches, L140, L2153 Cable Pulls, L529 Belt Conveyor

Environmental characteristics	
Conforming to standards	UL508
Product certifications	UL Listed, CSA Certified, CE Marked
Protective treatment	Corrosion resistant gray paint
Ambient air temperature	-10 to +185 °F (-23 to +85 °C) With H prefix: -10 to +350 °F (-23 to +177 °C). (1)
Vibration resistance	10G (10–55 Hz)
Shock resistance	30G
Electric shock protection	Class 0
Degree of protection	NEMA Types 1, 2, 4, 12, 13, IP65, 66, 67
Cable entry or connector	1/2" NPT (metric available)
Materials	Cast zinc ⬢

1. For a switch with an ambient temperature rating up to 350 °F (177 °C), add an H to the beginning of the catalog number.
For example, change catalog number L100WS2M2 to HL100WS2M2.

Contact block characteristics		
Rated operational characteristics hard contacts	AC Voltage	NEMA A600 Ithe = 20 A 20 A Resistive and continuous
	DC Voltage	NEMA P600 Ithe = 20 A 20 A Resistive and continuous
Rated insulation voltage		600 V
Rated impulse withstand voltage		2,500 Vac for 1 minute for CE, 2,200 Vac for 1 minute for UL, and 2,640 Vac for 1 minute for CSA
Positive opening		No
Short circuit protection		20 A Bussmann Class CC KTK-R-20 fuse, non-time-delay
Terminal wire sizes (Cabling/Screw Clamp)		12 – 22 AWG (3.31 mm ² – 0.326 mm ²) wire max.
Maximum actuation speed		15.2 mpm / 27.4 mpm (50 fpm / 90 fpm) with 45° Cam angle, levers only

Contacts	AC							DC				
	Volts	Inductive 35% Power Factor				Con- tinuous Carrying Amperes	Resistive 75% Power Factor		Volts	Inductive and Resistive		
		Make		Break			Make, Break and Continuous Carrying Amperes			Make and Break Amperes		Con- tinuous Carrying Amperes
SPDT Quick Make and Break	120	150	18,000	20	2400	20	20	120	5.0	9	20	
	240	75	18,000	12.5	3000	20	20	250	1.0	9	20	
	480	37.5	18,000	6.25	3000	20	20	600	0.2	9	20	
	600	30	18,000	5	3000	20	20					
All Slow Make and Break	120	60	7200	6	720	20	10	20	—	—	—	
	240	30	7200	3	720	20	10	20	—	—	—	
	480	15	7200	1.5	720	20	10	20	—	—	—	
	600	12	7200	1.2	720	20	10	20	—	—	—	

Characteristics for material and ratings comparisons — standard switches ⬢		
	9007 Type T/FT	Type L (R. B.Denison® Loxswitch™)
Body material	Cast zinc	Cast aluminum
Cover material	Cast zinc	Aluminum
Base plate material	Steel with zinc plating	Steel with chromate plating
Shaft seal material	Nitrile	PVC
Contact block material	Phenolic	Glass filled nylon
Moveable contact material	Fine silver on copper backing	Coin silver on steel backing
Stationary contact material	Fine silver on copper backing	90/10 AgCdO on copper backing
Low ambient temperature rating	-10° F	0° F
High ambient temperature at full rating ⬢	180° F	200° F
Enclosure rating	NEMA Types 1, 2, 4, 12 and 13	NEMA Types 1, 4 and 13
Vibration resistance	10G (10–150 Hz)	40G max (10-150 Hz)

⬢ Many switches are available with higher or lower temperature limits by selecting special versions or special options. See page 621.

Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

L100 Mill Switches

L100 Mill Switches					
Description	Operating Torque	Contact Diagram	Catalog Number	Operating Data	Weight, lb (kg)
Snap-action CW spring return	190 oz-in (1.34 N•m)		L100WS2M1	A (see page 613)	1.51 (0.68)
Snap-action CCW spring return	190 oz-in (1.34 N•m)		L100WS2M2	A (see page 613)	1.51 (0.68)
Maintained contact ■ CW and CCW snap action	45 oz-in (0.32 N•m)		L100WS2M3	A (see page 613)	1.51 (0.68)
Snap action CW spring return	190 oz-in (1.34 N•m)		L100WDR2M4	A (see page 613)	1.51 (0.68)
Snap action CCW spring return	190 oz-in (1.34 N•m)		L100WDR2M5	A (see page 613)	1.51 (0.68)
Maintained contact ■ CW and CCW snap action	45 oz-in (0.32 N•m)		L100WDR2M6	A (see page 613)	1.51 (0.68)
Snap action CCW spring return	190 oz-in (1.34 N•m)		L100WDL2M7	A (see page 613)	1.51 (0.68)
Snap action CW spring return	190 oz-in (1.34 N•m)		L100WDL2M8	A (see page 613)	1.51 (0.68)
Snap action CW 1 N.C./ 2 N.O. spring return	190 oz-in (1.34 N•m)		L100WTR2M10	A (see page 613)	1.51 (0.68)
Snap action CCW 1 N.O./ 2 N.C. spring return	190 oz-in (1.34 N•m)		L100WTR2M11	A (see page 613)	1.51 (0.68)
Maintained contact ■ CW and CCW snap action 3 poles	45 oz-in (0.32 N•m)		L100WTR2M12	A (see page 613)	1.51 (0.68)
Snap action CCW 2 N.O./ 1 N.C. spring return	190 oz-in (1.34 N•m)		L100WTL2M13	A (see page 613)	1.51 (0.68)
Snap action CW 1 N.O./ 2 N.C. spring return	190 oz-in (1.34 N•m)		L100WTL2M14	A (see page 613)	1.51 (0.68)
Maintained contact ■ CW and CCW snap action 3 poles	45 oz-in (0.32 N•m)		L100WTL2M15	A (see page 613)	1.51 (0.68)
Neutral position ■ spring return slow make and break 1 N.O. contact per direction	95 oz-in (0.67 N•m)		L100WN2M16	B (see page 613)	1.51 (0.68)
Neutral position ■ spring return slow make and break 1 N.O. contact for both directions	95 oz-in (0.67 N•m)		L100WN2M17	B (see page 613)	1.51 (0.68)

Dimensions:
page 622

Operating Data:
page 613

Interpretation of Catalog Numbers:
page 623

Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

L100 Mill Switches

L100 Mill Switches (continued)

Description	Operating Torque	Contact Diagram	Catalog Number	Operating Data	Weight, lb (kg)
Neutral position ■ spring return slow make and break 1 N.C.-CW, 1 N.C.-CCW	95 oz-in (0.67 N•m)		L100WNC2M18	B (see table below)	1.51 (0.68)
Neutral position ■ spring return slow make and break 2 N.O.-CW, 1 N.O.-CCW	95 oz-in (0.67 N•m)		L100WTRN2M20	B (see table below)	1.51 (0.68)
Neutral position ■ spring return slow make and break N.O.-CW, 2 N.O.-CCW	95 oz-in (0.67 N•m)		L100WTLN2M21	B (see table below)	1.51 (0.68)
Slow make-before-break CW spring return	170 oz-in (1.2 N•m)		L100WS02M22	C (see table below)	1.51 (0.68)
Slow make-before-break CCW spring return	170 oz-in (1.2 N•m)		L100WS02M23	C (see table below)	1.51 (0.68)
Neutral position ■ N.O.-CW, N.O.-CCW spring return snap action	170 oz-in (1.2 N•m)		L100WNS2M26	D (see table below)	1.51 (0.68)
Neutral position ■ N.O.-CW, N.O.-CCW maintained in CCW only	170 oz-in (1.2 N•m)		L100WNSR2M28	D (see table below)	1.51 (0.68)
Neutral position ■ N.O.-CW, N.O.-CCW maintained in CW only	170 oz-in (1.2 N•m)		L100WNSL2M29	D (see table below)	1.51 (0.68)
Neutral position ■ N.C.-CW, N.C.-CCW spring return snap action	170 oz-in (1.2 N•m)		L100WNC2M34	D (see table below)	1.51 (0.68)
Neutral position ■ N.O.-CW, N.O./N.C.-CCW spring return slow make and break	95 oz-in (0.67 N•m)		L100WTRN1C2M38	B (see table below)	1.51 (0.68)
Neutral position ■ N.O./N.C.-CW, N.O.-CCW spring return slow make and break	95 oz-in (0.67 N•m)		L100WTLN1C2M39	B (see table below)	1.51 (0.68)
Neutral position ■ N.O./N.C.-CW, N.C.-CCW spring return slow make and break	95 oz-in (0.67 N•m)		L100WTRN2C2M40	B (see table below)	1.51 (0.68)
Neutral position ■ N.C.-CW, N.O./N.C.-CCW spring return slow make and break	95 oz-in (0.67 N•m)		L100WTLN2M41	B (see table below)	1.51 (0.68)
Neutral position ■ N.O./N.C.-CW, N.C.-CCW spring return snap action	95 oz-in (0.67 N•m)		L100WTRN2CS2M48	D (see table below)	1.51 (0.68)

Operating Data for Contact Arrangements

	A	B	C	D
Pretravel	17° nominal	7° maximum	7° nominal	9° nominal
Differential travel	11° nominal	4° maximum	—	6° nominal
Overlapping travel	—	—	4° nominal	—
Total travel	80°	70°	80°	70°
Recommended installation travel	20°-35°	10° - 25°	20° - 35°	13° - 30°
Repetitive accuracy of switch	± 0.03x	—	—	± 0.03x
Operating torque, max with return spring	190 oz-in (1.34 N•m)	95 oz-in (0.67 N•m)	170 oz-in (1.2 N•m)	170 oz-in (1.2 N•m)
Maintained contact	45 oz-in (0.317 N•m)	—	—	45 oz-in (0.317 N•m)

Dimensions:
page 622

Operating Sequences for Conveyor Belts:
page 617

Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

L300 Foundry Switches

L300 Foundry Switches					
Description	Operating Torque	Contact Diagram	Catalog Number	Operating Data	Weight, lb (kg)
Snap-action CW spring return	190 oz-in (1.34 N•m)		L300WS2M1	A (see page 615)	1.54 (0.70)
Snap-action CCW spring return	190 oz-in (1.34 N•m)		L300WS2M2	A (see page 615)	1.54 (0.70)
Maintained contact ■ CW and CCW snap action	45 oz-in (0.32 N•m)		L300WS2M3	A (see page 615)	1.54 (0.70)
Snap action CW spring return	190 oz-in (1.34 N•m)		L300WDR2M4	A (see page 615)	1.54 (0.70)
Snap action CCW spring action	190 oz-in (1.34 N•m)		L300WDR2M5	A (see page 615)	1.54 (0.70)
Maintained contact ■ CW and CCW snap action	45 oz-in (0.32 N•m)		L300WDR2M6	A (see page 615)	1.54 (0.70)
Snap action CCW spring return	190 oz-in (1.34 N•m)		L300WDL2M7	A (see page 615)	1.54 (0.70)
Snap action CW spring return	190 oz-in (1.34 N•m)		L300WDL2M8	A (see page 615)	1.54 (0.70)
Snap action CW 1 N.C./2 N.O. spring return	190 oz-in (1.34 N•m)		L300WTR2M10	A (see page 615)	1.54 (0.70)
Snap action CCW 1 N.O./2 N.C. spring return	190 oz-in (1.34 N•m)		L300WTR2M11	A (see page 615)	1.54 (0.70)
Maintained contact ■ CW and CCW snap action 3 poles	45 oz-in (0.32 N•m)		L300WTR2M12	A (see page 615)	1.54 (0.70)
Snap action CCW 2 N.O./1 N.C. spring return	190 oz-in (1.34 N•m)		L300WTL2M13	A (see page 615)	1.54 (0.70)
Snap action CW 1 N.O./2 N.C. spring return	190 oz-in (1.34 N•m)		L300WTL2M14	A (see page 615)	1.54 (0.70)
Maintained contact ■ CW and CCW snap action 3 poles	45 oz-in (0.32 N•m)		L300WTL2M15	A (see page 615)	1.54 (0.70)
Neutral position ■ spring return slow make and break 1 N.O. contact per direction	95 oz-in (0.67 N•m)		L300WN2M16	B (see page 615)	1.54 (0.70)
Neutral position ■ spring return slow make and break 1 N.O. contact for both directions	95 oz-in (0.67 N•m)		L300WN2M17	B (see page 615)	1.54 (0.70)

Dimensions:
page 622

Operating Data:
page 615

Interpretation of Catalog Numbers:
page 623

Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

L300 Foundry Switches

L300 Foundry Switches (continued)					
Description	Operating Torque	Contact Diagram	Catalog Number	Operating Data	Weight, lb (kg)
Neutral position ■ spring return slow make and break 1 N.C.-CW, 1 N.C.-CCW	95 oz-in (0.67 N•m)		L300WNC2M18	B (see table below)	1.54 (0.70)
Neutral position ■ spring return slow make and break 2 N.O.-CW, 1 N.O.-CCW	95 oz-in (0.67 N•m)		L300WTRN2M20	B (see table below)	1.54 (0.70)
Neutral position ■ spring return slow make and break N.O.-CW, 2 N.O.-CCW	95 oz-in (0.67 N•m)		L300WTLN2M21	B (see table below)	1.54 (0.70)
Slow make-before-break CW spring return	170 oz-in (1.2 N•m)		L300WS02M22	C (see table below)	1.54 (0.70)
Slow make-before-break CCW spring return	170 oz-in (1.2 N•m)		L300WS02M23	C (see table below)	1.54 (0.70)
Neutral position ■ N.O.-CW, N.O.-CCW spring return snap action	170 oz-in (1.2 N•m)		L300WNS2M26	D (see table below)	1.54 (0.70)
Neutral position ■ N.O.-CW, N.O.-CCW maintained in CCW only	170 oz-in (1.2 N•m)		L300WNSR2M28	D (see table below)	1.54 (0.70)
Neutral position ■ N.O.-CW, N.O.-CCW maintained in CW only	170 oz-in (1.2 N•m)		L300WNSL2M29	D (see table below)	1.54 (0.70)
Neutral position ■ N.C.-CW, N.C.-CCW spring return snap action	170 oz-in (1.2 N•m)		L300WNCS2M34	D (see table below)	1.54 (0.70)
Neutral position ■ N.O.-CW, N.O./N.C.-CCW spring return slow make and break	95 oz-in (0.67 N•m)		L300WTRN1C2M38	B (see table below)	1.54 (0.70)
Neutral position ■ N.O./N.C.-CW, N.O.-CCW Spring return slow make and break	95 oz-in (0.67 N•m)		L300WTLN1C2M39	B (see table below)	1.54 (0.70)
Neutral position ■ N.O./N.C.-CW, N.C.-CCW spring return slow make and break	95 oz-in (0.67 N•m)		L300WTRN2C2M40	B (see table below)	1.54 (0.70)
Neutral position ■ N.C.-CW, N.O./N.C.-CCW spring return slow make and break	95 oz-in (0.67 N•m)		L300WTLN2M41	B (see table below)	1.54 (0.70)
Neutral position ■ N.O./N.C.-CW, N.C.-CCW spring return snap action	95 oz-in (0.67 N•m)		L300WTRN2CS2M48	D (see table below)	1.54 (0.70)

Operating Data for Contact Arrangements	A	B	C	D
Pretravel	17° nominal	7° maximum	7° nominal	9° nominal
Differential travel	11° nominal	4° maximum	—	6° nominal
Overlapping travel	—	—	4° nominal	—
Total travel	80°	70°	80°	70°
Recommended installation travel	20°-35°	10° - 25°	20° - 35°	13° - 30°
Repetitive accuracy of switch	± 0.03x	—	—	± 0.03x
Operating torque, max with return spring	190 oz-in (1.34 N•m)	95 oz-in (0.67 N•m)	170 oz-in (1.2 N•m)	170 oz-in (1.2 N•m)
Maintained contact	45 oz-in (0.317 N•m)	—	—	45 oz-in (0.317 N•m)

Dimensions:
page 622

Operating Sequences for Conveyor Belts:
page 617

Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches L140 and L2153 Cable Pulls



L140 Cable Pull



L2153 Dual Pull Stop

L140 Series Cable Pulls (1)

Circuit	Direction	Catalog Number (2)	Weight lb (kg)
1 N.C.	CW right	L142	1.54 (0.70)
1 N.O. and 1 N.C.	CW right	L143	1.54 (0.70)
1 N.O. and 1 N.C.	CCW left	L144	1.54 (0.70)
1 N.C.	CCW left	L145	1.54 (0.70)
2 N.O. and 1 N.C.	CW right	L146	1.54 (0.70)
2 N.C. and 1 N.O.	CW right	L147	1.54 (0.70)
2 N.O. and 1 N.C.	CCW left	L148	1.54 (0.70)
2 N.C. and 1 N.O.	CCW left	L149	1.54 (0.70)

1. Style K levers were designed specifically for this application; see page 619 (order separately).
2. To complete the catalog number, refer to page 623 and add the suffix for the mounting plate style and the front cover material.

L2153 Dual Pull Stop

Description	Catalog Number	Weight lb (kg)
Dual pull cord switch—maintained contacts (stop and lever included)	L2153	2.04 (0.93)

Characteristics

Pretravel	17° ± 2°
Differential travel	11° ± 2°
Overlapping travel	—
Total travel	80°
Recommended installation travel	—
Repetitive accuracy of switch	± 0.03x
Operating torque, max with return spring	13–27 lb-in (1.47–3.05 N•m)
Reset torque	7–19 lb-in (0.79–2.14 N•m)
Temperature range	-20 to 120 °F (-6.6 to 48.8 °C)
Maintained contact	—

Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

L525 Belt Conveyor Switches

L525 Belt Conveyor Switches				
Description	Operating Torque	Contact Diagram	Catalog Number	Weight lb (kg)
2 step sequence CW spring return, snap action, 2 N.O.	150 oz-in (1.06 N•m)		L525WDR2M56	1.5 (0.68)
2 step sequence CCW spring return, snap action, 2 N.O.	150 oz-in (1.06 N•m)		L525WDL2M57	1.5 (0.68)
2 step sequence CW spring return, snap action, 2 N.C.	150 oz-in (1.06 N•m)		L525WDL2M58	1.5 (0.68)
2 Step sequence CCW spring return, snap action, 2 N.C	150 oz-in (1.06 N•m)		L525WDR2M59	1.5 (0.68)
2 Step sequence CW spring return, snap action, N.O./N.C	150 oz-in (1.06 N•m)		L100WS0S2M60	1.5 (0.68)

■ Two step snap action. One normally closed, one normally open; CW operation to first step to 2-C. Further CW operation to second step, 1-O, 1-C. Spring return. Pretravel 9° nominal. Additional travel 8° nominal. Differential second step 7° nominal. Differential first step 7° nominal.

Characteristics

Pretravel	12° nominal
Additional travel	8° nominal
Differential travel	7× nominal
Total travel	75° nominal
Operating torque, max with return spring	150 oz-in nominal (1.06 N•m)

Dimensions:
page 622

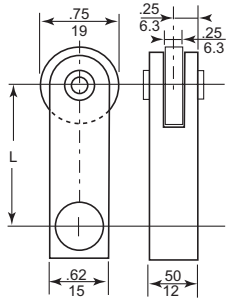
Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches L100/L300 Lever Arms

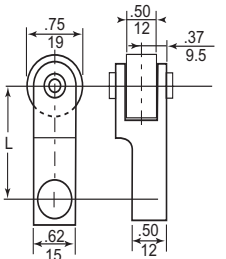
Lever Arms

Lever arms are constructed of machined aluminum.

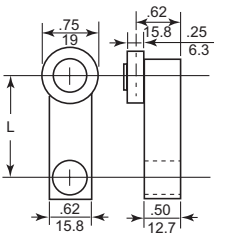
Dual dimensions: in. (mm)



Style A



Style B



Style C

Style A Steel Roller				
Arm	Steel roller		Catalog Number ♦	Weight lb (kg)
Length	Diameter	Width		
1.25 (31.7)	0.75 (19)	0.25 (6.3)	AC	0.06 (0.027)
1.50 (38.1)	0.75 (19)	0.25 (6.3)	AA	0.06 (0.027)
1.75 (44.4)	0.75 (19)	0.25 (6.3)	AD	0.07 (0.031)
2.00 (50.8)	0.75 (19)	0.25 (6.3)	AH	0.08 (0.036)
2.25 (57.1)	0.75 (19)	0.25 (6.3)	AJ	0.09 (0.041)
2.50 (63.5)	0.75 (19)	0.25 (6.3)	AO	0.10 (0.045)
2.75 (69.8)	0.75 (19)	0.25 (6.3)	AK	0.10 (0.045)
3.00 (76.2)	0.75 (19)	0.25 (6.3)	AB	0.11 (0.050)
3.50 (88.9)	0.75 (19)	0.25 (6.3)	AL	0.12 (0.054)
4.00 (101.6)	0.75 (19)	0.25 (6.3)	AM	0.13 (0.059)
4.50 (114.3)	0.75 (19)	0.25 (6.3)	AN	0.14 (0.064)
5.00 (127.0)	0.75 (19)	0.25 (6.3)	AP	0.16 (0.073)
5.50 (139.7)	0.75 (19)	0.25 (6.3)	AQ	0.18 (0.082)
6.00 (152.4)	0.75 (19)	0.25 (6.3)	AR	0.20 (0.091)

♦ Example: AC — This is the complete catalog number to order.

