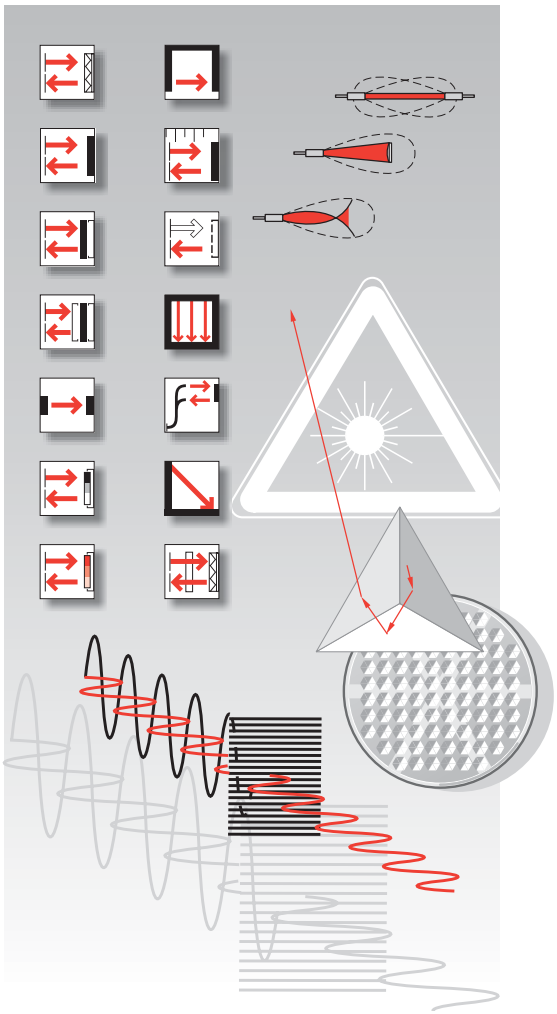
Contents



Photoelectric Sensors

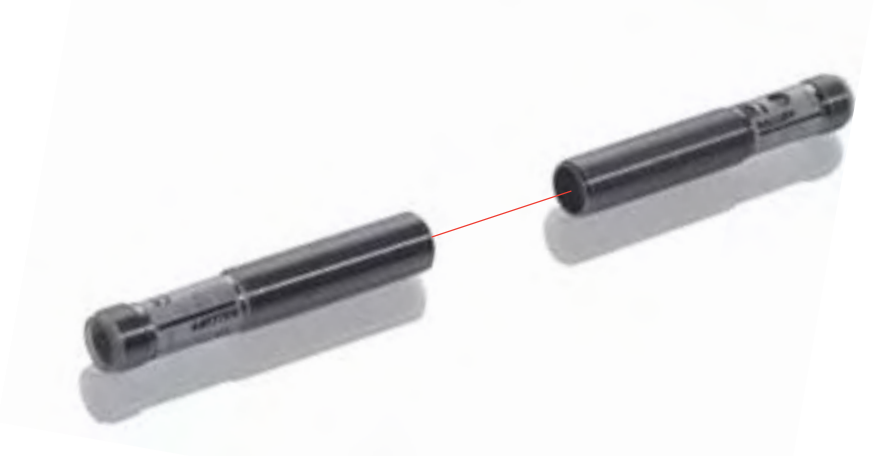
Photoelectric sensors are ideal for non-contact detection of targets at a distance regardless of material. Photoelectric sensors emit invisible infra-red or visible red light to detect the presence of an object. The target either breaks a beam of light or reflects it back to the detector to activate the sensor output. Advantages of photoelectric sensors include longer standoff distances than inductive proximity sensors, ability to detect virtually any target material, ability to differentiate between targets of different color or surface characteristics, and the ability to operate in different sensing modes such as thru-beam, retro-reflective, or diffuse. Balluff photoelectric sensors are available in a variety of tubular and block-style housings, with special functionalities such as laser distance measurement, luminescence detection, and color recognition.

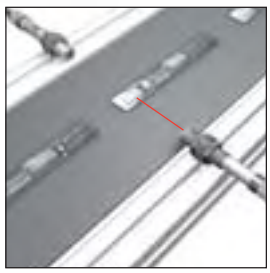
Selection Guide

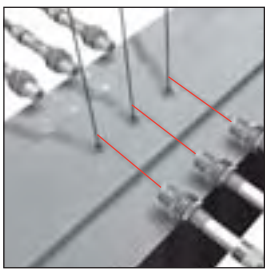
Series	BMOA	BMOA	08M	12M	
Housing Size	**5 mm**	**6 mm**	**8 mm**	**12 mm**	
Smooth or Threaded	Smooth	Threaded	Threaded	Threaded	
Housing Material	Metal	Metal	Metal	Metal	
Straight or 90° Optics	Straight	Straight	Straight	Straight	
Thru-beam			1.1 m	5 m	
Laser				Class I Laser - 3 m, 30m	
Non-polarized Retroreflective					
Polarized Retroreflective			550 mm	1.5 m	
Laser					
Transparent Retroreflective					
Diffuse	50 mm	50 mm	55 mm	100 mm, 200 mm, 400 mm	
Laser					
Background Suppression				10-60 mm	
Laser					
Foreground & Background Supp.					
Fixed Focus				23 mm	
Fiber Optic Compatible					
Supply Voltage	DC	DC	DC	DC	
Pages	**2.14**	**2.14**	**2.15**	**2.17**	

BOS 12M Thru-beam Laser Sensor

- Two versions optimized for small part and feature detection or long range detection
- Precise, highly visible laser beam provides range up to 30 meters
- Extremely small light spot detects objects or features down to 50 µm
- Class I Laser technology
- Metal housing combines inductive sensor durability with laser photoelectric accuracy







Selection Guide




	18K	18KF/18KW	18M/18E	30M
	18 mm	**18 mm**	**18 mm**	**30 mm**
	Threaded	Combination Threaded	Threaded	Threaded
	Plastic	Plastic	Metal	Metal
	Straight or 90°	Straight or 90°	Straight or 90°	Straight
	8 m, 10 m, 12 m	10 m, 15 m	16 m	
	Class I Laser - 60 m	Class I Laser - 50 m, 60 m	Class I Laser - 50 m, 60 m Class II Laser - 50 m	
	2 m	5 m	2 m, 4 m	
	1.5 m, 2 m, 3 m	3 m, 4.5 m	3 m, 4.5 m	
	Class I Laser - 12 m	Class I Laser - 9 m, 16 m	Class I Laser - 9 m, 16 m	
		1.7 m		
	250 mm, 300 mm, 350 mm	80 mm, 100 mm, 400 mm, 700 mm	100 mm, 200 mm, 400 mm 1000 mm	2 m
	Class I Laser - 350 mm	Class I Laser - 250 mm, 350 mm	Class I Laser - 250 mm, 350 mm	
		50-100 mm	10-120 mm, 40-120 mm	
			Class II Laser - 30-150 mm	
		40-100 mm		
		80 mm		
		Yes	Yes	Yes
	DC or AC	DC	DC or AC	DC
	2.21	**2.28**	**2.36**	**2.53**

BOS 18M Background Suppression Sensor

– Uses laser technology for accurate small part and feature detection to 100 µm

– 10-turn potentiometer for precise background supression adjustment

– Visible laser simplifies application set-up

– Built in LED confirms best set up for each application

– Metal housing combines inductive sensor durability with laser photoelectric accuracy

Selection Guide





Series	2K	Q08M/BMOA	5K	6K	11K	
Housing Size	**Small block**	**Small block**	**Small block**	**Small block**	**Combination 18mm threaded**	
Housing Material	Plastic	Metal	Plastic	Plastic	Plastic	
Straight or 90° Optics	90°	90°	90°	90°	90°	
Thru-beam	1.2 m	1.1 m	10 m	6 m	20 m	
Laser						
Non-polarized Retroreflective					6.5 m	
Polarized Retroreflective	3 m	550 mm	4 m	2.5 m	3.5 m	
Laser				Class II - 1 m		
Transparent Retroreflective				0.5 m		
Diffuse	50 mm	50 mm, 55 mm	200 mm, 900 mm	300 mm	450 mm	
Laser						
Wide Angle Diffuse						
Background Supression	1-15 mm 1-30 mm		50-200 mm	30-100 mm		
Laser				Class II - 20-60 mm, 30-110 mm		
Foreground & Background Supp.						
Fixed Focus						
Fiber Optic Compatible				Yes		
Supply Voltage	DC	DC	DC	DC	DC	
Pages	**2.56**	**2.59**	**2.61**	**2.64**	**2.69**	

BOS 2K Sub-Miniature Photoelectric Family

– Sub-miniature housing 25x7.5x10 mm

– Sensing modes include:
  - 1.2 m Thru-beam
  - 3 m Retroreflective
  - 50 mm Diffuse
  - 15 mm, 30 mm Precision Background Suppression

– Laser-like, visible light source for precision parts detection

– M8 pigtail connector or cable out

8 mm Tubular & Block Style Photoelectric Sensor Families

BOS 08M and BOS Q08M

– Sensing modes include:
  - 1.1 m Thru-Beam
  - 550 mm Polarized Retroreflective
  - 55 mm Diffuse

– The 08M tubular sensor can be used to replace bulky glass fiber optic cables with a 5/16" sensing tip

– The Q08M block style sensor's right angle design allows it to be easily integrated into machines where others won't fit

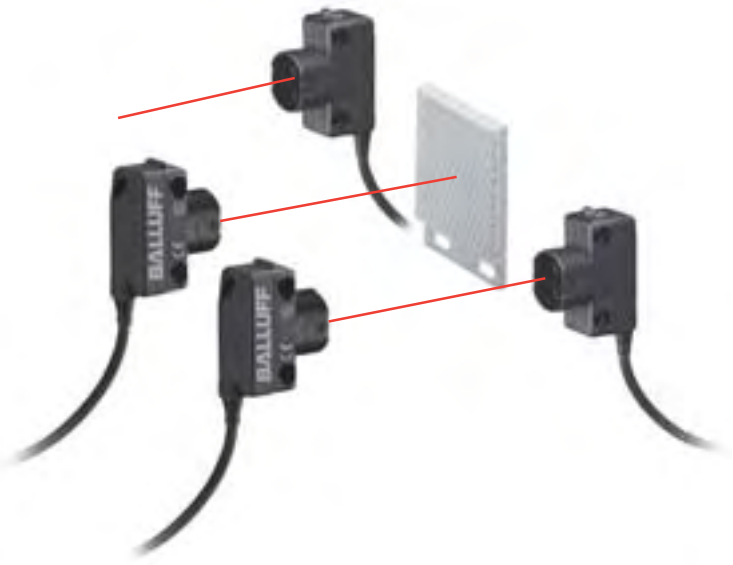





	15K	16K	21M	25K	26K	65K
	Mid-size block	**Combination 18 mm threaded**	**Mid-size block**	**Mid-size block**	**Mid-size block**	**Large block**
	Plastic	Plastic	Metal	Plastic	Plastic	Plastic
	Straight or 90°	Straight	90°	90°	90°	90°
	5 m	10 m, 30 m	20 m	20 m		70 m
			Class I - 60 m			
		2.5 m, 5 m				
	2 m	1 m, 2 m	4 m, 8 m	5 m	5.5 m	8 m
			Class I - 20 m		Class II - 20 m	
			2 m	1 m		
	100 mm, 500 mm	190 mm, 380 mm	1 m, 2 m	2 m		2 m
			Class I - 600 mm			
		90 mm, 180 mm				
			70-200 mm	50-250 mm	30-300 mm, 150-600 mm	200 mm - 1.1 m
			Class I - 50-100 mm		Class II - 40-60 mm, 30-150 mm, 50-300 mm	
			70-200 mm			
	12 mm	16 mm, 43 mm				
	Yes	Yes				
	DC	DC or AC/DC	DC	DC or AC/DC	DC	DC or AC/DC
	2.71	**2.73**	**2.79**	**2.85**	**2.87**	**2.91**

BOS 11K - The Photelectric Standard in Conveyor Control

- Compact size facilitates machine footprint reduction
- Innovative T-Block body style streamlines machine build
- 18 mm Snout mounting cuts assembly time
- Quick change-out minimizes unplanned downtime
- Application flexibility helps to decrease inventory



Selection Guide





Series	BOD 18KF BOD 6K	BOD 26K	BOL 27 K	BOD 63M	BOD 66M	
Sensing Technology	Distance Measurement	Distance Measurement	Distance Measurement	Distance Measurement	Distance Measurement	
Body Style	18KF = Combination 18 mm threaded 6K = Small block	Mid-size block	Mid-size block	Large block	Large block	
Housing Material	Plastic	Plastic	Plastic	Metal	Metal	
Straight or 90° Optics	18KF = Straight 6K = 90°	90°	90°	90°	90°	
Sensing Range	18KF = 100 mm 6K = 80 mm	85 mm, 100 mm, 300 mm	200 mm	2 m, 6 m	600 mm, 2 m	
Resolution	18KF = 1 mm 6K = 0.5 mm	20 µm, 70 µm, 80 µm, 220 µm	0.15 mm	1 mm	0.5 mm, 5 mm	
Outputs	18KF = 0-10 Vdc 6K = 0-10 Vdc, 1PNP	2 PNP max. 0-10 Vdc, 4-20 mA	2 PNP or NPN 4-20 mA	3 PNP or NPN 0-10 Vdc, 4-20 mA	1 PNP 0-10 Vdc, 4-20 mA	
Fiber Optic Compatible						
Supply Voltage	DC	DC	DC	DC	DC	
Pages	**2.94**	**2.96**	**2.99**	**2.101**	**2.104**	

BOD 63M Distance Sensor

Designed for the most demanding applications, the Balluff BOD 63M combines precision measurement and discrete sensing in one unit using time of flight technology.

Features

– Measuring the propagation time of light allows for greater ranges than with sensors using triangulation or energetic diffuse technologies

– Small laser spot for detecting small objects over large distances

– Virtually unaffected by the reflective properties of the object within a particular sensing range

– Background suppression is adjustable over the entire working range

– Discrete sensing and alarm outputs

	BGL	BWL Heavy Duty	BWL Standard	BFO Fiber Optic Cables	BOS Fiber Optic Amplifiers	BMOA Remote Miniature Sensors
	Self-contained Thru-beam	Self-contained Thru-beam	Self-contained Thru-beam	Diffuse Thru-beam	Diffuse Thru-beam	Diffuse Thru-beam
	Fork/slot	Fork/slot	Fork/slot		Many sizes	Headsize to 2mm
	Metal	Metal	Metal	Plastic, Metal	Plastic	Plastic, Metal
	Straight	Straight	Straight	Straight or 90°	Straight	Straight or 90°
	5, 10, 20, 30, 50, 80, 120, 180, 220 mm	22 x 22 mm, 42 x 41 mm, 42 x 60 mm	40 x 40, 54 x 54, 68 x 68, 90 x 90, 110 x 110 mm	Thru-beam (max) = 825 mm Diffuse (max) = 205 mm	Depends on cable	Thru-beam (max) = 800 mm Diffuse (max) = 63 mm
	1 PNP or NPN	1 PNP or NPN	1 PNP or NPN		1 PNP or NPN	1 PNP or NPN
				Yes	Yes	Yes
	DC	DC	DC		DC	DC
	2.106	**2.110**	**2.112**	**2.116**	**2.127**	**2.144**

BGL Advanced Slot Sensors

Balluff's BGL series of photoelectric slot/fork sensors offer pinpoint accuracy with highly visible red LED or Class II laser emission for resolutions down to 0.3mm. These self-contained thru-beam sensors, configured in a simple "U" shaped housing, save mounting and machine setup time.

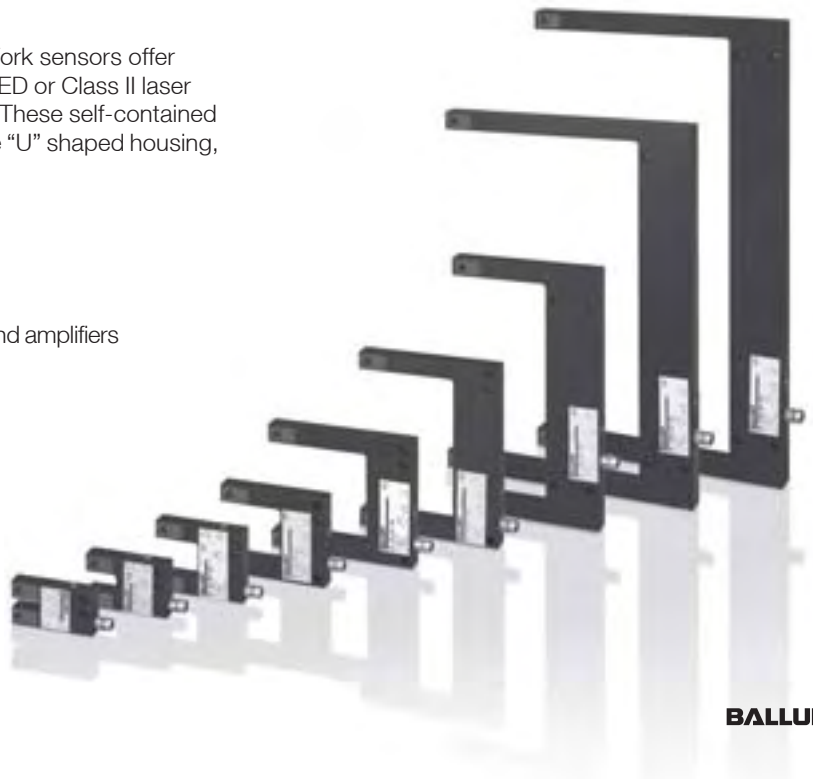
Features

– Rugged metal housing

– Replaces thru-beam fiber optics cables and amplifiers

– No alignment necessary

– Simple mounting, no hardware required



Selection Guide





Series	BFS 26K	BFS 27K	BFS 30M	BKT 18KF	BKT 6K BKT 21M	
Sensing Technology	Full color	Full color	Full color	Color mark (contrast)	Color mark (contrast)	
Body Style	Mid-size block	Mid-size block	30 mm threaded	Combination 18 mm threaded	6K = Small block 21M = Mid-size block	
Housing Material	Plastic	Plastic	Metal	Plastic	6K = Plastic 21M = Metal	
Straight or 90° Optics	90°	90°	Straight	Straight	90°	
Sensing Range	22 mm, 30 mm, 35 mm	25 mm, 45 mm	100 mm	10 mm	6K = 150 mm 21M = 19 mm	
Resolution						
Outputs	3 PNP	3 PNP or NPN	7 PNP or NPN 15 PNP or NPN (multiplexed)	1 PNP or NPN	1 PNP or NPN	
Fiber Optic Compatible						
Supply Voltage	DC	DC	DC	DC	DC	
Pages	**2.150**	**2.151**	**2.153**	**2.156**	**2.157**	

BFS 30M - Long Range Color Detection

The BFS 30M color sensors are designed to verify the presence of targets that can be differentiated by color. These sensors project a modulated high intensity white light onto a target and analyze the reflected light for its constituent RGB (red, green, blue) values. If the readings of all of the three colors fall within the preprogrammed parameters, the sensor issues a discrete signal that indicates a color match.

Two models are available to solve a variety of the most demanding applications, a 7-discrete output unit and a binary (4-bit) hexadecimal output unit.

	BKT M	BGL 21	BLT 18KF BLT 21M	BLT M BLT 31M	BOWA	BLG
	Color mark (contrast)	Color mark (contrast)	Luminescence	Luminescence	Optical window	Light grid
	Large block	Slot	18KF = Combination 18 mm threaded 21M = Mid-size block	M = Large block 31M = Mid-size block	Window	Light grid
	Metal	Metal	18KF = Plastic 21M = Metal	Metal	Metal	Metal
	Configurable	Straight	18KF = Straight 21M = 90°	M = Configurable 31M = Straight	Straight	Straight
	9 mm, 18 mm, 28 mm, 50 mm	2 mm	18KF = 20 mm 21M = 40 mm	M = 9 mm, 18 mm, 28 mm, 50 mm 31M = 100 mm, 300 mm	40 x 40 mm to 400 x 400 mm	150 mm - 2.1 m separation 100, 150, 300 mm sensing height
	1 PNP or NPN 0-7 Vdc	1 PNP or NPN	1 PNP or NPN	1 PNP or NPN 0-7 Vdc 0-5 Vdc	1 PNP or NPN	1 PNP or NPN 0-10 Vdc
	Yes			Yes		
	DC	DC	DC	DC	DC	DC
	2.159	**2.162**	**2.164**	**2.166**	**2.170**	**2.176**

BLT 31M - Long Range Luminescence Detection

Balluff BLT 31M sensors effectively detect the presence or absence of UV luminescent materials and markers. When the pulsed UV light source of the BLT 31M is directed towards a target, visible light is reflected back to the BLT 31M. The intensity of the returned light is measured and indicated on the sensors seven-segment display.

Features:

– Long range detection (up to 300 mm)

– High speed detection (6 kHz switching frequency)

– One discrete (auto-sensing PNP/NPN) output

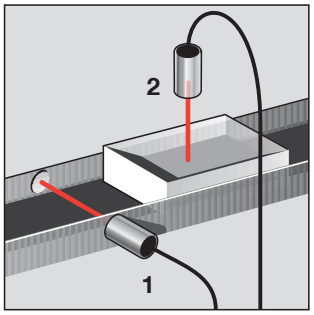
– One analog (0…5 V) output

– Auto-teach or manual programming

– Numerical display indicates intensity of reading

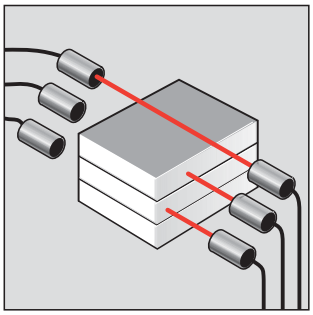
– Adjustable UV LED intensity

Sensing size and contents of containers



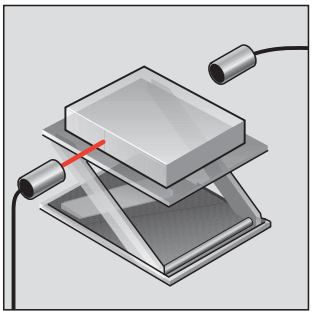
1: BOS 18KF
Retroreflective
2: BOS 18KF
Diffuse with Background Supp.

Sensing stack height



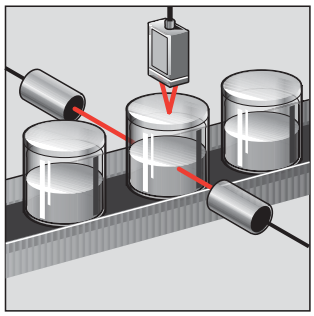
BOS 18KF Laser Emitter
BOS 18KF Laser Receiver

Guiding a moveable stage



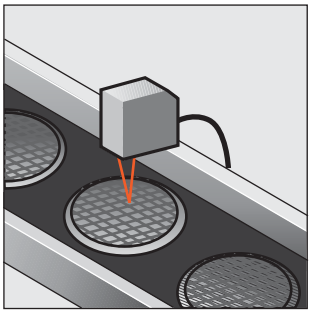
BLE 18M-..-1P-.. Receiver
BLS 18M-XX-1P-.. Emitter
BOS 18-BL-2

Cap checking containers



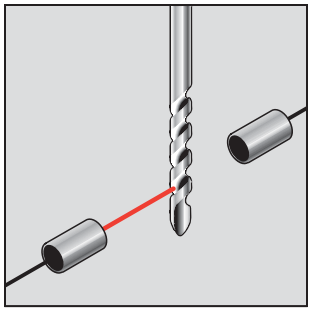
BOS 6K Background Supp.
BOS 11K Thru-beam

Biscuit counting



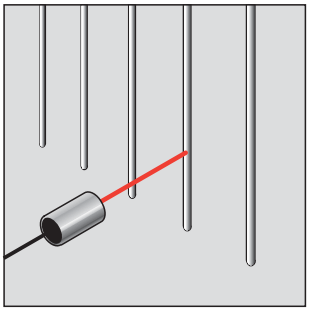
BOS 26K, 6K
Background suppression

Drill break monitor



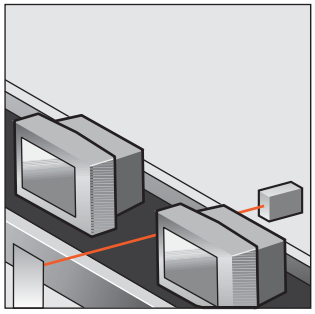
BLS 18M Laser Emitter
BLE 18M Receiver
or
BLS 18KF Laser Emitter
BLE 18KF Laser Receiver

Small parts detection



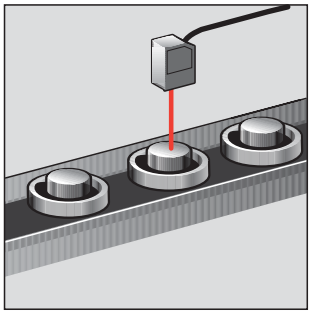
BOS 2K, 08M Diffuse

Television counting



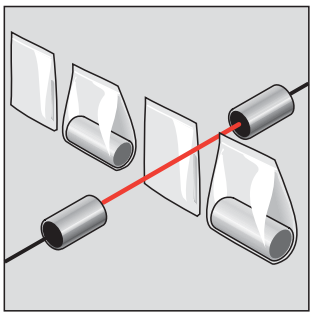
BOS 6K, 5K
Polarized retroreflective

Checking correct quantity



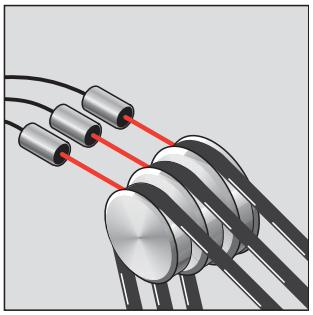
BOS 26K, 6K
Background suppression

Checking contents of a package



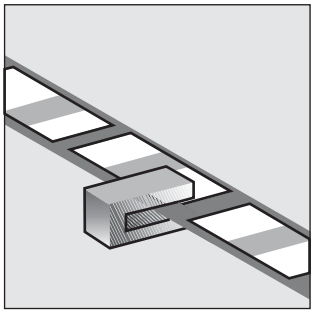
BLE 18M... Receiver
BLS 18M.. Emitter
BOS 18-BL-1