Style A Options		
Diameter	Description	Catalog Number—Add Suffix
1.00 (25.4)	Roller	1
1.25 (32)	Roller	4
1.50 (38.1)	Roller	2
—	Nylon roller	N
0.75 (19)	Ball bearing roller	R
—	Stainless steel roller	NS

Style B Steel Roller				
Arm	Steel roller		Catalog Number	Weight lb (kg)
Length	Diameter	Width		
1.50 (38.1)	0.75 (19)	0.50 (12.7)	BA	0.06 (0.027)
2.00 (50.8)	0.75 (19)	0.50 (12.7)	BH	0.08 (0.036)
2.50 (63.5)	0.75 (19)	0.50 (12.7)	BO	0.10 (0.045)
3.00 (76.2)	0.75 (19)	0.50 (12.7)	BB	0.12 (0.054)
4.00 (101.6)	0.75 (19)	0.50 (12.7)	BM	0.13 (0.059)
4.50 (114.3)	0.75 (19)	0.50 (12.7)	BN	0.14 (0.064)
5.50 (139.7)	0.75 (19)	0.50 (12.7)	BQ	0.18 (0.082)
6.00 (152.4)	0.75 (19)	0.50 (12.7)	BR	0.20 (0.091)

Style B Options		
Diameter	Description	Catalog Number—Add Suffix
—	Nylon roller	N
1.50 (38.1)	Roller	2

Style C Steel Roller On Side				
Arm	Steel roller		Catalog Number	Weight lb (kg)
Length	Diameter	Width		
1.25 (31.7)	0.75 (19)	0.25 (6.3)	CC	0.06 (0.027)
1.50 (38.1)	0.75 (19)	0.25 (6.3)	CA	0.06 (0.027)
1.75 (44.4)	0.75 (19)	0.25 (6.3)	CD	0.07 (0.031)
2.00 (50.8)	0.75 (19)	0.25 (6.3)	CH	0.08 (0.036)
2.50 (63.5)	0.75 (19)	0.25 (6.3)	CO	0.10 (0.045)
3.00 (76.2)	0.75 (19)	0.25 (6.3)	CB	0.11 (0.050)
3.50 (88.9)	0.75 (19)	0.25 (6.3)	CL	0.12 (0.054)
4.00 (101.6)	0.75 (19)	0.25 (6.3)	CM	0.13 (0.059)
6.00 (152.4)	0.75 (19)	0.25 (6.3)	CR	0.20 (0.091)

Style C Options		
Diameter	Description	Catalog Number—Add Suffix
1.0 (24.5)	Roller	1
1.25 (32)	Roller	4
1.50 (38.1)	Roller	2
—	Nylon roller	N

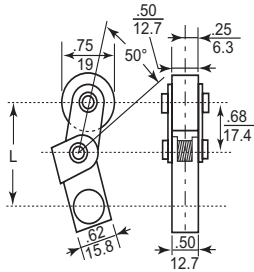
Dimensions:
page 622

Limit Switches

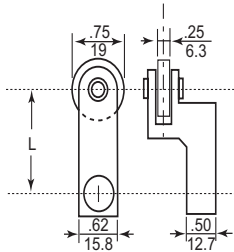
R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

L100/L300 Lever Arms

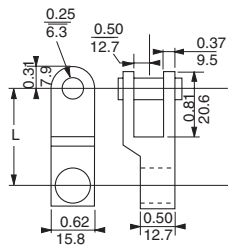
Dual dimensions: in. (mm)



Style E



Style F



Style K

Style E One Way Steel Roller

Arm	Steel roller		Catalog Number	Weight lb (kg)
Length	Diameter	Width		
1.50 (38.1)	0.75 (19)	0.50 (12.7)	EA	0.30 (0.136)
1.75 (44.4)	0.75 (19)	0.50 (12.7)	ED	0.40 (0.181)
3.00 (76.2)	0.75 (19)	0.50 (12.7)	EB	0.50 (0.227)

Style E Options

Diameter in. (mm)	Description	Catalog Number Add Suffix
—	Nylon roller	N

Style F Offset Steel Roller

Arm	Steel roller	Roller Position		Catalog Number	Weight lb (kg)
Length	Diameter	Offset	Width		
1.50 (38.1)	0.75 (19)	0.62 (15.8)	0.15 (3.8)	FB	0.06 (0.027)
1.50 (38.1)	0.75 (19)	0.87 (22.2)	0.15 (3.8)	FA	0.06 (0.027)
1.50 (38.1)	0.75 (19)	1.00 (25.4)	0.15 (3.8)	FC	0.06 (0.027)
2.00 (50.8)	0.75 (19)	1.00 (25.4)	0.15 (3.8)	FE	0.08 (0.036)
2.50 (63.5)	0.75 (19)	1.00 (25.4)	0.15 (3.8)	FG	0.10 (0.045)
3.00 (76.2)	0.75 (19)	0.62 (15.8)	0.15 (3.8)	FI	0.11 (0.050)
3.00 (76.2)	0.75 (19)	1.00 (25.4)	0.15 (3.8)	FJ	0.11 (0.050)

Style F Options

Diameter	Description	Catalog Number—Add Suffix
1.00 (24.5)	Roller	1
—	Nylon roller	N

Style K (for use with L140 cable pulls)

Arm	Steel roller	Description	Catalog Number ♦	Weight lb (kg)
1.50 (38.1)	—	—	KA	0.05 (0.023)
2.50 (63.5)	—	—	KO	0.08 (0.036)
3.00 (76.2)	—	—	KB	0.09 (0.041)

♦ Example: KA — This is the complete catalog number to order.

Style L (renewal parts for L2153 dual pull stop)

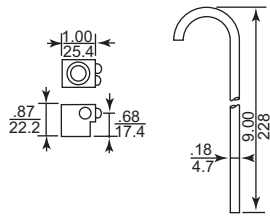
Description	Catalog Number	Weight lb (kg)
Lever	AL1746	0.25 (0.113)
Mechanical stop	AL1649	0.10 (0.045)

Limit Switches

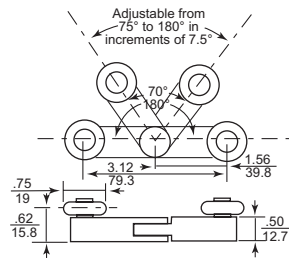
R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

Lever Arms

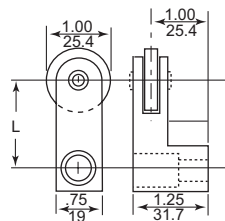
Dual dimensions: in. (mm)



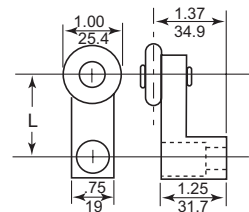
Style R



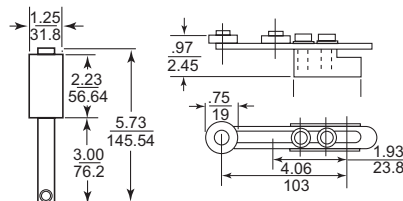
Style V



Style LA



Style LC



Rolling Pin

Adjustable Rolling Pin

Style R Steel Rod

Description	Catalog Number	Weight lb (kg)
Hub only	R	0.10 (0.045)
Rod only	R9	0.09 (0.041)

Style V Yoke (for maintained position switches)

Description	Catalog Number	Weight lb (kg)
Yoke	VA	0.50 (0.227)

Style V Options

Diameter	Description	Catalog Number—Add Suffix
1.0 (24.5)	Roller	1
—	Nylon roller	N
0.75 (19)	Ball bearing roller	R

Style LA (to pass over switch cover)

Arm	Catalog Number	Weight lb (kg)
Length		
1.50 (30)	LAA1	0.12 (0.054)
2.00 (50)	LAH1	0.12 (0.054)
2.50 (63)	LA01	0.12 (0.054)

Style LA Options

Diameter	Description	Catalog Number—Add Suffix
1.5 (38)	Roller	2
—	Nylon roller	N

Style LC (to pass over switch cover)

Arm	Catalog Number	Weight lb (kg)
Length		
1.50 (30)	LCA1	0.12 (0.054)
2.00 (50)	LCH1	0.12 (0.054)
2.50 (63)	LCO1	0.13 (0.059)

Style LC Options

Diameter	Description	Catalog Number—Add Suffix
1.25 (32)	Roller	4
1.5 (38)	Roller	2
—	Nylon roller	N

Rolling Pin (for use with 2 step switches for conveyor or belt applications)

Arm	Catalog Number	Weight lb (kg)	
Length			
2.25 (75.1)	AL1650	0.30 (0.136)	
2.25 (75.1)	High temp. Teflon® material	AL16501	0.33 (0.150)
3.0 (50.8)	AL1802	0.33 (0.150)	

Rolling Pin (adjustable)

Arm	Steel roller	Width	Catalog Number	Weight lb (kg)
Length	Diameter			
2.00 (51) to 4.00 (102)	0.75 (19)	0.25 (6.3)	AL1650	0.30 (0.136)

◆ Example: KA — This is the complete catalog number to order.

Note: No hub component is needed for Type AL rolling pins. The arm mounts directly onto the shaft of the switch.

Dimensions:
page 622

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Limit Switches

R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

L100/L300 Options and Accessories



Mini Change Connector



Straight Male Connector



90° Angle Male Connector

Housing Options •			
Description	Example	Catalog Number	Weight lb (kg)
	Full Catalog Number	Add Prefix	
0.75 in. conduit opening Available on 2 circuit switches. Standard on 3 circuit switches	L100WS2M1 changes to GL100WS2M1	G	1.54 (0.70)
High temperature 0 to +350 °F (-17.7 to +176.6 °C) ■ Metal front cover only	L100WS2M1 changes to HL100WS2M1	H	1.54 (0.70)
Low temperature -20 to 200 °F (-28.8 to +93.3 °C) ■	L100WS2M1 changes to TL100WS2M1	T	1.54 (0.70)
High shock Available only on operating sequences 1, 2, 4, 5, 7-11, 13, 14	L100WS2M1 changes to L526WS2M1	526	1.54 (0.70)
	L300WS2M1 changes to L326WS2M1	326	
Gold contacts	L100WS2M1 changes to L522WS2M1	522	1.54 (0.70)
	L300WS2M1 changes to L322WS2M1	322	
Metric conduit threads M20 (20 mm)	L100WS2M1 changes to ML100WS2M1	M	1.54 (0.70)
Wiring			
Description	Example	Catalog Number	Weight lb (kg)
	Full Catalog Number	Add Prefix	
Straight male receptacle 4-pin ▲ Factory prewired	L100WS2M1 changes to PL100WS2M1	P	1.54 (0.70)
90° Angle male receptacle 4-pin ▲ Factory prewired—facing right	L100WS2M1 changes to APL100WS2M1	AP	1.54 (0.70)
Ministyle male receptacle † 8 A max. 5-pin (double circuit) or 7 A max. 7-pin (triple circuit)	L100WS2M1 changes to BL100WS2M1	B	1.54 (0.70)
Potted and prewired	Example	Add Suffix	Weight lb (kg)
	Full Catalog Number		
5 wires 6 ft (1.8 mm) long	L100WS2M1 changes to L100WS2M1P	P	1.54 (0.70)
5 wires 12 ft (3.6 mm) long	L100WS2M1 changes to L100WS2M1P12	P12	
5 wires 18 ft (5.5 mm) long	L100WS2M1 changes to L100WS2M1P18	P18	
Front Covers			
Description	Example	Catalog Number	Weight lb (kg)
	Full Catalog Number	Add Suffix	
Standard metal		M	—
Transparent plastic cover with metal frame		PF	—
Transparent plastic cover with metal frame and Neon indicator light (not connected)		GF	—
	L100WS2M1 changes to L100WS2PF 1		1.54 (0.70)
Accessories			
Description	Catalog Number		Weight lb (kg)
Sealed female plug and cable for P and AP connector			
4 pin, #16 AWG STO cable 140 °F (60 °C)	4 ft. (1.21 m)	1010004	1.20 (0.54)
	6 ft. (1.82 m)	1010006	1.25 (0.57)
	10 ft. (3.04 m)	10100010	1.50 (0.68)
Sealed female plug and cable for ministyle connector (B)			
5 pin, #16 AWG STO cable 221 °F (105 °C)	3 ft. (0.91 m)	BH2053	1.50 (0.68)
	6 ft. (1.82 m)	BH2056	1.70 (0.77)
	12 ft. (3.65 m)	BH20512	2.10 (0.95)

- Other options available — contact your local field office for details.
- ▲ Receptacle is a 4-pin male APL/PL-SWTS, Cannon part # MS3102E20-4P-F79 or equal.
- † Ministyle male connectors are:
 - 5-pin: Brad Harrison #41310 (or equal)
 - 7-pin: Brad Harrison #42805 (or equal)
- The minimum temperatures listed are based on the absence of freezing moisture or water.

Limit Switches

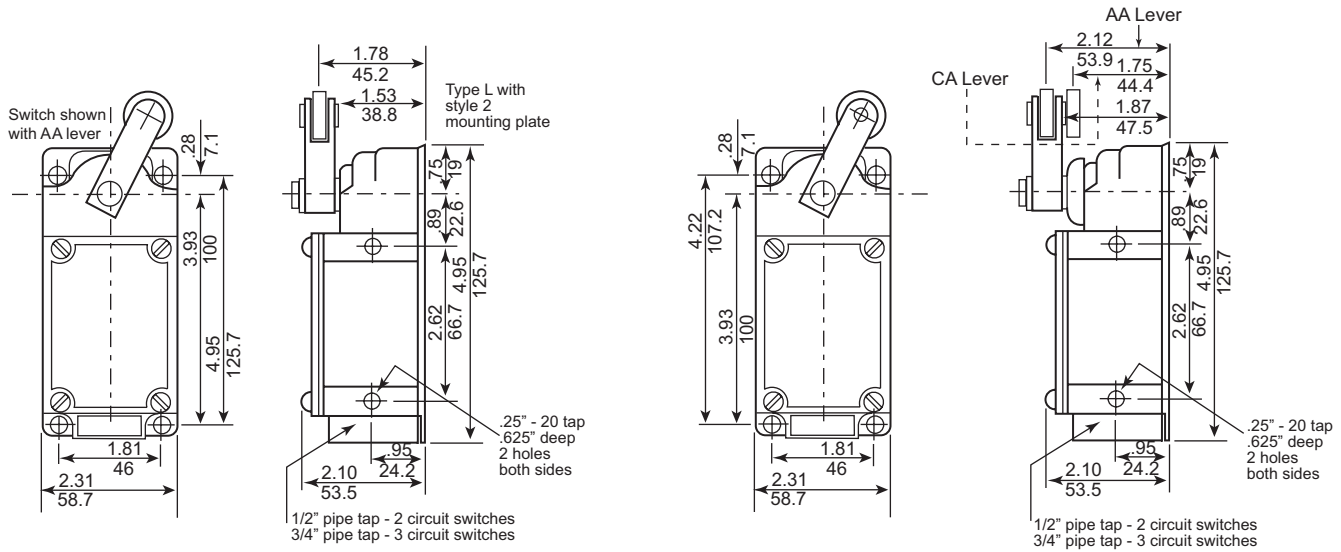
R.B.Denison® Lox-Switch™ L Severe Duty Mill and Foundry Switches

Dimensions

Switches

Type L100

Type L300



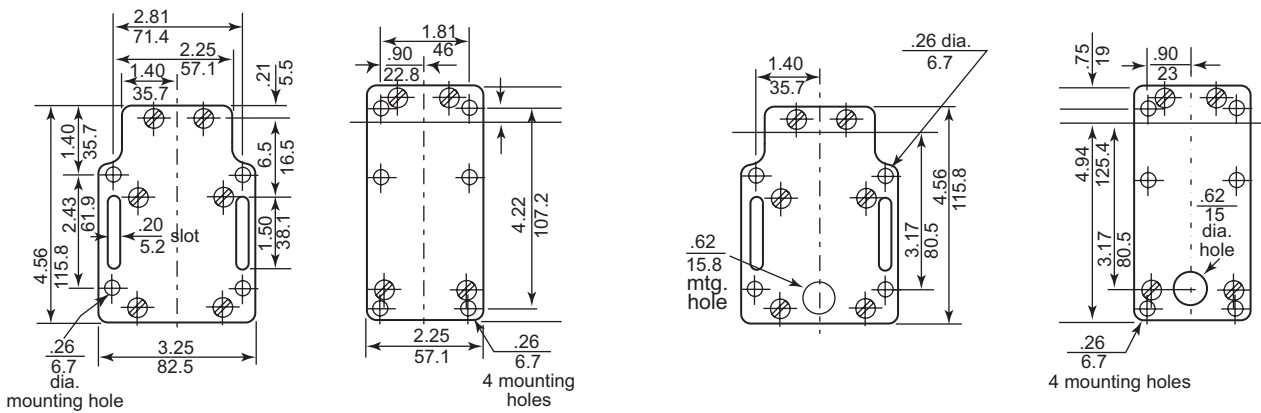
Base Plates

Style 1

Style 2

Style 3

Style 4

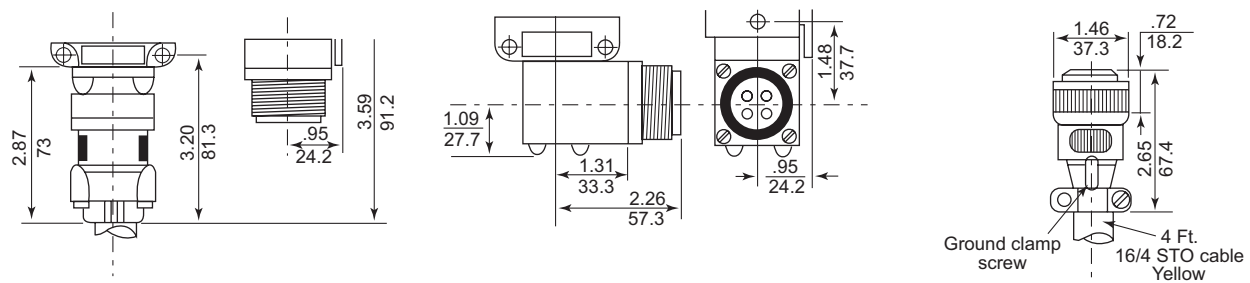


Receptacles

PL

APL

101000



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

Limit Switches

Interpretation of Catalog Numbers

Severe Duty Mill and Foundry Switches

Interpretation of Catalog Numbers

The interpretation of catalog numbers is intended to help you understand how the catalog number is laid out. It is to be used with existing numbers only. The table below should not be used to generate new catalog numbers. If the contact sequence required is not listed, contact your local field office.

L100 and L300

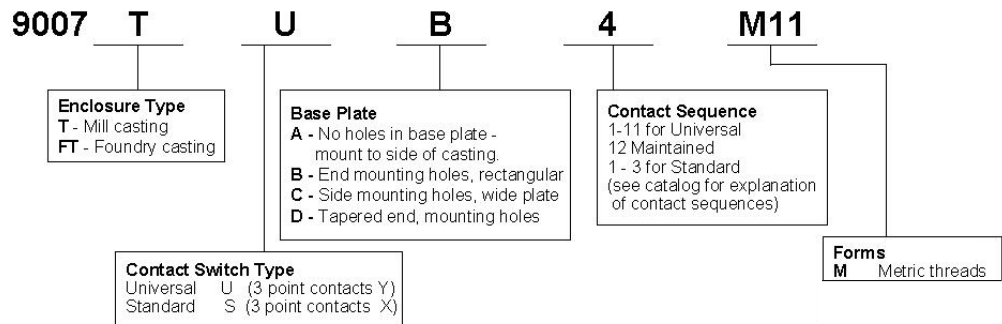


Style	Housing			Function	Mounting Plate	Front Cover		Contact Arrangement	
L	1	0	0	W	S	2	P	F	
									1 to 60
Mill	100	L14" and L2153 pull cord switches			Style 1	1	M	Standard metal	
Foundry	300				Style 2	2	PF	Transparent plastic	
Belt Conveyor	525				Style 3	3	GF	Transparent plastic with neon light	
Two circuit single operation				WS	Style 4	4			
Two circuit dual operation				WD					
Triple circuit				WT					
Neutral				WN					

The only modifications to the existing catalog numbers are:

- Base Plates: Select style 1, 2, 3 or 4
 - Front Covers: Select metal, transparent plastic, or transparent plastic with neon light.
- For special features see page 621.

9007T and FT

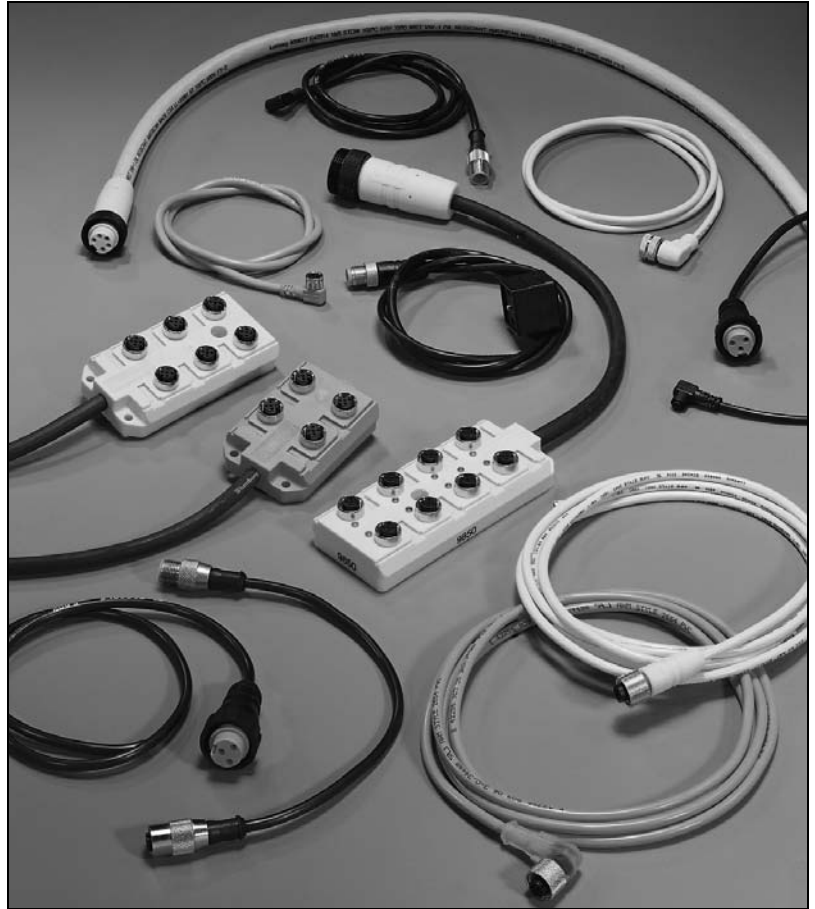


Cabling

Catalog
September

07

File 9006



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Cabling

Selection Guide

Connector Cables and Field-Attachable Connectors

Selection Guide for Typical Cabling Systems with Wiring to Connectors

Description	Connector Cables				Field-Attachable Connectors					
	Nano-Style M8	Micro-Style M12	Micro-Style 0.5 in. 20 UNF	Mini-Style 0.88 in. 16 UNF	Micro-Style M12	Micro-Style 0.5 in. 20 UNF	Mini-Style 0.88 in. 16 UNF	M18	DIN 43650 A	Type 717
Connector Type										
Female	•	•	•	•	•	•	•	•	•	•
Male					•	•	•			
Connection Type										
Non-Locking	•									
Locking	•	•	•	•	•	•	•	•	•	•
Model										
Straight	•	•	•	•	•	•	•	•		
90°	•	•	•	•	•	•	•	•	•	•
Number of Contacts	3, 4	2, 4, 5	3, 4, 5	3, 4, 5, 6, 7, 9	4, 5	3	3, 4, 5	4	4	5
Signaling										
without LED	•	•	•	•	•	•	•	•	•	•
with LED	•	•	•	•	•	•	•	•	•	•
Voltage										
DC	•	•		•	•		•	•	•	•
AC/DC		•	•	•		•	•			
Color										
Yellow	•	•	•	•						
Black	•	•	•	•	•	•	•	•	•	•
Current (A)	4	3, 4	3, 4	2, 8, 10, 12	4	4	8, 13	16	16	16
Cable Length										
1 m (3.3 ft)										
2 m (6.6 ft)	•	•	•	•						
5 m (16.4 ft)	•	•	•	•						
10 m (32.8 ft)	•	•	•	•						
Catalog Number Prefix	XSZCS9, XSZCS1, XZCP	XSZCD, XZCP	XSZCK, XZCP	XSZCA, XZCP	XSZFD	XSZFK	XSZFA	XZCC	XZCC	XZCC
Page Number	628	633	636	638	644	644	647	647	647	647

• Available selection

Cabling

Selection Guide

Extension Cables, Splitters, and Docks

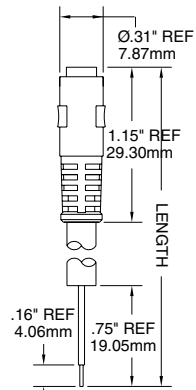
Selection Guide for Typical Cabling Systems with Wiring to Connectors

Description	Extension Cables				Splitter Cables	Splitter Boxes	Sensor Docks			AS-Interface® Modules
	Nano-Style M8 to Micro-Style	Micro-Style M12 to Micro-Style	DIN 43650 A to Micro-Style	Mini-Style 3-Pin to Mini-Style 3-Pin	2 Input Micro-Style M12 to Micro-Style	2 Input Micro-Style to Micro-Style	4 Input Micro-Style M12	6 Input Micro-Style M12	8 Input Micro-Style M12	
Connector Type										
Female	● M8	● M12	● DIN	● M8	● M12	● M12	●	●	●	
Male	● M12	● M12	● M12	● M12	● M12	● M12				
Connection Type										
Non-Locking										
Locking	●	●	●	●	●	●	●	●	●	
Model										
Straight	●	●	●	●	●					
90°	●	●	●	●	●					
Number of Contacts	3	3, 4	5	3	4	4, 5	3, 4	3, 4	3, 4	
Signaling										
without LED	●	●	●	●	●	●	●	●	●	
with LED					● (PNP)					
Voltage										
DC	●	●	●		●	●	●	●	●	
AC/DC		●		●			●	●	●	
Color										
Orange	●	●			●	●				
Yellow		●		●	●		●	●	●	
Black	●	●	●			●	●	●	●	
Current (A)	3, 4	3, 4	4	8	3	3	4/12	4/12	4/12	
Cable Length										
1 m (3.3 ft)	●	●	●	●	●					
2 m (6.6 ft)	●	●	●	●	●					
5 m (16.4 ft)					●		●	●	●	
10 m (32.8 ft)							●	●	●	
Catalog Number Prefix	XSZESD, XZCR	XSZEKK, XSZEDD, XZCR	XZCR	XSZEAA	XSZSDD, XSZSSD	XSZSDD, XZLC	XSZLD, XSZLK, XZLC	XSZLD, XSZLK, XZLC	XSZLD, XSZLK, XZLC	
Page Number	648	648, 650	650	650	652	653	654	654	654	656

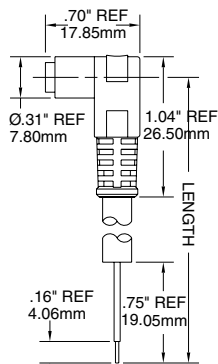
Cabling

Nano-Style Connector Cables (Female)

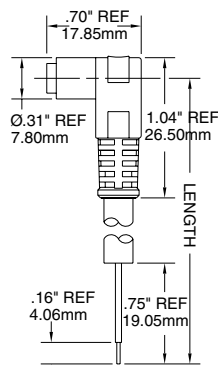
Non-Locking, with and without LEDs



Reference Number 1



Reference Number 2



Reference Number 3 and 4

Non-Locking Type—DC 3-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
S, M8	1	6.6	2	Straight	PVC	Yellow	XSZCS901
S, M8	1	16.4	5	Straight	PVC	Yellow	XSZCS902
S, M8	1	32.8	10	Straight	PVC	Yellow	XSZCS903
S, M8	1	6.6	2	Straight	PUR	Yellow	XSZCS904
S, M8	1	16.4	5	Straight	PUR	Yellow	XSZCS905
S, M8	1	32.8	10	Straight	PUR	Yellow	XSZCS906
S, M8	1	6.6	2	Straight	PVR	Black	XZCP0166L2
S, M8	1	16.4	5	Straight	PVR	Black	XZCP0166L5
S, M8	1	32.8	10	Straight	PVR	Black	XZCP0166L10
S, M8	2	6.6	2	90°	PVC	Yellow	XSZCS911
S, M8	2	16.4	5	90°	PVC	Yellow	XSZCS912
S, M8	2	32.8	10	90°	PVC	Yellow	XSZCS913
S, M8	2	32.8	10	90°	PVC	Yellow	XSZCS914
S, M8	2	16.4	5	90°	PUR	Yellow	XSZCS915
S, M8	2	32.8	10	90°	PUR	Yellow	XSZCS916
S, M8	2	6.6	2	90°	PVR	Black	XZCP0266L2
S, M8	2	16.4	5	90°	PVR	Black	XZCP0266L5
S, M8	2	32.8	10	90°	PVR	Black	XZCP0266L10

Non-Locking Type—PNP DC 3-Pin—With LEDs

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
S, M8	3	6.6	2	90°	PVC	Yellow	XSZCS921
S, M8	3	16.4	5	90°	PVC	Yellow	XSZCS922
S, M8	3	32.8	10	90°	PVC	Yellow	XSZCS923
S, M8	3	6.6	2	90°	PUR	Yellow	XSZCS924
S, M8	3	16.4	5	90°	PUR	Yellow	XSZCS925
S, M8	3	32.8	10	90°	PUR	Yellow	XSZCS926
S, M8	3	6.6	2	90°	PVR	Black	XZCP0366L2
S, M8	3	16.4	5	90°	PVR	Black	XZCP0366L5
S, M8	3	32.8	10	90°	PVR	Black	XZCP0366L10

Non-Locking Type—NPN DC 3-Pin—With LEDs

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
S, M8	4	6.6	2	90°	PVC	Yellow	XSZCS931
S, M8	4	16.4	5	90°	PVC	Yellow	XSZCS932
S, M8	4	32.8	10	90°	PVC	Yellow	XSZCS933
S, M8	4	6.6	2	90°	PUR	Yellow	XSZCS934
S, M8	4	16.4	5	90°	PUR	Yellow	XSZCS935
S, M8	4	32.8	10	90°	PUR	Yellow	XSZCS936
S, M8	4	6.6	2	90°	PVR	Black	XZCP0466L2
S, M8	4	16.4	5	90°	PVR	Black	XZCP0466L5
S, M8	4	32.8	10	90°	PVR	Black	XZCP0466L10

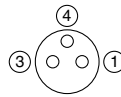
Cabling

Nano-Style Connector Cables (Female)

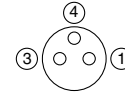
Non-Locking, with and without LEDs

Specifications

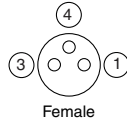
Mechanical		Yellow Cable (PVC)	Yellow Cable (PUR)	Black Cable (PVR)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)	-4 to +176 °F (-20 to +80 °C)	-31 to +212 °F (-35 to +100 °C)
Materials	Molded body	Transparent (LED version only)—PVC – TPE	Transparent (LED version only)—PVC – TPE	TPU
	Contact	Solid machined brass, gold over nickel plating	Solid machined brass, gold over nickel plating	Cu, Zn
	Cable	PVC	PUR	PvR (PVC/NBR)
	Insert	PBT	PBT	TPU PA6 GV
Cable		0.22 mm ² (24 AWG) conductor, PVC, Hi-Flex bare, UL style 2661 copper stranding	0.22 mm ² (24 AWG) conductor, PUR, Hi-Flex bare, UL style 20233 copper stranding	0.22 mm ² (24 AWG) conductor PVC TI2
Enclosure rating	NEMA Type	4	4	—
	IEC	IP65	IP65	IP65
Shock		IEC 60068-2-27	IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6	IEC 60068-2-6
Electrical				
Contact resistance		≤ 5 mΩ	≤ 5 mΩ	≤ 5 mΩ
Current ratings		4 A	4 A	4 A
Working voltage		60 Vac rms / 75 Vdc, Non-LED version; 10–30 Vdc, LED version	60 Vac rms / 75 Vdc, Non-LED version; 10–30 Vdc, LED version	60 Vac rms / 75 Vdc, Non-LED version; 10–30 Vdc, LED version
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s	1.5 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω	> 10 ⁹ Ω
LED (LED versions only)	Green	Power	Power	Power
	Yellow	Sensor Output Signal	Sensor Output Signal	Sensor Output Signal



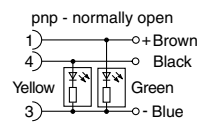
1 = Brown
3 = Blue
4 = Black



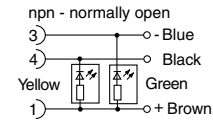
1 = Brown
3 = Blue
4 = Black



Female
Reference Number 1 and 2



Reference Number 3

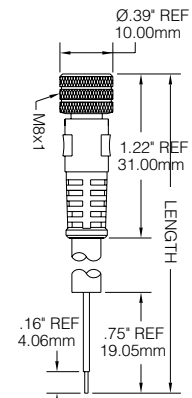


Reference Number 4

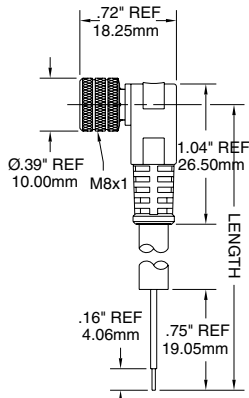
Cabling

Nano-Style Connector Cables (Female)

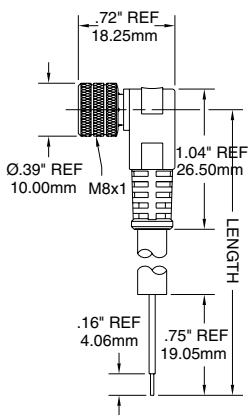
Locking, with and without LEDs



Reference Number 5



Reference Number 6



Reference Number 7 and 8

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Locking Type—DC 3-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
S, M8	5	6.6	2	Straight	PVC	Yellow	XSZCS101
S, M8	5	16.4	5	Straight	PVC	Yellow	XSZCS102
S, M8	5	32.8	10	Straight	PVC	Yellow	XSZCS103
S, M8	5	6.6	2	Straight	PUR	Yellow	XSZCS104
S, M8	5	16.4	5	Straight	PUR	Yellow	XSZCS105
S, M8	5	32.8	10	Straight	PUR	Yellow	XSZCS106
S, M8	5	6.6	2	Straight	PVR	Black	XZCP0566L2
S, M8	5	16.4	5	Straight	PVR	Black	XZCP0566L5
S, M8	5	32.8	10	Straight	PVR	Black	XZCP0566L10
S, M8	6	6.6	2	90°	PVC	Yellow	XSZCS111
S, M8	6	16.4	5	90°	PVC	Yellow	XSZCS112
S, M8	6	32.8	10	90°	PVC	Yellow	XSZCS113
S, M8	6	6.6	2	90°	PUR	Yellow	XSZCS114
S, M8	6	16.4	5	90°	PUR	Yellow	XSZCS115
S, M8	6	32.8	10	90°	PUR	Yellow	XSZCS116
S, M8	6	6.6	2	90°	PVR	Black	XZCP0666L2
S, M8	6	16.4	5	90°	PVR	Black	XZCP0666L5
S, M8	6	32.8	10	90°	PVR	Black	XZCP0666L10

Locking Type—PNP DC 3-Pin—With LEDs

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
S, M8	7	6.6	2	90°	PVR	Black	XZCP0766L2
S, M8	7	16.4	5	90°	PVR	Black	XZCP0766L5
S, M8	7	32.8	10	90°	PVR	Black	XZCP0766L10

Locking Type—NPN DC 3-Pin—With LEDs

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
S, M8	8	6.6	2	90°	PVC	Yellow	XSZCS131
S, M8	8	16.4	5	90°	PVC	Yellow	XSZCS132
S, M8	8	32.8	10	90°	PVC	Yellow	XSZCS133
S, M8	8	6.6	2	90°	PVR	Black	XZCP0866L2
S, M8	8	16.4	5	90°	PVR	Black	XZCP0866L5
S, M8	8	32.8	10	90°	PVR	Black	XZCP0866L10

Cabling

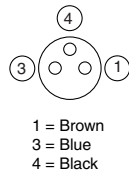
Nano-Style Connector Cables (Female)

Locking, with and without LEDs

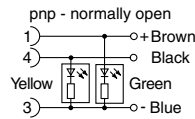
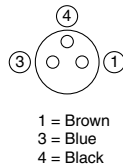
Specifications

Mechanical		Yellow Cable (PVC)	Yellow Cable (PUR)	Black Cable (PVR)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)	-4 to +176 °F (-20 to +80 °C)	-31 to +212 °F (-35 to 100 °C)
Materials	Molded body	Transparent (LED version only)—PVC-TPE	Transparent (LED version only)—PVC-TPE	TPU
	Contact	Solid machined brass, gold over nickel plating	Solid machined brass, gold over nickel plating	Cu ZA
	Cable	PVC	PUR	PVR (PVC/NBR)
	Coupling nut	Nickel-plated brass	Nickel-plated brass	Cu Zn
	Insert	PBT	PBT	TPU
Cable		0.22 mm ² (24 AWG) conductor, PVC, Hi-Flex bare, UL style 2661 copper stranding	0.22 mm ² (24 AWG) conductor, PUR, Hi-Flex bare, UL style 20233 copper stranding	0.22 mm ² (24 AWG) conductor PVC T12
Enclosure rating	NEMA Type ■	6P	6P	—
	IEC ■	IP68	IP68	IP67
Shock		IEC 60068-2-27	IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6	IEC 60068-2-6
Electrical				
Contact resistance		≤ 5 mΩ	≤ 5 mΩ	≤ 5 mΩ
Current ratings		4 A	4 A	4 A
Working voltage		60 Vac rms / 75 Vdc, Non-LED version; 10–30 Vdc, LED version	60 Vac rms / 75 Vdc, Non-LED version; 10–30 Vdc, LED version	60 Vac rms / 75 Vdc, Non-LED version; 10–30 Vdc, LED version
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s	1.5 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω	> 10 ⁹ Ω
LED (LED versions only)	Green	Power	Power	Power
	Yellow	Sensor Output Signal	Sensor Output Signal	Sensor Output Signal

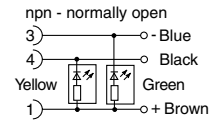
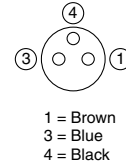
■ Only in fully locked position



Reference Number
6 and 7



Reference Number 7

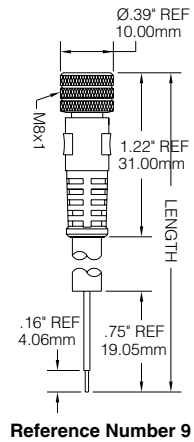


Reference Number 8

Cabling

Nano-Style Connector Cables (Female)

Locking, without LEDs

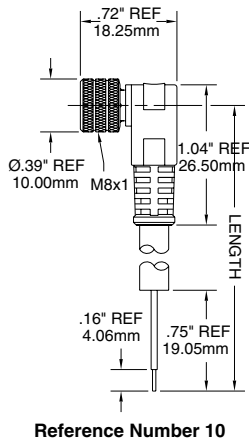


Locking Type—DC 4-Pin—Without LED

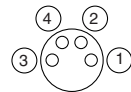
Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
S, M8	9	6.6	2	Straight	PVC	Yellow	XSZCS141
S, M8	9	16.4	5	Straight	PVC	Yellow	XSZCS142
S, M8	9	32.8	10	Straight	PVC	Yellow	XSZCS143
S, M8	9	6.6	2	Straight	PVR	Black	XZCP0941L2
S, M8	9	16.4	5	Straight	PVR	Black	XZCP0941L5
S, M8	9	32.8	10	Straight	PVR	Black	XZCP0941L10
S, M8	10	6.6	2	90°	PVC	Yellow	XSZCS151
S, M8	10	16.4	5	90°	PVC	Yellow	XSZCS152
S, M8	10	32.8	10	90°	PVC	Yellow	XSZCS153
S, M8	10	6.6	2	90°	PVR	Black	XZCP1041L2
S, M8	10	16.4	5	90°	PVR	Black	XZCP1041L5
S, M8	10	32.8	10	90°	PVR	Black	XZCP1041L10

Specifications

Mechanical



		Yellow Cable (PVC)	Black Cable (PVR)
Standard temperature range		—	-31 to +212 °F (-35 to 100 °C)
Materials	Molded body	TPE	TPU
	Contact	Solid machined brass, gold over nickel plating	Cu Zn
	Cable	PVC	PVR (PVC/NBR)
	Coupling nut	Nickel-plated brass	Cu Zn
Insert		PBT	TPU
Cable		0.22 mm ² (24 AWG) conductor, PVC, Hi-Flex bare, UL style 2661 copper stranding	0.34 mm ² (22 AWG) conductor, PVC T12
Enclosure rating	NEMA Type ■	6P	—
	IEC ■	IP68	IP67
Shock		IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6
Electrical			
Contact resistance		< 5 mΩ	< 5 mΩ
Current ratings		4 A	4 A
Working voltage		60 Vac rms / 75 Vdc	60 Vac rms / 75 Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω
■ Only in fully locked position			



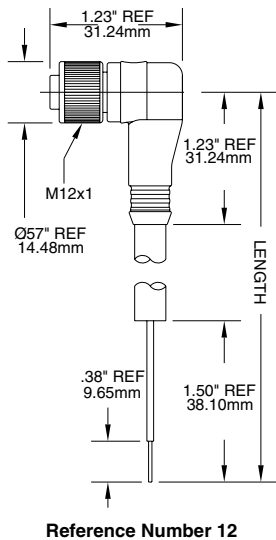
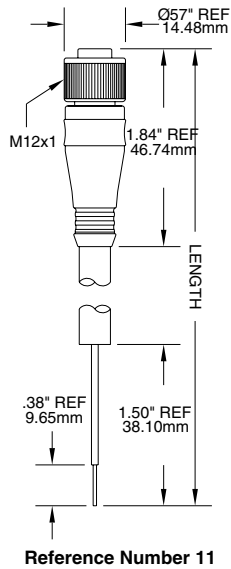
- 1 = Brown
- 2 = White
- 3 = Blue
- 4 = Black

Reference Number 9 and 10

Cabling

Micro-Style Connector Cables (Female)

Locking, without LEDs



DC 4-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
D, M12	11	6.6	2	Straight	PVC	Yellow	XSZCD101Y
D, M12	11	16.4	5	Straight	PVC	Yellow	XSZCD102Y
D, M12	11	32.8	10	Straight	PVC	Yellow	XSZCD103Y
D, M12	11	6.6	2	Straight	PUR	Yellow	XSZCD104Y
D, M12	11	16.4	5	Straight	PUR	Yellow	XSZCD105Y
D, M12	11	32.8	10	Straight	PUR	Yellow	XSZCD106Y
D, M12	11	6.6	2	Straight	PVR	Black	XZCP1141L2
D, M12	11	16.4	5	Straight	PVR	Black	XZCP1141L5
D, M12	11	32.8	10	Straight	PVR	Black	XZCP1141L10
D, M12	12	6.6	2	90°	PVC	Yellow	XSZCD111Y
D, M12	12	16.4	5	90°	PVC	Yellow	XSZCD112Y
D, M12	12	32.8	10	90°	PVC	Yellow	XSZCD113Y
D, M12	12	6.6	2	90°	PUR	Yellow	XSZCD114Y
D, M12	12	16.4	5	90°	PUR	Yellow	XSZCD115Y
D, M12	12	32.8	10	90°	PUR	Yellow	XSZCD116Y
D, M12	12	6.6	2	90°	PVR	Black	XZCP1241L2
D, M12	12	16.4	5	90°	PVR	Black	XZCP1241L5
D, M12	12	32.8	10	90°	PVR	Black	XZCP1241L10

Specifications

Mechanical		Yellow Cable (PVC)	Yellow Cable (PUR)	Black Cable (PVR)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)	-4 to +176 °F (-20 to +80 °C)	-31 to +212 °F (-35 to 100 °C)
Materials	Molded body	PVC	PUR (Polyurethane)	TPU
	Contact	Copper alloy, gold over nickel plating	Copper alloy, gold over nickel plating	Cu Zn
	Cable	PVC, Self extinguishing	PUR (Polyurethane), Self extinguishing	PVR (PVC/NBR)
	Coupling nut	Nickel-plated brass	Nickel-plated brass	Cu Zn
	Insert	Nylon 6/6	Nylon 6/6	TPU
Cable		22 AWG, UL style 2661; Hi-Flex bare, 26x36 copper stranding	22 AWG, UL style 20233; Hi-Flex bare, 26x36 copper stranding	0.34 mm ² (22 AWG) conductor, PVC T12
Enclosure rating	NEMA Type ■	6P	6P	—
	IEC ■	IP68	IP68	IP67
Shock		IEC 60068-2-27	IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6	IEC 60068-2-6
Electrical				
Contact resistance		≤ 5 mΩ	≤ 5 mΩ	≤ 5 mΩ
Current ratings		4 A	4 A	4 A
Working voltage		250 Vdc	250 Vdc	250 Vac / 300 Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		≥ 10 ⁹ Ω	≥ 10 ⁹ Ω	≥ 10 ⁹ Ω
Agency Approvals	UL	Yes	Yes	—
	CSA	Yes	Yes	—

■ Only in fully locked position



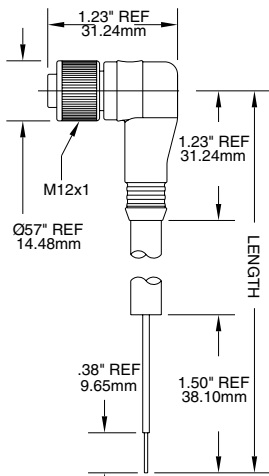
- 1 = Brown
- 2 = White
- 3 = Blue
- 4 = Black
- 5 = not used

Reference Number 11 and 12

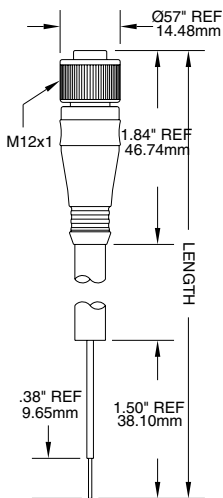
Cabling

Micro-Style Connector Cables (Female)

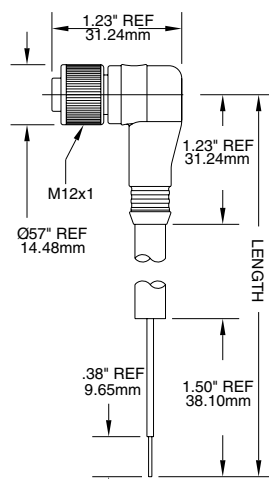
DC with and without LEDs



Reference Number 13 and 14



Reference Number 15



Reference Number 16

PNP DC 4-Pin—With LEDs

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
D, M12	13	6.6	2	90°	PVC	Yellow	XSZCD121Y
D, M12	13	16.4	5	90°	PVC	Yellow	XSZCD122Y
D, M12	13	32.8	10	90°	PVC	Yellow	XSZCD123Y
D, M12	13	6.6	2	90°	PUR	Yellow	XSZCD124
D, M12	13	16.4	5	90°	PUR	Yellow	XSZCD125
D, M12	13	32.8	10	90°	PUR	Yellow	XSZCD126
D, M12	13	6.6	2	90°	PVR	Black	XZCP1340L2
D, M12	13	16.4	5	90°	PVR	Black	XZCP1340L5
D, M12	13	32.8	10	90°	PVR	Black	XZCP1340L10

NPN DC 4-Pin—With LEDs

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
D, M12	14	6.6	2	90°	PVC	Yellow	XSZCD131Y
D, M12	14	16.4	5	90°	PVC	Yellow	XSZCD132Y
D, M12	14	32.8	10	90°	PVC	Yellow	XSZCD133Y
D, M12	14	6.6	2	90°	PUR	Yellow	XSZCD134
D, M12	14	16.4	5	90°	PUR	Yellow	XSZCD135
D, M12	14	32.8	10	90°	PUR	Yellow	XSZCD136
D, M12	14	6.6	2	90°	PVR	Black	XZCP1440L2
D, M12	14	16.4	5	90°	PVR	Black	XZCP1440L5
D, M12	14	32.8	10	90°	PVR	Black	XZCP1440L10

DC 5-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
—	15	6.6	2	Straight	PVC	Yellow	XSZCD1501Y
—	15	16.4	5	Straight	PVC	Yellow	XSZCD1502Y
—	15	32.8	10	Straight	PVC	Yellow	XSZCD1503Y
—	16	6.6	2	90°	PVC	Yellow	XSZCD1511Y
—	16	16.4	5	90°	PVC	Yellow	XSZCD1512Y
—	16	32.8	10	90°	PVC	Yellow	XSZCD1513Y