Checking pulley belts



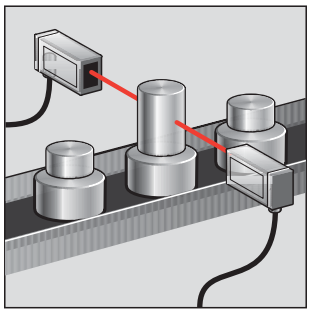
BOS 18KF Diffuse

Label presence detection



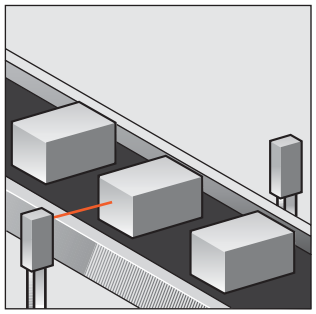
BGL 21 Slot sensors

Part sorting



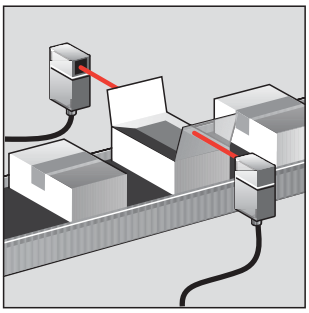
BLS/BLE 5K, 21M
Thru-beam sensor

Box control on conveyors



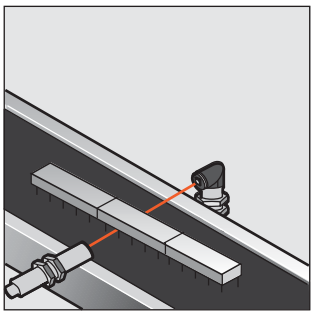
BOS 6K, 5K
Thru-beam

Packaging inspection



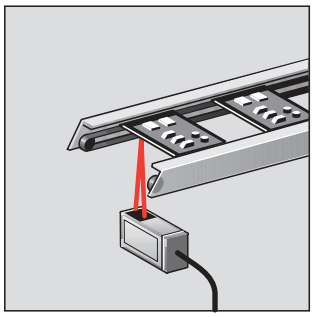
BOS 5K, 21M
Thru-beam sensor

Circuit lead counting



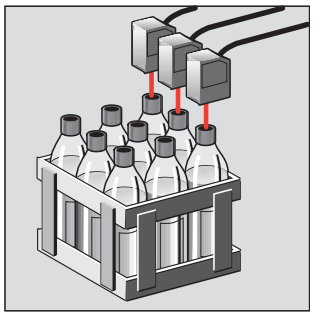
18M Laser
Thru-beam

Inspecting PCB's



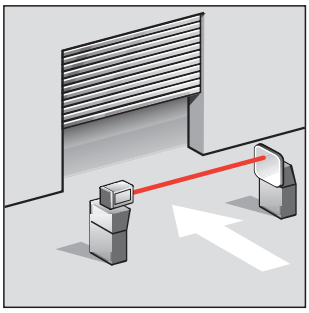
BOS 5K, 6K
Diffuse with focused beam

Checking seals



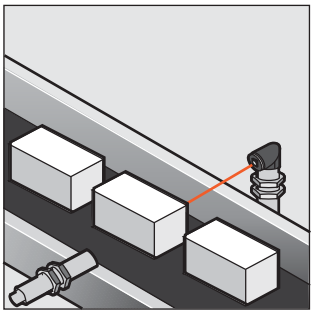
BOS 26K
Background suppression

Gate control



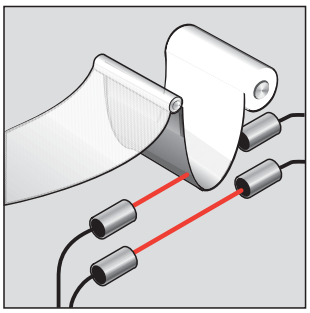
BOS 21M, 25K
Retroreflective sensor

High speed parts detection



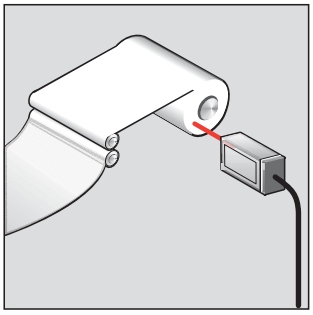
18M Laser
Thru-beam

Entry control



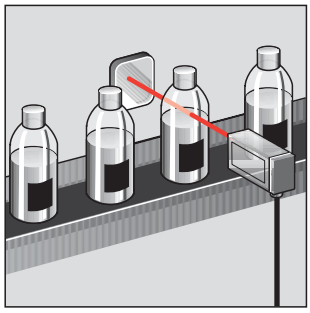
BLE/BLS 18KF
Thru-beam

Paper roll size monitoring



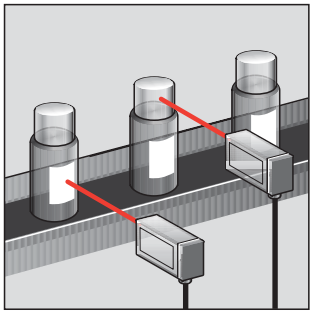
BOD 26K
Measurement

Level monitoring



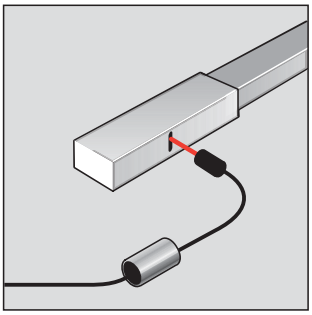
BOS 11M
Retroreflective sensor

Inspecting labels and caps



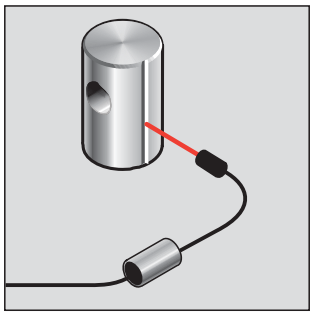
BOS 21M
Diffuse

Sensing a read mark



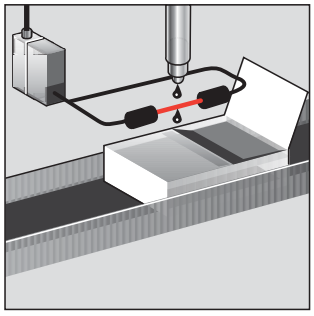
BOS 72K — Plastic fibers, Fiber optic cable

Detecting a groove



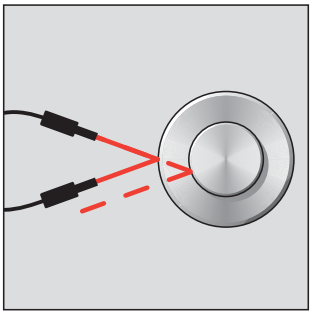
BOS 18M — Sensor with adjustable sensing distance

Adhesive dispensing



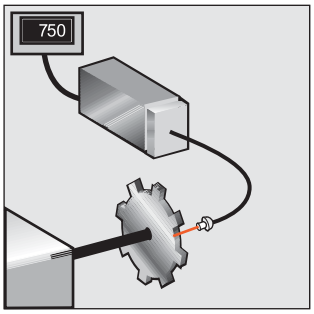
BOS 75K
With fiber optic cable

Differentiating various diameters



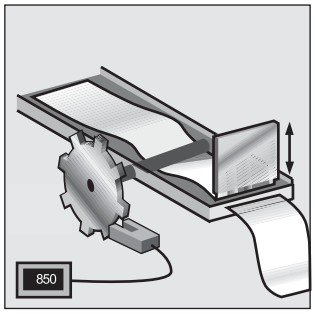
BMOA — Fiber optic amp, Fiber optics

Speed detection



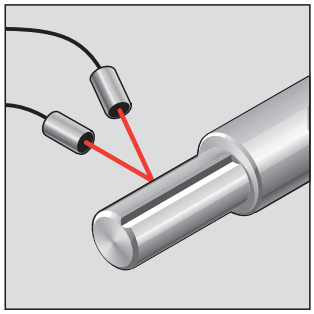
BOS 72K
High-speed fiber optics

Cutting synchronization



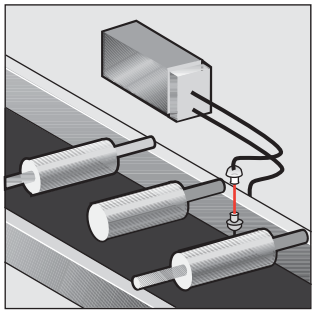
BGL — Slot sensors

Parts positioning



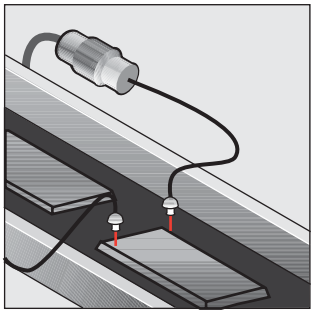
BOS 72K, BFO 22G — Fiber optic amp, Glass fiber optics

Lead presence detection



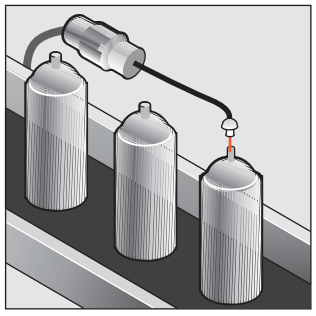
BOS 72K Fiber optic amp
Thru-beam with fiber optics

Chocolate bar position



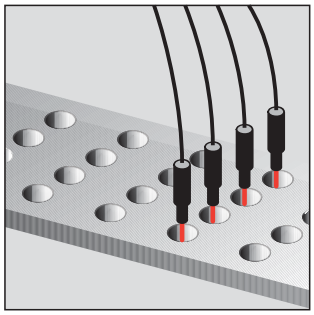
BMOA Fiber optic amp
Fiber optics

Missing nozzle detection



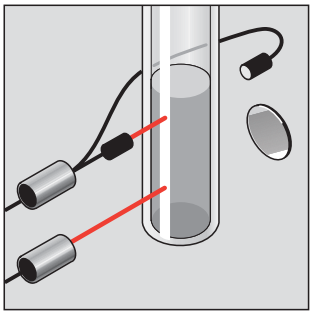
BOS 18KF fiber optic amp
Fiber optics

Level control of granules in small packages

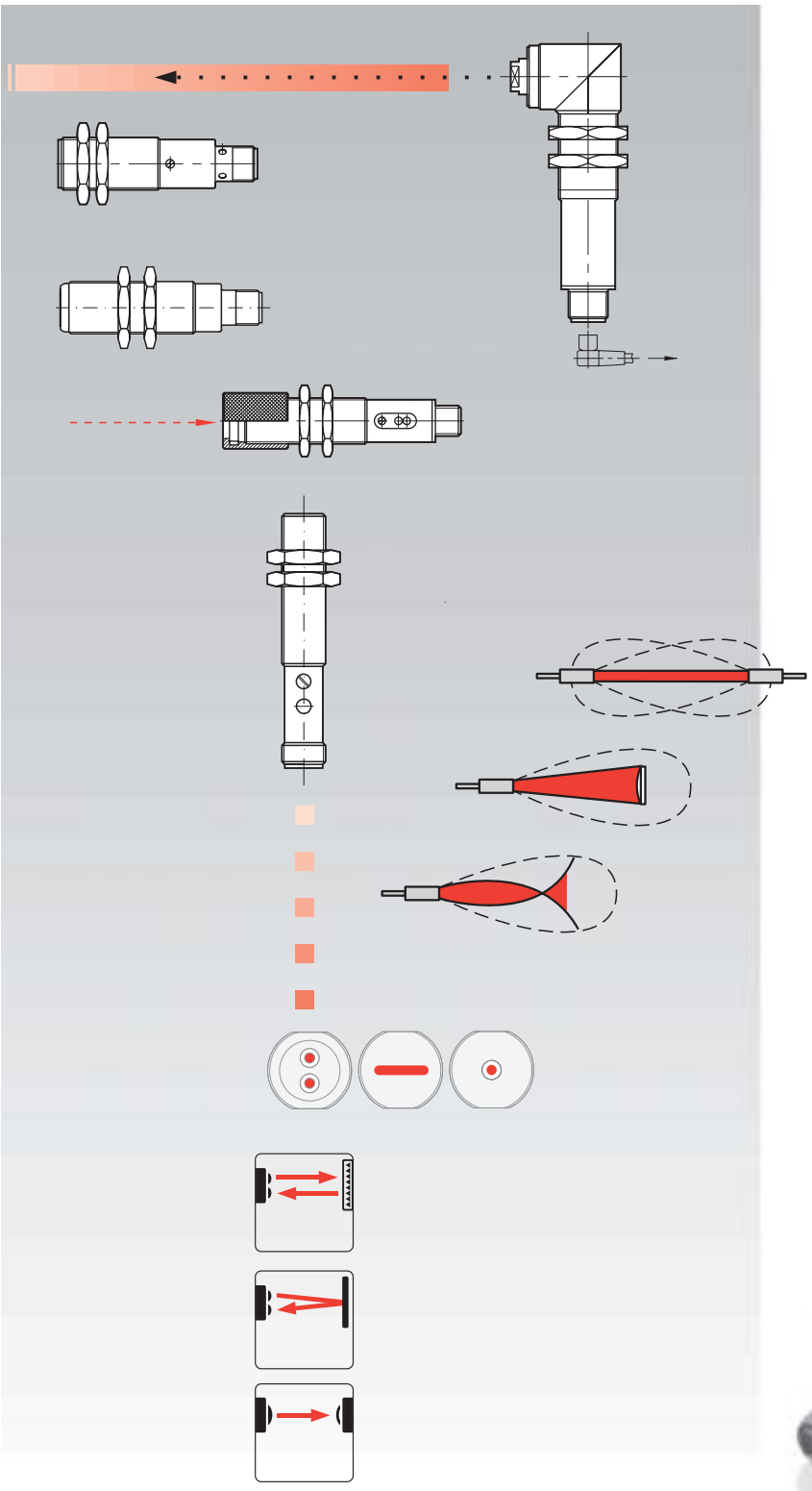


BOS 72K — Plastic fiber optics

Level detection



BFB 75K — Fiber optic amp, Fiber optics
BOS 18KF — Retroreflective



Tubular Housing Photoelectric Sensors

Photoelectric sensors in tubular housings offer through-hole mounting simplicity that saves time and installation cost. Standardization of the tubular form factor across multiple operating modes simplifies machine design and helps reduce the number of discrete components that must be inventoried. Metal housing variants offer additional ruggedness to enable photoelectric sensors to survive in tough applications where lesser designs will not hold up.

BMOA Miniature Metal

Balluff BMOA miniature sensors are among the smallest completely self-contained photoelectric sensors in the world. Smooth housing models easily mount using clamp-style mounting brackets. Threaded barrels are furnished with mounting nuts for quick installation.

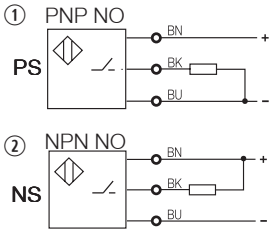
Features

- Totally self-contained units; no separate amplifier
- Miniature housing sealed to IP65 standards
- Protection against short-circuits and polarity reversal

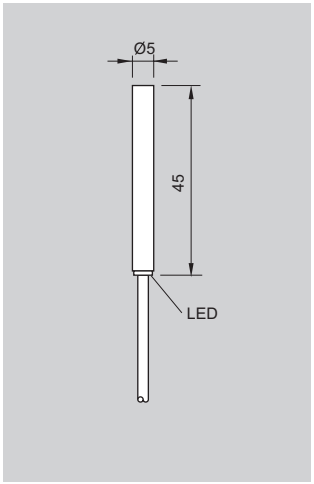
Applications

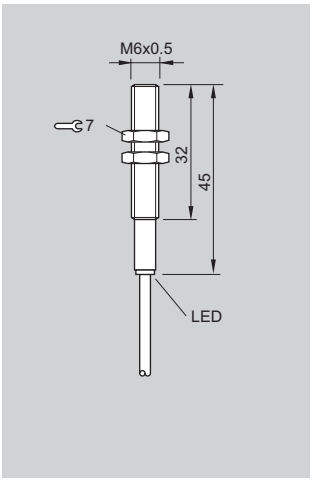
- General automation tasks
- Assembly and handling
- Machine building
- Packaging machinery
- Robots
- Machine tools

Wiring diagrams



Body Style	5 mm smooth	6 mm threaded
Type	Straight optics	Straight optics



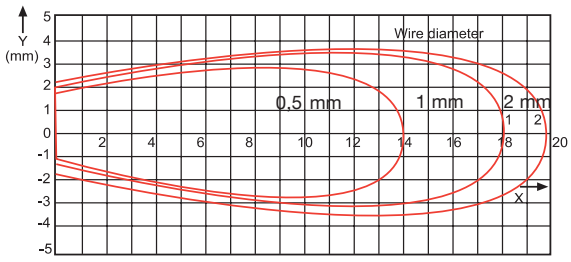


Diffuse

PNP NO Light-on 50 mm	①	BMOA 05SM-X50-PS-C-2	BMOA 06TM-X50-PS-C-2
NPN NO Light-on 50 mm	②	BMOA 05SM-X50-NS-C-2	BMOA 06TM-X50-NS-C-2

Supply Voltage	10...30 Vdc
Ripple	<15% peak-to-peak
Voltage Drop U_d at I_e	< 2.0 V at 100 mA
Rated Cutput Current I_e	100 mA
Current Consumption I_O (No Load)	30 mA
Switching Frequency	500 Hz
Response Time	1 ms
Output Type	PNP/NPN
Output Function	Light-on
Output Indicator	Red LED
Ambient Light Protection	EN 60947-5-2
Emitter Light Source	Infrared 880 nm
Operating Temperature Range	-10°C to +55°C
Storage Temperature	30°C to +70°C
Degree of Protection	IP 65
Relative Humidity	90% at 20°C
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	stainless steel
Sensing Face Material	PMMA
Connection	2 m cable 3-wire, 3 x 26 AWG, PUR

Detection diagram



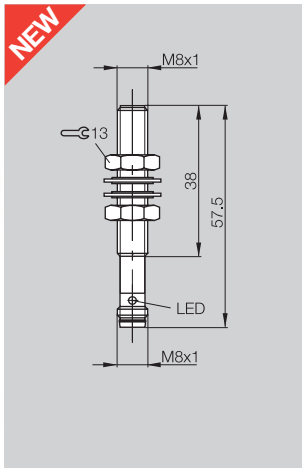
While the standard Kodak Test Card is used for determining normal sensing range, very few applications use it as the target. The chart above shows the approximate performance of these sensors using several different wire sizes as a target.

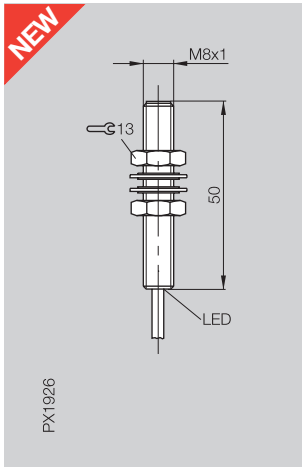
BOS 08M

Balluff's BOS 08M photoelectric sensor family includes thru-beam, polarized retroreflective, and proximity diffuse sensing models, available in M8 connector or cable out versions.

An 8 mm diameter allows maximum mounting flexibility in confined areas. It's more economical form factor can replace bulky fiber optic cables, and offers a better bend radius without a loss of light, giving the BOS 08M more power for difficult applications.

Body Style	8 mm threaded	8 mm threaded
Type	Straight optics	Straight optics





Diffuse			
PNP NO Light-on 55 mm	①	BOS 08M-PS-RD11-S49	BOS 08M-PS-RD11-03
PNP NC Dark-on 55 mm	②	BOS 08M-PO-RD11-S49	BOS 08M-PO-RD11-03
NPN NO Light-on 55 mm	③	BOS 08M-NS-RD11-S49	BOS 08M-NS-RD11-03
NPN NC Dark-on 55 mm	④	BOS 08M-NO-RD11-S49	BOS 08M-NO-RD11-03
Polarized Retroreflective			
PNP NO Dark-on 550 mm	①	BOS 08M-PS-PR11-S49	BOS 08M-PS-PR11-03
PNP NC Light-on 550 mm	②	BOS 08M-PO-PR11-S49	BOS 08M-PO-PR11-03
NPN NO Dark-on 550 mm	③	BOS 08M-NS-PR11-S49	BOS 08M-NS-PR11-03
NPN NC Light-on 550 mm	④	BOS 08M-NO-PR11-S49	BOS 08M-NO-PR11-03
Thru-beam			
PNP NO Dark-on 1.1 m Receiver	①	BOS 08M-PS-RE11-S49	BOS 08M-PS-RE11-03
PNP NC Light-on 1.1 m Receiver	②	BOS 08M-PO-RE11-S49	BOS 08M-PO-RE11-03
NPN NO Dark-on 1.1 m Receiver	③	BOS 08M-NS-RE11-S49	BOS 08M-NS-RE11-03
NPN NC Light-on 1.1 m Receiver	④	BOS 08M-NO-RE11-S49	BOS 08M-NO-RE11-03
Emitter	⑤	BOS 08M-X-RS11-S49	BOS 08M-X-RS11-03

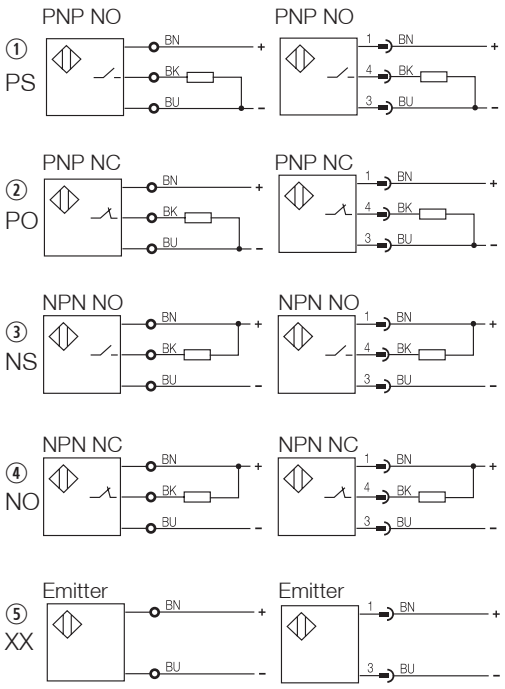
Supply Voltage	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (No Load)	Thru-beam ≤15 mA, Others ≤ 20 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Visible Red 640 nm	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Output Indicator	Red LED	
Switching Frequency	500 Hz	
Response Time (On/Off Delay)	≤ 1ms	
Operating Temperature Range	-10°C to +60°C	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	nickel plated brass	
Sensing Face Material	PMMA	
Connection	M8 3-pin connector	Cable 3 m, PUR, 3 x 26 AWG
Recommended Connector	C49 ANE-00-VY-050M	
Weight	13 g	47 g

Diffuse values referenced to standard Kodak test card.
Retroreflective values referenced to BOS R-9 reflector.

① = Number indicates wiring diagram

See page 2.16 for diagrams

Wiring diagrams



Recommended accessories and cables

Please order separately
See sections 6 & 7

Reflector
BOS R-9

Cable
C49 ANE/BNE

BOS 12M Metal

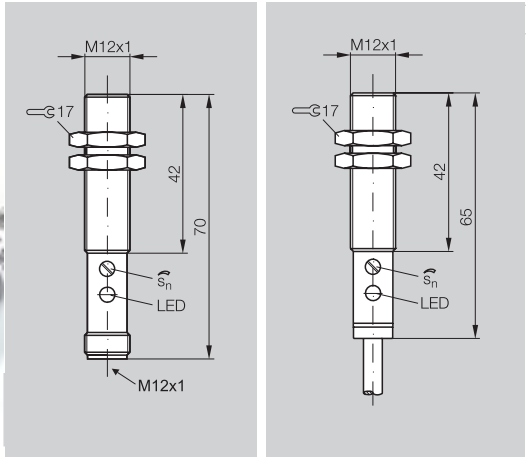
Easy to install Balluff BOS12M photoelectric sensors combine a simple rugged short body with a 12 mm diameter to meet most difficult mounting applications, including those usually met with inductive designs.

Features

- Supply voltage 10 to 30 Vdc, polarity reverse protected
- 200 mA output, short-circuit protected
- PNP or NPN, light-on or dark-on
- Output status display
- IP 67 housing
- Standard metal housing (M12×1)
- Red and infrared light versions
- Fixed and adjustable sensitivity
- Cable and connector versions (M12 connector)

Applications

- Anywhere M18×1 is too large
- Simple M12 bore mounting allows the sensor to be used wherever inductive proximity sensors are in use
- General automation tasks
- Assembly and handling
- Machine building
- Packaging machinery
- Robots
- Machine tools



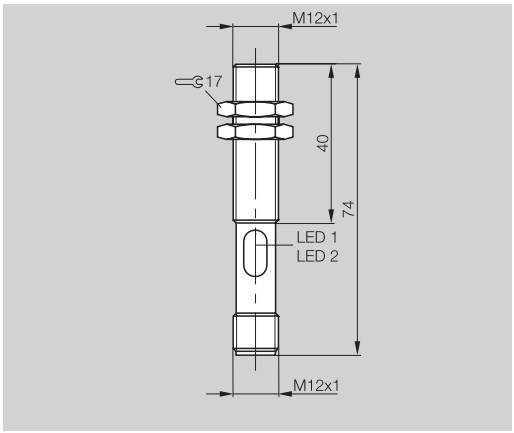
Body Style	12 mm threaded	12 mm threaded
Type	Straight optics	Straight optics
Diffuse		
PNP NO Light-on 100 mm Visible Red ①Ⓐ	BOS 12M-PS-1YA-S4-C	BOS 12M-PS-1YA-BO-C-03
NPN NO Light-on 100 mm Visible Red ④Ⓐ	BOS 12M-NS-1YA-S4-C	BOS 12M-NS-1YA-BO-C-03
PNP NC Dark-on 100 mm Visible Red ②Ⓐ	BOS 12M-PO-1YA-S4-C	BOS 12M-PO-1YA-BO-C-03
NPN NC Dark-on 100 mm Visible Red ⑦Ⓐ	BOS 12M-NO-1YA-S4-C	BOS 12M-NO-1YA-BO-C-03
PNP NO Light-on 200 mm Visible Red ①Ⓐ	BOS 12M-PS-1YB-S4-C	BOS 12M-PS-1YB-BO-C-03
NPN NO Light-on 200 mm Visible Red ④Ⓐ	BOS 12M-NS-1YB-S4-C	BOS 12M-NS-1YB-BO-C-03
PNP NC Dark-on 200 mm Visible Red ②Ⓐ	BOS 12M-PO-1YB-S4-C	BOS 12M-PO-1YB-BO-C-03
NPN NC Dark-on 200 mm Visible Red ⑦Ⓐ	BOS 12M-NO-1YB-S4-C	BOS 12M-NO-1YB-BO-C-03
PNP NO Light-on 400 mm Infrared, Pot. ①Ⓐ	BOS 12M-PS-1PD-S4-C	BOS 12M-PS-1PD-BO-C-03
NPN NO Light-on 400 mm Infrared, Pot. ④Ⓐ	BOS 12M-NS-1PD-S4-C	BOS 12M-NS-1PD-BO-C-03
PNP NC Dark-on 400 mm Infrared, Pot. ②Ⓐ	BOS 12M-PO-1PD-S4-C	BOS 12M-PO-1PD-BO-C-03
NPN NC Dark-on 400 mm Infrared, Pot. ⑦Ⓐ	BOS 12M-NO-1PD-S4-C	BOS 12M-NO-1PD-BO-C-03
Polarized Retroreflective		
PNP NO Dark-on 1.5 m Visible Red, Pot. ①Ⓑ	BOS 12M-PS-1QA-S4-C	BOS 12M-PS-1QA-BO-C-03
PNP NC Light-on 1.5 m Visible Red, Pot. ②Ⓑ	BOS 12M-PO-1QA-S4-C	BOS 12M-PO-1QA-BO-C-03
NPN NO Dark-on 1.5 m Visible Red, Pot. ④Ⓑ	BOS 12M-NS-1QA-S4-C	
Thru-beam		
PNP NO+NC Light/Dark 5 m Receiver Visible Red, Pot. ③Ⓒ	BLE 12M-PA-1PD-S4-C	BLE 12M-PA-1PD-BO-C-03
NPN NO+NC Light/Dark 5 m Receiver Visible Red, Pot. ⑧Ⓒ	BLE 12M-NA-1PD-S4-C	
Emitter ⑤Ⓒ	BLS 12M-XX-1RD-S 4-L	BLS 12M-XX-1RD-BO-L-03

Supply Voltage	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	200 mA	
Current Consumption I_O (No Load)	≤ 20 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Visible Red 640 nm/Long range diffuse infrared 880 nm	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Output Indicator	Yellow LED	
Switching Frequency	Thru-beam 500 Hz/All others 200 Hz	
Response Time (On/Off Delay)	≤ 2.5 ms, Thru-beam ≤ 1 ms	
Operating Temperature Range	-10°C to +60°C	
Degree of Protection per IEC 60529	IP 67	
Housing Material	nickel plated brass	
Sensing Face Material	PMMA	
Connection	M12 4-pin connector	Cable 3 m, PVC, 3 x 22 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	30 g	136 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.20 for diagrams

– Diffuse values referenced to standard Kodak test card
– Retroreflective values referenced to BOS R-1 reflector

Body Style	12 mm threaded
Type	Straight optics



Background Suppression		
PNP NO/NC Light/Dark 10...60 mm, Teach-in	⑥Ⓓ	BOS 12M-PU-1HA-S4-C
Fixed Focus		
PNP NO Light-on 23 mm	①	BOS 12M-PS-1N1I-S4-C

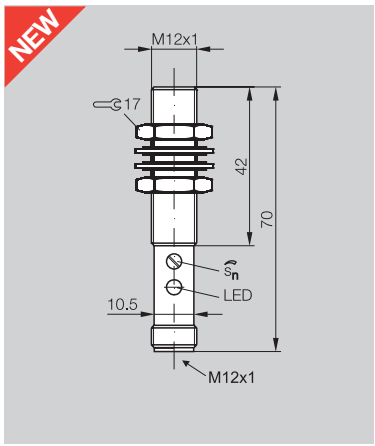
Supply Voltage	10…30 Vdc
Ripple	≤ 10%
Voltage Drop U_d at I_e	≤ 2.5 V
Rated Output Current I_e	100 mA
Current Consumption I_O (No Load)	≤ 25mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	Visible Red 660 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux
Output Indicator	Yellow LED
Stability Indicator	Green LED
Switching Frequency f	1000 Hz
Response Time (On/Off Delay)	≤ 0.5ms
Operating Temperature Range	-20°C to +60°C
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	nickel plated brass
Sensing Face Material	PMMA
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	30 g

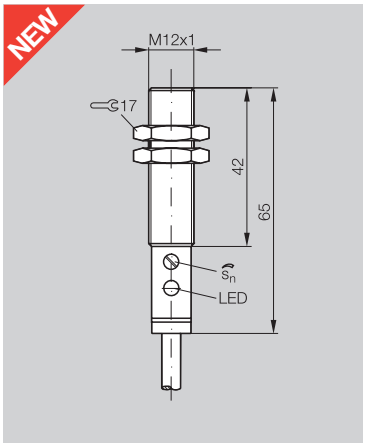
Note: NPN versions available. Consult factory for details.