Cabling

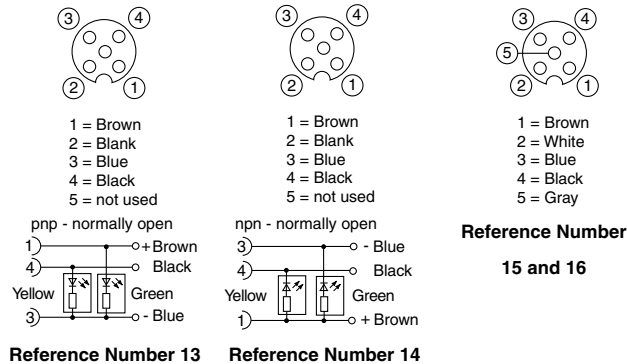
Micro-Style Connector Cables (Female)

DC with and without LEDs

Specifications

Mechanical		Yellow Cable (PVC)	Yellow Cable (PUR)	Black Cable (PVR)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)	-4 to +176 °F (-20 to +80 °C)	-31 to +212 °F (-35 to 100 °C)
Materials	Molded body	PUR (Polyurethane), Transparent (LED version only)	PUR (Polyurethane), Transparent (LED version only)	TPU
	Contact	Copper alloy, gold over nickel plating	Copper alloy, gold over nickel plating	Cu Sn
	Cable	PVC, Self extinguishing	PUR/PVC	PVR (PVC/NBR)
	Coupling nut	Nickel-plated brass	Nickel-plated brass	Cu Zn
	Insert	PUR	PUR	TPU
Cable		22 AWG, UL style 2661; Hi-Flex bare, 26x36 copper stranding	22 AWG, UL style 20233; Hi-Flex bare, 26x36 copper stranding	0.34 mm ² (22 AWG) conductor, PVC T12
Enclosure rating	NEMA Type ■	6P	6P	—
	IEC ■	IP68	IP68	IP67
Shock		IEC 60068-2-27	IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6	IEC 60068-2-6
Electrical				
Contact resistance		≤ 5 mΩ	≤ 5 mΩ	≤ 5 mΩ
Current ratings		3 A	3 A	3 A
Working voltage		250 Vdc	250 Vdc	250 Vdc (LED version 10–30 Vdc)
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω	> 10 ⁹ Ω
LED (LED versions only)	Green	Power	Power	Power
	Yellow	Sensor Output Signal	Sensor Output Signal	Sensor Output Signal
Agency Approvals	UL	Yes	Yes	—
	CSA	Yes	Yes	—

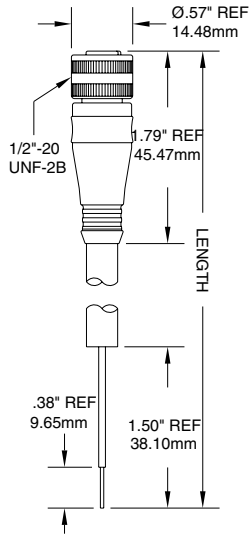
■ Only in fully locked position



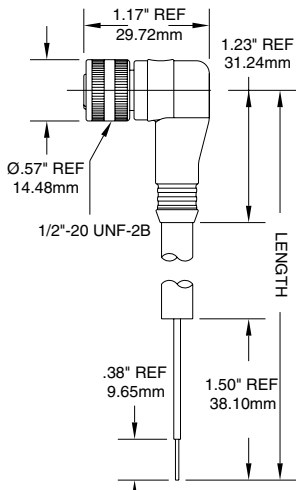
Cabling

Micro-Style Connector Cables (Female)

AC/DC without LED



Reference Number 17



Reference Number 18, 19 and 20

AC/DC 3-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
K, U20	18	6.0	1.8	90°	PVC	Yellow	XSZCK101Y
K, U20	18	15.0	4.6	90°	PVC	Yellow	XSZCK102Y
K, U20	18	30.0	9.1	90°	PVC	Yellow	XSZCK103Y
K, U20	18	6.6	2.0	90°	PVR	Black	XZCP1865L2
K, U20	18	16.4	5.0	90°	PVR	Black	XZCP1865L5
K, U20	18	32.8	10.0	90°	PVR	Black	XZCP1865L10
K, U20	17	6.0	1.8	Straight	PVC	Yellow	XSZCK111Y
K, U20	17	15.0	4.6	Straight	PVC	Yellow	XSZCK112Y
K, U20	17	30.0	9.1	Straight	PVC	Yellow	XSZCK113Y
K, U20	17	6.6	2.0	Straight	PVR	Black	XZCP1965L2
K, U20	17	16.4	5.0	Straight	PVR	Black	XZCP1965L5
K, U20	17	32.8	10.0	Straight	PVR	Black	XZCP1965L10

AC/DC 4-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
—	17	6.6	2	Straight	PVC	Yellow	XSZCK1401Y
—	17	16.4	5	Straight	PVC	Yellow	XSZCK1402Y
—	17	32.8	10	Straight	PVC	Yellow	XSZCK1403Y
—	19	6.6	2	90°	PVC	Yellow	XSZCK1411Y
—	19	16.4	5	90°	PVC	Yellow	XSZCK1412Y
—	19	32.8	10	90°	PVC	Yellow	XSZCK1413Y

AC/DC 5-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
—	17	6.6	2	Straight	PVC	Yellow	XSZCK1501Y
—	17	16.4	5	Straight	PVC	Yellow	XSZCK1502Y
—	17	32.8	10	Straight	PVC	Yellow	XSZCK1503Y
—	20	6.6	2	90°	PVC	Yellow	XSZCK1511Y
—	20	16.4	5	90°	PVC	Yellow	XSZCK1512Y
—	20	32.8	10	90°	PVC	Yellow	XSZCK1513Y

Cabling

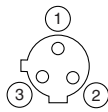
Micro-Style Connector Cables (Female)

AC/DC without LED

Specifications

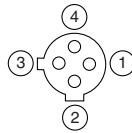
Mechanical		Yellow Cable (PVC)	Black Cable (PVR)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)	-31 to +212 °F (-35 to 100 °C)
Materials	Molded body	PVC	TPU
	Contact	Copper alloy, gold over nickel plating	Cu Sn
	Cable	PVC, self extinguishing	PVR (PVC/NBR)
	Coupling nut	Nickel-plated brass	Cu Zn
	Insert	Nylon 6/6	TPU
Cable		22 AWG, UL style 2661; Metallic braid, 26x36 copper stranding	0.34 mm ² (22 AWG) conductor, PVC T12
Enclosure rating	NEMA Type ■	6P	—
	IEC ■	IP68	IP67
Shock		IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6
Electrical			
Contact resistance		≤ 5 mΩ	≤ 5 mΩ
Current ratings		4 A	4 A
Working voltage		250 Vac/Vdc	250 Vac / 300 Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω
Agency Approvals	UL	Yes	—
	CSA	Yes	—

■ Only in fully locked position



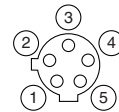
1 = Green
2 = Red/Black
3 = Red/White

**Reference Number
17 and 18**



1 = Red/Black
2 = Red/White
3 = Red
4 = Green

**Reference Number
17 and 19**



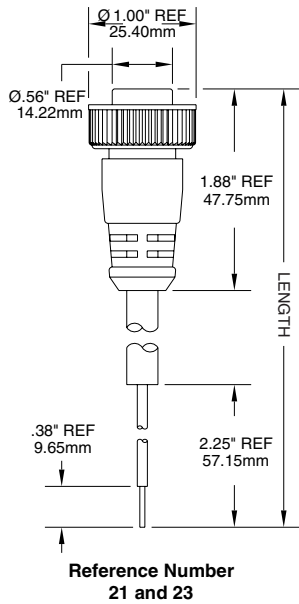
1 = Red/White
2 = Red
3 = Green
4 = Red/Yellow
5 = Red/Black

**Reference Number
17 and 20**

Cabling

Mini-Style Connector Cables (Female)

DC, AC/DC without LEDs—3 Pin



DC 3-Pin—Without LED

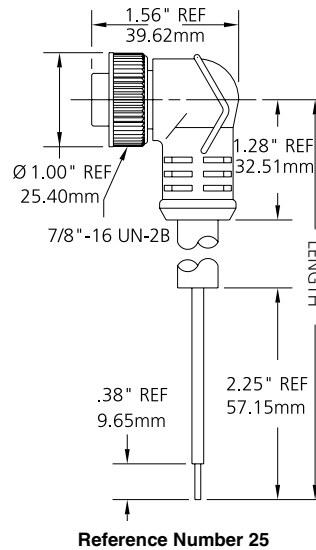
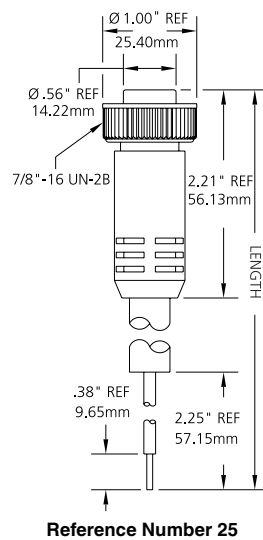
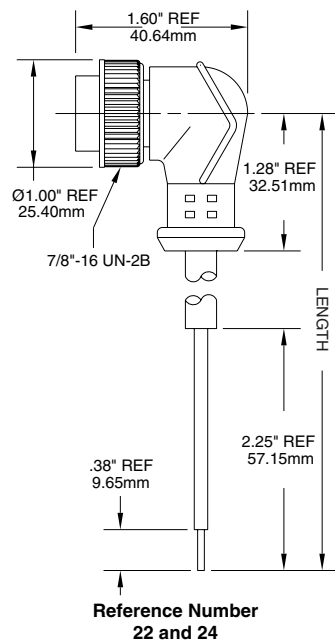
Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
A, R3	21	6.0	1.8	Straight	PVC	Yellow	XSZCA101Y
A, R3	21	15.0	4.6	Straight	PVC	Yellow	XSZCA102Y
A, R3	21	30.0	9.1	Straight	PVC	Yellow	XSZCA103Y
A, R3	21	6.6	2.0	Straight	PVR	Black	XZCP1662L2
A, R3	21	16.4	5.0	Straight	PVR	Black	XZCP1662L5
A, R3	21	32.8	10.0	Straight	PVR	Black	XZCP1662L10
A, R3	22	6.0	1.8	90°	PVC	Yellow	XSZCA111Y
A, R3	22	15.0	4.6	90°	PVC	Yellow	XSZCA112Y
A, R3	22	30.0	9.1	90°	PVC	Yellow	XSZCA113Y

AC/DC 3-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
A, R3	23	6.0	1.8	Straight	PVC	Yellow	XSZCA901Y
A, R3	23	15.0	4.6	Straight	PVC	Yellow	XSZCA902Y
A, R3	23	30.0	9.1	Straight	PVC	Yellow	XSZCA903Y
A, R3	23	6.6	2.0	Straight	PVR	Black	XZCP1670L2
A, R3	23	16.4	5.0	Straight	PVR	Black	XZCP1670L5
A, R3	23	32.8	10.0	Straight	PVR	Black	XZCP1670L10
A, R3	24	6.0	1.8	90°	PVC	Yellow	XSZCA911Y
A, R3	24	15.0	4.6	90°	PVC	Yellow	XSZCA912Y
A, R3	24	30.0	9.1	90°	PVC	Yellow	XSZCA913Y

AC/DC 3-Pin—Without LED—(10 A rated)

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
A, R3	25	6	1.8	Straight	STOOW	Yellow	XSZCA1311Y
A, R3	25	15	4.6	Straight	STOOW	Yellow	XSZCA1312Y
A, R3	25	30	9.1	Straight	STOOW	Yellow	XSZCA1313Y
A, R3	26	6	1.8	90°	STOOW	Yellow	XSZCA9311Y
A, R3	26	15	4.6	90°	STOOW	Yellow	XSZCA9312Y
A, R3	26	30	9.1	90°	STOOW	Yellow	XSZCA9313Y



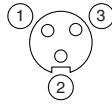
Cabling

Mini-Style Connector Cables (Female)

DC, AC/DC without LEDs—3 Pin

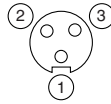
Specifications

Mechanical		Yellow Cable (PVC)	Yellow Cable (STOOW) 13 A	Black Cable (PVR)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)	-4 to +221 °F (-20 to +105 °C)	-31 to +212 °F (-35 to 100 °C)
Materials	Molded body	PVC - UL - 94	PVC - UL - 94	TPU
	Contact	Solid machined brass, gold over silver plating	Solid machined brass, gold over silver plating	Cu Sn
	Cable	PVC, Self extinguishing	STOOW	PVR (PVC/NBR)
	Coupling nut	Diecast zinc with black epoxy coat	Diecast zinc with black epoxy coat	Cu Zn
	Insert	PVC - UL STD - 94	PVC - UL STD - 94	TPU
Cable		18 AWG, UL style 2661; Hi-Flex bare, 41x34 copper stranding	1.23 mm ² (16 AWG), UL-STOOW; Hi-Flex bare, 65x34 copper stranding	0.5 mm ² (20 AWG) conductor, PVC T12
Enclosure rating	NEMA Type ■	6P	6P	—
	IEC ■	IP68	IP68	IP67
Insertion force		≤ 3.0 N (0.67 lb) ≥ 1.0 N (0.22 lb)	≤ 3.0 N (0.67 lb) ≥ 1.0 N (0.22 lb)	≤ 3.0 N (0.67 lb) ≥ 1.0 N (0.22 lb)
Shock		IEC 60068-2-27	IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6	IEC 60068-2-6
Electrical				
Contact resistance		≤ 5 mΩ	≤ 5 mΩ	≤ 5 mΩ
Current ratings		7 A	10 A	12 A
Working voltage		300 Vac/Vdc rms	600 Vac rms	250 Vac rms
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω	> 10 ⁹ Ω
Agency Approvals	UL	Yes	Yes	—
	CSA	Yes	Yes	—
■ Only in fully locked position				



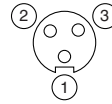
1 = Brown
2 = Black (Ground)
3 = Blue

Reference Number
21 and 22



1 = Green (Ground)
2 = Red w/Black
3 = Red w/White

Reference Number
23 and 24



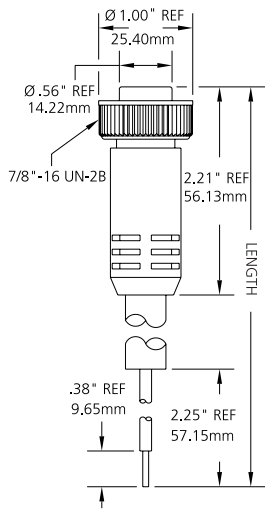
1 = Green (Ground)
2 = Red w/Black
3 = Red w/White

Reference Number
25 and 26

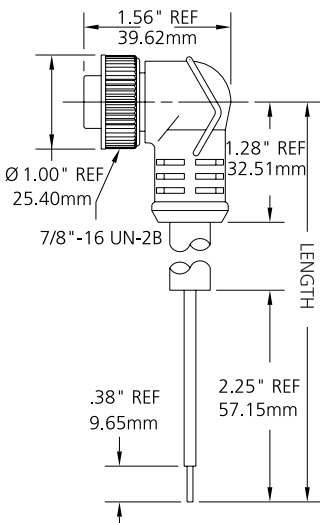
Cabling

Mini-Style Connector Cables (Female)

DC, AC/DC without LEDs—4 and 5 Pin



Reference Number
27, 29 and 31



Reference Number
28, 30 and 32

DC 4-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
A, R4	27	6	1.8	Straight	STOOW	Yellow	XSZCA1401Y
A, R4	27	15	4.6	Straight	STOOW	Yellow	XSZCA1402Y
A, R4	27	30	9.1	Straight	STOOW	Yellow	XSZCA1403Y
A, R4	28	6	1.8	90°	STOOW	Yellow	XSZCA9401Y
A, R4	28	15	4.6	90°	STOOW	Yellow	XSZCA9402Y
A, R4	28	30	9.1	90°	STOOW	Yellow	XSZCA9403Y

AC/DC 4-Pin—Without LED

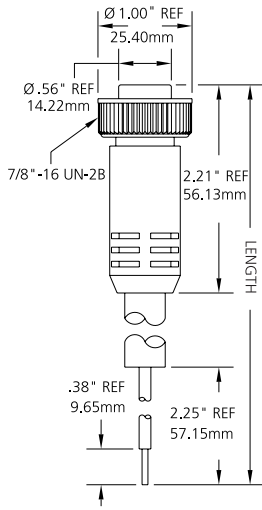
Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
—	29	6	1.8	Straight	STOOW	Yellow	XSZCA1411Y
—	29	15	4.6	Straight	STOOW	Yellow	XSZCA1412Y
—	29	30	9.1	Straight	STOOW	Yellow	XSZCA1413Y
—	30	6	1.8	90°	STOOW	Yellow	XSZCA9411Y
—	30	15	4.6	90°	STOOW	Yellow	XSZCA9412Y
—	30	30	9.1	90°	STOOW	Yellow	XSZCA9413Y

Cabling

Mini-Style Connector Cables (Female)

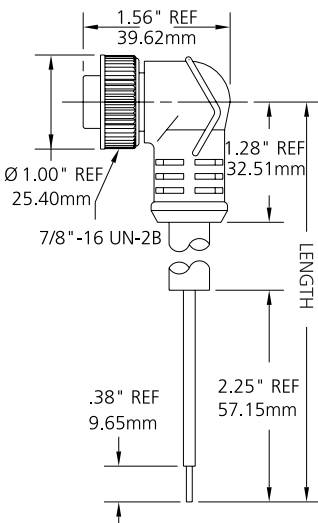
DC, AC/DC without LEDs—4 and 5 Pin

AC/DC 5-Pin—Without LED



Reference Number
27, 29 and 31

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
R5, U78	31	6	1.8	Straight	STOOW	Yellow	XSZCA1501Y
R5, U78	31	15	4.6	Straight	STOOW	Yellow	XSZCA1502Y
R5, U78	31	30	9.1	Straight	STOOW	Yellow	XSZCA1503Y
R5, U78	32	6	1.8	90°	STOOW	Yellow	XSZCA9501Y
R5, U78	32	15	4.6	90°	STOOW	Yellow	XSZCA9502Y
R5, U78	32	30	9.1	90°	STOOW	Yellow	XSZCA9503Y



Reference Number
28, 30 and 32

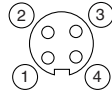
Cabling

Mini-Style Connector Cables (Female)

DC, AC/DC without LEDs

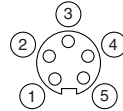
Specifications

Mechanical		Yellow Cable (STOOW)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)
Materials	Molded body	PVC - UL STD - 94
	Contact	Solid machined brass, gold over silver plating
	Cable	STOOW
	Coupling nut	Diecast zinc with black epoxy coat
	Insert	PUR
Cable		16 AWG, UL-STOOW; Hi-Flex bare, 65x34 copper stranding
Enclosure rating	NEMA Type ■	6P
	IEC ■	IP68
Insertion force		≤ 3.0 N (0.67 lb) ≥ 1.0 N (0.22 lb)
Shock		IEC 60068-2-27
Vibration		IEC 60068-2-6
Electrical		
Contact resistance		≤ 5 mΩ
Current ratings		8 A
Working voltage		600 Vac/Vdc rms
Dielectric withstanding voltage		1.5 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω
Agency Approvals	UL	Yes
	CSA	Yes
■ Only in fully locked position		



- 1 = Black
- 2 = White
- 3 = Red
- 4 = Green (Ground)

Reference Number
27, 28, 29 and 30



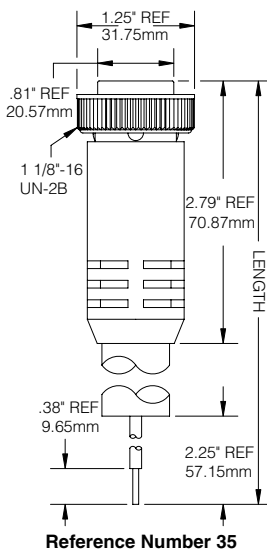
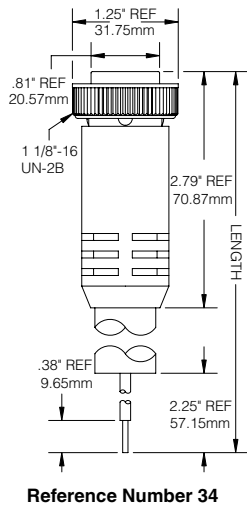
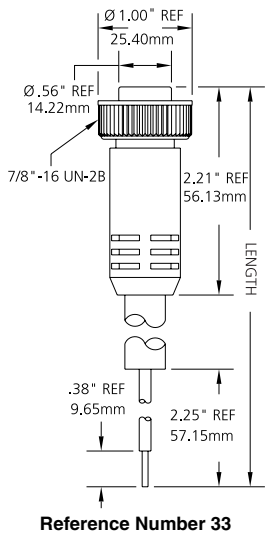
- 1 = White
- 2 = Red
- 3 = Green (Ground)
- 4 = Orange
- 5 = Black

Reference Number
31 and 32

Cabling

Mini-Style Connector Cables (Female)

AC/DC without LEDs



AC/DC 6-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
—	33	6	1.8	Straight	STOOW	Yellow	XSZCA1601Y
—	33	15	4.6	Straight	STOOW	Yellow	XSZCA1602Y
—	33	30	9.1	Straight	STOOW	Yellow	XSZCA1603Y

AC/DC 7-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
—	34	6	1.8	Straight	STOOW	Yellow	XSZCA1701Y
—	34	15	4.6	Straight	STOOW	Yellow	XSZCA1702Y
—	34	30	9.1	Straight	STOOW	Yellow	XSZCA1703Y

AC/DC 9-Pin—Without LED

Sensor Suffix Letter	Connector Reference Number	Cable Length		Connector Style	Cable Material	Cable Color	Catalog Number
		ft	m				
—	35	6	1.8	Straight	STOOW	Yellow	XSZCA1901Y
—	35	15	4.6	Straight	STOOW	Yellow	XSZCA1902Y
—	35	30	9.1	Straight	STOOW	Yellow	XSZCA1903Y

Specifications

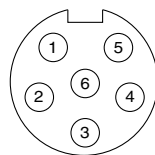
Mechanical

		Yellow Cable (STOOW)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)
Materials	Molded body	PVC - UL STD - 94
	Contact	Solid machined brass, gold over silver plating
	Cable	STOOW
	Coupling nut	Diecast zinc with black epoxy coat
	Insert	PVC - UL STD - 94
Cable		16 AWG, UL-STOOW; Hi-Flex bare, 65x34 copper stranding
Enclosure rating	NEMA Type ■	6P
	IEC ■	IP68
Insertion force		≤ 3.0 N (0.67 lb)
		≥ 1.0 N (0.22 lb)
Shock		IEC 60068-2-27
Vibration		IEC 60068-2-6

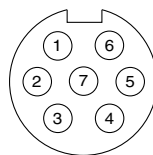
Electrical

Contact resistance	≤ 5 mΩ	
Current ratings	8 A	
Working voltage	600 Vac rms	
Dielectric withstanding voltage	1.5 kVac rms / 60 s	
Insulation resistance	> 10 ⁹ Ω	
Agency Approvals	UL	Yes
	CSA	Yes