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.20 for diagrams

Mounting bracket
BOS 12,0-KB-1

Body Style	12mm threaded	12mm threaded
Type	Straight optics	Straight optics





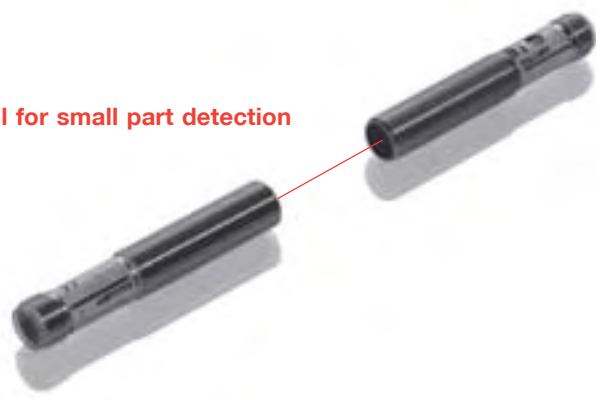
Thru-beam

PNP Receiver	3 m/30 m	③ⒺⒻⒼ	BOS 12M-PA-LE10-S4	BOS 12M-PA-LE10-03
NPN Receiver	3 m/30 m	⑧ⒺⒻⒼ	BOS 12M-NA-LE10-S4	BOS 12M-NA-LE10-03
Emitter	3 m (Resolution = 50 µm)	⑨Ⓔ	BOS 12M-XT-LS11-S4	BOS 12M-XT-LS11-03
Emitter	30 m (Resolution = 200 µm)	⑨ⒻⒼ	BOS 12M-XT-LS12-S4	BOS 12M-XT-LS12-03

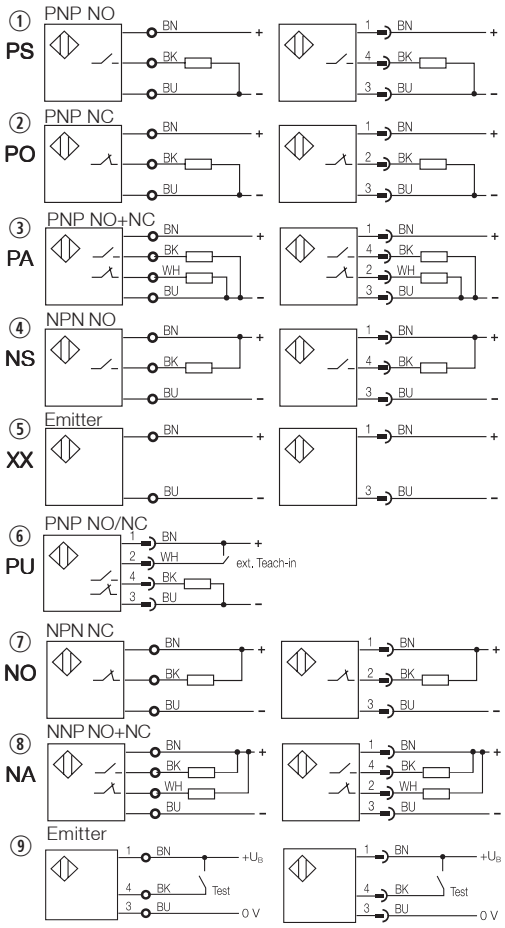
Supply Voltage	10...30 V DC	10...30 V DC
Ripple	10%	10%
Voltage Drop U_d at I_e	≤ 2.5 V	≤ 2.5 V
Rated Output Current I_e	200 mA	200 mA
Current Consumption I_o (No Load)	≤ 10 mA (Emitter)/≤ 15 mA (Receiver)	≤10 mA (Emitter)/≤ 15 mA (Receiver)
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	DC13
Reverse Polarity Protection	Yes	Yes
Short Circuit Protection	Yes	Yes
Emitter Light Source	Laser red light (655 mm)	Laser red light (655 mm)
Ambient Light Immunity (EN 60-947-5-2)	500 Lux	500 Lux
Laser Class	Class 1	Class 1
Emitter Focal Point	LS11 = 500 mm/LS12 = N/A	LS11 = 500 mm/LS12 = N/A
Resolution (Max.)	LS11 = 50 µm/LS12 = 200 µm	LS11 = 50 µm/LS12 = 200 µm
Output Indicator	Yellow LED	Yellow LED
Switching Frequency f	1000 Hz	1000 Hz
Response Time	≤ 0.5 ms	≤ 0.5 ms
Operating Temperature Range	-10 to +50° C	-10 to +50° C
Degree of protection per IEC 60529	IP 67	IP 67
Short Circuit Protection	Yes	Yes
Overload Protection	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass
Sensing Face Material	Glass	Glass
Connection	M12 4-pin connector	Cable, 3 m
Wire Size		3 x 22 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	30 g	126 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.20 for diagrams

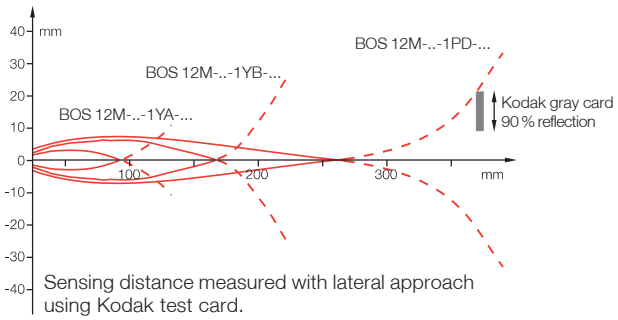
Ideal for small part detection



Wiring Diagrams

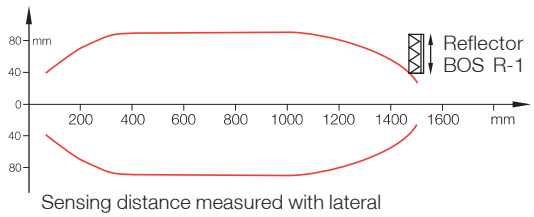


Ⓐ Diffuse



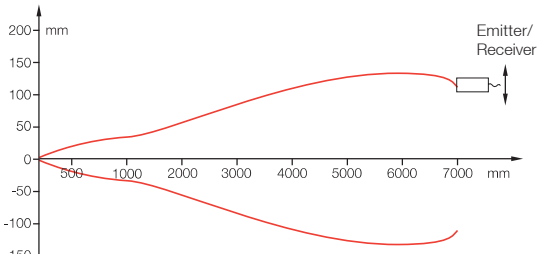
Sensing distance measured with lateral approach using Kodak test card.

Ⓑ Retroreflective



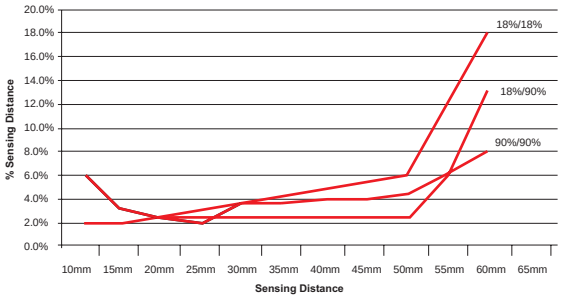
Sensing distance measured with lateral approach using reflector.

Ⓒ Thru Beam



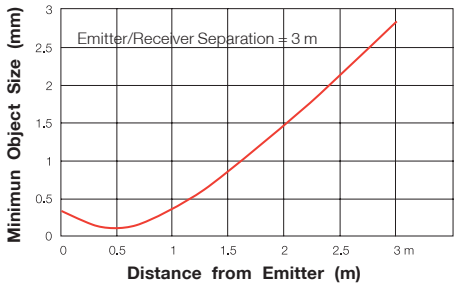
For the thru-beam sensor the maximum possible offset between emitter and receiver is measured.

Ⓓ Background Suppression



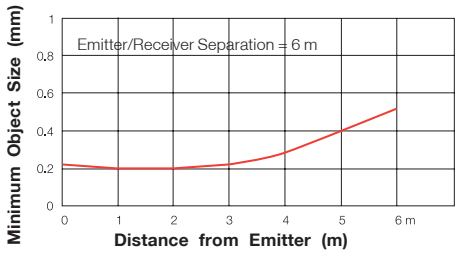
Ⓔ Laser Thru-beam

BOS 12M-XT-**LS11**-..



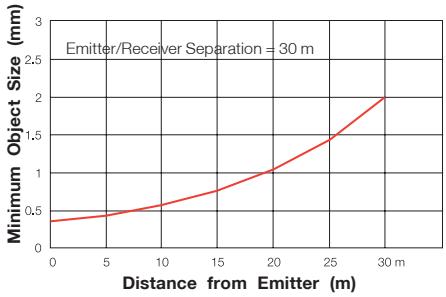
Ⓕ Laser Thru-beam

BOS 12M-XT-**LS12**-..



Ⓖ Laser Thru-beam

BOS 12M-XT-**LS12**-..



18K Economical and Universal Body Style

Available in standard sensing modes in either straight or right angle versions, Balluff BOS 18K provides OEMs a high quality economical plastic body sensor style, perfect for MRO replacement. DC versions are available in PNP, NPN, Normally Open, and Normally Closed models. AC versions come in diffuse, polarized and non-polarized retroreflective, and thru-beam models.

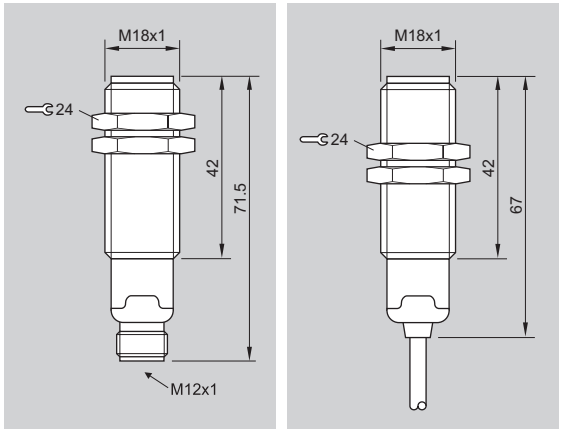
Features

- DC Versions (10 to 30 Vdc)
- PNP/NPN/NO/NC selectable
- Test Input (Emitter only)
- Straight or Right Angle
- Cable or M12 Connector
- AC Versions (15 to 264 Vac)
- Straight or Right Angle

Applications

- Automatic packaging machines
- Part presence detection
- Conveyor lines
- Parts counting
- Small object detection

Economical		
Body Style	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics



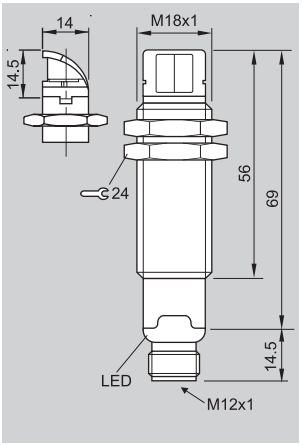
Diffuse		
PNP NO Light/Dark 300 mm 270° Pot. ①Ⓐ	BOS 18K-PU-ID10-S4	BOS 18K-PU-ID10-02
NPN NO Light/Dark 300 mm 270° Pot. ②Ⓐ	BOS 18K-NU-ID10-S4	BOS 18K-NU-ID10-02
Polarized Retroreflective		
PNP NO Light/Dark 2 m 270° Pot. ①Ⓑ	BOS 18K-PU-PR10-S4	BOS 18K-PU-PR10-02
NPN NO Light/Dark 2 m 270° Pot. ②Ⓑ	BOS 18K-NU-PR10-S4	BOS 18K-NU-PR10-02
Thru-beam		
PNP NO Light/Dark Receiver 12 m ①Ⓒ	BOS 18K-PU-IE10-S4	BOS 18K-PU-IE10-02
NPN NO Light/Dark Receiver 12 m ②Ⓒ	BOS 18K-NU-IE10-S4	BOS 18K-NU-IE10-02
Emitter ③Ⓒ	BOS 18K-XT-IS10-S4	BOS 18K-XT-IS10-02

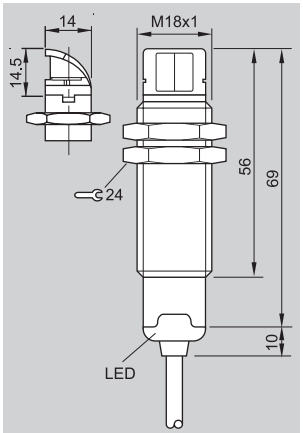
Supply Voltage	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (No Load)	≤ 35 mA	
Utilization Category (IEC 60-947-4-1)	DC 13	
Output Duty Cycle		
Emitter Light Source	Infrared 880nm/ Visible Red 640 nm Polarized Only	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Power Indicator	Green LED (Emitter Only)	
Output Indicator	Red LED (Except Emitter)	
Stability Indicator	Green LED	
Switching Frequency	500 Hz, Thru-beam 250 Hz	
Response Time (On/Off Delay)	≤ 1 ms/ ≤ 2 ms Thru-beam	
Operating Temperature Range	-25°C to +55°C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	PBT	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 hr with Ta=+25°C	
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	25 g	75 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.26-2.27 for diagrams

Economical

Body Style	18 mm threaded	18 mm threaded
Type	90° optics	90° optics





Diffuse			
PNP NO/NC Light/Dark 250 mm 270° Pot.	①Ⓐ	BOS 18KR-PU-ID10-S4	BOS 18KR-PU-ID10-02
NPN NO/NC Light/Dark 250 mm 270° Pot.	②Ⓐ	BOS 18KR-NU-ID10-S4	BOS 18KR-NU-ID10-02
Polarized Retroreflective			
PNP NO/NC Light/Dark 1.5 m 270° Pot.	①Ⓑ	BOS 18KR-PU-PR10-S4	BOS 18KR-PU-PR10-02
NPN NO/NC Light/Dark 1.5 m 270° Pot.	②Ⓑ	BOS 18KR-NU-PR10-S4	BOS 18KR-NU-PR10-02
Thru-beam			
PNP NO/NC Light/Dark Receiver 10 m	①Ⓒ	BOS 18KR-PU-IE10-S4	BOS 18KR-PU-IE10-02
NPN NO/NC Light/Dark Receiver 10 m	②Ⓒ	BOS 18KR-NU-IE10-S4	BOS 18KR-NU-IE10-02
Emitter	③Ⓒ	BOS 18KR-XT-IS10-S4	BOS 18KR-XT-IS10-02

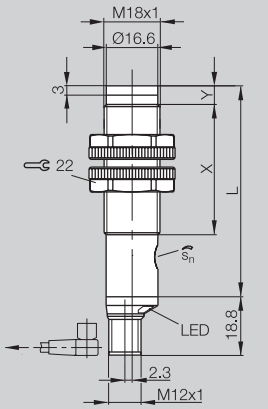
Supply Voltage	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (No Load)	≤ 35 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Infrared 880 nm/ Visible Red 640 nm Polarized Only	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Power Indicator	Green LED (Emitter Only)	
Output Indicator	Red LED (Except Emitter)	
Stability Indicator	Green LED	
Switching Frequency	500 Hz, Thru-beam 250 Hz	
Response Time (On/Off Delay)	≤ 1 ms/ ≤ 2 ms Thru-beam	
Operating Temperature Range	-25°C to +55°C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	PBT	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 hr with Ta=+25°C	
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	25 g	75 g

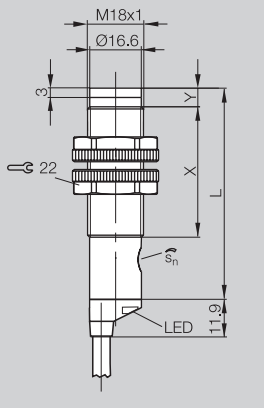
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.26-2.27 for diagrams

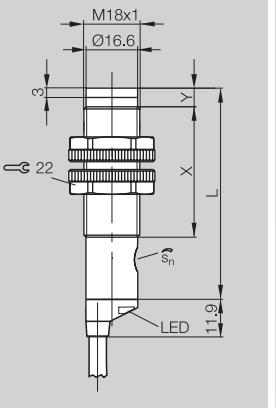
Photoelectric sensors with 90° optics are an ideal solution where space is limited.

Universal

Body Style	18 mm threaded	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics	Straight optics







AC

Diffuse			
PNP/NPN NO/NC Light/Dark 350 mm 270° Pot. ④Ⓓ	BOS 18K-5-C35-32-S4	BOS 18K-5-C35-30-02	
AC NO Light-on 300 mm 270° Pot. ⑤Ⓓ			BOS 18K-1-C30-20-02
AC NC Dark-on 300 mm 270° Pot. ⑥Ⓓ			BOS 18K-1-C30-10-02
Non-Polarized Retroreflective			
AC NC Light-on 2 m ⑥Ⓕ			BOS 18K-1-A2-20-02
AC NO Dark-on 2 m ⑤Ⓕ			BOS 18K-1-A2-10-02
Polarized Retroreflective			
PNP/NPN NO/NC Light/Dark 3 m 270° Pot. ④Ⓕ	BOS 18K-5-B3-32-S4	BOS 18K-5-B3-30-02	
Thru-beam			
AC NC Light-on 8 m Receiver 270° Pot. ⑥Ⓗ			BLE-18K-1-F8-20-02
AC NO Dark-on 8 m Receiver 270° Pot. ⑤Ⓗ			BLE-18K-1-F8-10-02
PNP/NPN NO/NC Light/Dark 12 m Receiver 270° Pot. ④①	BLE 18K-5-F12-32-S4	BLE 18K-5-F12-30-02	
AC Emitter ⑦Ⓗ			BLS-18K-1-G8-00-02
DC Emitter 12 m ③①	BLS 18K-5-G12-02-S4	BLS 18K-5-G12-00-02	

Supply Voltage	10…30 Vdc		15…264 Vac, 48 to 62 Hz
Ripple	≤ 2 V pp		
Voltage Drop U_d at I_e	≤ 1.5 V		≤ 2.5 V
Rated Output Current I_e	150 mA		100 mA
Current Consumption I_O (No Load)	≤ 30 mA		≤ 10 mA
Utilization Category (IEC 60-947-4-1)	DC 13		AC 140
Output Duty Cycle			
Emitter Light Source	Infrared 880 nm/ Visible Red 660 nm Polarized		Infrared 880 nm/ Visible Red 660 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux		5000 Lux
Power Indicator	Green LED (Emitter)		Red LED (Emitter)
Output Indicator	Yellow LED		Red LED
Stability Indicator	Green LED		Green LED
Switching Frequency	500 Hz		25 Hz
Response Time (On/Off Delay)	≤ 1 ms		≤ 20 ms
Operating Temperature Range	-15°C to +55°C		-25°C to +55°C
Electrical Shock Protection	Class 2		Class 1
Degree of Protection per IEC 60529	IP 67		IP 67
Short Circuit Protection	Yes		No
Overload Protection	Yes		No
Housing Material	ABS		ABS UL 94V-0
Sensing Face Material	PMMA		PMMA
Emitter Life	Average 100,000 hr with Ta=+25°C		Average 100,000 hr with Ta=+25°C
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 22 AWG	Cable 2 m, PVC, 3 x 24 AWG
Recommended Connector	C04 AEL-00-VY-050M		
Weight	25 g	100 g	100 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.26-2.27 for diagrams

DC Versions

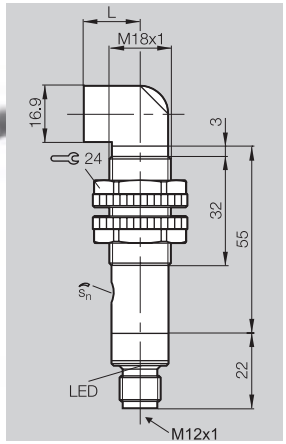
Emitter/BLS	X=32 mm, Y=3 mm, L=55 mm
Diffuse/Receiver	X=42 mm, Y=3 mm, L=65 mm
Polarized	X=42 mm, Y=3 mm, L=68 mm

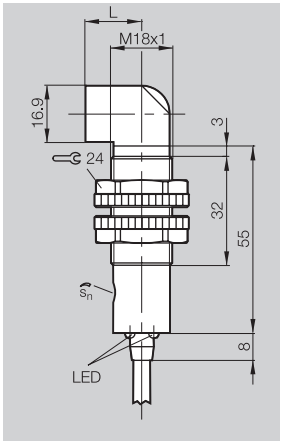
AC Versions

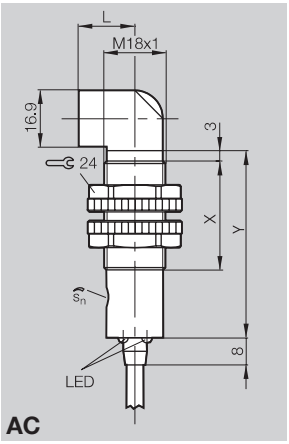
With Pot.	Emitter
X=52 mm Y=3 mm L=75 mm	X=42 mm Y=3 mm L=65 mm

Universal

Body Style	18 mm threaded	18 mm threaded	18 mm threaded
Type	90° optics	90° optics	90° optics







AC

Diffuse			
PNP/NPN NO/NC Light/Dark 350 mm 270° Pot. ④Ⓔ	BOS 18K-5-C35-37-S4	BOS 18K-5-C35-35-02	
AC NO Light-on 300 mm 270° Pot. ⑤Ⓓ			BOS 18K-1-C30-25-02
AC NC Dark-on 300 mm 270° Pot. ⑥Ⓓ			BOS 18K-1-C30-15-02
Non-Polarized Retroreflective			
AC NC Light-on 2 m ⑥Ⓕ			BOS 18K-1-A2-25-02
AC NO Dark-on 2 m ⑤Ⓕ			BOS 18K-1-A2-15-02
Polarized Retroreflective			
PNP/NPN NO/NC Light/Dark 3 m 270° Pot. ④Ⓖ	BOS 18K-5-B3-37-S4	BOS 18K-5-B3-35-02	
Thru-beam			
AC NC Light-on 8 m Receiver 270° Pot. ⑥Ⓗ			BLE-18K-1-F8-25-02
AC NO Dark-on 8 m Receiver 270° Pot. ⑤Ⓗ			BLE-18K-1-F8-15-02
PNP/NPN NO/NC Light/Dark 8 m Receiver 270° Pot ④Ⓗ	BLE 18K-5-F8-37-S4	BLE 18K-5-F8-35-02	
AC Emitter ⑦Ⓗ			BLS-18K-1-G8-05-02
DC Emitter 8 m ③Ⓗ	BLS 18K-5-G8-07-S4	BLS 18K-5-G8-05-02	

Supply Voltage	10…30 Vdc		15…264 Vac, 48 to 62 Hz
Ripple	≤ 2 V pp		
Voltage Drop U_d at I_e	≤ 1.5 V		≤ 2.5 V
Rated Output Current I_e	150 mA		100 mA
Current Consumption I_O (No Load)	≤ 30 mA		≤ 10 mA
Utilization Category (IEC 60-947-4-1)	DC 13		AC 140
Output Duty Cycle			
Emitter Light Source	Infrared 880 nm/ Visible Red 660 nm Polarized		Infrared 880 nm/ Visible Red 660 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux		5000 Lux
Power Indicator	Green LED (Emitter)		Red LED (Emitter)
Output Indicator	Red LED (C35, B3)		Red LED
Stability Indicator	Green LED		Green LED
Switching Frequency	500 Hz		25 Hz
Response Time (On/Off Delay)	≤ 1 ms		≤ 20 ms
Operating Temperature Range	-15°C to +55°C		-25°C to +55°C
Electrical Shock Protection	Class 2		Class 1
Degree of Protection per IEC 60529	IP 67		IP 67
Short Circuit Protection	Yes		No
Overload Protection	Yes		No
Housing Material	ABS		ABS UL 94V-0
Sensing Face Material	PMMA		PMMA
Emitter Life	Average 100,000 hr with Ta=+25°C		Average 100,000 hr with Ta=+25°C
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 22 AWG	Cable 2 m, PVC, 3 x 24 AWG
Recommended Connector	C04 AEL-00-VY-050M		
Weight	25 g	100 g	100 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.26-2.27 for diagrams