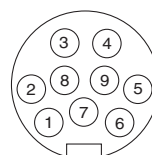
■ Only in fully locked position



Reference Number 33



Reference Number 34

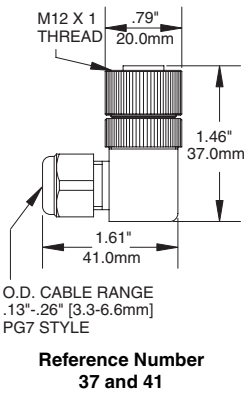
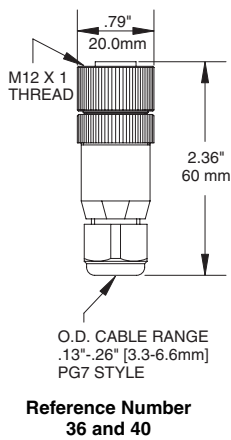
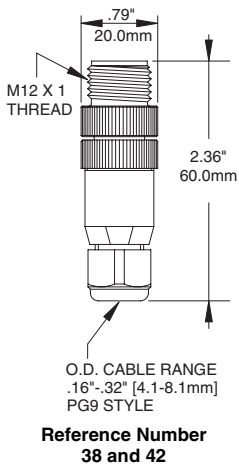


Reference Number 35

Cabling

Micro-Style Field-Attachable Connectors

DC, AC/DC

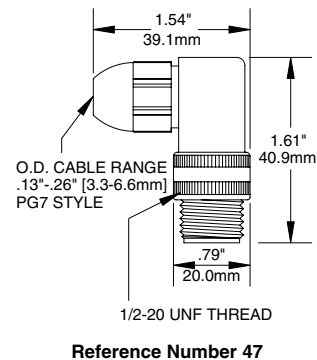
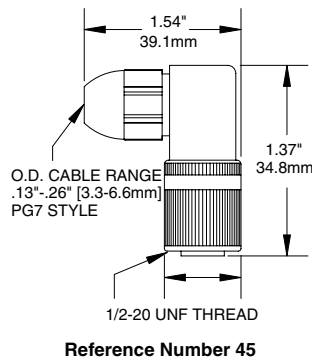
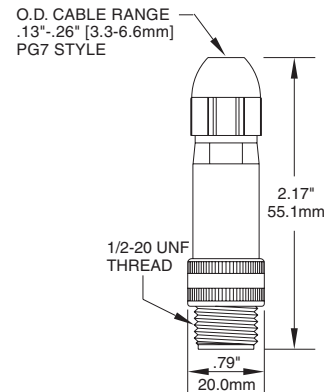
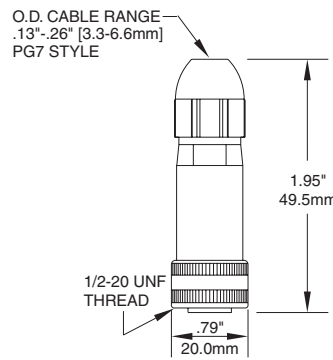
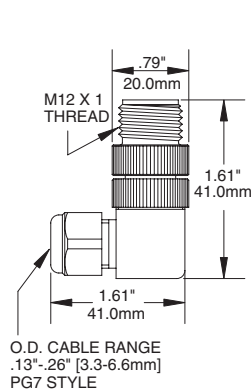


Micro-Style DC Only

Sensor Suffix Letter	Connector Reference Number	Number of Pins	Connector Style	Male/Female	Cable Diameter	Catalog Number
—	36	4	Straight	Female	3-6 mm	XSZFD6409
—	37	4	90°	Female	3-6 mm	XSZFD6419
—	38	4	Straight	Male	4-8 mm	XSZFD9409
—	39	4	90°	Male	3-6 mm	XSZFD9419
—	40	5	Straight	Female	3-6 mm	XSZFD6509
—	41	5	90°	Female	3-6 mm	XSZFD6519
—	42	5	Straight	Male	4-8 mm	XSZFD9509
—	43	5	90°	Male	3-6 mm	XSZFD9519

Micro-Style AC/DC

Sensor Suffix Letter	Connector Reference Number	Number of Pins	Connector Style	Male/Female	Cable Diameter	Catalog Number
—	44	3	Straight	Female	3-6 mm	XSZFK6309
—	45	3	90°	Female	3-6 mm	XSZFK6319
—	46	3	Straight	Male	3-6 mm	XSZFK9309
—	47	3	90°	Male	3-6 mm	XSZFK9319



Cabling

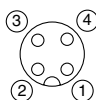
Micro-Style Field-Attachable Connectors

DC, AC/DC

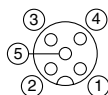
Specifications

Mechanical		Micro-Style AC/DC	Micro-Style DC
Standard temperature range		-40 to +185 °F (-40 to +85 °C)	-13 to +194 °F (-25 to +90 °C)
Materials	Molded body	Nylon	Polyamide
	Contact	Gold plated copper alloy	Silver plated brass
Enclosure rating	NEMA Type ■	6P	6P
	IEC ■	IP68	IP68
Electrical			
Contact resistance		≤ 5 mΩ	≤ 5 mΩ
Current ratings		4 A	4 A
Working voltage		250 Vac/Vdc rms	4P: 250 Vac / 300 Vdc; 5P: 30 Vac / 36 Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω

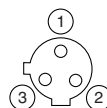
■ Only in fully locked position



Reference Number
36, 37, 38 and 39



Reference Number
40, 41, 42 and 43



Reference Number
44, 45, 46 and 47

Cabling

Snap-C™ Quick Connector Connector and Cables



Features

- Custom build a connector cable suiting your needs using the self-assembled connector
- Create the best wiring solution quickly with no waste of cable
- Complete the assembly without a screwdriver or solder
- Use with a 3- or 4-pin receptacle
- Eliminate errors in wiring with the color-coded sleeve
- Use with black cable only. Yellow cable diameter is too large.

Connector

Description Type	Mating Type	Contact Resistance Maximum	Wire Size	Catalog Number
Connector	Female	8 Ω	AWG 20 (4 x 0.5 mm ²)	XZCC12FDM40V

Cables

Total Length	Jacket Material	Catalog Number
25 m (82 ft)	PvR	XZCB4L0025
50 m (164 ft)	PvR	XZCB4L0050
100 m (328 ft)	PvR	XZCB4L0100
500 m (1640 ft)	PvR	XZCB4L0500
1000 m (3280 ft)	PvR	XZCB4L1000

Assembly in Five Easy Steps:

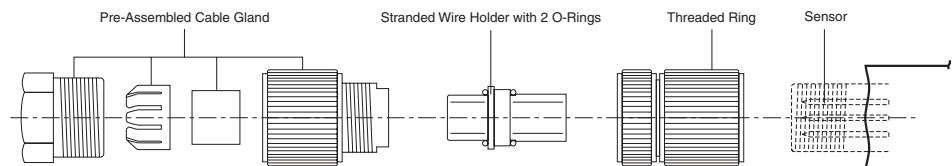
1. Trimming 22 mm of the outer sheath of the cable
2. Sliding the wire nut, grommet and rubber washer assembly over the cable
3. Sliding the plastic body over the assembly and placing the conductors in the color-coded insert
4. Attaching the metal ring and tightening counterclockwise
5. Connecting to any Snap-C™ compatible sensor from Schneider Electric

Specifications

Mechanical		
Temperature Range		-13° to 158° F (-25° to 70° C)
Enclosure Rating	CENELEC	IP67
Enclosure Material		Plastic Body, Metal Locking Ring
Torque		50–60 N•m
Cable Gland Size		PG7 (7 P) 6 mm Diameter
Wiring		3 or 4 wires, 0.5 mm ² (20 AWG)
Electrical		
DC Nominal Voltage (maximum)		60 V
Nominal Current (maximum)		4 A
Contact Resistance (maximum)		8 Ω
Conformity		EN50044 and IEC 60947-5-2

Accessories

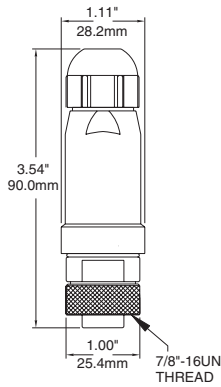
Description	Catalog Number
Cable Stripping Servicing Tool	XZCG01M
Cable Stripping Professional Tool	XZCG02P



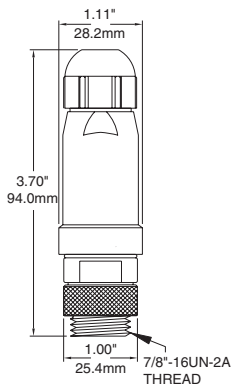
Cabling

Mini and International Field-Attachable Connectors

AC/DC



Reference Number
48 and 52



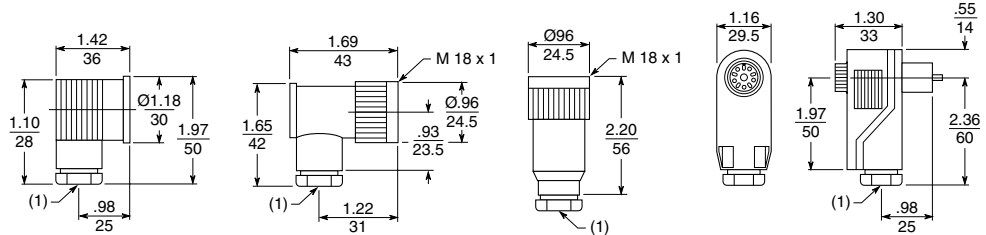
Reference Number
49 and 53

Mini-Style AC/DC

Sensor Suffix Letter	Connector Reference Number	Number of Pins	Connector Style	Male/ Female	Cable Diameter	Catalog Number
—	48	3	Straight	Female	5–12 mm	XSZFA6301
—	49	3	Straight	Male	5–12 mm	XSZFA9301
—	52	5	Straight	Female	5–12 mm	XSZFA6501
—	53	5	Straight	Male	5–12 mm	XSZFA9501

International Types

Sensor Suffix Letter	Connector Reference Number	Number of Pins	Connector Style	Male/ Female	Cable Diameter	Catalog Number
C	54	4	DIN 43650 Form A, 90°	Female	6–8 mm	XZCC43FCP40B
G	55	4	M18, 90°	Female	6.5–8 mm	XZCC18FCP40B
G	56	4	M18, Straight	Female	6.5–8 mm	XZCC18FDP40B
T	57	5	Type 717, 90°	Female	5–11 mm	XZCC51FCP50B



Reference Number 54

Reference Number 55

Reference Number 56

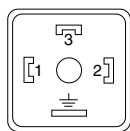
Reference Number 57

Specifications

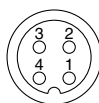
Mechanical		Mini-Style	International Styles
Standard temperature range		-40 to +176 °F (-40 to +80 °C)	-40 to +257 °F (-40 to +125 °C)
Materials	Molded body	Polyamide	PA
	Coupling nut	Nickel-plated brass	Cu Zn/Sn
	Contact	Brass, gold over nickel plating	Cu Zn
	Insert	PUR	PA
Enclosure rating	NEMA Type ■	6P	—
	IEC ■	IP68	IP65

Electrical		Mini-Style	International Styles
Contact resistance		≤ 5 mΩ	≤ 5 mΩ
Current ratings	3-Pole	13 A	—
	5-Pole	8 A	16 A
Working voltage		600 Vac/Vdc	250 Vac
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω
Agency Approvals	CSA	Yes	—

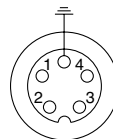
■ Only in fully locked position



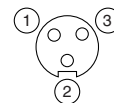
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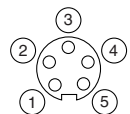
Reference Number 55 and 56



Reference Number 57



Reference Number 48 and 49



Reference Number 52 and 53

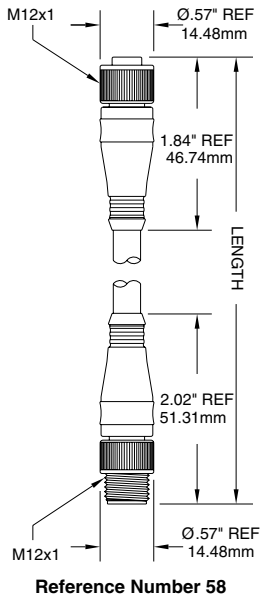
Cabling

Micro- and Nano-Style Extension Cables

DC

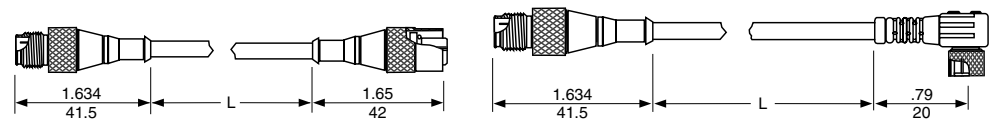
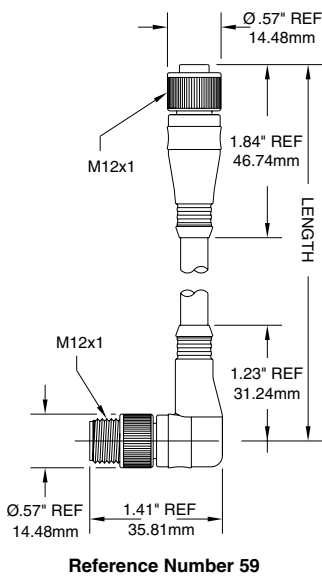
Micro-Style 4-Pin DC Female Connector to Micro-Style 4-Pin DC Male Connector

Connector Reference Number	Female Connector Style	Male Connector Style	Cable Length		Cable Color/Material	Catalog Number
			ft	m		
58	Straight	Straight	3.3	1	Black/PVC	XSZEDD1020
58	Straight	Straight	6.6	2	Black/PVC	XSZEDD1040
59	Straight	90°	3.3	1	Black/PVC	XSZEDD1120
59	Straight	90°	6.6	2	Black/PVC	XSZEDD1140
60	Straight	Straight	3.3	1	Black/PVR	XZCR1511040A1
60	Straight	Straight	6.6	2	Black/PVR	XZCR1511040A2
61	90°	Straight	3.3	1	Black/PVR	XZCR1512040A1
61	90°	Straight	6.6	2	Black/PVR	XZCR1512040A2
62	Straight	Straight	3.3	1	Black/PVR	XZCR1511040E1
62	Straight	Straight	6.6	2	Black/PVR	XZCR1511040E2
63	90°	Straight	3.3	1	Black/PVR	XZCR1512040E1
63	90°	Straight	6.6	2	Black/PVR	XZCR1512040E2
64	Straight	Straight	3.3	1	Black/PVR	XZCR1511062B1
64	Straight	Straight	6.6	2	Black/PVR	XZCR1511062B2
65	90°	Straight	3.3	1	Black/PVR	XZCR1512062B1
65	90°	Straight	6.6	2	Black/PVR	XZCR1512062B2
66	Straight	Straight	3.3	1	Black/PVR	XZCR1511062F1
66	Straight	Straight	6.6	2	Black/PVR	XZCR1511062F2
67	90°	Straight	3.3	1	Black/PVR	XZCR1512062F1
67	90°	Straight	6.6	2	Black/PVR	XZCR1512062F2

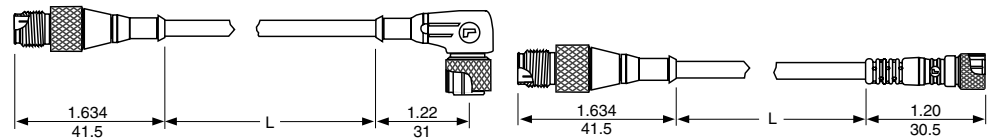


Nano-Style 3-Pin DC Female Connector to Micro-Style 4-Pin DC Male Connector

Connector Reference Number	Female Connector Style	Male Connector Style	Cable Length		Cable Color/Material	Catalog Number
			ft	m		
70	Straight	Straight	3.3	1	Black/PVR	XZCR1501040G1
70	Straight	Straight	6.6	2	Black/PVR	XZCR1501040G2
71	90°	Straight	3.3	1	Black/PVR	XZCR1502040G1
71	90°	Straight	6.6	2	Black/PVR	XZCR1502040G2



Reference Number 71



Reference Number 70

Cabling

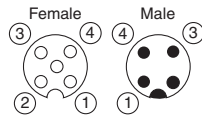
Micro- and Nano-Style Extension Cables

DC

Specifications

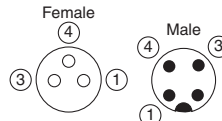
Mechanical		Black Cable (PVC)	Black Cable (PVR)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)	-31 to +212 °F (-35 to 100 °C)
Materials	Molded body	PBT	TPU
	Contact	Copper alloy, gold over nickel plating	Cu Zn
	Cable	PVC, Self extinguishing	PVR (PVC/NBR)
	Coupling nut	Nickel-plated brass	Cu Zn
	Insert	PBT	TPU
Cable		22 AWG; Hi-Flex bare, copper stranding 300 V UL style 2661	0.34 mm ² (22 AWG) conductor, PVC
Enclosure rating	NEMA Type ■	6P	—
	IEC ■	IP68	IP67
Insertion force	Contact	≤ 2 N (0.45 lb)	≤ 2 N (0.45 lb)
Withdrawal force	Contact	≥ 0.5 N (0.11 lb)	≥ 0.5 N (0.11 lb)
Shock		IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6
Electrical			
Contact resistance		≤ 5 mΩ	≤ 5 mΩ
Current ratings		4 A	4 A
Working voltage		250 Vac/Vdc	10–30 Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s	1.5 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω
Agency Approvals	CSA	Yes	—

■ Only in fully locked position



1 = Brown
2 = Blank
3 = Blue
4 = Black

Reference Number
58, 59, 60, 61, 62, 63,
64, 65, 66 and 67



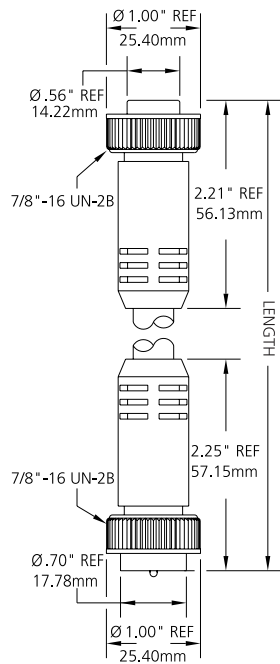
1 = Brown
3 = Blue
4 = Black

Reference Number
70 and 71

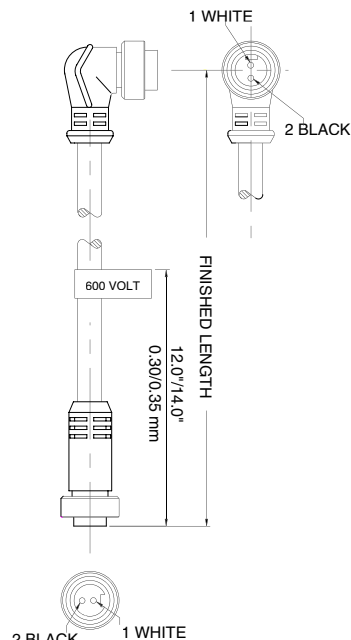
Cabling

Mini, Micro and DIN Style Extension Cables

DC, AC and AC/DC



Reference Number 72



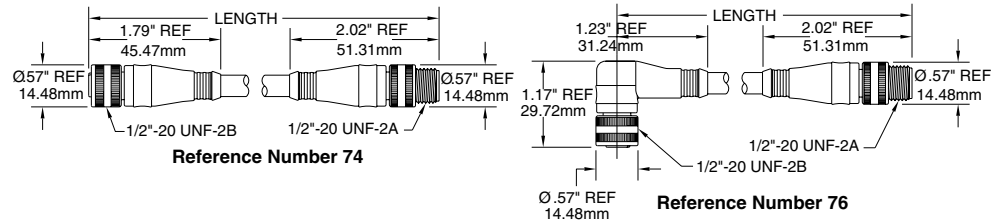
Reference Number 73

Mini-Style 3-Pin AC/DC to Mini-Style 3-Pin AC/DC

Connector Reference Number	Female Connector Type	Female Connector Style	Male Connector Type	Male Connector Style	Cable Length		Cable Color/Material	Catalog Number
					ft	m		
72	Mini-Style 3-Pin	Straight	Mini-Style 3-Pin	Straight	3	0.9	STOOW	XSZEAA3030
72	Mini-Style 3-Pin	Straight	Mini-Style 3-Pin	Straight	6	1.8	STOOW	XSZEAA3060
72	Mini-Style 3-Pin	Straight	Mini-Style 3-Pin	Straight	12	3.7	STOOW	XSZEAA3012
73	Mini-Style 3-Pin	Straight	Mini-Style 3-Pin	90°	3	0.9	STOOW	XSZEAA3130
73	Mini-Style 3-Pin	Straight	Mini-Style 3-Pin	90°	6	1.8	STOOW	XSZEAA3160
73	Mini-Style 3-Pin	Straight	Mini-Style 3-Pin	90°	12	3.7	STOOW	XSZEAA3112

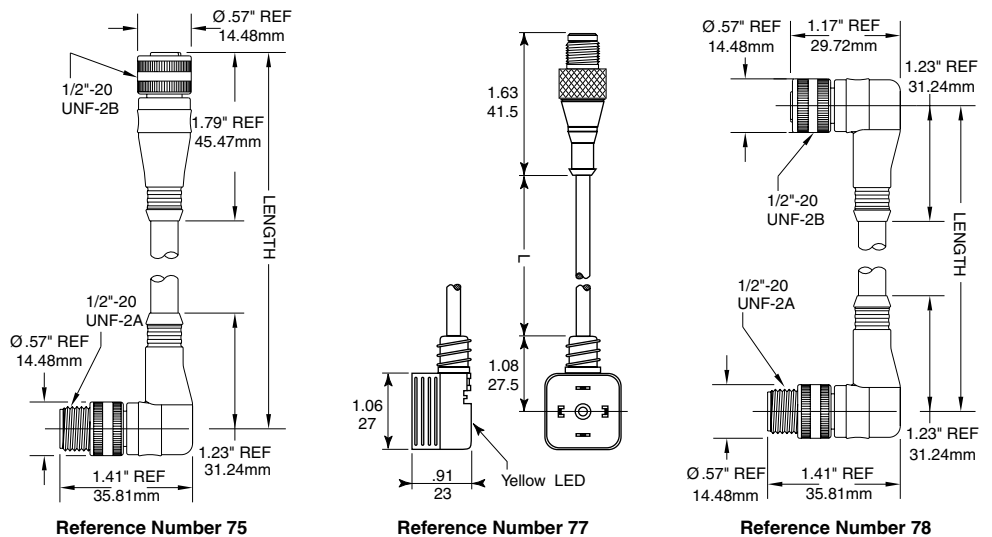
Micro-Style 3-Pin AC to Micro-Style 3-Pin AC

Conn. Ref. Number	Female Connector Type	Female Conn. Style	Male Connector Type	Male Conn. Style	Cable Length		Cable Color/Material	Catalog Number
					ft	m		
74	Micro-Style 3-Pin AC/DC	Straight	Micro-Style 3-Pin AC/DC	Straight	3.3	1	Yellow/PVC	XSZEKK1020Y
74	Micro-Style 3-Pin AC/DC	Straight	Micro-Style 3-Pin AC/DC	Straight	6.6	2	Yellow/PVC	XSZEKK1040Y
75	Micro-Style 3-Pin AC/DC	Straight	Micro-Style 3-Pin AC/DC	90°	3.3	1	Yellow/PVC	XSZEKK1021Y
75	Micro-Style 3-Pin AC/DC	Straight	Micro-Style 3-Pin AC/DC	90°	6.6	2	Yellow/PVC	XSZEKK1041Y
76	Micro-Style 3-Pin AC/DC	90°	Micro-Style 3-Pin AC/DC	Straight	3.3	1	Yellow/PVC	XSZEKK2120Y
76	Micro-Style 3-Pin AC/DC	90°	Micro-Style 3-Pin AC/DC	Straight	6.6	2	Yellow/PVC	XSZEKK2140Y
78	Micro-Style 3-Pin AC/DC	90°	Micro-Style 3-Pin AC/DC	90°	3.3	1	Yellow/PVC	XSZEKK2121Y
78	Micro-Style 3-Pin AC/DC	90°	Micro-Style 3-Pin AC/DC	90°	6.6	2	Yellow/PVC	XSZEKK2141Y