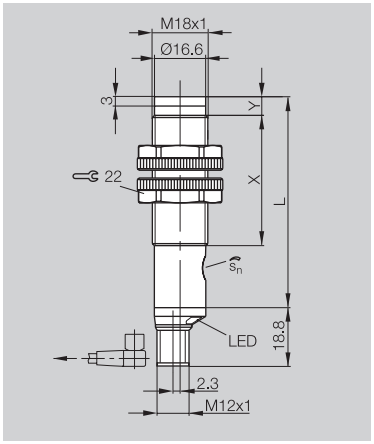
DC Versions

Diffuse	L=16.5 mm
Polarized Retroreflective	L=19.5 mm
Thru-Beam	L=20.5 mm

AC Versions

With Pot.	Emitter
X=52 mm	X=42 mm
Y=75 mm	Y=65 mm
L=19.5	L= 20.5

Body Style	18 mm threaded
Type	Straight optics



Diffuse — Class I Laser		
PNP NO Light-on 10 to 350 mm 270° Pot.	⑧ⒽⓀ	BOS 18K-PS-1LOC-E5-C-S 4*
PNP NC Dark-on 10 to 350 mm 270° Pot.	⑨ⒽⓀ	BOS 18K-PO-1LOC-E5-C-S 4*
Polarized Retroreflective — Class I Laser		
PNP NO Dark-on 12 m 270° Pot.	⑧ⒾⓁ	BOS 18K-PS-1LQK-E5-C-S 4*
PNP NC Light-on 12 m 270° Pot.	⑨ⒾⓁ	BOS 18K-PO-1LQK-E5-C-S 4*
Thru-beam — Class I Laser		
PNP NO Dark-on 60 m 270° Pot.	⑧ⒿⓂ	BLE 18K-PS-1LT-E5-C-S 4*
Emitter — Class I Laser	⑩ⒿⓂ	BLS-18K-XX-1LT-E5-C-S 4*

***Not recommended for new applications. For new applications, use BOS 18KF/BOS KW lasers on page 2.32 & 2.33.**

Supply Voltage	10…30 Vdc
Ripple	≤ 2 V pp
Voltage Drop U_d at I_e	≤ 2 V
Rated Output Current I_e	100 mA
Current Consumption I_O (No Load)	≤ 35 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	Visible Red Class I Laser 650 nm
Spot Size	1 mm @ 100 mm
	3 mm @ 6 m
	2.5 mm @ 5 m
	5 mm @ 10 m
	10 mm @ > 20 m
Ambient Light Immunity (EN 60947-5-2)	5000 Lux
Power/Stability Indicator	Green LED
Output Indicator	Yellow LED
Switching Frequency	1.5 kHz
Response Time (On/Off Delay)	≤ 0.33 ms
Operating Temperature Range	-10°C to +50°C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	ABS
Sensing Face Material	PMMA
Emitter Life	Average 100,000 hr with Ta=+25°C
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	50 g

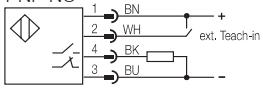
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.26-2.27 for diagrams

Dimensional Values

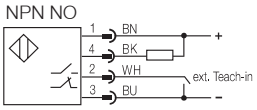
Diffuse	X=42 mm, Y=3 mm, L=65 mm
Polarized	X=42 mm, Y=6 mm, L=68 mm
Thru-Beam BLE	X=42 mm, Y=3 mm, L=65 mm
Thru-Beam BLS	X=32 mm, Y=3 mm, L=55 mm

Wiring Diagrams

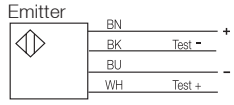
① PU — PNP NO



② NU — NPN NO

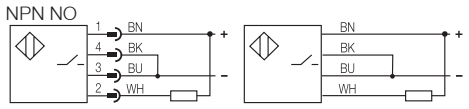


③ XX — Emitter

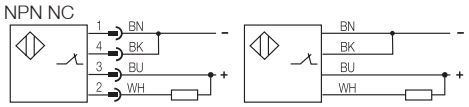


Universal PNP/NPN NO/NC

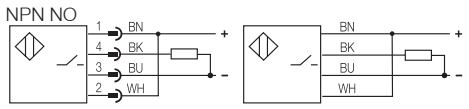
④ UU — NPN NO



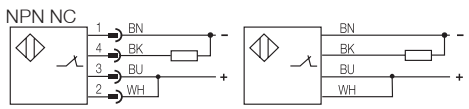
NPN NC



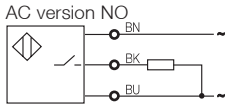
NPN NO



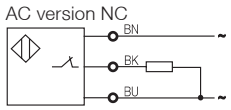
NPN NC



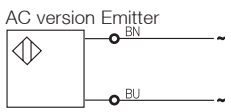
⑤ AC version NO



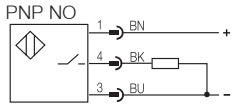
⑥ AC version NC



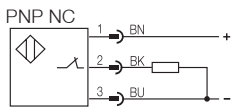
⑦ AC version Emitter



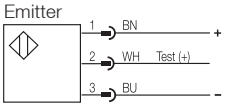
⑧ PS — PNP NO



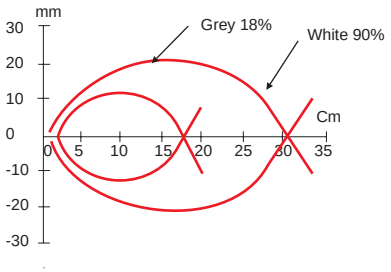
⑨ PO — PNP NC



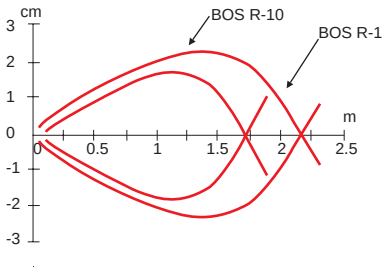
⑩ Emitter



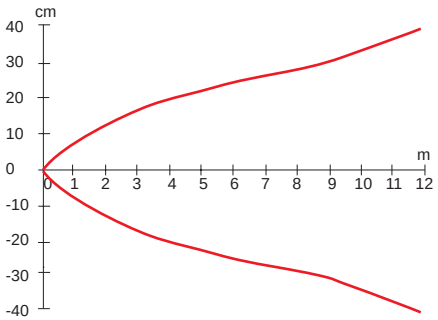
Ⓐ Diffuse



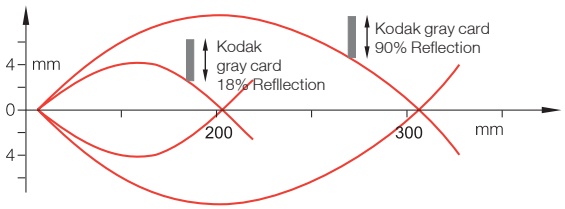
Ⓑ Polarized Retroreflective



Ⓒ Thru-Beam

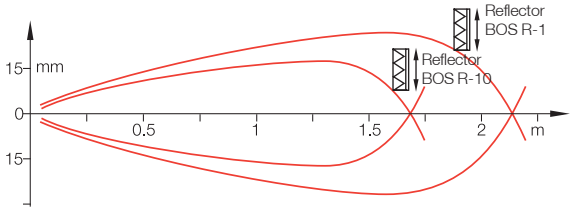


Ⓓ Diffuse



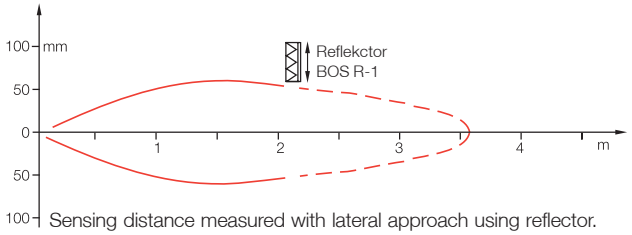
Sensing distance measured with lateral approach using Kodak test card.

Ⓔ Non-Polarized Retroreflective



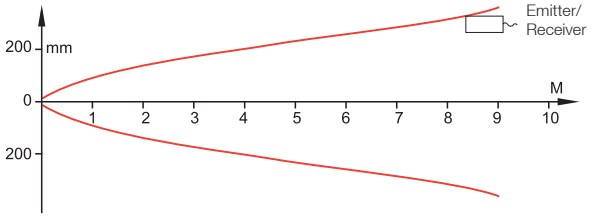
Sensing distance measured with lateral approach using reflector.

Ⓕ Polarized Retroreflective



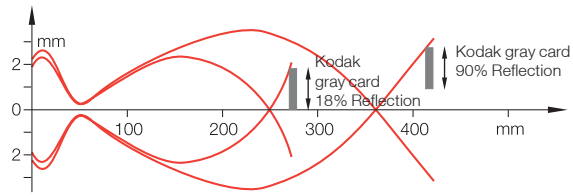
Sensing distance measured with lateral approach using reflector.

Ⓖ Thru-Beam BLE/BLS



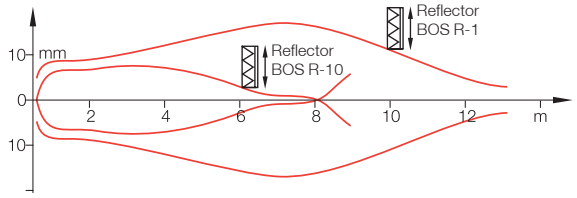
For the thru-beam sensor, the maximum possible offset between emitter and receiver is measured.

Ⓗ Diffuse with potentiometer Class I Laser



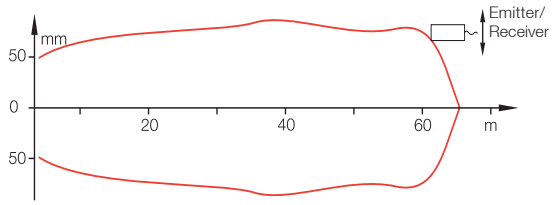
Sensing distance measured with lateral approach using Kodak gray card.

Ⓘ Retroreflective Class I Laser



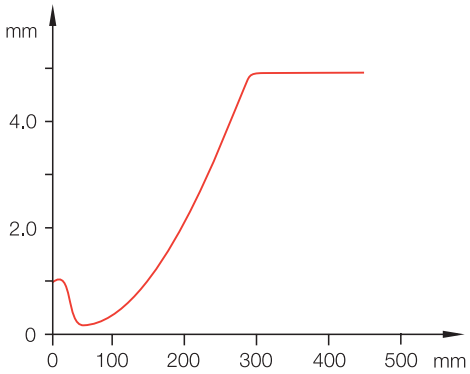
Sensing distance measured with lateral approach using reflector.

Ⓙ Thru-Beam Class I Laser

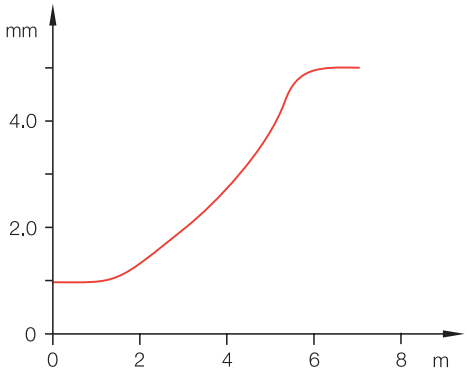


For the thru-beam sensor, the maximum possible offset between emitter and receiver is measured.

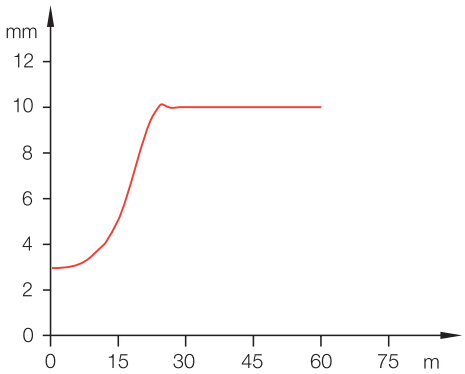
Ⓚ Resolution – Diffuse Class I Laser



Ⓛ Resolution – Retroreflective Class I Laser



Ⓜ Resolution – Thru-Beam Class I Laser



BOS 18KF
Advanced Body Style
Combination Body Style

Balluff's BOS 18KF Body Style represents the broadest, most technologically advanced 18mm tubular photoelectric family in the world. The innovative plastic flat tubular design allows the 18KF to be mounted like a tubular or block style sensor. The 18KF, available in either straight or right angle versions, offers maximum flexibility in mounting options.

The 18KF Body Style is a true platform approach to fulfilling all of your sensing needs while solving your most difficult applications.

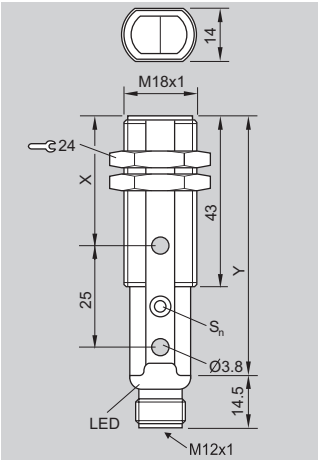
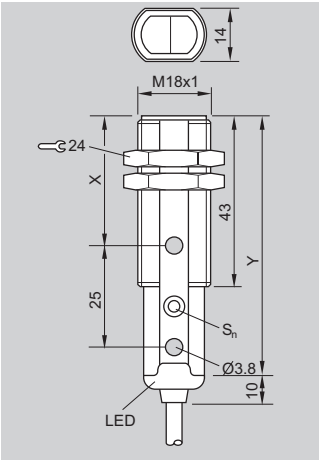
Features

- Innovative plastic flat 18mm tubular design
- Straight or right angle versions
- 10 to 30 Vdc supply voltage works with most DC supplies
- Simple potentiometer adjustment or the patented EASYtouch™ System found on select versions make set-up as simple as a push of the button
- Standard M12 connector or cable out versions
- Highly visible LEDs aid troubleshooting and set-up
- Extensive line of mounting accessories
- Test input on Thru-beam versions can be used to verify operational status of system
- Economical standard sensing modes to solve typical applications

Applications

- Assembly machines
- Conveyors
- Packaging machines
- Automotive assembly
- Automatic storage and retrieval systems
- Filling machines
- Bagging machines

	x	y
L_1	34	67
L_2	24	57

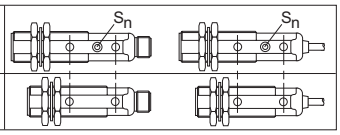
Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics
		
Background Suppression (BGS) (L_1)		
PNP NO+NC Light-on 50...100 mm Teach-in ①Ⓐ	BOS 18KF-PA-1HA-S4-C	BOS 18KF-PA-1HA-C-02
NPN NO+NC Light-on 50...100 mm Teach-in ②Ⓐ	BOS 18KF-NA-1HA-S4-C	BOS 18KF-NA-1HA-C-02
Foreground/Background Suppression (FGBGS) (L_1)		
PNP NO+NC Light-on 40...100 mm Teach-in ①Ⓑ	BOS 18KF-PA-1GA-S4-C	BOS 18KF-PA-1GA-C-02
NPN NO+NC Light-on 40...100 mm Teach-in ②Ⓑ	BOS 18KF-NA-1GA-S4-C	BOS 18KF-NA-1GA-C-02
Long Range Diffuse (L_1)		
PNP NO+NC Light-on 700 mm 270° Pot. ①Ⓒ	BOS 18KF-PA-1PE-S4-C	BOS 18KF-PA-1PE-C-02
NPN NO+NC Light-on 700 mm 270° Pot. ②Ⓒ	BOS 18KF-NA-1PE-S4-C	BOS 18KF-NA-1PE-C-02
Mid Range Diffuse (L_1)		
PNP NO+NC Light-on 400 mm 270° Pot. ①Ⓓ	BOS 18KF-PA-1PD-S4-C	BOS 18KF-PA-1PD-C-02
NPN NO+NC Light-on 400 mm 270° Pot. ②Ⓓ	BOS 18KF-NA-1PD-S4-C	BOS 18KF-NA-1PD-C-02
Short Range Diffuse (L_2)		
PNP NO+NC Light-on 100 mm ①Ⓔ	BOS 18KF-PA-1XA-S4-C	BOS 18KF-PA-1XA-C-02
NPN NO+NC Light-on 100 mm ②Ⓔ	BOS 18KF-NA-1XA-S4-C	BOS 18KF-NA-1XA-C-02
Fixed Focus (L_2)		
PNP NO+NC Light-on 80 mm ①Ⓕ	BOS 18KF-PA-1N1R-S4-C	BOS 18KF-PA-1N1R-C-02
NPN NO+NC Light-on 80 mm ②Ⓕ	BOS 18KF-NA-1N1R-S4-C	BOS 18KF-NA-1N1R-C-02

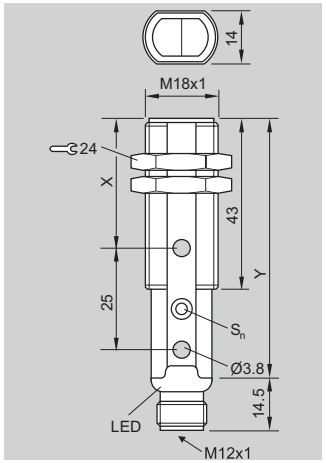
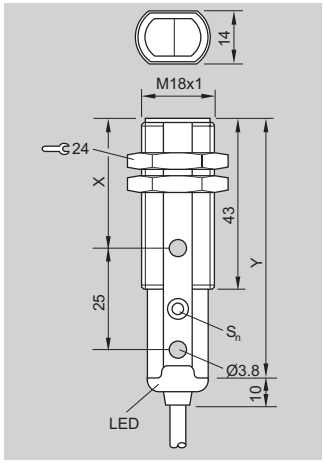
Supply Voltage		10…30 Vdc	
Ripple		≤ 10%	
Voltage Drop U_d at I_e		≤ 2 V	
Rated Output Current I_e		100 mA	
Current Consumption I_O (No Load)		≤ 30 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13	
Emitter Light Source		Visible Red 630 nm BGS, FGBGS, Fixed Focus/Infrared 880 nm Diffuse	
Light Spot Diameter	BGS/FGBGS	8 mm @ 100 mm	
	Long Range Diffuse	200 mm @ 600 mm	
	Mid Range Diffuse	100 mm @ 300 mm	
	Short Range Diffuse	80 mm @ 100 mm	
	Fixed Focus	20 mm @ 80 mm	
Ambient Light Immunity (EN 60947-5-2)		5000 Lux	
Output Indicator		Yellow LED	
Stability/Error Indicator		Green/Red LED	
Switching Frequency f		500 Hz BGS, 250 Hz FGBGS, 1 kHz Diffuse/Fixed Focus	
Response Time (On/Off Delay)		< 1 ms BGS, < 2 ms FGBGS, < 0.5 ms Diffuse/Fixed Focus	
Operating Temperature Range		-25°C to +55°C	
Electrical Shock Protection		Class 2	
Degree of Protection per IEC 60529		IP 67	
Short Circuit Protection		Yes	
Overload Protection		Yes	
Housing Material		PBT	
Sensing Face Material		PMMA	
Emitter Life		Average 100,000 hr with Ta=+25°C	
Connection		M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector		C04 AEL-00-VY-050M	
Weight		25 g	75 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

See pages 2.34-2.35 for diagrams

	x	y
L_1	34	67
L_2	24	57



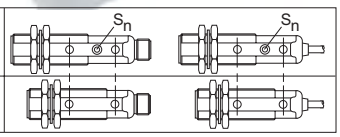
Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics
		
Polarized Retroreflective (L_1)		
PNP NO+NC Dark-on 4.5 m 270° Pot. ①Ⓗ	BOS 18KF-PA-1QD-S4-C	BOS 18KF-PA-1QD-C-02
NPN NO+NC Dark-on 4.5 m 270° Pot. ②Ⓗ	BOS 18KF-NA-1QD-S4-C	BOS 18KF-NA-1QD-C-02
Non-Polarized Retroreflective (L_2)		
PNP NO+NC Dark-on 5 m ①Ⓘ	BOS 18KF-PA-1RE-S4-C	BOS 18KF-PA-1RE-C-02
NPN NO+NC Dark-on 5 m ②Ⓘ	BOS 18KF-NA-1RE-S4-C	BOS 18KF-NA-1RE-C-02
Transparent Detection Retroreflective (L_1)		
PNP NO+NC Dark-on 1.7 m 270° Pot. ①Ⓙ	BOS 18KF-PA-1TB-S4-C	BOS 18KF-PA-1TB-C-02
NPN NO+NC Dark-on 1.7 m 270° Pot. ②Ⓙ	BOS 18KF-NA-1TB-S4-C	BOS 18KF-NA-1TB-C-02
Thru-beam (L_1)		
PNP NO+NC Dark-on 15 m Receiver 270° Pot. ①Ⓚ	BLE 18KF-PA-1PP-S4-C	BLE 18KF-PA-1PP-C-02
NPN NO+NC Dark-on 15 m Receiver 270° Pot. ②Ⓚ	BLE 18KF-NA-1PP-S4-C	BLE 18KF-NA-1PP-C-02
Emitter **(L_2)** ③Ⓚ	BLS 18KF-XX-1P-S4-L	BLS 18KF-XX-1P-L-02

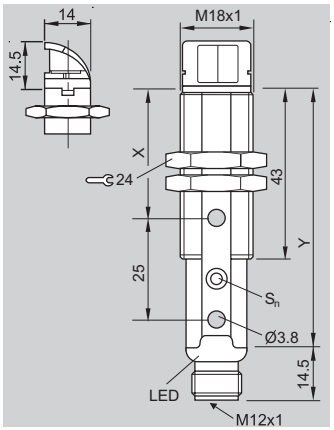
Supply Voltage	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (No Load)	≤ 30 mA/ ≤ 35 mA Emitter	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Visible Red 660 nm Polarized Retro, Transparent /Infrared 880 nm Non-Polarized, Thru-beam	
Light Spot Diameter – Polarized	45 mm @ 1 m	
Light Spot Diameter – Non-Polarized	100 mm @ 2 m	
Light Spot Diameter – Transparent	45 mm @ 1 m	
Light Spot Diameter – Thru-beam	500 mm @ 15 m	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Power Indicator	Green LED (Emitter Only)	
Output Indicator	Yellow LED (Except Emitter)	
Stability/Error Indicator	Green/Red LED	
Switching Frequency f	250 Hz Thru-beam, Retroreflective (All), 150 Hz Distance	
Response Time (On/Off Delay)	≤ 2 ms Thru-beam, Retroreflective (All), ≤ 3.33 ms Distance	
Operating Temperature Range	-25°C to +55°C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	PBT	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 hr with Ta=+25°C	
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	25 g	75 g

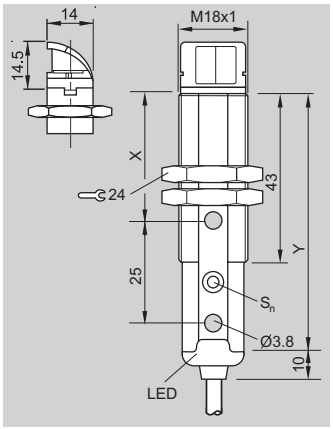
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

See pages 2.34-2.35 for diagrams

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	90° optics	90° optics

	x	y	
L_1	46	79	
L_2	36	69	



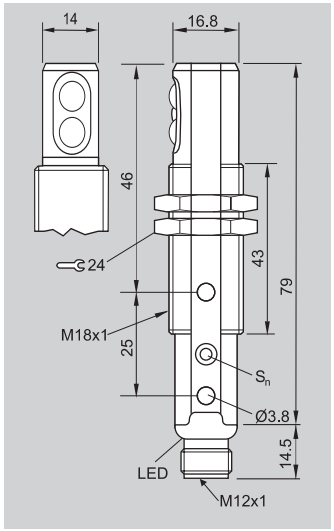


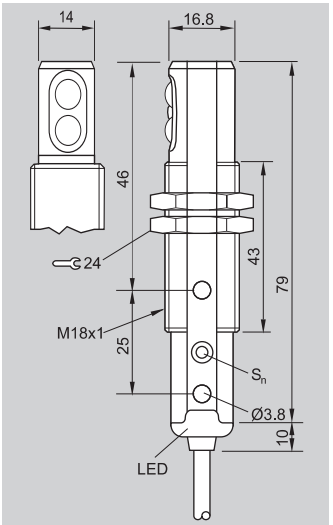
Long Range Diffuse (L_1)			
PNP NO+NC Light-on 400 mm 270° Pot.	①Ⓝ	BOS 18KW-PA-1PD-S4-C	BOS 18KW-PA-1PD-C-02
NPN NO+NC Light-on 400 mm 270° Pot.	②Ⓝ	BOS 18KW-NA-1PD-S4-C	BOS 18KW-NA-1PD-C-02
Short Range Diffuse (L_2)			
PNP NO+NC Light-on 80 mm	①Ⓞ	BOS 18KW-PA-1XA-S4-C	BOS 18KW-PA-1XA-C-02
NPN NO+NC Light-on 80 mm	②Ⓞ	BOS 18KW-NA-1XA-S4-C	BOS 18KW-NA-1XA-C-02
Fixed Focus (L_2)			
PNP NO+NC Light-on 80 mm	①Ⓟ	BOS 18KW-PA-1N1R-S4-C	BOS 18KW-PA-1N1R-C-02
NPN NO+NC Light-on 80 mm	②Ⓟ	BOS 18KW-NA-1N1R-S4-C	BOS 18KW-NA-1N1R-C-02
Polarized Retroreflective (L_1)			
PNP NO+NC Dark-on 3 m 270° Pot.	①Ⓠ	BOS 18KW-PA-1QC-S4-C	BOS 18KW-PA-1QC-C-02
NPN NO+NC Dark-on 3 m 270° Pot.	②Ⓠ	BOS 18KW-NA-1QC-S4-C	BOS 18KW-NA-1QC-C-02
Transparent Detection Retroreflective (L_1)			
PNP NO+NC Dark-on 1.7 m 270° Pot.	①Ⓡ	BOS 18KW-PA-1TB-S4-C	BOS 18KW-PA-1TB-C-02
NPN NO+NC Dark-on 1.7 m 270° Pot.	②Ⓡ	BOS 18KW-NA-1TB-S4-C	BOS 18KW-NA-1TB-C-02
Thru-beam (L_1)			
PNP NO+NC Dark-on 10 m Receiver 270° Pot.	①Ⓢ	BLE 18KW-PA-1PP-S4-C	BLE 18KW-PA-1PP-C-02
NPN NO+NC Dark-on 10 m Receiver 270° Pot.	②Ⓢ	BLE 18KW-NA-1PP-S4-C	BLE 18KW-NA-1PP-C-02
Emitter **(L_2)**	③Ⓢ	BLS 18KW-XX-1P-S4-L	BLS 18KW-XX-1P-L-02

Supply Voltage		10…30 Vdc
Ripple		≤ 10%
Voltage Drop U_d at I_e		≤ 2 V
Rated Output Current I_e		100 mA
Current Consumption I_O (No Load)		≤ 30 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13
Emitter Light Source		Visible Red 630 nm Fixed Focus/Infrared 880 nm Diffuse
Light Spot Diameter	Long Range Diffuse	35 mm @ 400 mm
	Short Range Diffuse	55 mm @ 100 mm
	Fixed Focus	25 mm @ 80 mm
	Polarized	60 mm @ 2 m
	Transparent	60 mm @ 1 m
	Thru-beam	470 mm @ 10 m
Ambient Light Immunity (EN 60947-5-2)		5000 Lux
Power Indicator		Green LED (Emitter Only)
Output Indicator		Yellow LED (Except Emitter)
Stability/Error Indicator		Green/Red LED
Switching Frequency f		250 Hz Thru-beam, 1 kHz Diffuse/Fixed Focus/Retroreflective
Response Time (On/Off Delay)		< 2 ms Thru-beam, < 0.5 ms Diffuse/Fixed Focus/Retroreflective
OperatingTemperature Range		-25°C to +55°C
Electrical Shock Protection		Class 2
Degree of Protection per IEC 60529		IP 67
Short Circuit Protection		Yes
Overload Protection		Yes
Housing Material		PBT
Sensing Face Material		PMMA
Emitter Life		Average 100,000 hr with Ta=+25°C
Connection		M12 4-pin connector / Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector		C04 AEL-00-VY-050M
Weight		25 g / 75 g