DIN 43650 Form A 4-Pin Female Connector to Micro-Style 5-Pin DC Male Connector

Connector Reference Number	Female Connector Style	Male Connector Style	Cable Length		Cable Color/Material	Catalog Number
			ft	m		
77	90°	Straight	3.3	1	Black/PVR	XZCR1523D62K1
77	90°	Straight	6.6	2	Black/PVR	XZCR1523D62K2



Cabling

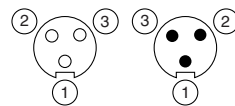
Mini, Micro and DIN Style Extension Cables

DC, AC and AC/DC

Specifications

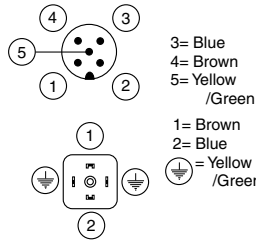
Mechanical		Mini-Style Yellow Cable (STOOW)	Micro-Style Yellow Cable (PVC)	DIN 43650 Form A (PVR)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)	-4 to +221 °F (-20 to +105 °C)	-31 to +212 °F (-35 to 100 °C)
Materials	Molded body	PVC - ULSTD - 94	PVC - ULSTD - 94	TPU
	Contact	Solid machined brass, gold over silver plating	Copper alloy, gold over nickel plating	Cu Zn
	Cable	STOOW	PVC	PVR (PVC/NBR)
	Coupling nut	Diecast zinc with black epoxy coat	Nickel-plated brass	Cu Zn
	Insert	PVC - ULSTD - 94	Nylon 6/6	TPU
Cable		16 AWG, UL-STOOW; Hi-Flex bare, 65x34 copper stranding	22 AWG, UL-2661; Hi-Flex bare, 26 x 36 AWG copper stranding, 300 V	22 AWG conductor, PVC
Enclosure rating	NEMA Type ■	6P	6P	—
	IEC ■	IP68	IP68	IP67
Insertion force	Contact	≤ 3 N (0.67 lb)	≤ 2 N (0.45 lb)	≤ 2 N (0.45 lb)
Withdrawal force	Contact	≥ 1.0 N (0.22 lb)	≥ 0.5 N (0.11 lb)	≥ 0.5 N (0.11 lb)
Shock		IEC 60068-2-27	IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6	IEC 60068-2-6
Electrical				
Contact resistance		≤ 5 mΩ	≤ 5 mΩ	≤ 5 mΩ
Current ratings		13 A	4 A	4 A
Working voltage		600 Vac rms	250 Vac/Vdc	30 Vac / 36 Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω	> 10 ⁹ Ω
Agency Approvals	UL	Yes	Yes	—
	CSA	Yes	Yes	—

■ Only in fully locked position



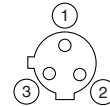
- 1 = Green
- 2 = Red w/Black
- 3 = Red w/White

Reference Number
72 and 73



- 3= Blue
- 4= Brown
- 5= Yellow /Green
- 1= Brown
- 2= Blue
- ⊕ = Yellow /Green

Reference Number
77



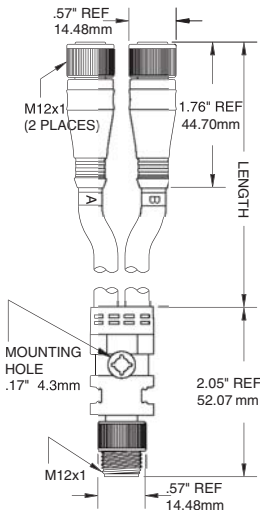
- 1 = Green
- 2 = Red/Black
- 3 = Red/White

Reference Number
74, 75, 76 and 78

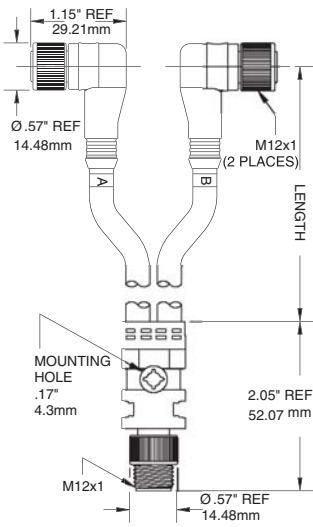
Cabling

Micro to Micro Splitter Cables

DC



Reference Number 78



Reference Number 79

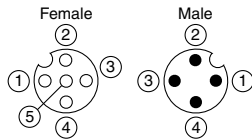
Micro-Style to Micro-Style 2 # 4-Pin DC Female Connector to 1 # 4-Pin DC Male Connector

Connector Reference Number	Female Connector Style	Male Connector Style	Cable Length		Cable Color/ Material	Catalog Number
			ft	m		
78	Straight	Straight	3.3	1	Yellow/PVC	XSZSDD12401Y
78	Straight	Straight	4.9	1.5	Yellow/PVC	XSZSDD12402Y
79	90°	Straight	3.3	1	Yellow/PVC	XSZSDD22401Y
79	90°	Straight	4.9	1.5	Yellow/PVC	XSZSDD22402Y

Specification

Mechanical		Yellow Cables (TPE)
Standard temperature range		-4 to +221 °F (-20 to +105 °C)
Materials	Molded body	PVC
	Contact	Brass, gold over nickel plating
	Cable	TPE
	Coupling nut	Diecast zinc with black epoxy coat
	O-ring	Nitrile rubber
	Insert	Nylon 6/6
Cable		22 AWG
Enclosure rating	NEMA Type ■	6P
	IEC ■	IP68
Insertion force	Contact	≤ 2 N (0.45 lb)
Withdrawal force	Contact	≥ 0.5 N (0.11 lb)
Shock		IEC 60068-2-27
Vibration		IEC 60068-2-6
Electrical		
Contact resistance		≤ 5 mΩ
Current ratings		4 A
Working voltage		250 Vac/Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω
Agency Approvals	UL	Yes
	CSA	Yes

■ Only in fully locked position

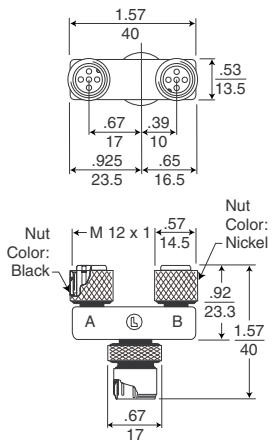


Reference Number
78 and 79

Cabling

Micro-Style Splitter Boxes

DC



Reference Number 85

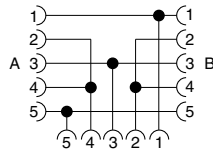
Splitter Box

Connector Reference Number	Female Connector Type	Female Connector Style	Male Connector Type	Male Connector Style	Box Color	Catalog Number
85	2 # Micro-Style 4-Pin DC	Straight	1 # Micro-Style 4-Pin DC	Straight	Black	XZLC1220C1

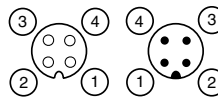
Specifications

Mechanical		Splitter Boxes (Black)
Standard temperature range		-5 to +212 °F (-15 to +100 °C)
Materials	Molded body	TPU
	Contact	Cu Zn
	Coupling nut	Cu Zn
	O-ring	Viton
	Insert	TPU
Enclosure rating	NEMA Type ■	—
	IEC ■	IP67
Insertion force	Contact	≤ 2 N (0.45 lb)
Withdrawal force	Contact	≥ 0.5 N (0.11 lb)
Shock		IEC 60068-2-27
Vibration		IEC 60068-2-6
Electrical		
Contact resistance		≤ 5 mΩ
Current ratings		4 A per input, 4 A maximum per box
Working voltage		10–30 Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω
Agency Approvals	UL	—
	GSA	—

■ Only in fully locked position



Reference Number 85

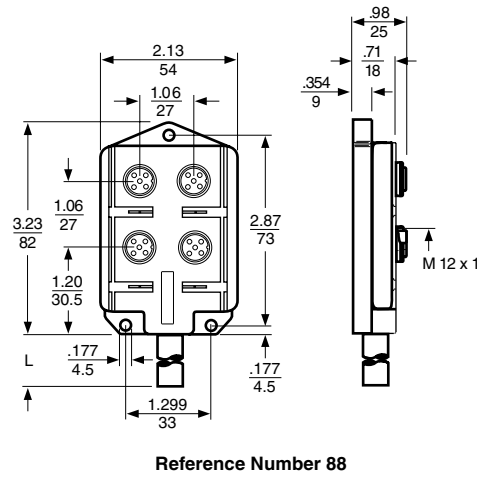


Reference Number 85

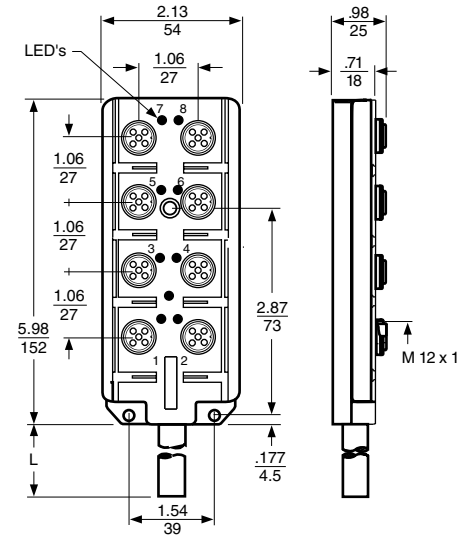
Cabling
Sensor Dock (Connector Box)
DC

DC Only (Without LEDs), Micro-Style 4-Pin DC Female Connector

Connector Reference Number	Number of Input Connectors	Cable Length/ Output Connector		Box Color/ Material	Cable Color/ Material	Catalog Number
		ft	m			
88	4	16.4	5	Black	Black	XZLC1240L5
88	4	32.8	10	Black	Black	XZLC1240L10
90	8	16.4	5	Black	Black	XZLC1280L5
90	8	32.8	10	Black	Black	XZLC1280L10
88	4	16.4	5	Yellow	Black/Purple	XSZLD1405Y
88	4	32.8	10	Yellow	Black/Purple	XSZLD1406Y
90	8	16.4	5	Yellow	Black/Purple	XSZLD1805Y
90	8	32.8	10	Yellow	Black/Purple	XSZLD1806Y



Reference Number 88



Reference Number 90

Cabling

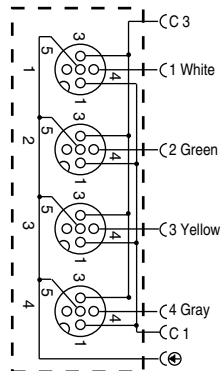
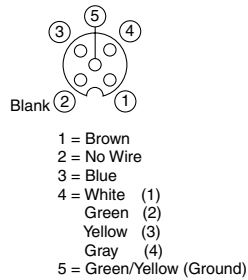
Sensor Dock (Connector Box)

DC

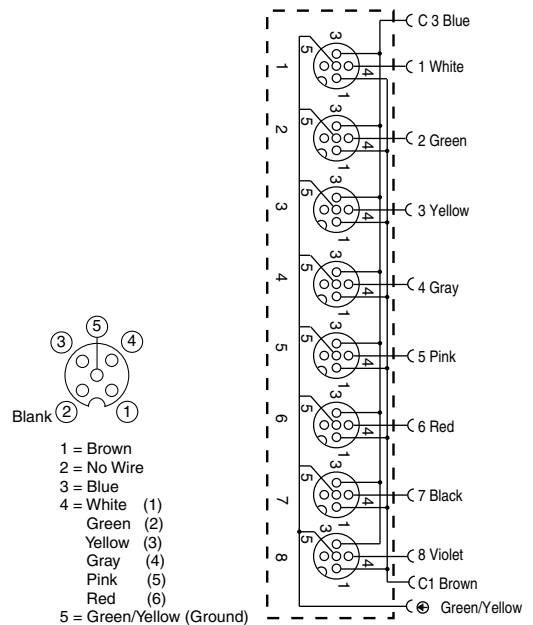
Specifications

Mechanical		Micro-Style DC (XZLC _)	XSZLD
Standard temperature range		-31 to +212 °F (-35 to +100 °C)	-13 to +194 °F (-25 to + 90 °C)
Materials	Molded body	TPU	PBT
	Contact	Cu Zn	Nickel-plated brass
	Receptacle shell	Cu Zn	Nickel-plated brass
	O-ring	Viton	Viton
	Insert	PA 6.6	PBT
Cable		PUR	PUR
Enclosure rating	NEMA Type ■	—	6P
	IEC ■	IP67	IP68
Insertion force	Contact	≤ 2 N (0.45 lb)	≤ 2 N (0.45 lb)
Withdrawal force	Contact	≥ 0.5 N (0.11 lb)	≥ 0.5 N (0.11 lb)
Shock		IEC 60068-2-27	IEC 60068-2-27
Vibration		IEC 60068-2-6	IEC 60068-2-6
Electrical			
Contact resistance		≤ 5 mΩ	≤ 5 mΩ
Current ratings		4 A per input, 12 A maximum per box	2 A per input, 12 A maximum
Working voltage		60 Vac / 75 Vdc	10–30 Vdc
Dielectric withstanding voltage		2 kVac rms / 60 s	2 kVac rms / 60 s
Insulation resistance		> 10 ⁹ Ω	> 10 ⁹ Ω
Agency Approvals	UL	—	—
	CSA	—	—

■ Only in fully locked position



Reference Number 88



Reference Number 90

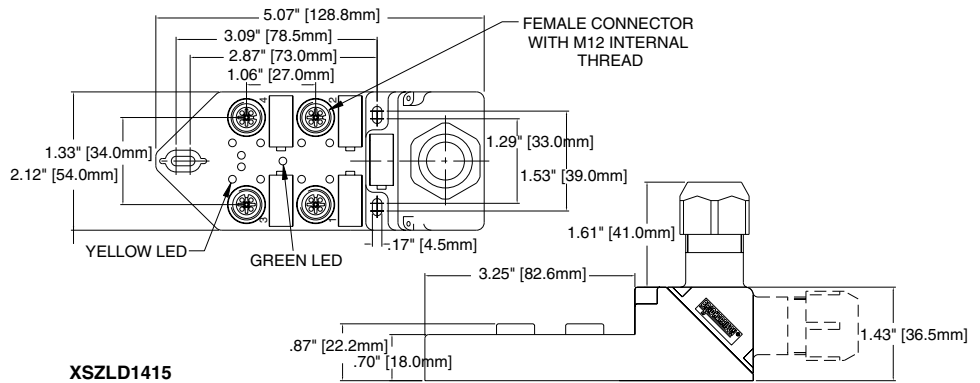
Cabling

Micro-Style Sensor Dock (Connector Box) with Output LEDs

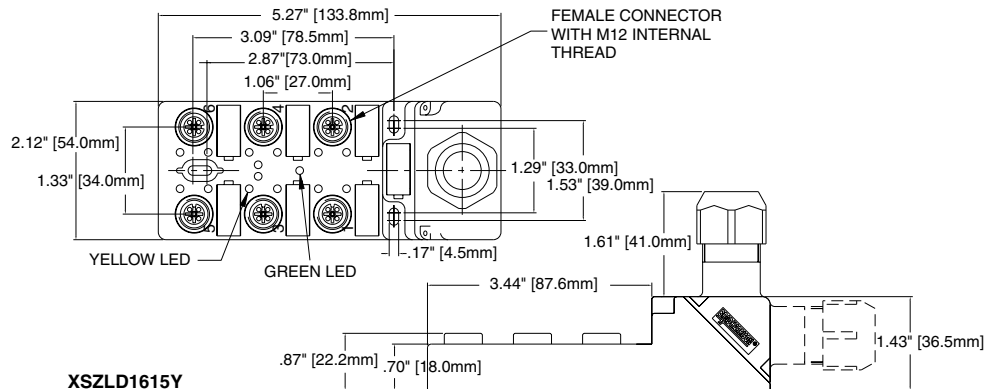
DC

DC Only, Micro-Style 4-Pin DC Female Connector

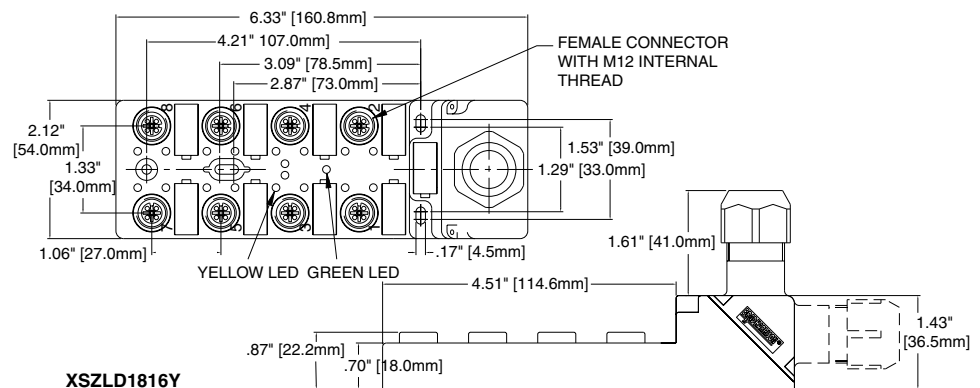
Connector Reference Number	Output LED Type	Number of Input Connectors	Cable Length/ Output Connector		Box Color/ Material	Cable Color/ Material	Catalog Number
			ft	m			
97	PNP Input Only!	4	N/A	N/A	Yellow	—	XSZLD1415
97	PNP Input Only!	4	16.4	5	Black	Black	XZLC1241L5
97	PNP Input Only!	4	32.8	10	Black	Black	XZLC1241L10
99	PNP Input Only!	6	N/A	N/A	Yellow	—	XSZLD1615Y
100	PNP Input Only!	8	N/A	N/A	—	—	XSZLD1816Y
100	PNP Input Only!	6	16.4	5	Black	Black	XZLC1281L5
100	PNP Input Only!	8	32.8	10	Black	Black	XZLC1281L10



XSZLD1415



XSZLD1615Y

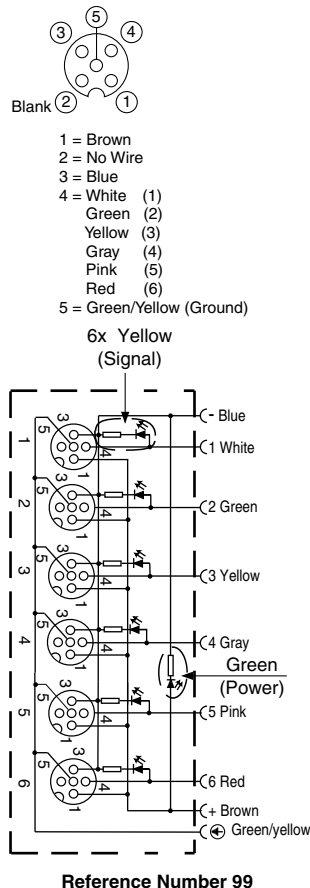
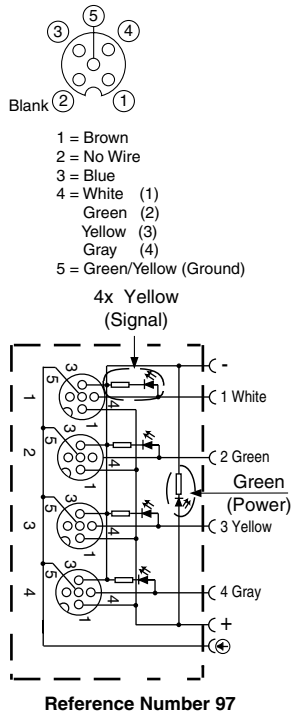


XSZLD1816Y

Cabling

Micro-Style Sensor Dock (Connector Box) with Output LEDs

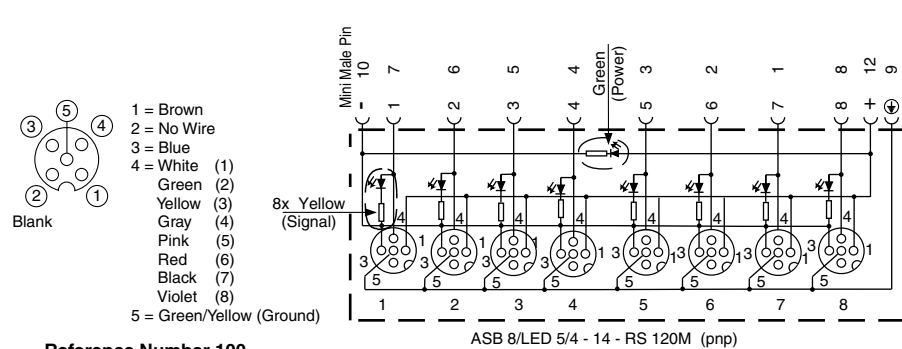
DC



Specifications

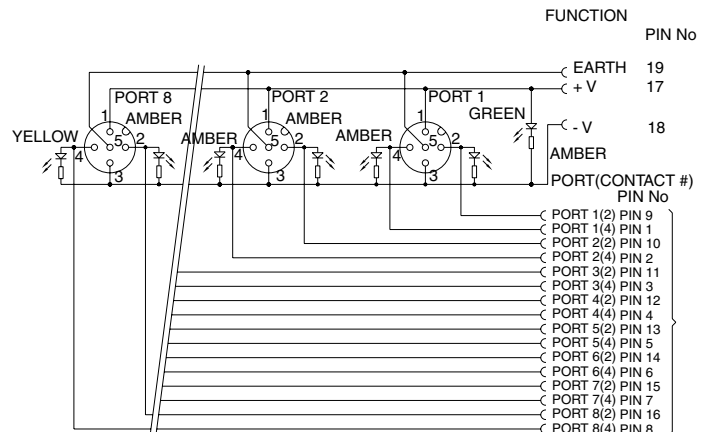
Mechanical	Micro DC (XSZLD_)	Micro DC (XZLC_)
Standard temperature range	—	-31 to +212 °F (-35 to +100 °C)
Materials	Molded body	PBT
	Contact	Brass, gold over nickel plating
	Receptacle shell	Nickel-plated brass
	O-ring	Viton
	Insert	PBT
Screw terminals, maximum 18 AWG, PG 16	—	PUR
Enclosure rating	NEMA Type ■	6P
	IEC ■	IP68
Insertion force	Contact	≤ 2 N (0.45 lb)
Withdrawal force	Contact	≥ 0.5 N (0.11 lb)
Shock	IEC 60068-2-27	IEC 60068-2-27
Vibration	IEC 60068-2-6	IEC 60068-2-6
Electrical		
Contact resistance	≤ 5 mΩ	≤ 5 mΩ
Current ratings	2 A per input, 12 A maximum per box	4 A per input, 12 A maximum per box
Working voltage	10–30 Vdc	10–30 Vdc
Dielectric withstanding voltage	2 kVac rms / 60 s	1 kVac rms / 60 s
Insulation resistance	> 10 ⁹ Ω	> 10 ⁹ Ω
LED (LED versions only)	Green	Power
	Yellow	Sensor output signal (PNP)
Agency approvals	UL	—
	CSA	—