① = Number indicates wiring diagram Ⓐ = Letter indicates detection diagram See pages 2.34-2.35 for diagrams

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	90° optics	90° optics





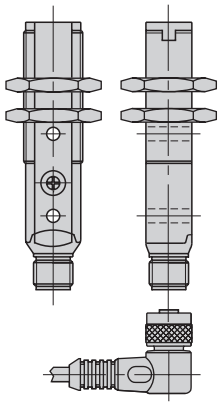
Background Suppression (BGS)

PNP NO+NC Light-on 50...100 mm Teach-in	①Ⓜ	BOS 18KW-PA-1HA-S4-C	BOS 18KW-PA-1HA-C-02
NPN NO+NC Light-on 50...100 mm Teach-in	②Ⓜ	BOS 18KW-NA-1HA-S4-C	BOS 18KW-NA-1HA-C-02

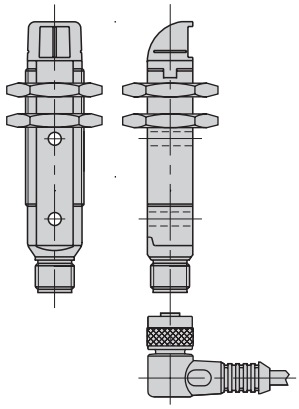
Supply Voltage	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (No Load)	≤ 30 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Visible Red 630 nm	
Light Spot Diameter	10 mm @ 100 mm	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Output Indicator	Yellow LED	
Stability/Error Indicator	Green/Red LED	
Switching Frequency f	500 Hz BGS	
Response Time (On/Off Delay)	< 1 ms BGS	
Operating Temperature Range	-25°C to +55°C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	PBT	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 hr with Ta=+25°C	
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	25 g	75 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.34-2.35 for diagrams

Connector Orientation

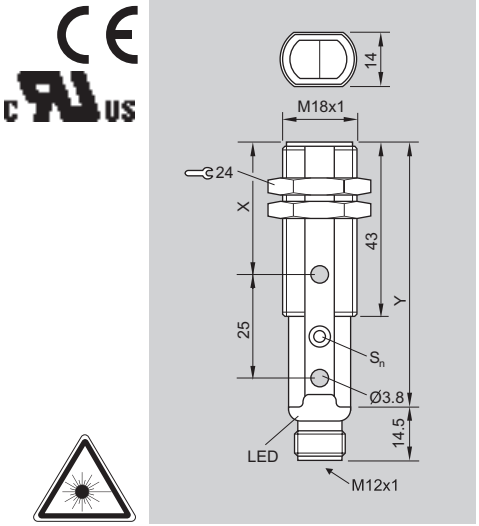


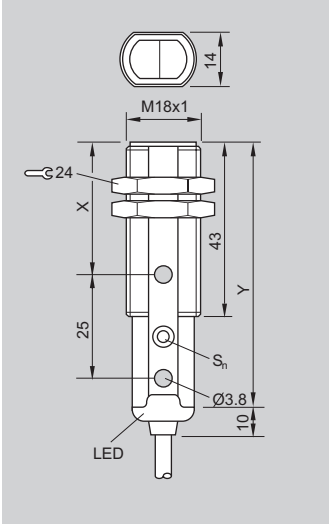
BOS 18**KF**

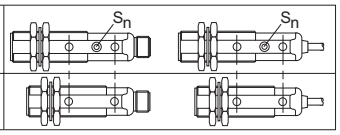


BOS 18**KW**

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics





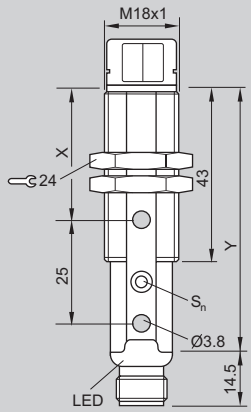
	x	y	
L_1	34	67	
L_2	24	57	

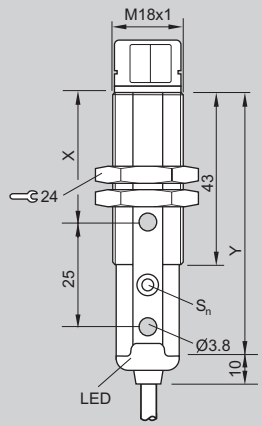
Diffuse — Class I Laser (L_1)			
PNP NO+NC Light-on 350 mm 270° Pot.	①Ⓣ	BOS 18KF-PA-1LOC-S4-C	BOS 18KF-PA-1LOC-C-02
NPN NO+NC Light-on 350 mm 270° Pot.	②Ⓣ	BOS 18KF-NA-1LOC-S4-C	BOS 18KF-NA-1LOC-C-02
Polarized Retroreflective — Class I Laser (L_1)			
PNP NO+NC Dark-on 16 m 270° Pot.	①Ⓤ	BOS 18KF-PA-1LQP-S4-C	BOS 18KF-PA-1LQP-C-02
NPN NO+NC Dark-on 16 m 270° Pot.	②Ⓤ	BOS 18KF-NA-1LQP-S4-C	BOS 18KF-NA-1LQP-C-02
Thru-beam — Class I Laser (L_1)			
PNP NO+NC Dark-on 60 m Receiver 270° Pot.	①Ⓥ	BLE 18KF-PA-1LT-S4-C	BLE 18KF-PA-1LT-C-02
NPN NO+NC Dark-on 60 m Receiver 270° Pot.	②Ⓥ	BLE 18KF-NA-1LT-S4-C	BLE 18KF-NA-1LT-C-02
Emitter **(L_2)**	③Ⓥ	BLS 18KF-XX-1LT-S4-L	BLS 18KF-XX-1LT-L-02

Supply Voltage		10…30 Vdc	
Ripple		≤ 10%	
Voltage Drop U_d at I_e		≤ 2 V	
Rated Output Current I_e		100 mA	
Current Consumption I_O (No Load)		≤ 30 mA/ ≤ 35 mA (Emitter only)	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13	
Emitter Light Source		Class I Laser 650 nm	
Spot Size	Diffuse	0.5 mm @ 150 mm	
	Polarized	9 mm @ 1 m	
	Thru-beam	5 mm @ 10 m	
Ambient Light Immunity (EN 60947-5-2)		5000 Lux	
Power Indicator		Green LED (Emitter Only)	
Output Indicator		Yellow LED (Except Emitter)	
Stability/Error Indicator		Green/Red LED	
Switching Frequency f		1.5 kHz	
Response Time (On/Off Delay)		333 µs	
OperatingTemperature Range		-25°C to +55°C	
Electrical Shock Protection		Class 2	
Degree of Protection per IEC 60529		IP 67	
Short Circuit Protection		Yes	
Overload Protection		Yes	
Housing Material		PBT	
Sensing Face Material		PMMA	
Emitter Life		Average 100,000 hr with Ta=+25°C	
Connection		M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector		C04 AEL-00-VY-050M	
Weight		25g	75 g

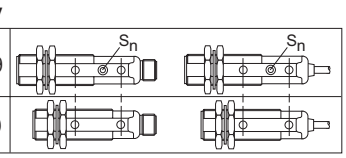
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.34-2.35 for diagrams

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	90° optics	90° optics





	x	y
L_1	46	79
L_2	36	69



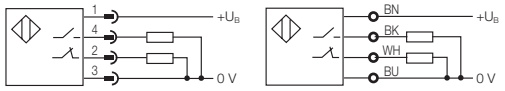
Diffuse — Class I Laser (L_1)			
PNP NO+NC Light-on 250 mm 270° Pot.	①Ⓦ	BOS 18KW-PA-1LOB-S4-C	BOS 18KW-PA-1LOB-C-02
NPN NO+NC Light-on 250 mm 270° Pot.	②Ⓦ	BOS 18KW-NA-1LOB-S4-C	BOS 18KW-NA-1LOB-C-02
Polarized Retroreflective — Class I Laser (L_1)			
PNP NO+NC Dark-on 9 m 270° Pot.	①Ⓧ	BOS 18KW-PA-1LQH-S4-C	BOS 18KW-PA-1LQH-C-02
NPN NO+NC Dark-on 9 m 270° Pot.	②Ⓧ	BOS 18KW-NA-1LQH-S4-C	BOS 18KW-NA-1LQH-C-02
Thru-beam — Class I Laser (L_1)			
PNP NO+NC Dark-on 50 m Receiver 270° Pot.	①Ⓨ	BLE 18KW-PA-1LT-S4-C	BLE 18KW-PA-1LT-C-02
NPN NO+NC Dark-on 50 m Receiver 270° Pot.	②Ⓨ	BLE 18KW-NA-1LT-S4-C	BLE 18KW-NA-1LT-C-02
Emitter **(L_2)**	③Ⓨ	BLS 18KW-XX-1LT-S4-L	BLS 18KW-XX-1LT-L-02

Supply Voltage	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (No Load)	≤ 30 mA/ ≤ 35 mA (Emitter only)	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Class I Laser 650 nm	
Spot Size — Diffuse	0.5 mm @ 150 mm	
Spot Size — Polarized	9 mm @ 1 m	
Spot Size — Thru-beam	5 mm @ 10 m	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Power Indicator	Green LED (Emitter Only)	
Output Indicator	Yellow LED (Except Emitter)	
Stability/Error Indicator	Green/Red LED	
Switching Frequency f	1.5 kHz	
Response Time (On/Off Delay)	333 µs	
Operating Temperature Range	-25°C to +55°C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	PBT	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 hr with Ta=+25°C	
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	25 g	75 g

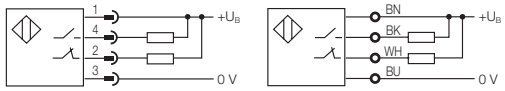
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.34-2.35 for diagrams

Wiring Diagrams

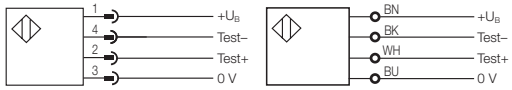
① PNP NO+NC
PA



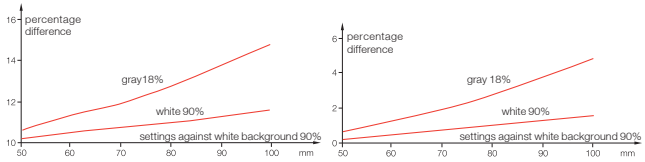
② NPN NO+NC
NA



③ Emitter
XX



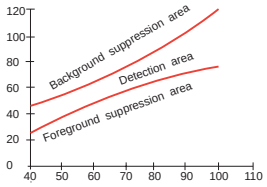
Ⓐ Background Suppression – straight



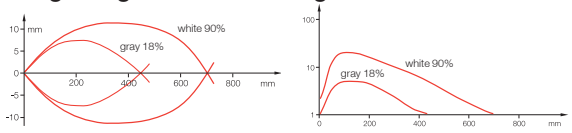
Tolerance with standard setting

Tolerance with fine setting

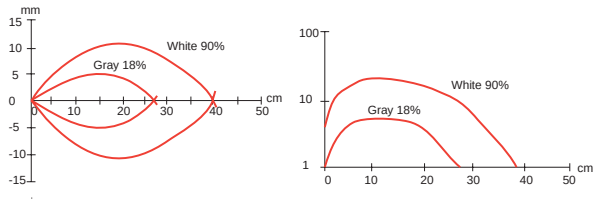
Ⓑ Foreground/Background Suppression – straight



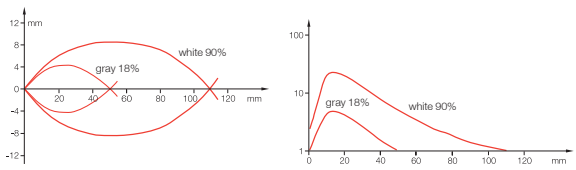
Ⓒ Long Range Diffuse – straight



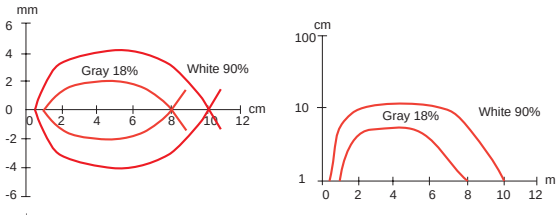
Ⓓ Mid Range Diffuse – straight



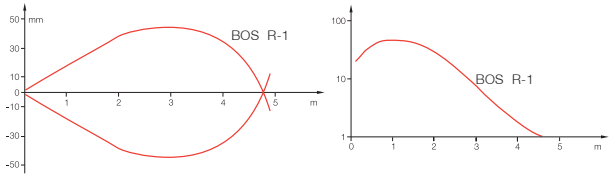
Ⓔ Short Range Diffuse – straight



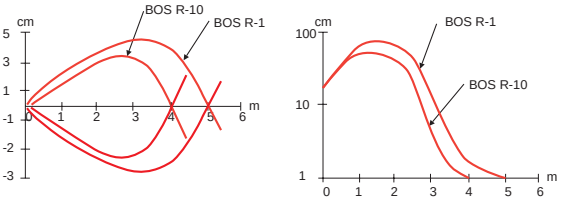
Ⓕ Fixed Focus – straight



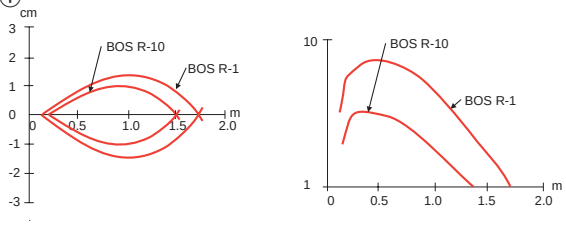
Ⓖ Polarized Retroreflective – straight



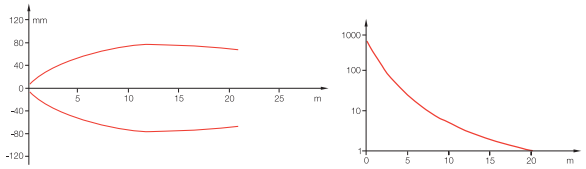
Ⓗ Non-Polarized Retroreflective – straight



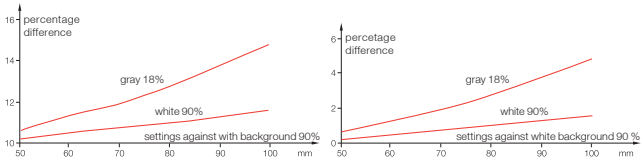
Ⓘ Transparent Retroreflective – straight



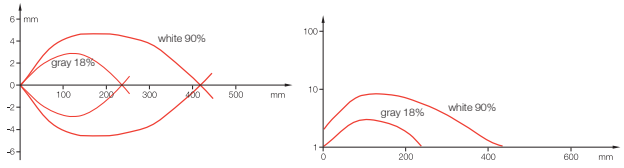
Ⓙ Thru-Beam – straight



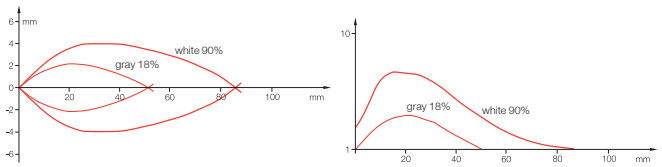
Ⓚ Background Suppression – 90°



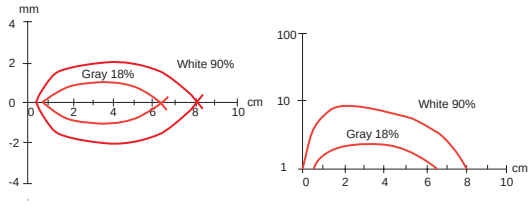
Ⓛ Long Range Diffuse – 90°



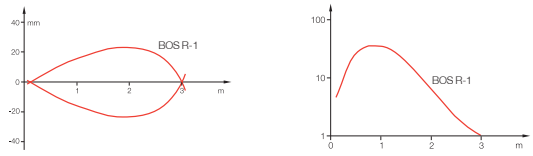
Ⓜ Short Range Diffuse – 90°



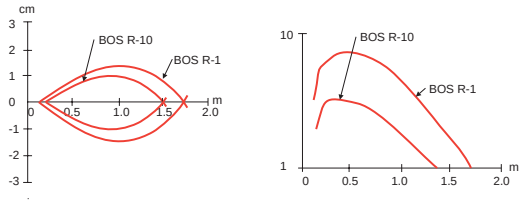
Ⓝ Fixed Focus – 90°



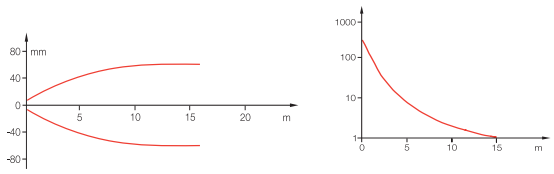
Ⓞ Polarized Retroreflective – 90°



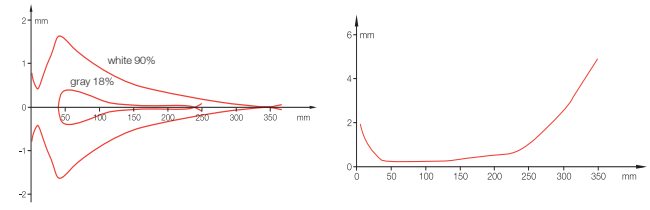
Ⓟ Transparent Retroreflective – 90°



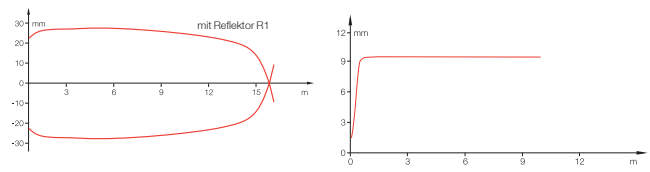
Ⓠ Thru-Beam – 90°



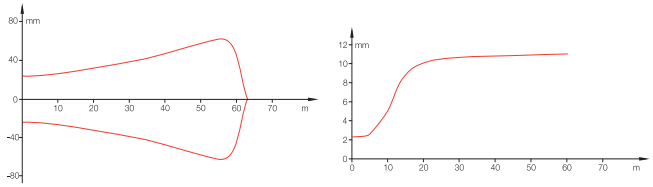
Ⓡ Diffuse Class I Laser – straight



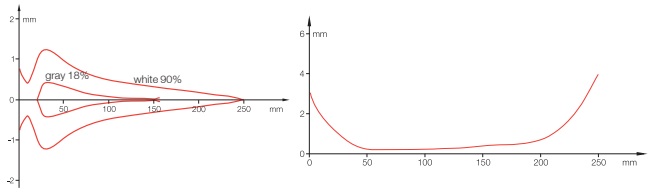
Ⓢ Diffuse Class I Laser – 90°



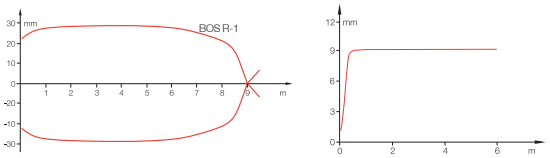
Ⓣ Thru-Beam Class I Laser – straight



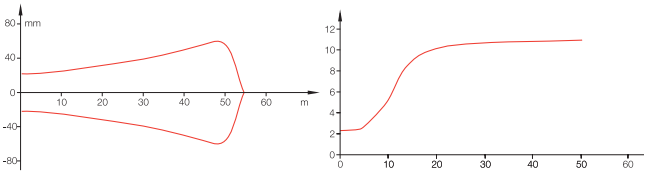
Ⓤ Diffuse Class I Laser – 90°



Ⓥ Polarized Retrorflective Class I Laser – 90°



Ⓦ Thru-Beam Class I Laser – 90°



Recommended Accessories & Connectors

Sold separately. See section 6 & 7.

Adapter Bracket
BOS 18.0-BS-3

Swivel Mount
BOS 18.0-KB-1

Bracket
BES 18-HW-1

Reflector BOS R-1

Connector
C04A/C04B

BOS 18M Metal Rugged Body Style

Balluff 18M photoelectric sensors feature an epoxy filled rugged metal 18mm tubular body designed to survive in tough applications where other photoelectric sensors fail. The 18M body style, designed to meet the stringent requirements of the machine tool industry, is available in AC or DC operating voltages to meet most operational requirements. The BOS 18M precision background suppression sensor is so precise it can detect a white business card on a white background. A highly visible red emission with a small spot diameter aids in set-up and operation especially when detecting small targets. It's rugged metal housing is available in straight or right angle sensing models, plus cable or M12 connector versions for simple, error free wiring.

BOS 18E Stainless Steel Extreme Body Style (Page 2.44)

If other sensors are failing in your application, try Balluff's 18E extreme body syle to keep your production rate high and your maintenance bill low. The Balluff 18E is machined from a single piece of corrosion resistance stainless steel (1.4571) to prevent surface degradation. The 18E extreme, designed to meet FDA requirements, is equipped with a 2mm thick Tempax lens and is sealed to IP68 to withstand high-pressure hose down and even steam cleaning. The sensor part number is engraved for permanent identification.

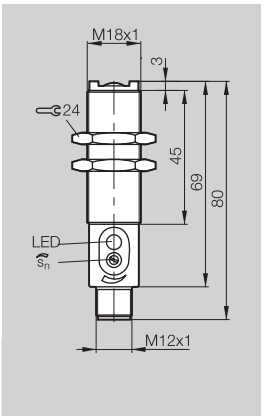
Features

– Rugged IP 67 Metal housing
– Short circuit and overload protection
– High immunity to ambient light and noise spikes
– Potentiometer for sensitivity adjustment (most models)

Applications

– Machine tool
– Packaging machines
– Assembly machines
– Automotive assembly
– Automatic storage and retrieval systems
– Bagging machines
– Food and beverage machines

Body Style	18 mm threaded
Type	Straight optics

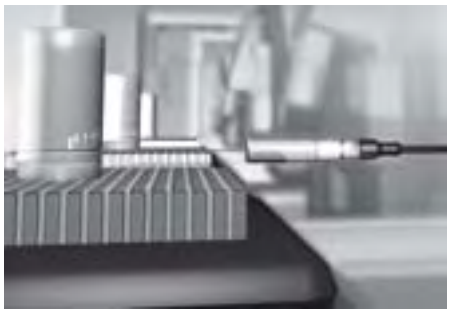


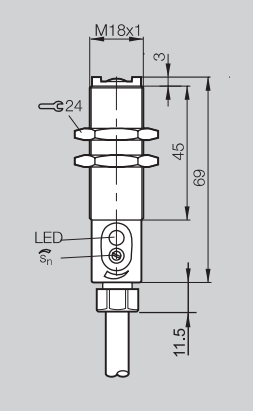
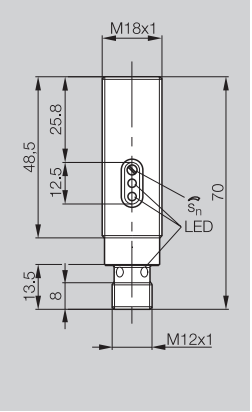
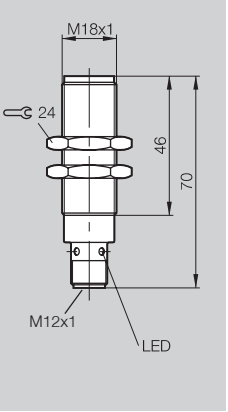
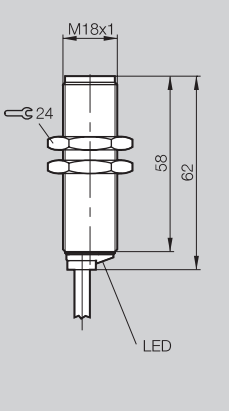
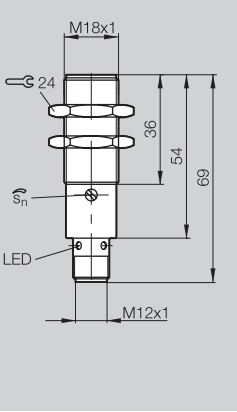
Background Suppression		
PNP NO+NC Light-on 40 …120 mm, multi-turn Pot.	③Ⓐ	BOS 18M-PA-1HA-S4-C
PNP NO Light-on 10 …120 mm, multi-turn Pot.	①Ⓐ	
Diffuse		
PNP NO, Light-on 100 mm	①Ⓑ	
PNP NC, Dark-on 100 mm	②Ⓑ	
PNP NO+NC Light-on 100 mm, 270° Pot.	③Ⓑ	
PNP NO, Light-on 200 mm	①Ⓑ	
PNP NC, Dark-on 200 mm	②Ⓑ	
PNP NO+NC Light-on 400 mm, 270° Pot.	③Ⓑ	
NPN NO+NC Light-on 400 mm, 270° Pot.	④Ⓑ	
PNP NO+NC Light-on 1000 mm, 270° Pot.	③Ⓑ	

Supply Voltage	10…30 Vdc
Ripple	≤ 10%
Voltage Drop U_d at I_e	≤ 2.5 V
Rated Output Current I_e	200 mA
Current Consumption I_O (No Load)	≤ 30 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	Visible Red 660 nm
Ambient Light Immunity (EN 60947-5-2)	2000 Lux.
Output Indicator	Yellow LED
Switching Frequency f	600 Hz
Response Time (On/Off Delay)	0.8 ms
Operating Temperature Range	-15°C to +55°C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	nickel plated brass
Sensing Face Material	Glass
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	62 g

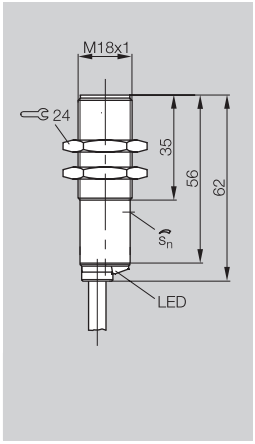
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

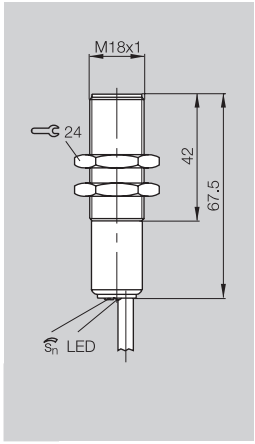
BOS 18M Diffuse sensor with background suppression — Detect small parts reliably and ensure quality

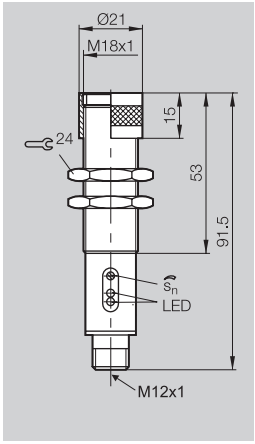


18 mm threaded Straight optics	18 mm threaded Straight optics	18 mm threaded Straight optics	18 mm threaded Straight optics	18 mm threaded Straight optics
				