■ Only in fully locked position



Reference Number 100

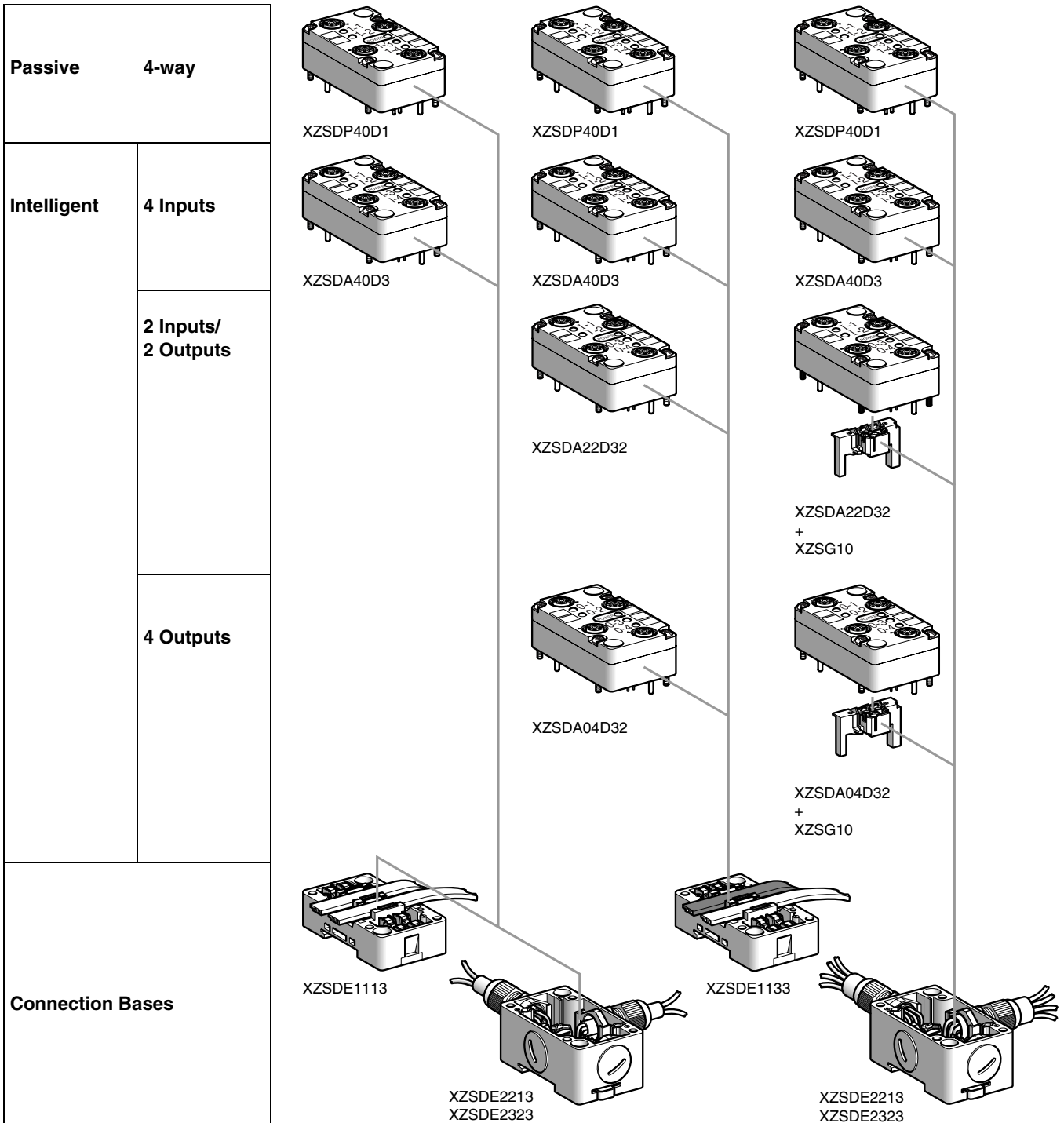
XSZLD••••



Cabling

AS-Interface® Bus

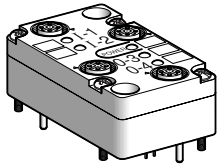
Intelligent Splitter Modules



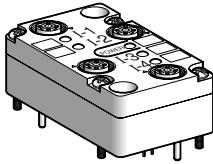
Cabling

AS-Interface® Bus

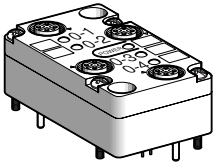
Intelligent Splitter Modules



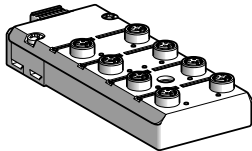
XZSDA22D32



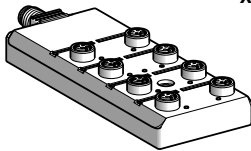
XZSDA40D3



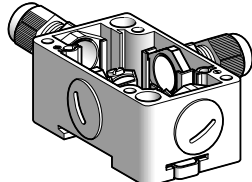
XZSDA04D32



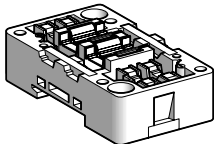
XZSCA44D21



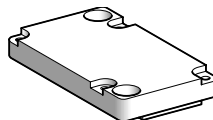
XZSCA44D22



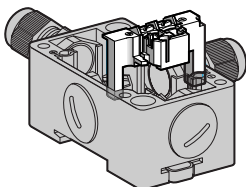
XZSDE2213



XZSDE11-3



XZSDP



XZSG10



XZLG102

4-Port Intelligent Splitter Modules for Connections to Actuators ■ or Sensors ▲

Description	Sensor Supply	Separate Supply to the Actuators	Catalog Number
Splitter module 2 inputs/ 2 solid-state outputs	Via XZSDE**** connection base, from the AS-Interface bus	Via XZSDE**** connection base	XZSDA22D32
Splitter module 4 inputs (200 mA maximum)	Via XZSDE**** connection base, from the AS-Interface bus	—	XZSDA40D3
Splitter module 4 solid-state outputs	—	Via XZSDE**** connection base	XZSDA04D32

■ Connection to outputs of low-power relays, LEDs, valves, etc.

▲ Connection to inputs of digital contacts (push buttons, limit switches) and to solid-state outputs of 2- or 3-wire type PNP sensors.

8-Port Splitter Modules

Description	Connection	Catalog Number
Splitter boxes 4 inputs/ 4 solid-state outputs	To the AS-Interface bus and to the separate supply by IDC (insulation displacement connectors) to yellow and black flat cables	XZSCA44D21
	To the AS-Interface bus and to the separate supply by 5-pin male M12 connector	XZSCA44D22

Connection Bases

Description	Cable Connection	Type and Number of Cables	Catalog Number
Connection bases for flat cable	By IDC	2 flat cables for AS-Interface bus (yellow) or 2 flat cables for separate supply (black) $I_e \leq 2$ A	XZSDE1113
	By IDC	2 flat cables: • 1 for AS-Interface bus (yellow) • 1 for separate supply (black) $I_e \leq 2$ A	XZSDE1133
Connection base for round cable ●	To the screw terminals Maximum clamping capacity: 2×16 AWG (2×1.5 mm ²)	Non-shielded	XZSDE2213
		Shielded	XZSDE2323

● Two PG 11 cable glands (clamping capacity $\varnothing 6$ – 10 mm) and three blanking plugs included with connection base. For twin-conductor cable for AS-Interface bus $I_e \leq 4$ A.

Accessories for Connection Bases

Description	Cable Type Suitable for Connection to Equipped Base	Catalog Number
Adapter for provision of separate supply from the XZSDE2*** connection base	4-core cable (2 for the AS-Interface bus, 2 for the separate supply)	XZSG10
Cover for connection base	—	XZSDP

Accessory for Splitter Modules

Description	Catalog Number
Blanking plug for M12 connector Degree of protection IP67	XZLG102

Cabling AS-Interface® Bus Intelligent Splitter Modules

Specifications

Type	2 inputs/2 outputs	4 inputs/4 outputs	4 inputs/4 outputs
Catalog Number	XZSDA22D32	XZSCA44D21	XZSCA44D22

Environment

Product certifications	AS-Interface No. 10201	AS-Interface No. 26201	AS-Interface No. 26201	
Ambient Air Temperature	Operation: -13 to +158 °F (-25 to +70 °C) Storage: -40 to +185 °F (-40 to +85 °C)			
Degree of Protection	IP67			
Materials	PA6-GF-FR			
Connection	From the bus	By connection base XZSDE****	By insulation displacement connector	By male, 5-pin, M12 connector
	To the actuators or PNP sensors	By female, 4-pin, M12 connector		

Electrical Specifications

Power Supply	Module	From the AS-Interface bus	From the AS-Interface bus (protected against reverse polarity)	
	Sensors	18 to 30 Vdc ■		
	Actuators	From separate 24 Vdc supply, -10% to +15%	From separate 24 Vdc supply, -10% to +15% (with protection against reverse polarity)	
Via connection base		Via AS-Interface black flat cable	Via connector	
Current Consumption from the Bus	≤ 200 mA	≤ 250 mA (output On)		
PNP Inputs	Maximum current for the 2 or 4 sensors	90 mA	200 mA	
	Input current—high	≥ 5 mA		
	Input current—low	≤ 1.5 mA		
	Input voltage—high	> 10 Vdc		
	Input voltage—low	< 5 Vdc		
Outputs	Type	Solid-state, 24 Vdc		
	Watchdog	Default to state O (off) in the event of a communications failure		
	Maximum current	2 A ▲	DC12: 1.4 A; DC13: 2 A	
	Short-circuit protection	Yes	Yes plus protection against inductive overvoltages	
Indicators	Green LED	Supply		
	Yellow LEDs	Inputs/outputs		

Data Exchange Specifications

AS-Interface Profile	S3.0		S7.0				
Data Bits Status (I) and Commands (O)	Bit value	= 0	= 1	= 0	= 1	= 0	= 1
	D0	(I): Sensor 1 signal		(I): Sensor 1 signal		(I): Sensor 1 signal	
		Absent	Present	Absent	Present	Absent	Present
				(O): Output 1		(O): Output 1	
		Off	On	Off	On	Off	On
	D1	(I): Sensor 2 signal		(I): Sensor 2 signal		(I): Sensor 2 signal	
		Absent	Present	Absent	Present	Absent	Present
				(O): Output 2		(O): Output 2	
		Off	On	Off	On	Off	On
	D2	(O): Output 3		(I): Sensor 3 signal		(I): Sensor 3 signal	
		Off	On	Absent	Present	Absent	Present
				(O): Output 3		(O): Output 3	
		Off	On	Off	On	Off	On
	D3	(O): Output 4		(I): Sensor 4 signal		(I): Sensor 4 signal	
		Off	On	Absent	Present	Absent	Present
				(O): Output 4		(O): Output 4	
Off		On	Off	On	Off	On	
Parameter Bits	P0 to P3	Not used					

■ The power supplied to the module from the AS-Interface bus is short-circuit protected (maximum current: 100 mA).

▲ Total permissible current for the module: 2 A maximum

Specifications Continued

Type	4 inputs	4 outputs
Catalog Number	XZSDA40D3	XZSDA04D32

Environment

Product Certifications	AS-Interface No. 03602	AS-Interface No. 10301
Ambient Air Temperature	Operation: -13 to +158 °F (-25 to +70 °C) Storage: -40 to +185 °F (-40 to +85 °C)	
Degree of Protection	IP67	
Materials	PA6-GF-FR	
Connection	From the bus	By connection base XZSDE***
	To the actuators or PNP sensors	By female, 4-pin, M12 connector

Electrical Specifications

Power Supply	Module	From the AS-Interface bus	
	Sensors	18 to 30 Vdc ■	—
	Actuators	—	From separate 24 Vdc supply, -10% to +15% Via connection base
Current Consumption from the Bus	≤ 300 mA	≤ 50 mA	
PNP Inputs	Maximum current for the 2 or 4 sensors	200 mA	—
	Input current—high	≥ 5 mA	—
	Input current—low	≤ 1.5 mA	—
	Input voltage—high	> 10 Vdc	—
	Input voltage—low	< 5 Vdc	—
Outputs	Type	—	Solid-state, 24 Vdc
	Watchdog	—	Default to state O (off) in the event of a communications failure
	Maximum current	—	2 A ▲
	Short-circuit protection	—	Yes
Indicators	Green LED	Supply	
	Yellow LEDs	Inputs/outputs	

Data Exchange Specifications

AS-Interface Profile	S0.0				
Data Bits Status (I) and Commands (O)	Bit value	= 0	= 1	= 0	= 1
	D0	(I): Sensor 1 signal		(O): Output 1	
		Absent	Present	Off	On
	D1	(I): Sensor 2 signal		(O): Output 2	
		Absent	Present	Off	On
	D2	(I): Sensor 3 signal		(O): Output 3	
		Absent	Present	Off	On
	D3	(I): Sensor 4 signal		(O): Output 4	
Absent		Present	Off	On	
Parameter Bits	P0 to P3	Not used			

■ The power supplied to the module from the AS-Interface bus is short-circuit protected (maximum current: 100 mA).
▲ Total permissible current for the module: 2 A maximum

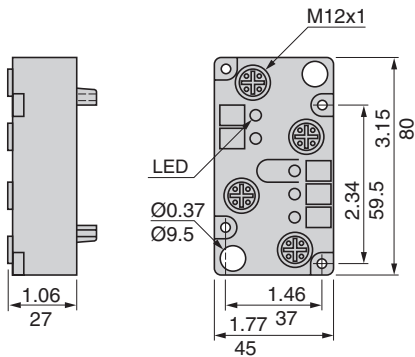
Cabling

AS-Interface® Bus

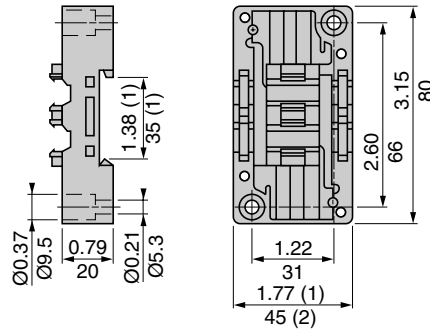
Intelligent Splitter Modules

Dimensions

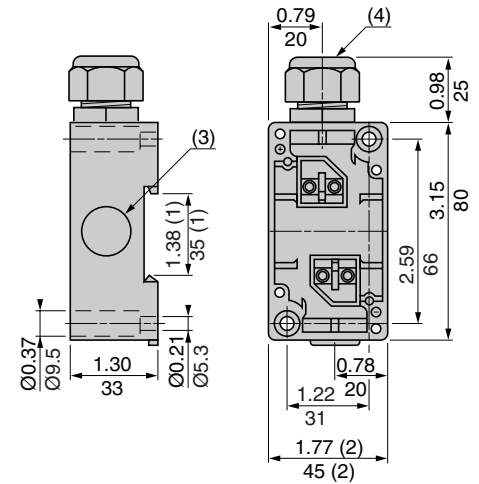
Splitter modules XZSDA***, XZSDP40D1



Connection bases XZSDE11*3



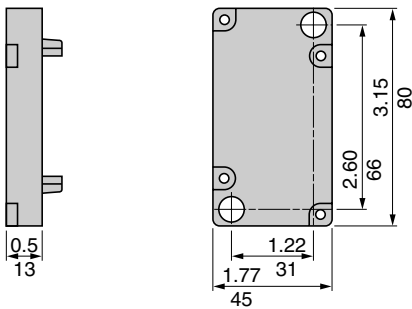
Connection bases XZSDE2***



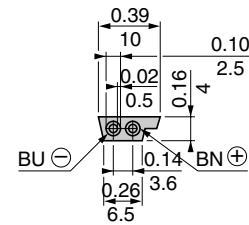
- (1) Mounting on DIN rail.
- (2) When mounting side-by-side, allow 0.04 in (1 mm) minimum between the modules.

- (3) 4 holes for mounting PG 11 cable gland or blanking plug.
- (4) PG 11 cable gland.

Cover XZSDP



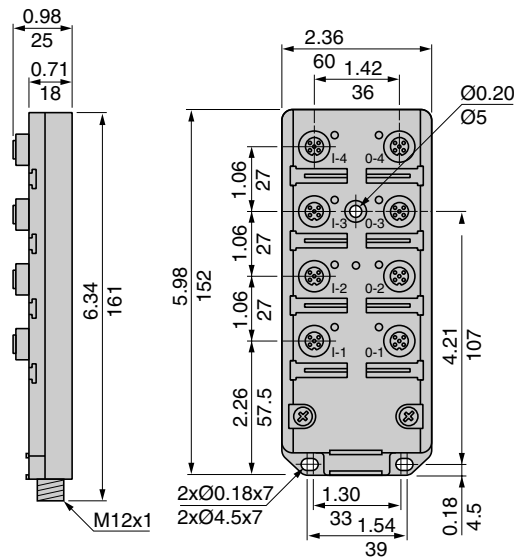
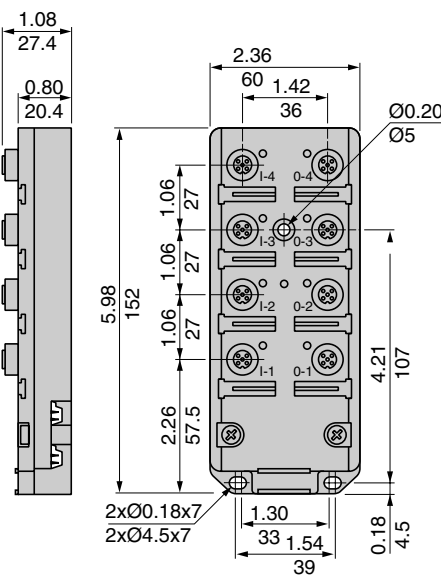
Cables XZCB***



Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Splitter boxes
XZSCA44D21

XZSCA44D22



Cabling

Cabling

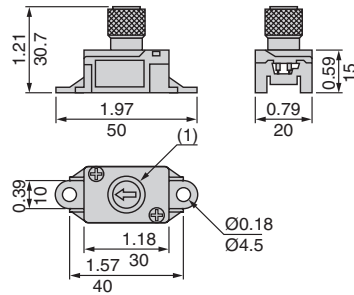
AS-Interface® Bus

Intelligent Splitter Modules

Dimensions

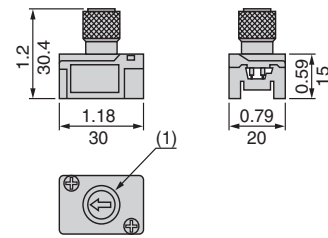
T-connectors

XZCG0120



(1) Connector adjustable to 2 positions through 90°

XZCG0220

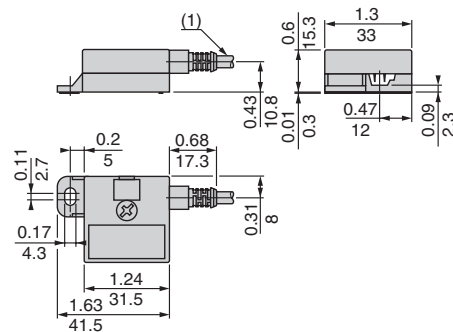


(1) Connector adjustable to 2 positions through 90°

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

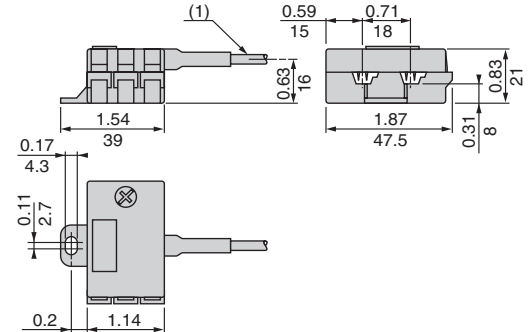
Tap-Offs

XZCG012**



(1) Cable length 0.6 m (2.0 ft), 1 m (3.3 ft), or 2 m (6.6 ft).
Either with stripped ends for terminals [brown: AS-Interface (+); blue: AS-Interface (-)] or fitted with M12 connector.

XZCG014**



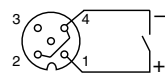
(1) Cable length 0.3 m (1.0 ft) or 2 m (6.6 ft).
Either with stripped ends for terminals [brown: AS-Interface (+); blue: AS-Interface (-); white: 0 V; black: +24 V] or fitted with M12 connector

Connections

M12 connectors on intelligent splitter modules

Inputs XZSDA40D*, XZSDA22D**

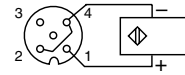
Digital contact



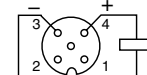
3-wire sensor



2-wire sensor



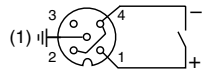
Outputs XZSDA04D**



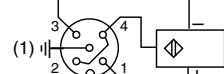
M12 connectors on splitter boxes XZSCA44D2

Inputs

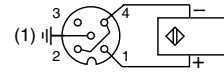
Digital contact



3-wire sensor

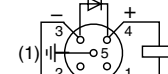


2-wire sensor

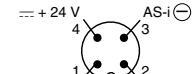


Outputs

XZSCA44D22

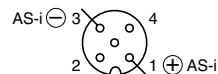


Connection to bus and separate supply

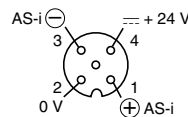


(1) Ground connected to splitter box assembly screws.