BOS 18M-PA-1HA-C-02	BOS 18M-PS-1HA-E5-C-S4			
		BOS 18M-PS-1XA-E5-C-S4	BOS 18M-PS-1XA-E4-C-03	
		BOS 18M-PO-1XA-E5-C-S4	BOS 18M-PO-1XA-E4-C-03	
				BOS -18M-PA-1PA-E5-C-S4
		BOS 18M-PS-1XB-E5-C-S4	BOS 18M-PS-1XB-E4-C-03	
		BOS 18M-PO-1XB-E5-C-S4	BOS 18M-PO-1XB-E4-C-03	
				BOS 18M-PA-1PD-E5-C-S4
				BOS 18M-NA-1PD-E5-C-S4
				BOS 18M-PA-1PF-E5-C-S4
10…30 Vdc	10…30 Vdc	10…30 Vdc	10…30 Vdc	10…30 Vdc
≤ 10%	≤ 20%	≤ 10%	≤ 10%	≤ 10%
≤ 2.5 V	≤ 2 V	≤ 2.5 V	≤ 2.5 V	≤ 2.5 V
200 mA	200 mA	200 mA	200 mA	200 mA
≤ 30 mA	≤ 30 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA
DC 13	DC 13	DC 13	DC 13	DC 13
Visible Red 660 nm	Visible Red 660 nm	Infrared 880 nm	Infrared 880 nm	Infrared 880 nm
2000 Lux.	5000 Lux.	2000 Lux.	2000 Lux.	5000 Lux.
Yellow LED	Yellow LED	Yellow LED	Yellow LED	Yellow LED
600 Hz	500 Hz	500 Hz	500 Hz	100 Hz
0.8 ms	1 ms	1 ms	1 ms	5 ms
-15°C to +55°C	-25°C to +55°C	-5°C to +55°C	-5°C to +55°C	-5°C to +55°C
Class 2	Class 2	Class 2	Class 2	Class 2
IP 67	IP 67	IP 67	IP 67	IP 67
Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes
nickel plated brass	nickel plated brass	nickel plated brass	nickel plated brass	nickel plated brass
Glass	Glass	PMMA	PMMA	PMMA
2 m Cable 4x22 AWG	M12 4-pin connector	M12 4-pin connector	3 m Cable, 3 x 22 AWG	M12 4-pin connector
	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M		C04 AEL-00-VY-050M
100 g	50 g	40 g	150 g	40 g

Body Style	18 mm threaded	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics	Straight optics







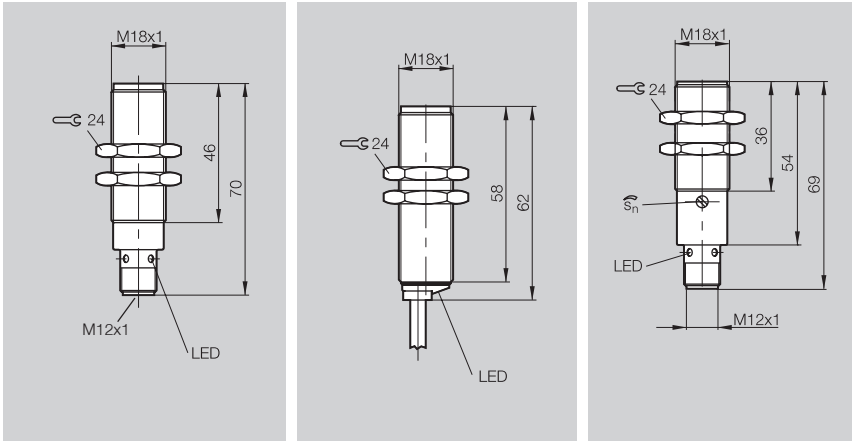
Diffuse

PNP NO+NC Light-on 100 mm, 270° Pot.	③Ⓑ	BOS-18M-PA-1PA-E4-C-03	
PNP NO, Light-on 400 mm, 18-turn Pot.	①Ⓑ		BOS 18M-PS-1PD-E4-C-03
PNP NO, Dark-on 400 mm, 18-turn Pot.	②Ⓑ		BOS 18M-PO-1PD-E4-C-03
PNP NO+NC Light-on 400 mm, 270° Pot.	③Ⓑ	BOS18M-PA-1PD-E4-C-03	
NPN NO+NC Light-on 400 mm, 270° Pot.	④Ⓑ	BOS 18M-NA-1PD-E4-C-03	
PNP+NPN NO/NC Light-on/Dark-on 1000 mm, 18-turn Pot.	⑤		BOS 18M-GU-1PF-S4-Y

Supply Voltage	10…30 Vdc	10…30 Vdc	11…30 Vdc
Ripple	≤ 10%	≤ 10%	≤ 10%
Voltage Drop U_d at I_e	≤ 2.5 V	≤ 2.5 V	≤ 2.5 V
Rated Output Current I_e	200 mA	200 mA	200 mA
Current Consumption I_O (No Load)	≤ 20 mA	≤ 20 mA	≤ 25 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	DC 13	DC 13
Emitter Light Source	Infrared 880 nm	Infrared 880 nm	Infrared 880 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux.	5000 Lux.	1000 Lux.
Output Indicator	Yellow LED	Yellow LED	Yellow LED
Stability/Error Indicator			Green/Red LED
Switching Frequency f	100 Hz	100 Hz	1 kHz
Response Time (On/Off Delay)	5 ms	5 ms	0.5 ms
Operating Temperature Range	-5°C to +55°C	-5°C to +55°C	-20°C to +60°C
Electrical Shock Protection	Class 2	Class 2	Class 2
Degree of Protection per IEC 60529	IP 67	IP 67	IP 65
Short Circuit Protection	Yes	Yes	Yes
Overload Protection	Yes	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass	nickel plated brass
Sensing Face Material	PMMA	PMMA	Glass
Connection	3 m Cable, 3 x 22 AWG	3 m Cable, 3 x 22 AWG	M12 4-pin connector
Recommended Connector			C04 AEL-00-VY-050M
Weight	150 g	150 g	100 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

Body Style	18 mm threaded	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics	Straight optics



Non-Polarized Retroreflective			
PNP NO, Dark-on 2 m ①Ⓒ	BOS 18M-PS-1RB-E5-C-S4	BOS 18M-PS-1RB-E4-C-03	
PNP NO, Light-on 2 m ②Ⓒ	BOS 18M-PO-1RB-E5-C-S4	BOS 18M-PO-1RB-E4-C-03	
PNP NO, Dark-on 4 m, 270° Pot. ①Ⓒ	BOS 18M-PS-1RD-E5-C-S4	BOS 18M-PS-1RD-E4-C-03	
PNP NO, Light-on 4 m, 270° Pot. ②Ⓒ	BOS 18M-PO-1RD-E5-C-S4	BOS 18M-PO-1RD-E4-C-03	
PNP NO+NC Dark-on 4 m, 270° Pot. ③Ⓒ			BOS 18M-PA-1VD-E5-C-S4
NPN NO+NC Dark-on 4 m, 270° Pot. ④Ⓒ			BOS 18M-NA-1VD-E5-C-S4
Thru-beam			
PNP NO, Dark-on 16 m, Receiver ①Ⓓ	BLE 18M-PS-1P-E5-C-S4	BLE 18M-PS-1P-E4-C-03	
PNP NO, Light-on 16 m, Receiver ②Ⓓ	BLE 18M-PO-1P-E5-C-S4	BLE 18M-PO-1P-E4-C-03	
Emitter 16 m ⑦Ⓓ	BLS 18M-XX-1P-E5-L-S4	BLS 18M-XX-1P-E4-L-03	
Supply Voltage	10…30 Vdc	10…30 Vdc	10…30 Vdc
Ripple	≤ 10%	≤ 10%	≤ 10%
Voltage Drop U_d at I_e	≤ 2.5 V	≤ 2.5 V	≤ 2.5 V
Rated Output Current I_e	200 mA	200 mA	200 mA
Current Consumption I_O (No Load)	≤ 20 mA	≤ 20 mA	≤ 20 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	DC 13	DC 13
Emitter Light Source	Infrared 880 nm	Infrared 880 nm	Infrared 880 nm
Ambient Light Immunity (EN 60947-5-2)	2000 Lux.	2000 Lux.	5000 Lux.
Output Indicator	Yellow LED	Yellow LED	Yellow LED
Switching Frequency f	100 Hz	100 Hz	100 Hz
Response Time (On/Off Delay)	5 ms	5 ms	5 ms
Operating Temperature Range	-5°C to +55°C	-5°C to +55°C	-15°C to +55°C
Electrical Shock Protection	Class 2	Class 2	Class 2
Degree of Protection per IEC 60529	IP 67	IP 67	IP 67
Short Circuit Protection	Yes	Yes	Yes
Overload Protection	Yes	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass	nickel plated brass
Sensing Face Material	PMMA	PMMA	PMMA
Connection	M12 4-pin connector	3 m Cable, 3 x 22 AWG	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M		C04 AEL-00-VY-050M
Weight	40 g	150 g	40 g

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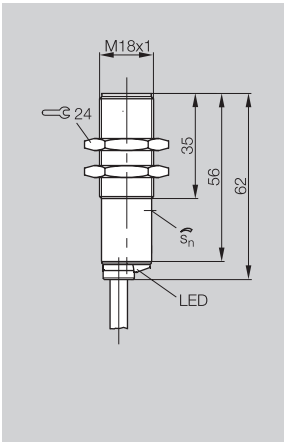
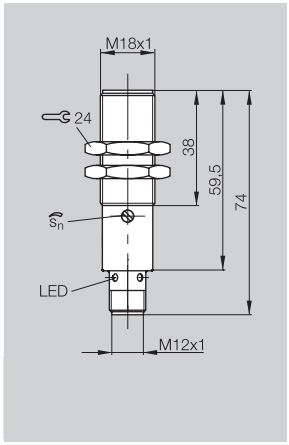
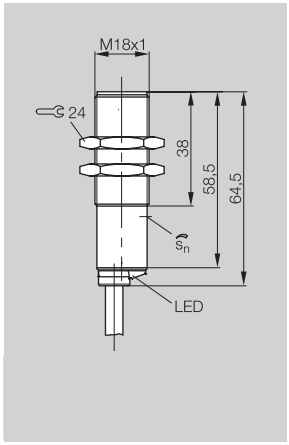
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

Body Style	18 mm threaded	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics	Straight optics



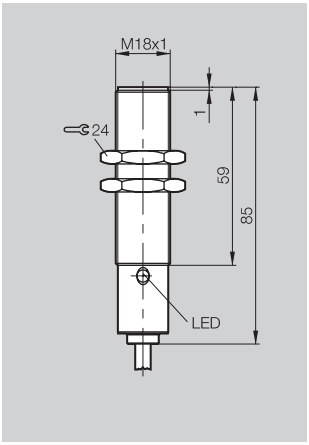


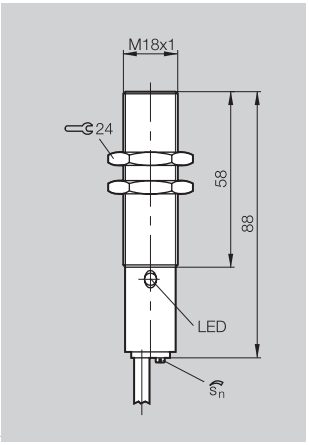


Non-Polarized Retroreflective			
PNP NO+NC Dark-on 4 m, 270° Pot. ③Ⓒ	BOS 18M-PA-1VD-E4-C-03		
NPN NO+NC Dark-on 4 m, 270° Pot. ④Ⓒ	BOS 18M-NA-1VD-E4-C-03		
Polarized Retroreflective			
PNP NO+NC Dark-on 2 m, 270° Pot. ③Ⓒ		BOS 18M-PA-1QB-E5-C-S4	BOS 18M-PA-1QB-E4-C-03
NPN NO+NC Dark-on 2 m, 270° Pot. ④Ⓒ		BOS 18M-NA-1QB-E5-C-S4	BOS 18M-NA-1QB-E4-C-03
Supply Voltage	10…30 Vdc	10…30 Vdc	10…30 Vdc
Ripple	≤ 10%	≤ 10%	≤ 10%
Voltage Drop U_d at I_e	≤ 2.5 V	≤ 2.5 V	≤ 2.5 V
Rated Output Current I_e	200 mA	200 mA	200 mA
Current Consumption I_O (No Load)	≤ 20 mA	≤ 20 mA	≤ 20 mA
Utilization Category (IEC 60-947-4-1)	DC 13	DC 13	DC 13
Output Duty Cycle			
Emitter Light Source	Infrared 880 nm	Visible Red 660 nm	Visible Red 660 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux.	5000 Lux.	5000 Lux.
Output Indicator	Yellow LED	Yellow LED	Yellow LED
Switching Frequency f	100 Hz	100 Hz	100 Hz
Response Time (On/Off Delay)	5 ms	5 ms	5 ms
Operating Temperature Range	-15°C to +55°C	-15°C to +55°C	-15°C to +55°C
Electrical Shock Protection	Class 2	Class 2	Class 2
Degree of Protection per IEC 60529	IP 67	IP 67	IP 67
Short Circuit Protection	Yes	Yes	Yes
Overload Protection	Yes	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass	nickel plated brass
Sensing Face Material	PMMA	PMMA	PMMA
Connection	3 m Cable, 3 x 22 AWG	M12 4-pin connector	3 m Cable, 3 x 22 AWG
Recommended Connector		C04 AEL-00-VY-050M	
Weight	150 g	40 g	150 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

Body Style	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics



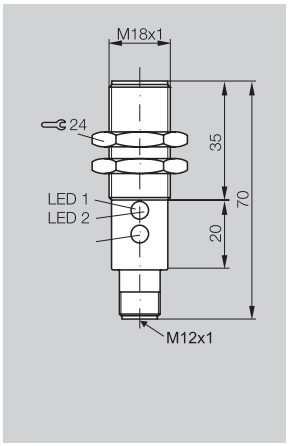


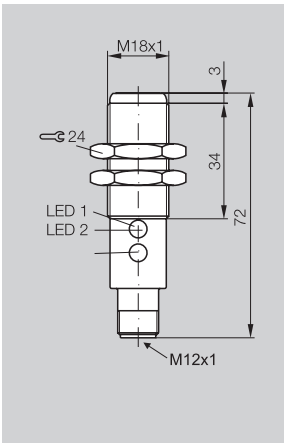
Diffuse			
AC 3 wire, NO, Light-on, 100 mm	⑨Ⓑ	BOS 18M-WS-7XA-B0-L-03	
AC 3 wire, NC, Dark-on, 100 mm	⑩Ⓑ	BOS 18M-WO-7XA-B0-L-03	
AC 3 wire, NO, Light-on, 200 mm	⑨Ⓑ	BOS 18M-WS-7XB-B0-L-03	
AC 3 wire, NO, Light-on, 200 mm, 16-turn Pot.	⑩Ⓑ		BOS 18M-WS-7PB-B1-L-03
Non-Polarized Retroreflective			
AC 3 wire, NO, Dark-on, 2 m	⑨Ⓒ	BOS 18M-WS-7RB-B0-L-03	
AC 3 wire, NC, Light-on, 2 m	⑨Ⓒ	BOS 18M-WO-7RB-B0-L-03	

Supply Voltage	20…250 Vac	20…250 Vac
Voltage Drop U_d at I_e	≤ 4 V	≤ 4 V
Rated Output Current I_e	200 mA	200 mA
Current Consumption I_O (No Load)	≤ 15 mA	≤ 15 mA
Utilization Category (IEC 60-947-4-1)	AC 140	AC 140
Output Duty Cycle		
Emitter Light Source	Infrared 880 nm	Infrared 880 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux.	5000 Lux.
Output Indicator	Red LED	Red LED
Switching Frequency f	10 Hz	10 Hz
Response Time (On/Off Delay)	50 ms	50 ms
Operating Temperature Range	-5°C to +55°C	-5°C to +55°C
Electrical Shock Protection	Class 2	Class 2
Degree of Protection per IEC 60529	IP 67	IP 67
Short Circuit Protection	Yes	Yes
Overload Protection	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass
Sensing Face Material	PMMA	PMMA
Connection	3 m Cable, 3 x 22 AWG	3 m Cable, 3 x 22 AWG
Recommended Connector		
Weight	160 g	160 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

Body Style	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics

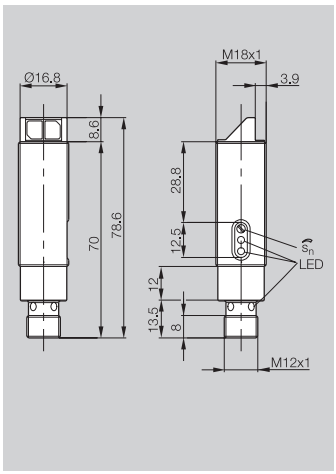
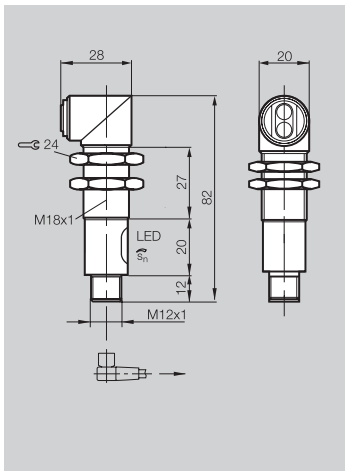
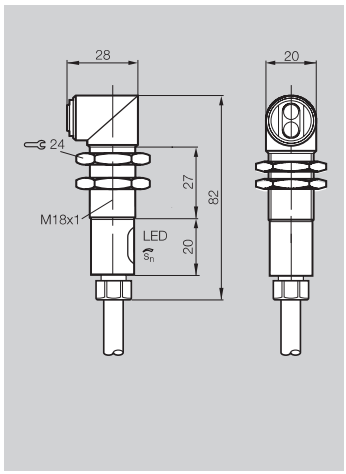




Diffuse		
PNP NO/NC, Alarm output, Light-on/Dark-on, 400 mm, Teach-in ⑥Ⓑ	BOS 18M-PU-1PD-S4-C	
Polarized Retroreflective		
PNP NO/NC, Alarm output, Light-on/Dark-on, 2 m, Teach-in ⑥Ⓒ		BOS 18M-PU-1QB-S4-C
Thru-beam		
PNP NO/NC, Alarm output, Light-on/Dark-on, 16 m, Teach-in, Receiver ⑥Ⓓ		BLE 18M-PU-1PP-S4-C
Emitter, Test-input, 16 m ⑧Ⓓ		BLS 18M-XX-1P-S4-L

Supply Voltage	10…30 Vdc	10…30 Vdc
Voltage Drop U_d at I_e	≤ 2.5 V	≤ 2.5 V
Rated Output Current I_e	200 mA	200 mA
Current Consumption I_O (No Load)	≤ 25 mA	≤ 25 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	DC 13
Emitter Light Source — Polarized		Visible Red 660 nm
Emitter Light Source — Others	Infrared 880 nm	Infrared 880 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux.	5000 Lux.
Output Indicator	Yellow LED	Yellow LED
Stability Indicator	Green LED	Green LED
Switching Frequency f	500 Hz	500 Hz
Response Time (On/Off Delay)	1 ms	1 ms
Operation Temperature Range	-15°C to +55°C	-15°C to +55°C
Electrical Shock Protection	Class 2	Class 2
Degree of Protection per IEC 60529	IP 67	IP 67
Short Circuit Protection	Yes	Yes
Overload Protection	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass
Sensing Face Material	PMMA	Glass
Connection	M12 4-pin connector	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M
Weight	65 g	65 g

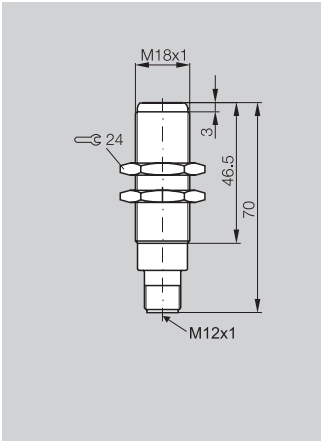
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

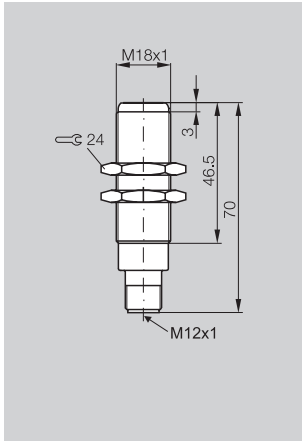
Body Style	18 mm threaded	18 mm threaded	18 mm threaded
Type	90° optics	90° optics	90° optics
			
Background Suppression			
PNP NO Light-on ① 10…120 mm, 270° Pot.	BOS 18MR-PS-1HA-E5-C-S4		
PNP NO+NC Light-on ③ 40 …120 mm, 270° Pot.		BOS 18MR-PA-1HA-S4-C	BOS 18MR-PA-1HA-C-02
Diffuse			
PNP NO Light-on ① 400 mm 270° Pot.	BOS 18MR-PS-1OD-E5-C-S4		
Polarized Retroreflective			
PNP NO Dark-on ① 2 m, 270° Pot.	BOS 18MR-PS-1QB-E5-C-S4		
Thru-beam			
PNP NO+NC Light/Dark ③ 16 m Receiver, 270° Pot.	BLE 18MR-PA-1PP-E5-C-S4		
16 m Emitter, Test Input ⑧	BLS 18MR-XX-1P-E5-C-S4		
Supply Voltage	10…30 Vdc	10…30 Vdc	10…30 Vdc
Voltage Drop U_d at I_e	≤ 2 V	≤ 2.5 V	≤ 2.5 V
Rated Output Current I_e	200 mA	200 mA	200 mA
Current Consumption I_O (No Load)	≤ 20 mA	≤ 30 mA	≤ 30 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	DC 13	DC 13
Emitter Light Source	Visible Red 660 nm	Visible Red 660 nm	Visible Red 660 nm
Ambient Light Immunity	10000 Lux	2000 Lux.	2000 Lux.
Output Indicator	2 x Yellow LED	Yellow	Yellow
Stability Indicator	Green LED		
Switching Frequency f	500 Hz BGS, 1.5 kHz others	600 Hz	600 Hz
Response Time (On/Off Delay)	≤ 1ms BGS, ≤ 0.5ms others	0.8 ms	0.8 ms
Operating Temperature Range	-25°C to +55°C	-15°C to +55°C	-15°C to +55°C
Electrical Shock Protection	Class II	Class II	Class II
Degree of Protection per IEC 60529	IP 67	IP 67	IP 67
Short Circuit Protection	Yes	Yes	Yes
Overload Protection	Yes	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass	nickel plated brass
Sensing Face Material	Glass	Glass	Glass
Connection	M12 4-pin connector	M12 4-pin connector	2 m Cable 4 x 22 AWG
Recommended Connector	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M	
Weight	50 g	62 g	100 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

See pages 2.50-2.52 for diagrams

Body Style	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics



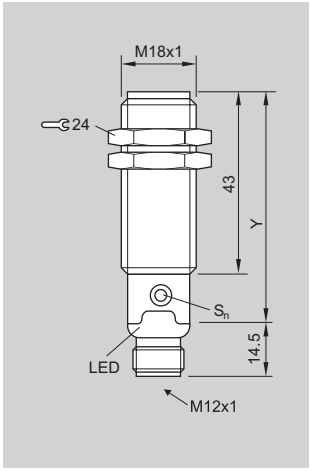


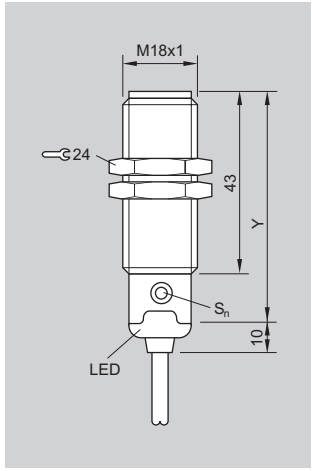
Diffuse		
PNP NO, Light-on, 100 mm, Visible Red ①Ⓔ	BOS 18E-PS-1YA-E5-D-S4	
PNP NO, Light-on, 100 mm, Infrared ①Ⓔ		BOS 18E-PS-1XA-SA1-S4
PNP NO, Light-on, 200 mm, Visible Red ①Ⓔ	BOS 18E-PS-1YB-E5-D-S4	
PNP NO, Light-on, 200 mm, Infrared ①Ⓔ		BOS 18E-PS-1XB-SA1-S4
PNP NO, Light-on, 400 mm, Visible Red ①Ⓔ	BOS 18E-PS-1YD-E5-D-S4	
PNP NO, Light-on, 400 mm, Infrared Red ①Ⓔ		BOS 18E-PS-1XD-SA1-S4
Non-Polarized Retroreflective		
PNP NO, Dark-on, 4 m, Visible Red ①Ⓔ	BOS 18E-PS-1WD-E5-D-S4	
Polarized Retroreflective		
PNP NO, Dark-on, 2 m, Visible Red ①Ⓔ	BOS 18E-PS-1UB-E5-D-S4	BOS 18E-PS-1UB-SA1-S4
Thru-beam		
PNP NO, Dark-on, 16 m, Infrared Red ①Ⓓ	BLE 18E-PS-1P-E5-D-S4	BLE 18E-PS-1P-SA1-S4
Emitter, 16 m ⑦Ⓓ	BLS 18E-XX-1P-E5-X-S4	BLS 18E-XX-1P-SA1-S4

Supply Voltage		10…30 Vdc	10…30 Vdc
Voltage Drop U_d at I_e		≤ 2.5 V	≤ 2.5 V
Rated Output Current I_e		200 mA	200 mA
Current Consumption I_O (No Load)	Emitter	≤ 40 mA	≤ 40 mA
	All Others	≤ 25 mA	≤ 25 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13	DC 13
Emitter Light Source	-SA1 Types (except -1UB)	Infrared 880 nm	Infrared 880 nm
	All Others	Visble Red 660 nm	Visble Red 660 nm
Ambient Light Immunity (EN 60947-5-2)		2000 Lux.	2000 Lux.
LED Indicators		No	No
Switching Frequency f		100 Hz	100 Hz
Response Time (On/Off Delay)		5 ms	5 ms
Operating Temperature Range		-20°C to +75°C	-20°C to +75°C
Electrical Shock Protection		Class 2	Class 2
Degree of Protection per IEC 60529		**IP 69K and IP 68 Wash Down Rated (per BWN Pr. 27)**	**IP 69K and IP 68 Wash Down Rated (per BWN Pr. 27)**
Short Circuit Protection		Yes	Yes
Overload Protection		Yes	Yes
Housing Material		**Stainless Steel 1.4571 316L**	**Stainless Steel 1.4571 316L**
Sensing Face Material		Glass	PMMA Scratch resistant
Connection		M12 4-pin connector	M12 4-pin connector
Recommended Connector		C04 AEL-00-VY-050M	C04 AEL-00-VY-050M
Weight		40 g	40 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

Body Style	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics

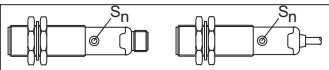




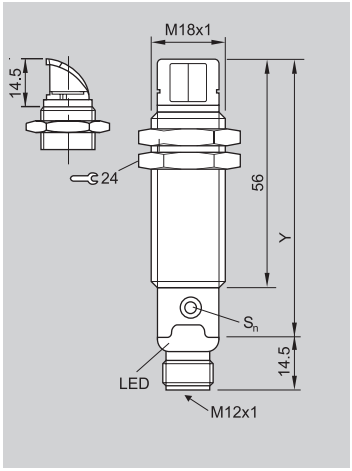
Diffuse Class I Laser (L_1)		
PNP NO+NC Light-on 350 mm 270° Pot. ③Ⓖ	BOS 18M-PA-LD-10-S4	BOS 18M-PA-LD-10-02
NPN NO+NC Light-on 350 mm 270° Pot. ④Ⓖ	BOS 18M-NA-LD-10-S4	BOS 18M-NA-LD-10-02
Polarized Retroreflective Class I Laser (L_1)		
PNP NO+NC Dark-on 16 m 270° Pot. ③Ⓗ	BOS 18M-PA-LR-10-S4	BOS 18M-PA-LR-10-02
NPN NO+NC Dark-on 16 m 270° Pot. ④Ⓗ	BOS 18M-NA-LR-10-S4	BOS 18M-NA-LR-10-02
Thru-beam Class I Laser (L_2)		
PNP NO+NC Dark-on 60 m Receiver 270° Pot. ③①	BOS 18M-PA-LE-10-S4	BOS 18M-PA-LE-10-02
NPN NO+NC Dark-on 60 m Receiver 270° Pot. ④①	BOS 18M-NA-LE-10-S4	BOS 18M-NA-LE-10-02
Emitter **(L_2)** ⑧①	BOS 18M-XT-LS-10-S4	BOS 18M-XT-LS-10-02

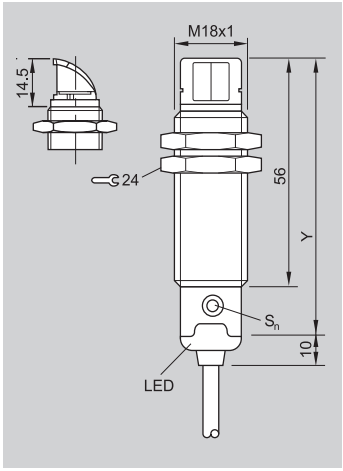
Supply Voltage		10…30 Vdc	
Ripple		≤ 10%	
Voltage Drop U_d at I_e		≤ 2 V	
Rated Output Current I_e		100 mA	
Current Consumption I_O (No Load)		≤ 30 mA/ ≤ 35 mA (Emitter only)	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13	
Emitter Light Source		Class I Laser 650 nm	
Spot Size	Diffuse	0.5 mm @ 200 mm	
	Polarized	9 mm @ 1 m	
	Thru-Beam	5 mm @ 10 m	
Ambient Light Immunity (EN 60947-5-2)		5000 Lux	
Power Indicator		Green LED (Emitter Only)	
Output Indicator		Yellow LED (Except Emitter)	
Stability/Error Indicator		Green/Red LED	
Switching Frequency f		1.5 kHz	
Response Time (On/Off Delay)		333 µs	
OperatingTemperature Range		-25°C to +55°C	
Electrical Shock Protection		Class 2	
Degree of Protection per IEC 60529		IP 67	
Short Circuit Protection		Yes	
Overload Protection		Yes	
Housing Material		nickel plated brass	
Sensing Face Material		PMMA	
Emitter Life		Average 100,000 hr with Ta=+25°C	
Connection		M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector		C04 AEL-00-VY-050M	
Weight		60 g	110 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

	y	
L_1	67	
L_2	57	

Body Style	18 mm threaded	18 mm threaded
Type	90° optics	90° optics

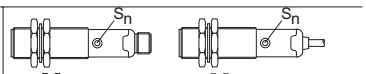




Diffuse Class I Laser (L_1)			
PNP NO+NC Light-on 250 mm 270° Pot.	③Ⓘ	BOS 18MR-PA-LD10-S4	BOS 18MR-PA-LD10-02
NPN NO+NC Light-on 250 mm 270° Pot.	④Ⓘ	BOS 18MR-NA-LD10-S4	BOS 18MR-NA-LD10-02
Polarized Retroreflective Class I Laser (L_1)			
PNP NO+NC Dark-on 9 m 270° Pot.	③Ⓚ	BOS 18MR-PA-LR10-S4	BOS 18MR-PA-LR10-02
NPN NO+NC Dark-on 9 m 270° Pot.	④Ⓚ	BOS 18MR-NA-LR10-S4	BOS 18MR-NA-LR10-02
Thru-beam Class I Laser (L_1)			
PNP NO+NC Dark-on 50 m Receiver 270° Pot.	③Ⓛ	BOS 18MR-PA-LE10-S4	BOS 18MR-PA-LE10-02
NPN NO+NCDark-on 50 m Receiver 270° Pot.	④Ⓛ	BOS 18MR-NA-LE10-S4	BOS 18MR-NA-LE10-02
Emitter **(L_2)**	⑧Ⓛ	BOS 18MR-XT-LS10-S4	BOS 18MR-XT-LS10-02

Supply Voltage		10…30 Vdc	
Ripple		≤ 10%	
Voltage Drop U_d at I_e		≤ 2 V	
Rated Output Current I_e		100 mA	
Current Consumption I_O (No Load)		≤ 30 mA/ ≤ 35 mA (Emitter only)	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13	
Emitter Light Source		Class I Laser 650 nm	
Resolution	Diffuse	0.5 mm @ 200 mm	
	Polarized	9 mm @ 1 m	
	Thru-Beam	5 mm @ 10 m	
Ambient Light Immunity (EN 60947-5-2)		5000 Lux	
Power Indicator		Green LED (Emitter Only)	
Output Indicator		Yellow LED (Except Emitter)	
Stability/Error Indicator		Green/Red LED	
Switching Frequency f		1.5 kHz	
Response Time (On/Off Delay)		333 µs	
Opreating Temperature Range		-25°C to +55°C	
Electrical Shock Protection		Class 2	
Degree of Protection per IEC 60529		IP 67	
Short Circuit Protection		Yes	
Overload Protection		Yes	
Housing Material		nickel plated brass	
Sensing Face Material		PMMA	
Emitter Life		Average 100,000 hr with Ta=+25°C	
Connection		M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector		C04 AEL-00-VY-050M	
Weight		60 g	110 g

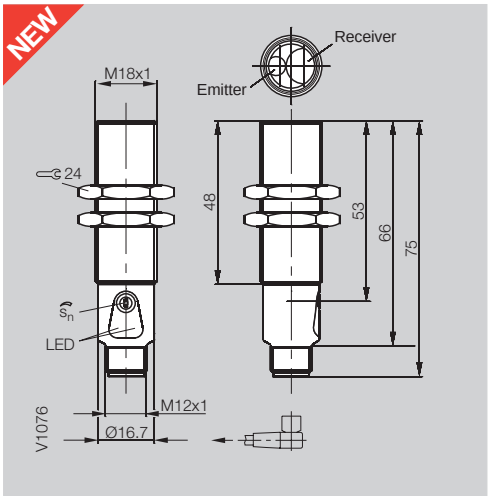
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

	y	
L_1	67	
L_2	57	

BOS 18M Laser

The new BOS 18M Background Suppression Laser is ideal for those applications that require a small spot size and the highest level of resolution.

Body Style	18 mm threaded
Type	Straight optics



Background Suppression

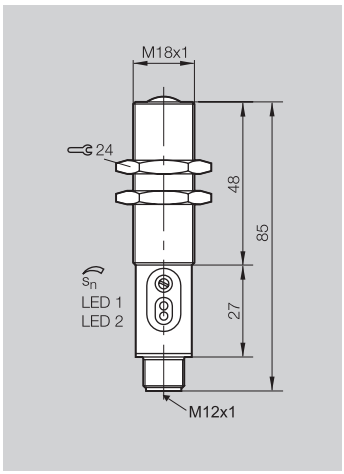
PNP NO Light-on 30...150 mm	⑪Ⓜ	BOS 18M-PSV-LH22-S4
PNP NC Dark-on 30...150 mm	⑫Ⓜ	BOS 18M-POV-LH22-S4
NPN NO Light-on 30...150 mm	⑬Ⓜ	BOS 18M-NSV-LH22-S4
NPN NC Dark-on 30...150 mm	⑭Ⓜ	BOS 18M-NOV-LH22-S4

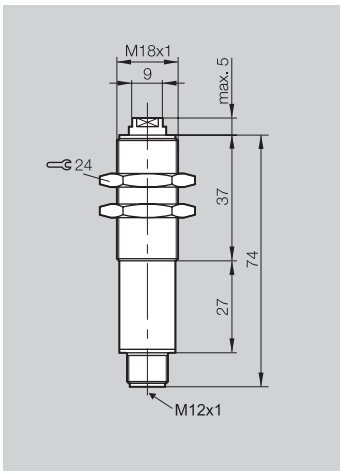
Supply Voltage	10...30 Vdc
Output Current	100 mA
Switching Output	PNP or NPN transistor
Output Function	Light-on
Settings	10-turn potentiometer
Switching Frequency	500 Hz
Emitter Light Source	Laser, red light
Wavelength	670 nm
Output Function Indicator	Yellow LED
Stability Indicator	Red LED
Housing Material	nickel plated brass
Sensing Face Material	PMMA
Degree of Protection per IEC 60529	IP 67
Reverse Polarity Protected	Yes
Short Circuit Protected	Yes
Operating Temperature Range	-5...+55°C
Reference Standard	EN 60947-5-2
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	55 g

Diffuse values referenced to Kodak testcard 90% reflective

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

Body Style	18 mm threaded	18 mm threaded
Type	Straight optics	Straight optics





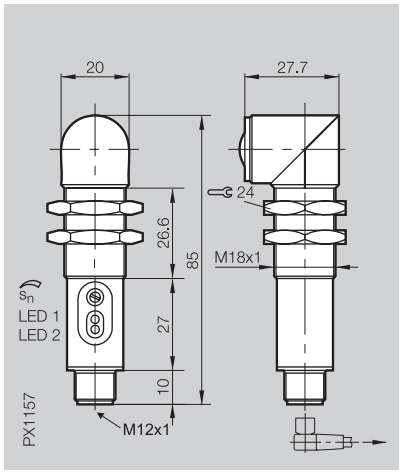
Thru-beam Class II Laser

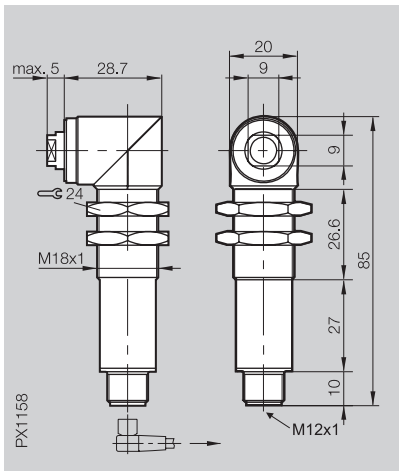
PNP NO+NC Dark-on 50 m Receiver 270° Pot. ③Ⓝ	BLE 18M-BA-1LT-S4-C	
Emitter Class II Laser ⑦Ⓝ		BLS 18M-XX-1LT-S4-C
Supply Voltage	10…30 Vdc	10…30 Vdc
Ripple	≤ 10%	≤ 10%
Voltage Drop U_d at I_e	≤ 2.5 V	
Rated Output Current I_e	200 mA	
Current Consumption I_O (No Load)	≤ 15 mA	≤ 10 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source		Class II Laser 660 nm
Ambient Light Immunity (EN 60947-5-2)	2000 Lux	
LED Function	Yellow LED	
Stability/Error Indicator	Green/Red LED	
Switching Frequency f	6 kHz	
Response Time (On/Off Delay)	≤ 0.08 µs	
Operating Temperature Range	-15°C to +55°C	-15°C to +55°C
Electrical Shock Protection	Class 2	Class 2
Degree of Protection per IEC 60529	IP 65	IP 65
Short Circuit Protection	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass
Sensing Face Material	Glass	Glass
Connection	M12 4-pin connector	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M
Maximum Resolution	0.03 mm	0.03 mm

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

Class II Laser Operation Information
Beam divergence θ = 0.5 mrad
Pulse Power Pp < 1.5 mW
Pulse width t = 7 µs
Pulse repetition frequency F = 30 kHz
Time base T = 250 ms

Body Style	18 mm threaded	18 mm threaded
Type	90° optics	90° optics





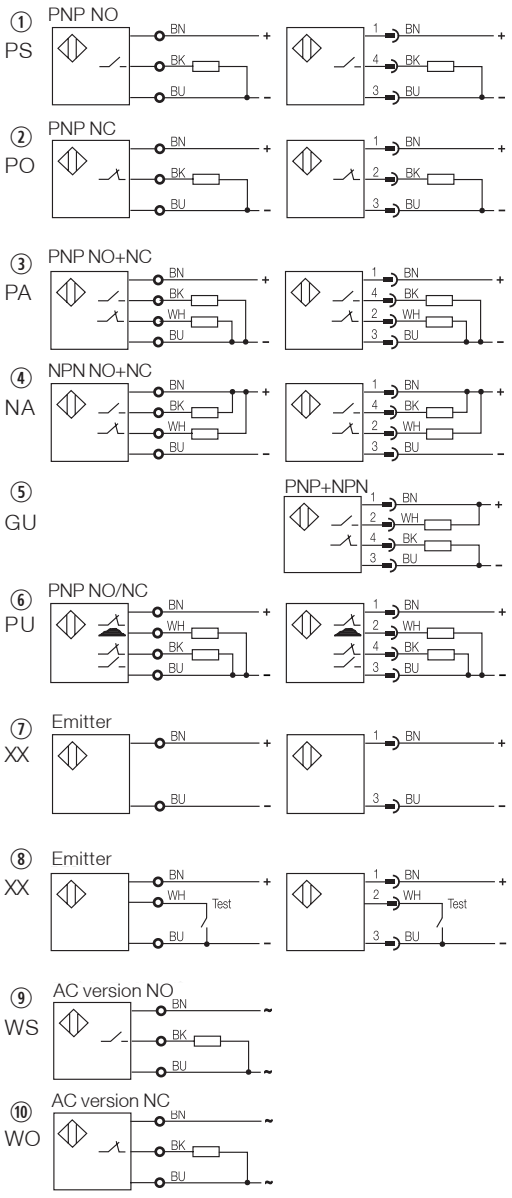
Thru-beam Class II Laser

PNP NO+NC Dark-on 50 m Receiver 270° Pot. ③Ⓝ	BLE 18MR-BA-1LT-S4-C	
Emitter Class II Laser ⑦Ⓝ		BLS 18MR-XX-1LT-S4-C
Supply Voltage	10…30 Vdc	10…30 Vdc
Ripple	≤ 10%	≤ 10%
Voltage Drop U_d at I_e	≤ 2.5 V	
Rated Output Current I_e	200 mA	
Current Consumption I_O (No Load)	≤ 15 mA	≤ 10 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source		Class II Laser 660 nm
Ambient Light Immunity (EN 60947-5-2)	2000 Lux	
LED Function	Yellow LED	
Stability/Error Indicator	Green/Red LED	
Switching Frequency f	6 kHz	
Response Time (On/Off Delay)	≤ 0.08 ms	
Operating Temperature Range	-15°C to +55°C	-15°C to +55°C
Electrical Shock Protection	Class 2	Class 2
Degree of Protection per IEC 60529	IP 65	IP 65
Short Circuit Protection	Yes	Yes
Housing Material	nickel plated brass	nickel plated brass
Sensing Face Material	Glass	Glass
Connection	M12 4-pin connector	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M
Maximum Resolution	0.03 mm	0.03 mm

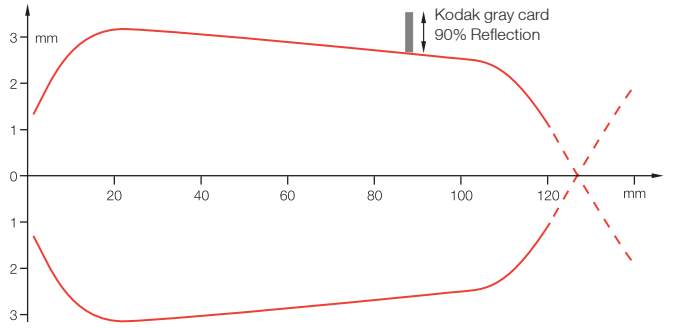
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.50-2.52 for diagrams

With the included focusing tool for the emitter, the beam can be brought to focus at a point. At this point you achieve the optimum small part detection. At an emitter-receiver distance of 20...80 cm parts down to a diameter of 0.03 mm can be detected.

Wiring Diagrams

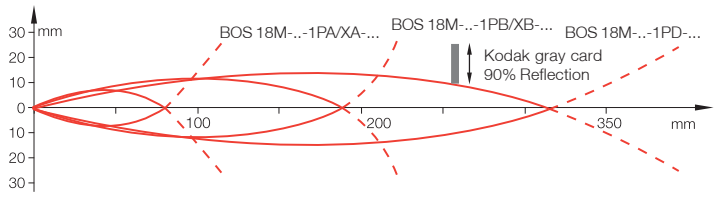


Ⓐ Diffuse with background suppression



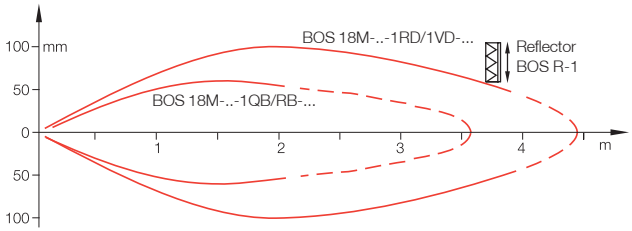
Sensing distance measured with lateral approach using Kodak gray card.

Ⓑ Diffuse



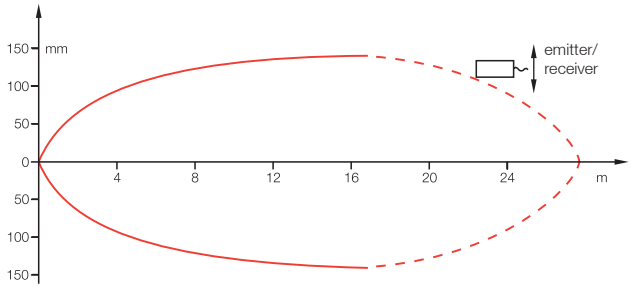
Sensing distance measured with lateral approach using Kodak gray card.

Ⓒ Retroreflective



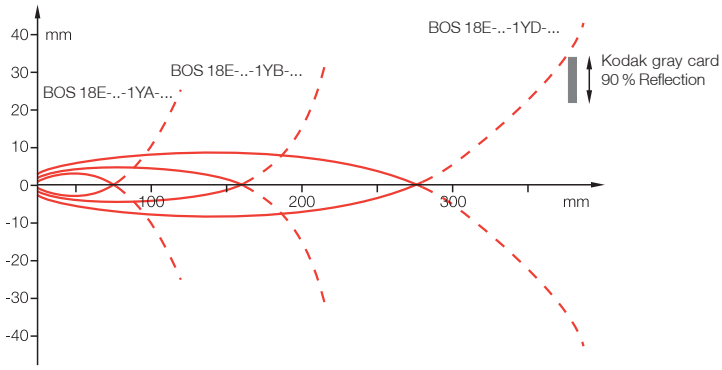
Sensing distance measured with lateral approach using reflector.

Ⓓ Thru-Beam



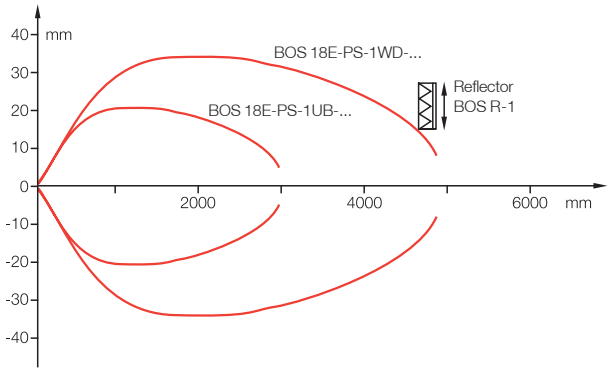
For the thru-beam sensor, the maximum possible offset between emitter and receiver is measured.

Ⓔ Diffuse



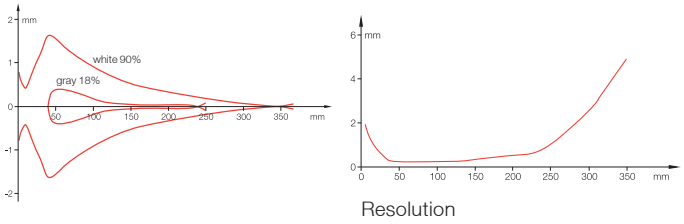
Sensing distance measured with lateral approach using Kodak gray card.

Ⓕ Retroreflective



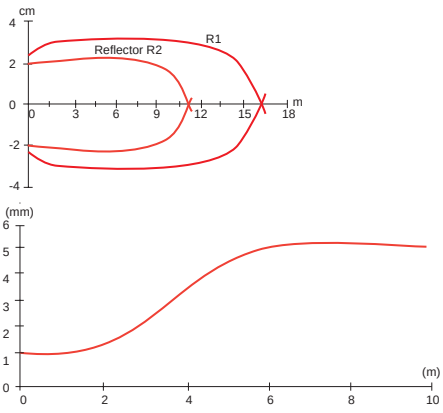
Sensing distance measured with lateral approach using reflector.

Ⓖ Diffuse Class I Laser – straight

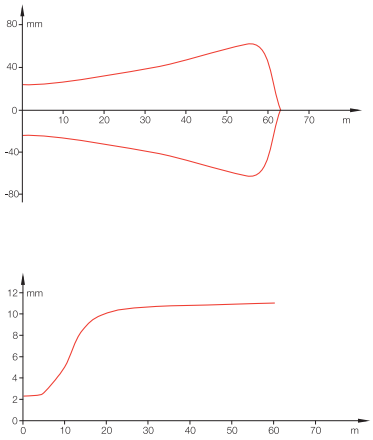


Resolution

Ⓗ Polarized Retroreflective Class I Laser – straight

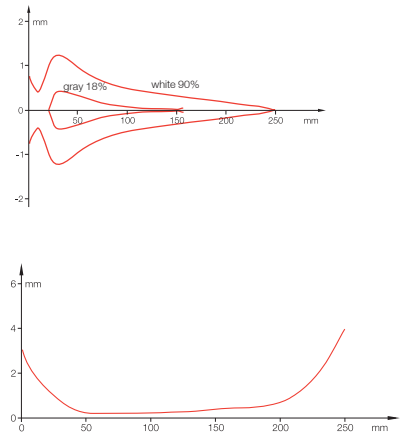


Ⓘ Thru-Beam Class I Laser – straight

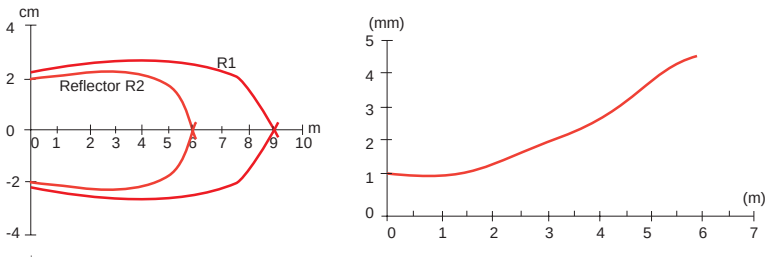


Resolution

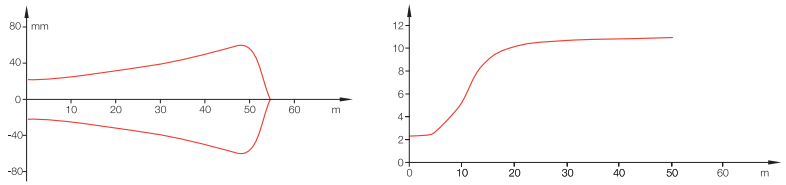
Ⓙ Diffuse Class I Laser – 90°



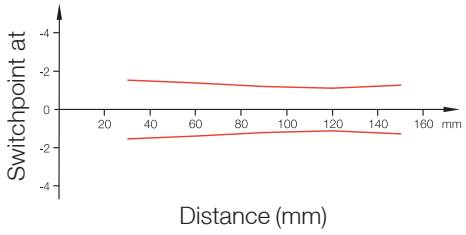
Ⓚ Polarized Retroreflective Class I Laser – 90°

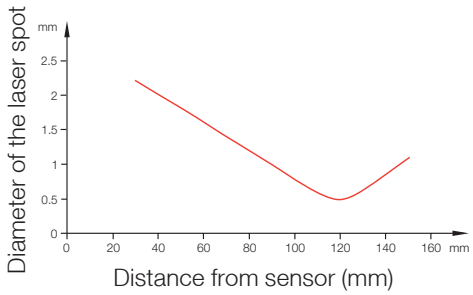


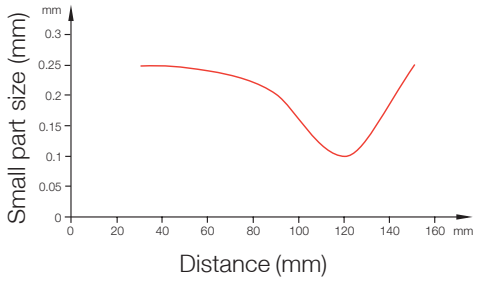
Ⓛ Thru-Beam Class I Laser – 90°



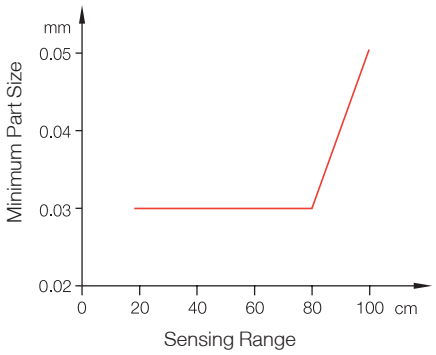
Ⓜ Background Suppression Class II Laser

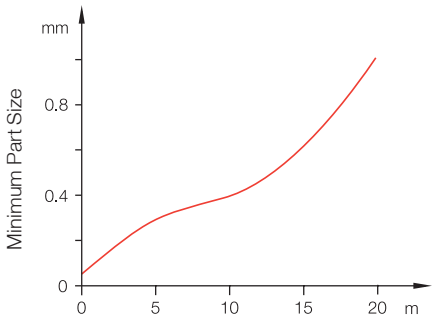






Ⓝ Thru-Beam Class II Laser – Straight and 90°





Beam spot vertical to object direction of travel.