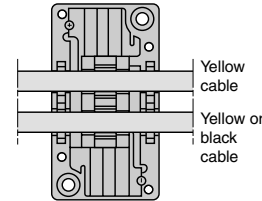
M12 connectors on T connectors XZCG0*20 passive splitter modules XZSDP40D1 and tap-offs XZCG012**



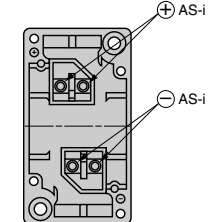
M12 connectors on tap-offs XZCG014**



Connection bases XZSDE11*3



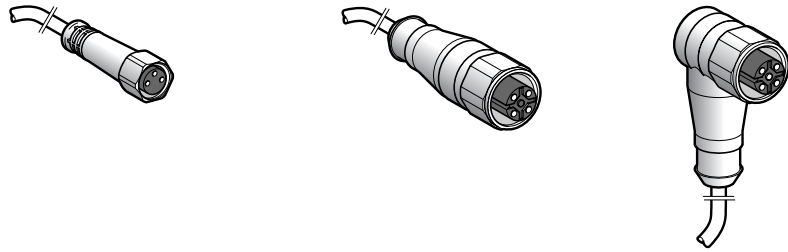
XZSDE2**



Cabling

Pre-wired Connectors, Application Series

M8, M12, 1/2" 20UNF and 7/8" 16UN

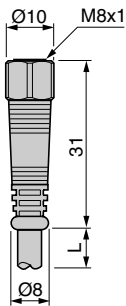


Connector type		Female, M8, straight	Female, M8, straight	Female, M12, straight	Female, M12, elbowed	Female, M12, elbowed
Number of pins		3	4	4	4	5
Catalog Numbers						
PVC cable (see page 30208/3)	L = 2 m	—	—	XZCPA1141L2	XZCPA1241L2	XZCPA1164L2
	L = 5 m	XZCPA0566L5	XZCPA0941L5	XZCPA1141L5	XZCPA1241L5	XZCPA1164L5
	L = 10 m	XZCPA0566L10	XZCPA0941L10	XZCPA1141L10	XZCPA1241L10	XZCPA1164L10
Weight (kg)	L = 2 m	—	—	0.090 (0.198)	0.090 (0.198)	0.110 (0.243)
	L = 5 m	0.175 (0.386)	0.200	0.210 (0.463)	0.210 (0.463)	0.250 (0.551)
	L = 10 m	0.340 (0.750)	0.400 (0.882)	0.410 (0.904)	0.410 (0.904)	0.485 (1.069)
Characteristics						
Connection type	Screw threaded, smooth, hexagonal, stainless steel 316L clamping ring (1)					
Clamping ring dimension	9 mm			14 mm		
Degree of protection	IP 68			IP 69K		
Ambient air temperature	Static cable usage	- 25...+ 85 °C				
Cabling	Cable	Ø 5.0 mm	Ø 5.3 mm	Ø 5.3 mm	Ø 5.3 mm	Ø 5.7 mm
	Conductor c.s.a.	3 x 0.34 mm ²	4 x 0.34 mm ²	4 x 0.34 mm ²		5 x 0.34 mm ²
Nominal voltage	60 V~, 75 V~			250 V~, 300 V~		
Nominal current	4 A			4 A		
Insulation resistance	> 10 ⁹ Ω					
Contact resistance	≤ 5 mΩ					

1. Tightening by hand recommended

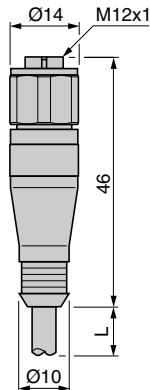
Dimensions

XZCPA0566L•, XZCPA0941L•

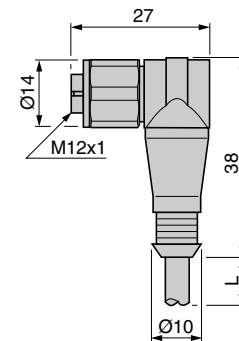


L = 2, 5, or 10 m

XZCPA1141L•

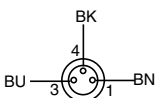


XZCPA1241L•, XZCPA1164L•

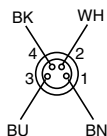


Connections

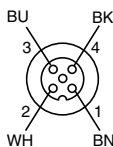
XZCPA0566L•



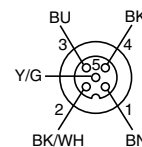
XZCPA0941L•



XZCPA1141L•, XZCPA1241L•



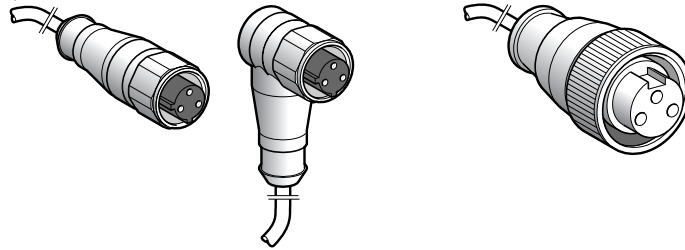
XZCPA1164L•



Cabling

Pre-wired Connectors, Application Series

M8, M12, 1/2" 20UNF and 7/8" 16UN

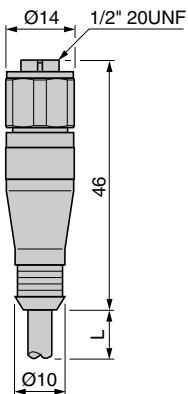


Connector type		Female, 1/2" 20UNF, straight	Female, 1/2" 20UNF, elbowed	Female, 7/8" 16UN, straight	Female, 7/8" 16UN, straight
Number of pins		3	3	3	3
Catalog Numbers					
PVC cable (see page 30208/3)	L = 2 m	—	—	—	—
	L = 5 m	XZCPA1865L5	XZCPA1965L5	XZCPA1662L5	XZCPA1670L5
	L = 10 m	XZCPA1865L10	XZCPA1965L10	XZCPA1662L10	XZCPA1670L10
Weight (kg)	L = 2 m	—	—	—	—
	L = 5 m	0.210 (0.463)	0.250 (0.551)	0.280 (0.617)	0.280 (0.617)
	L = 10 m	0.410 (0.904)	0.485 (1.069)	0.530 (1.168)	0.530 (1.168)
Characteristics					
Connection type	Screw threaded, smooth, hexagonal, stainless steel 316L clamping ring (1)			Screw threaded knurled clamping ring	
Clamping ring dimension	14 mm			—	
Degree of protection	IP 69K			IP 67	
Ambient air temperature	Static cable usage - 25...+ 85 °C			- 25...+ 85 °C	
Cabling	Cable	Ø 5.0 mm			Ø 5.0 mm
	Conductor c.s.a.	3 x 0.34 mm ²	3 x 0.34 mm ²	3 x 0.5 mm ²	3 x 0.5 mm ²
Nominal voltage	250 V~, 300 V---		250 V~, 300 V---	250 V~	250 V~
Nominal current	4 A		4 A	6 A	6 A
Insulation resistance	> 10 ⁹ Ω		> 10 ⁹ Ω	> 10 ⁹ Ω	> 10 ⁹ Ω
Contact resistance	≤ 5 mΩ		≤ 5 mΩ	≤ 5 mΩ	≤ 5 mΩ

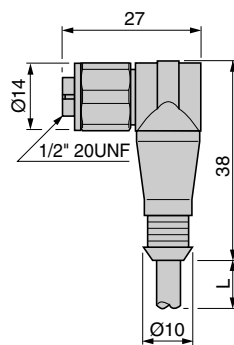
1. Tightening by hand recommended

Dimensions

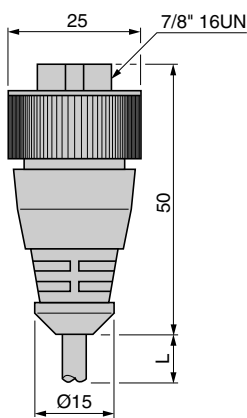
XZCPA1865L•



XZCPA1965L•



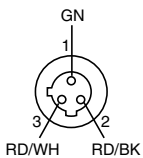
XZCPA1662L•, XZCPA1670L•



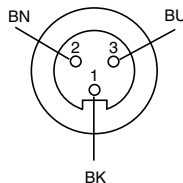
L = 5 or 10 m

Connections

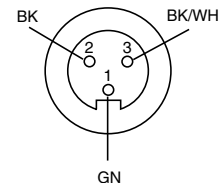
XZCPA1865L•, XZCPA1965L•



XZCPA1662L•



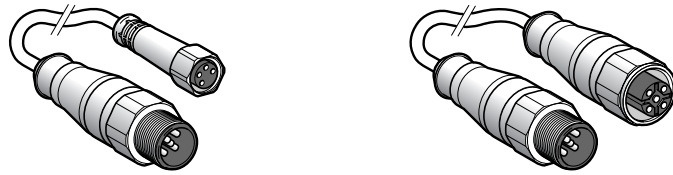
XZCPA1670L•



Cabling

Jumper Cables, Application Series

M8-M12 and M12-M12



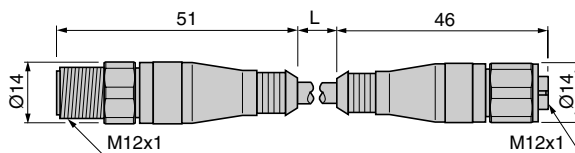
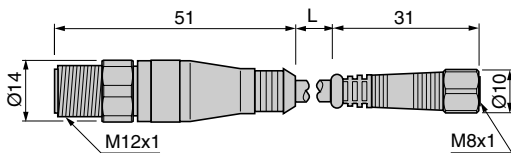
Male connector type		M12, 4-pin, straight	M12, 3-pin, straight
Female connector type		M8, 4-pin, straight	M12, 3-pin, straight
Number of conductors		4	3
Catalog Numbers			
PVC cable (see page 30208/3)	L = 2 m	XZCRA150941J2	XZCRA151140A2
	L = 5 m	XZCRA150941J5	XZCRA151140A5
Weight (kg)	L = 2 m	0.100 (0.220)	0.095 (0.209)
	L = 5 m	0.210 (0.463)	0.200
Characteristics			
Connection type	Screw threaded, smooth, hexagonal, stainless steel 316L clamping ring (1)		
Clamping ring dimension	14/9 mm		14 mm
Degree of protection	IP 68		IP 69K
Ambient air temperature	Static cable usage	- 25...+ 85 °C	
	Cable	Ø 5.3 mm	Ø 5.0 mm
Cabling	Conductor c.s.a.	4 x 0.34 mm ²	3 x 0.34 mm ²
	Nominal voltage	60 V~, 75 V---	250 V~, 300 V---
Nominal current	4 A		
Insulation resistance	> 10 ⁹ Ω		
Contact resistance	≤ 5 mΩ		

1. Tightening by hand recommended

Dimensions

XZCRA150941J•

XZCRA151140A•

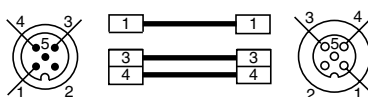
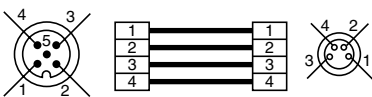


L = 2 or 5 m

Connections

XZCRA150941J•

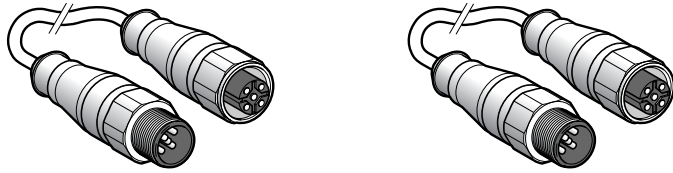
XZCRA151140A•



Cabling

Jumper Cables, Application Series

M8-M12 and M12-M12



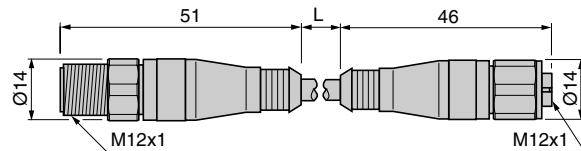
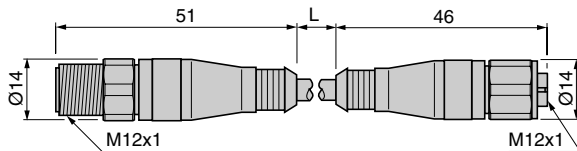
Male connector type		M12, 4-pin, straight	M12, 5-pin, straight
Female connector type		M12, 4-pin, straight	M12, 5-pin, straight
Number of conductors		4	5
Catalog Numbers			
PVC cable (see page 30208/3)	L = 2 m	XZCRA151141C2	XZCRA151164D2
	L = 5 m	XZCRA151141C5	XZCRA151164D5
Weight (kg)	L = 2 m	0.105 (0.231)	0.120 (0.265)
	L = 5 m	0.220 (0.485)	0.260 (0.573)
Characteristics			
Connection type	Screw threaded, smooth, hexagonal, stainless steel 316L clamping ring (1)		
Clamping ring dimension	14 mm		
Degree of protection	IP 69K		
Ambient air temperature	Static cable usage	- 25...+ 85 °C	
Cabling	Cable	Ø 5.3 mm	Ø 5.7 mm
	Conductor c.s.a.	4 x 0.34 mm ²	5 x 0.34 mm ²
Nominal voltage	250 V~ , 300 V---		
Nominal current	4 A		
Insulation resistance	> 10 ⁹ Ω		
Contact resistance	≤ 5 mΩ		

1. Tightening by hand recommended

Dimensions

XZCRA151141C•

XZCRA151164D•

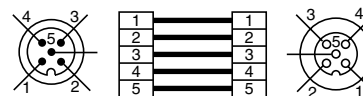
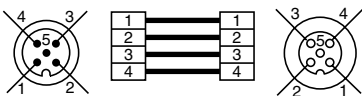


L = 2 or 5 m

Connections

XZCRA151141C•

XZCRA151164D•



Abrasion Resistance

The ability of a material or product to resist wear when rubbed across a rough surface.

American Wire Gage (AWG)

The U.S. standard system to specify size of electrical wiring.

Appliance Wiring Material (AWM)

UL designation for cable intended for use in the appliance wiring industry.

Braid

A metal mesh or screen, usually copper, used in a cable to shield against electrical interference or to reinforce the jacket against damage.

Cable

Either a stranded conductor with or without insulation and other coverings (single conductor cable), or a combination of conductors insulated from one another (multiple conductor cable).

Color-Code

A color system for wire or circuit identification by use of solid colors, tracers, braids, surface printing, etc.

Conductor

A material capable of passing electrical current.

Connector

Used generally to describe all devices used to provide rapid connect and disconnect service for an electrical circuit.

Connector Insert

Insulating device that holds the contacts in their proper location.

Contact

The conducting members of a connecting device that are designed to provide a separable connection.

Control Cable

A term sometimes used to describe the cable that runs between the PLC and a distribution box.

Cord

A small and flexible insulated cable constructed to withstand mechanical abuse.

Crimp Termination

Connection in which a metal sleeve is secured to a conductor by mechanically crimping the sleeve with a hard crimping tool, presses, or automated crimping equipment.

CSA International (CSA)

Canadian Standards Association
Canadian electrical standards publishing organization and certification agency.

Current Carrying Capacity

The maximum current an insulated conductor can safely carry without exceeding the insulation or jacket temperature limitations.

Cut-Through Resistance

Ability of a material or product to withstand slices by a sharp object without being cut.

Dielectric Strength

The voltage that an insulator can withstand before breakdown occurs.

Fillers

A material used in multi-conductor cables to occupy large interstices formed by the assembled conductors.

FM

Factory Mutual Research.

IEC

International Electrotechnical Commission.

Insertion Force

The force required to insert a contact into the mating contact.

Insulation

A material that offers high electrical resistance.

Insulation Resistance

The resistance measured in Ohms at a designated voltage between two or more conductors separated by the insulation whose resistance is being measured.

Irradiation

The exposure of the material to high-energy emissions. In thermoplastic insulation for the purpose of cross linking the molecules to form a thermoset material.

Jacket

A rubber or synthetic covering applied over the primary insulation, braids, shields, cable components, or the cable itself.

LED

Light Emitting Diode.

Molded Plug

A connector that is molded on the end of a cable.

NEMA

National Electrical Manufacturers Association.

NPN

Option that allows switching to the negative side of the load (sinking).

Nylon

The generic name for synthetic fiber-forming polyamides.

Plug

The connector associated with being attached to a cable.

PNP

Option that allows switching to the positive side of the load (sourcing).

Polarization

The feature of a connector that prevents mismatching by allowing plugging to occur only when the connectors are properly orientated.

Polyurethane (PUR)

A thermoplastic material with good natural chemical resistance.

Polyvinyl Chloride (PVC)

A thermoplastic material with good specific properties when blended with additives.

Receptacle

The connector that is usually mounted in a fixed location and mates with a plug type connector.

Resistance (Electrical)

Property of a conductor that determines the current produced by a given electrical difference of potential (voltage). Measured in ohms.

SAE

Society of Automotive Engineers

Separator

Pertaining to the wire and cable: a layer of textile, paper, etc. that is placed between the outer jacket and core construction to enhance jacket stripability.

Shield

A conductive envelope around the primary conductors that provides an electronic barrier to electromagnetic interference.

SJOO

A UL designation for a rubber-jacketed service cord with oil-resistant conductors and jacket. Voltage rating is 300 V.

SOO

A UL designation for a rubber-insulated hard service cord with oil-resistant primaries and jacket. Voltage rating is 600 V.

SOOW-A

Same as SOO with an outdoor weather rating.

STO

A UL designation for a thermoplastic (usually PVC) insulated hard service cord with oil resistant outer jacket. Voltage rating is 600 V.

STOW-A

Same as STO with an outdoor weather rating.

Thermoplastic

A classification of plastics that can be readily softened and resoftened by repeated heating.

Thermoset

A classification of plastics that cures by chemical reaction when heated and when cured, cannot be resoftened by heating.

UL

Underwriters Laboratories Inc., U.S. electrical standards publishing organization and certification agency.

VDE

Verband Deutscher Elektrotechniker, German approval agency equivalent to U.L.

Voltage Rating

The highest voltage that may be continuously applied to a wire, cable, or connector in conformance with a standard or specification.

Wicking

Capillary absorption of a liquid along the fibers of the base material.

Withdrawal Force

The force required to separate two mated contacts or group of contacts.

Irradiated PUR 0.34 mm² (22 AWG)

90 °C, 300 V rated. Provides the excellent oil and chemical resistance of standard PUR, and is also designed for long-term, high-flex applications. Cable is also resistant to weld flash and hot objects. Available in European color-code. Designed primarily for special flexing applications.

Irradiated PVC 0.34 mm² (22 AWG)

90 °C, 300 V rated. Ideal for use in welding applications. Cable is resistant to melting for short term high heat areas such as weld flash or contact with hot objects (i.e. soldering iron). Excellent resistance to most chemicals and oils. Available in European color-code and automotive color-code. Used in smaller quantities, specifically for welding environments.

SJOOW-A★ NBR/PVC 18 AWG

105 °C 300 V rated. Same as our SOOW-A cable except rated at 300 V. Available in European (leech) color-code.

SOOW-A★ NBR/PVC 16 and 18 AWG

105 °C, 600 V rated. Used in general machine tool applications. Primarily for use in welding applications, or where hot metal chips are present. Good resistance to most chemicals and oils. Available in U.S. industry standard color-code.

STOW-A★ PVC 16 AWG

105 °C, 600 V rated. Used in general applications where environment is less severe. Good resistance to most chemicals and oils. Available in U.S. Industry standard color-code and automotive color-code. Widely accepted industry standard cable.

UL AWM 2661★ PVC Shielded 22 AWG

90 °C 300 V rated. Used in general industrial applications where electrostatic interference is a problem. Aluminized mylar shield with drain wire. Available in European (IEC) color-code.

UL AWM 2661★ PVC 18 and 22 AWG

105 °C, 300 V rated. Originally designed for the automotive industry. Used in general industrial applications. Ideal for use when constant movement or flexible cable runs are required. Good resistance to most chemicals and oils. Available in automotive color-code and European color-code.

UL AWN 20233★ PUR 18 and 22 AWG

105 °C, 300 V rated. Used in general industrial applications, and primarily for use in machining or grinding areas. Excellent resistance to most lubricating and cuffing oils. High degree of flexibility makes the cable excellent for use in rapid-constant motion applications. Available in automotive color-code and European color-code.

★ UL Designations

Cabling
Wire Size Chart
AWG to Metric

Comparison of AWG and Metric Wire Sizes

AWG Size	Conduit			Resistance at 20° C		AWG Size	Conduit			Resistance at 20° C	
	Dia., mm	Area, mm ²	Dia., in.	Ω/ft	Ω/m		Dia., mm	Area, mm ²	Dia., in.	Ω/ft	Ω/m
29			.01126	.08180	.2684	13	1.900	2.8353	.07480	.001863	.006081
28	.316	.0779	.01240	.06743	.2212	12	2.000	3.1416	.07874	.001673	.005488
			.01264	.06491	.2130				.08081	.001588	.005210
27	.355	.0990	.01398	.05309	.1742	11	2.120	3.5299	.08346	.001489	.004884
			.01420	.05143	.1687				.08819	.001333	.004375
26	.400	.01257	.01575	.04182	.1372	10	2.360	4.3744	.09291	.001201	.003941
			.01594	.04082	.1339				.09074	.001260	.004132
25	.450	.1590	.01772	.03304	.1084	9	2.500	4.9087	.09843	.001071	.003512
			.01790	.03237	.1062				.1019	.0009988	.003277
24	.500	.1963	.01969	.02676	.08781	8	2.650	5.5155	.1043	.0009528	.003125
			.02010	.02567	.08781				.1102	.0008534	.002800
23	.560	.2463	.02205	.02134	.07000	7	2.800	5.1575	.1144	.0007924	.002500
			.02257	.02036	.06679				.1181	.0007343	.002439
22	.630	.3117	.02480	.01686	.05531	6	3.000	7.0686	.1240	.0006743	.002212
			.02535	.01614	.05531				.1285	.0006281	.002061
21	.710	.3969	.02795	.01280	.04201	5	3.150	8.8141	.1319	.0005662	.001956
			.02846	.01280	.04201				.1398	.0005309	.001742
20	.750	.4418	.02953	.01190	.03903	4	3.350	9.8980	.1398	.0004981	.001634
			.03150	.01045	.03430				.1443	.0004758	.001561
19	.800	.5027	.03196	.01015	.03331	3	3.500	11.0447	.1476	.0004758	.001561
			.03346	.009261	.05038				.1575	.0004182	.001372
18	.850	.5675	.03346	.009261	.05038	2	4.000	12.5664	.1620	.0003952	.001296
			.03543	.008260	.02642				.1673	.0003704	.001215
17	.900	.6362	.03543	.008260	.02642	1	4.250	14.1863	.1673	.0003704	.001215
			.03589	.008051	.02642				.1772	.0003304	.001084
16	.950	.7088	.03740	.007414	.02432	1/0	4.500	15.9043	.1772	.0003304	.001084
			.03937	.006991	.02195				.1819	.0003134	.001028
15	1.000	.7854	.03937	.006991	.02195	3/0	4.750	17.7205	.1870	.0002966	.0009729
			.04030	.006386	.02096				.1968	.0002676	.0008781
14	1.060	.8825	.04173	.005955	.01954	2/0	5.000	19.6350	.1968	.0002676	.0008781
			.04409	.005334	.01750				.2043	.0002485	.0008152
13	1.120	.9862	.04409	.005334	.01750	1	5.600	24.6301	.2205	.0002134	.0007000
			.04526	.005063	.01661				.2294	.0001971	.0006466
12	1.180	1.0936	.04646	.004805	.01577	1/0	6.300	31.1725	.2480	.0001686	.0005531
			.04921	.004282	.01405				.2576	.0001563	.0006128
11	1.250	1.2272	.05082	.004016	.01317	3/0	7.100	39.5919	.2795	.0001327	.0004355
			.05197	.003840	.01260				.2893	.0001239	.0004065
10	1.320	1.3685	.05512	.004016	.01317	2/0	8.000	50.2655	.3150	.0001045	.0003430
			.05707	.003414	.01045				.3249	.00009285	.0003223
9	1.500	1.7671	.05906	.002974	.009756	1/0	9.000	63.6173	.3543	.00008260	.0002710
			.06299	.002526	.008286				.3648	.00007793	.0002557
8	1.600	2.0106	.06408	.002315	.007596	3/0	10.000	78.5398	.3937	.00006691	.0002196
			.06693	.002315	.007596				.4096	.00006182	.0002195
7	1.700	2.2698	.07087	.002065	.006775	2/0	11.800	109.3588	.4600	.00004901	.0001608
			.07196	.002003	.006571				.4646	.00004805	.0001577



**MANUFACTURER'S
DECLARATION OF CONFORMITY**

INDUSTRIAL CONTROL BUSINESS UNIT
Machine Equipment Activity Management

WE : SCHNEIDER ELECTRIC INDUSTRIES SA
89,Boulevard Franklin Roosevelt
92500 Rueil Malmaison
FRANCE

declare under our own responsibility that the product(s):

TRADEMARK : TELEMECANIQUE

NAME, TYPE : *Proximity sensors*
MODELS : XS1, XS2, XS3, XS4, XS5, XS6, XS7, XS8, XS9
XSA, XSB, XSC, XSD, XSE, XT1, XT4, XT7

NAME, TYPE : *Photoelectric sensors*
MODELS : XUA, XUB, XUC, XUD, XUE, XUJ,
XUK, XUL, XUM, XUP, XUR, XUV, XUX
XU1, XU2, XU5, XU8, XU9

to which this declaration refers conform to :

STANDARDS OR NORMATIVE DOCUMENTS :
Low-voltage switchgear and controlgear,
General rules IEC 947-1 (EN60947-1)
Proximity sensors IEC 947-5-2 (EN60947-5-2)

Subject to installation, maintenance and use conforming to its (their) intended purpose, to the applicable regulations and standards, to the supplier's instructions and to standard practice,

the products conform to the requirements of the applicable European Directives :

Low-voltage Directive N° 73/23/CEE
EMC Directive N° 89/336/CEE

The CE marking on the products and/or their packaging signifies that Schneider Electric holds the reference technical file available to the European Union authorities.

Issued at Angoulême : February 10 , 2000

Authorised Signatory

Name :
Title :
Signature :

Jean-Marc Chatelard
Activity Director



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