Recommended Accessories

Sold separately

See section 7

Protective End Cap
BOS 18-SM-2

Aperture
BOS 18-UK-10

Air Shield
BOS 18-LT-1

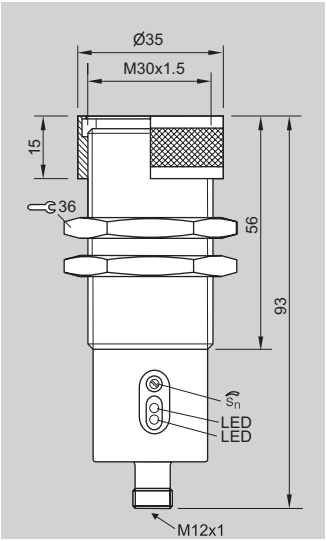
Reflector
BOS R-1

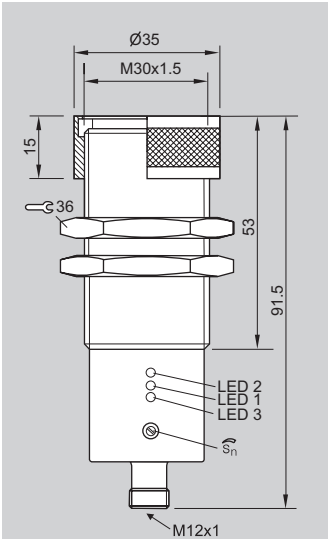
Aperture
BOS 18-BL-1

Mounting Bracket
BOS Micro-18-HW

Swivel Mount
BOS 18.0-KB-1

Body Style	30 mm threaded	30 mm threaded
Type	Straight optics	Straight optics



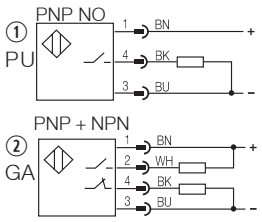


Diffuse

PNP	2 m	Light-on/Dark-on selectable	①Ⓐ	BOS 30M-PU-1PH-SA3-C	
PNP/NPN	2 m	Light-on/Dark-on selectable	②Ⓐ		BOS 30M-GA-1PH-S4-C

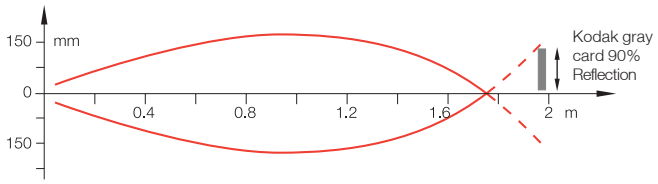
Supply Voltage	10...30 Vdc	10...30 Vdc
Voltage Drop U_d at I_e	≤ 2.4 V	≤ 2 V
Rated Isolation Voltage	75 Vdc	75 Vdc
Rated Output Current I_e	200 mA	200 mA
Current Consumption I_o (No Load)	≤ 40 mA	≤ 20 mA
Short Circuit Protected	Yes	Yes
Permissable Capacitance	1µF	1µF
On/Off Delay	5 ms	33 ms
Operating Frequency	15 Hz	100 Hz
Utilization Category	DC13	DC13
Output	PNP	PNP/NPN selectable
Output Function	Light/Dark selectable	Light/Dark selectable
Permissable Ambient Light	1000 Lux	1000 Lux
Sensitivity Adjustment	Yes	Yes
Output Function Indication	Yes	Yes
Stability Indication	Yes	Yes
Operating Temperature Range	-5...+55°C	-5...+55°C
Degree of Protection per IEC 529	IP 65	IP 65
Emitter Light Source	Infrared 880 nm	Infrared 880 nm
Housing Material	nickel plated brass	nickel plated brass
Material Sensing Face	glass	glass
Connection	M12 4-pin connector	M12 4-pin connector
Weight	230 g	230 g
Recommended Connector	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M

Wiring Diagrams

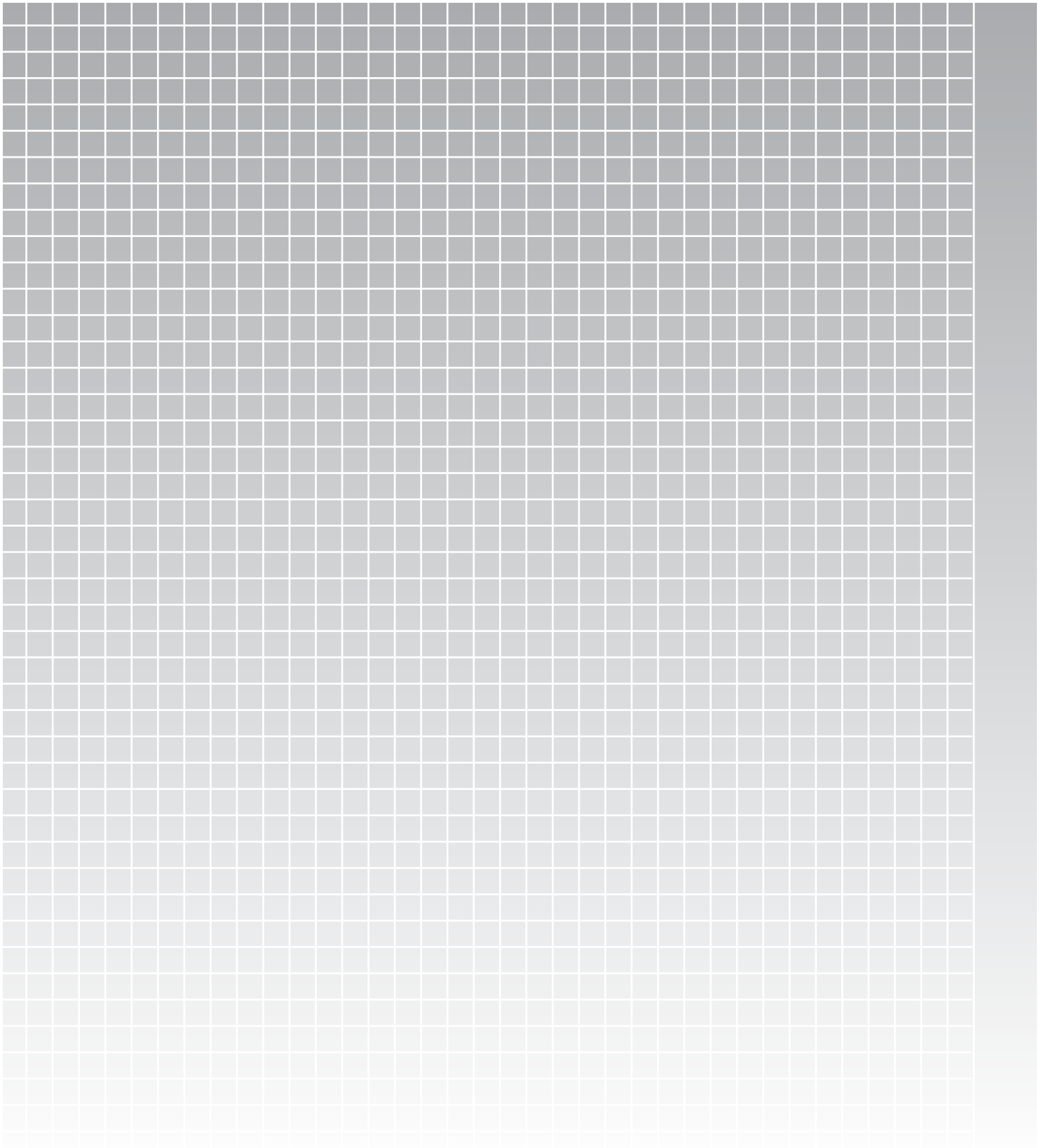


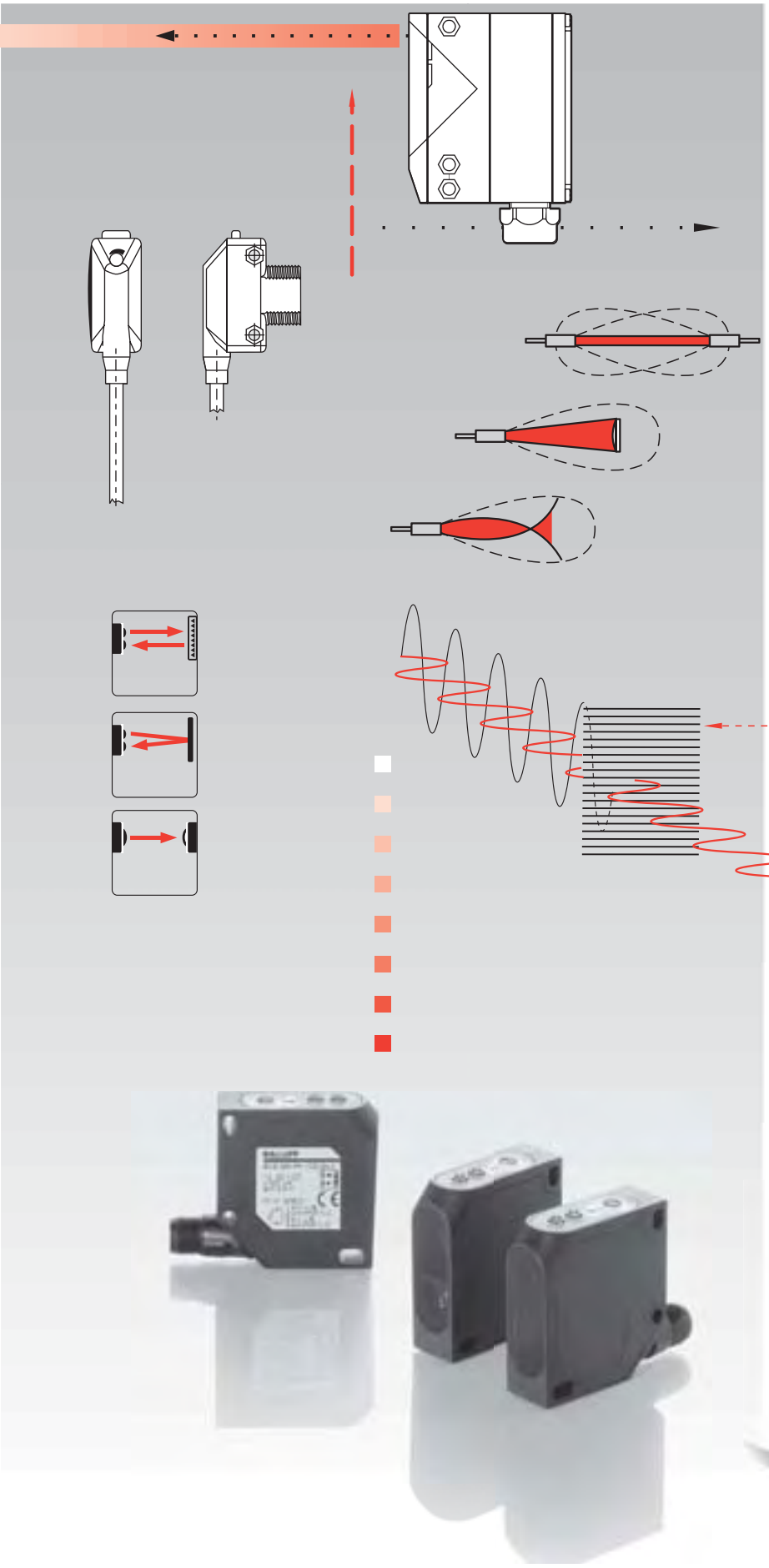
Note: The BOS 30M models shown above have switches for range reduction (to 1 m) and PNP/NPN output type (-GA) under the front lens. They are also suitable for use with fiber optic cables (see pages 2.139-2.143).

Ⓐ Diffuse



Sensing distance measured with lateral approach using Kodak gray card.

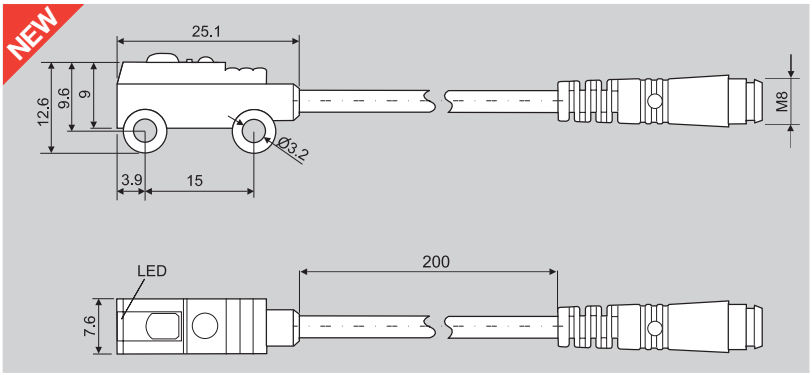




Block Style Housing Photoelectric Sensors

Block style housings offer an advantage in longer sensing range for the diffuse and retroreflective sensing modes, due to wider separation between the emitter and receiver elements. Block style sensors can also fit into more compact locations where sensor length is a concern.

Body Style	Small block	Small block
Type	90° optics	90° optics

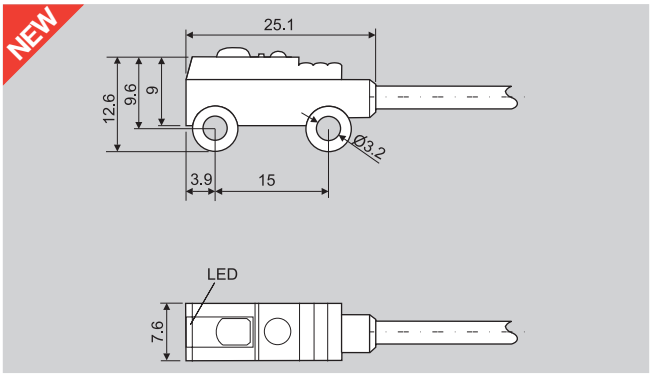


Background Suppression			
PNP NO Light-on 1...15 mm	①Ⓑ	BOS 2K-PS-RH10-00,2-S49	BOS 2K-PS-RH10-00,2-S75
PNP NC Dark-on 1...15 mm	②Ⓑ	BOS 2K-PO-RH10-00,2-S49	
PNP NO Light-on 1...30 mm	①Ⓒ	BOS 2K-PS-RH11-00,2-S49	BOS 2K-PS-RH11-00,2-S75
PNP NC Dark-on 1...30 mm	②Ⓒ	BOS 2K-PO-RH11-00,2-S49	
Diffuse			
PNP NO Light-on 50 mm	①Ⓐ	BOS 2K-PS-RD10-00,2-S49	BOS 2K-PS-RD10-00,2-S75
Polarized Retroreflective			
PNP NO Dark-on 3 m	⑦Ⓓ	BOS 2K-PS-PR10-00,2-S49	BOS 2K-PS-PR10-00,2-S75
PNP NC Light-on 3 m	⑤Ⓓ	BOS 2K-PO-PR10-00,2-S49	
Thru-beam			
PNP NO Dark-on 1.2 m	⑦Ⓔ	BOS 2K-PS-RE10-00,2-S49	BOS 2K-PS-RE10-00,2-S75
Emitter	⑨Ⓔ	BOS 2K-XX-RS10-00,2-S49	BOS 2K-XX-RS10-00,2-S75

Supply Voltage	10…30 Vdc	
Ripple	≤ 5%	
Voltage Drop U_d at I_e	≤ 2.5 Vdc	
Rated Output Current I_e	≤ 50 mA	
Current Consumption I_O (No Load)	Receiver ≤ 10 mA, All other ≤ 20 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Visible Red Light 660 nm	
Ambient Light Immunity (EN 60947-5-2)	Sunlight: 10,000 lux maximum, Artificial Light: 5,000 lux maximum (at receiver)	
LED Output	Yellow LED	
Switching Frequency	800 Hz, Thru-beam 200 Hz	
Response Time (On/Off Delay)	≤ 0.6 ms, Thru-beam ≤ 2.5 ms	
Operating Temperature Range	-20…+50 °C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Housing Material	ABS	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 hr with Ta=+25° C	
Connection	M8 3-pin, 200 mm pigtail connector	M8 4-pin, 200 mm pigtail connector
Recommended Connector	C49 ANE-00-VY-050M	C75 ANL-00-VY-050M
Weight	18 g	

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.58 for diagrams

Body Style	Small block
Type	90° optics

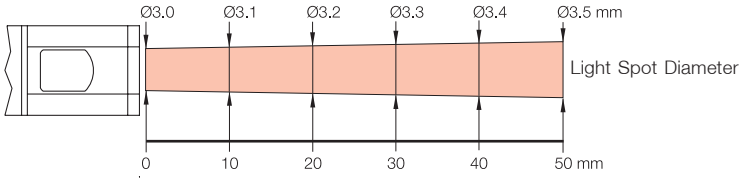


Background Suppression		
PNP NO Light-on 15 mm	①Ⓑ	BOS 2K-PS-RH10-02
PNP NC Dark-on 15 mm	②Ⓑ	BOS 2K-PO-RH10-02
NPN NO Light-on 15 mm	③Ⓑ	BOS 2K-NS-RH10-02
NPN NC Dark-on 15 mm	④Ⓑ	BOS 2K-NO-RH10-02
PNP NO Light-on 30 mm	①Ⓒ	BOS 2K-PS-RH11-02
PNP NC Dark-on 30 mm	②Ⓒ	BOS 2K-PO-RH11-02
NPN NO Light-on 30 mm	③Ⓒ	BOS 2K-NS-RH11-02
Diffuse		
PNP NO Light-on 50 mm	①Ⓐ	BOS 2K-PS-RD10-02
NPN NO Light-on 50 mm	③Ⓐ	BOS 2K-NS-RD10-02
Polarized Retroreflective		
PNP NO Dark-on 3 m	⑦Ⓓ	BOS 2K-PS-PR10-02
PNP NC Light-on 3 m	⑤Ⓓ	BOS 2K-PO-PR10-02
NPN NO Dark-on 3 m	⑧Ⓓ	BOS 2K-NS-PR10-02
NPN NC Light-on 3 m	⑥Ⓓ	BOS 2K-NO-PR10-02
Thru-beam		
PNP NO Dark-on 1.2 m	⑦Ⓔ	BOS 2K-PS-RE10-02
NPN NO Dark-on 1.2 m	⑧Ⓔ	BOS 2K-NS-PR10-02
Emitter	⑨Ⓔ	BOS 2K-XX-RS10-02

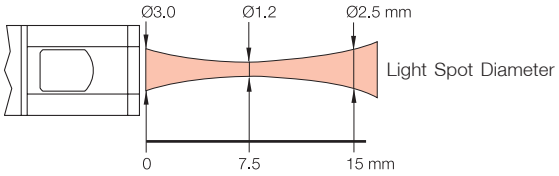
Supply Voltage	10…30 Vdc
Ripple	≤ 5%
Voltage Drop U_d at I_e	≤ 2.5 Vdc
Rated Output Current I_e	≤ 50 mA
Current Consumption I_O (No Load)	Receiver ≤ 10 mA, All other ≤ 20 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	Visible Red Light 660 nm
Ambient Light Immunity (EN 60947-5-2)	Sunlight: 10,000 lux maximum, Artificial Light: 5,000 lux maximum (at receiver)
LED Output	Yellow LED
Switching Frequency	800 Hz, Thru-beam 200 Hz
Response Time (On/Off Delay)	≤ 0.6 ms, Thru-beam ≤ 2.5 ms
Operating Temperature Range	-20…+50 °C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Housing Material	ABS
Sensing Face Material	PMMA
Emitter Life	Average 100,000 hr with Ta=+25° C
Connection	2 m Cable Ø 2, 4 mm, PVC, 3 x 28 AWG
Weight	30 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.58 for diagrams

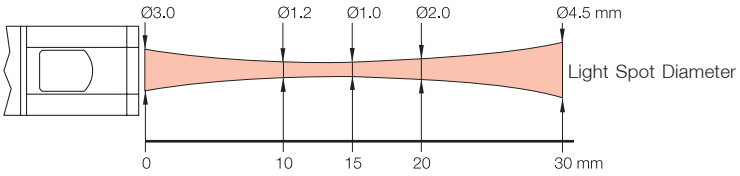
Ⓐ Diffuse 50 mm



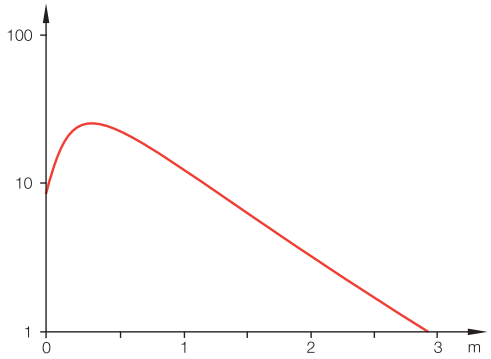
Ⓑ Background Suppression 15 mm



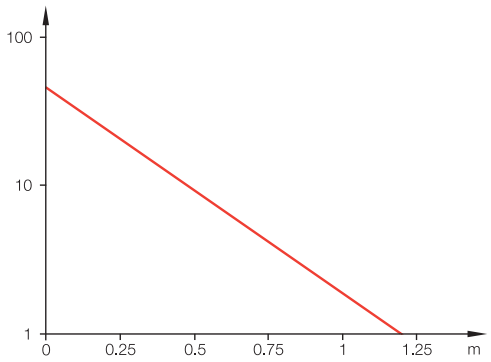
Ⓒ Background Suppression 30 mm



Ⓓ Retroreflective 3 m

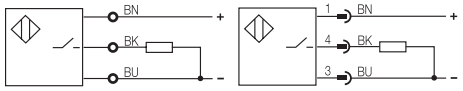


Ⓔ Thru-Beam 1.2 m

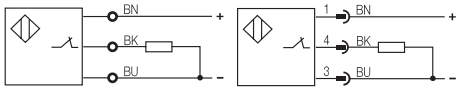


Diffuse & Background Suppression

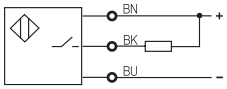
① PNP light-on



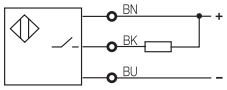
② PNP dark-on



③ NPN light-on

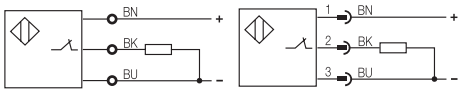


④ NPN dark-on

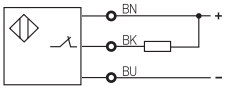


Retroreflective & Thru-beam

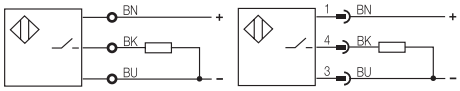
⑤ PNP light-on



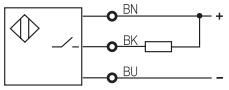
⑥ NPN light-on



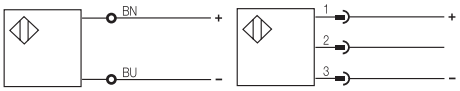
⑦ PNP dark-on



⑧ NPN dark-on

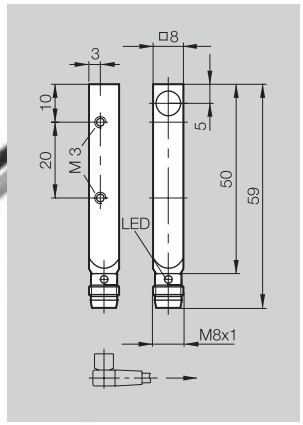


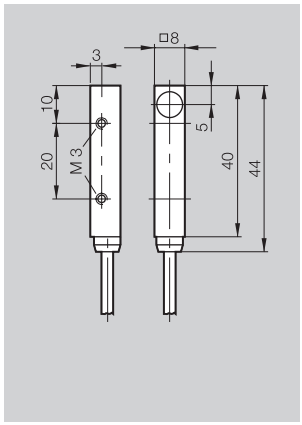
⑨ Thru-Beam emitter



BOS Q08M

Balluff's BOS Q08 8x8x50 mm block style offers right angle sensing, allowing the sensor to be easily integrated into machines where ccnventional sensors won't fit. With its rugged IP67 housing, the BOS Q08M is well suited for tough applications.





Body Style	8x8 mm Block	8x8 mm Block
Type	90° optics	90° optics
Diffuse		
PNP NO Light-on 55 mm ①	BOS Q08M-PS-RD11-S49	BOS Q08M-PS-RD11-03
PNP NC Dark-on 55 mm ②	BOS Q08M-PO-RD11-S49	BOS Q08M-PO-RD11-03
NPN NO Light-on 55 mm ③	BOS Q08M-NS-RD11-S49	BOS Q08M-NS-RD11-03
NPN NC Dark-on 55 mm ④	BOS Q08M-NO-RD11-S49	BOS Q08M-NO-RD11-03
Polarized Retroreflective		
PNP NO Dark-on 550 mm ①	BOS Q08M-PS-PR11-S49	BOS Q08M-PS-PR11-03
PNP NC Light-on 550 mm ②	BOS Q08M-PO-PR11-S49	BOS Q08M-PO-PR11-03
NPN NO Dark-on 550 mm ③	BOS Q08M-NS-PR11-S49	BOS Q08M-NS-PR11-03
NPN NC Light-on 550 mm ④	BOS Q08M-NO-PR11-S49	BOS Q08M-NO-PR11-03
Thru-beam		
PNP NO Dark-on 1.1m Receiver ①	BOS Q08M-PS-RE10-S49	BOS Q08M-PS-RE10-03
PNP NC Light-on 1.1m Receiver ②	BOS Q08M-PO-RE10-S49	BOS Q08M-PO-RE10-03
NPN NO Dark-on 1.1m Receiver ③	BOS Q08M-NS-RE10-S49	BOS Q08M-NS-RE10-03
NPN NC Light-on 1.1m Receiver ④	BOS Q08M-NO-RE10-S49	BOS Q08M-NO-RE10-03
Emitter ⑤	BOS Q08M-X-RS10-S49	BOS Q08M-X-RS10-03

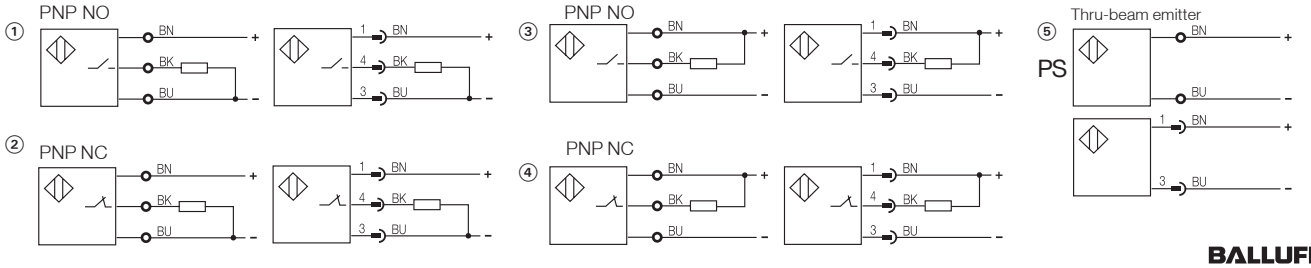
Supply Voltage	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (No Load)	Thru-beam ≤ 15 mA, Others ≤ 20 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Visible Red 640 nm	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Output Indicator	Red LED	
Switching Frequency	500 Hz	
Response Time (On/Off Delay)	≤ 1 ms	
Operating Temperature Range	-10° C to +60° C	
Degree of Protection per IEC 60529	IP 67	
Housing Material	Nickel plated brass	
Sensing Face Material	PMMA	
Connection	M8 3-pin connector	3 m cable, PUR, 3 x 26 AWG
Recommended Connector	C49 ANE-00-VY-050M	
Weight	13 g	47 g

Diffuse values referenced to Kodak gray test card.

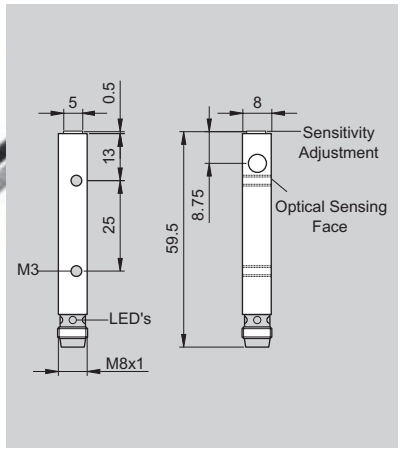
Retroreflective values referenced to BOS R-9 reflector.

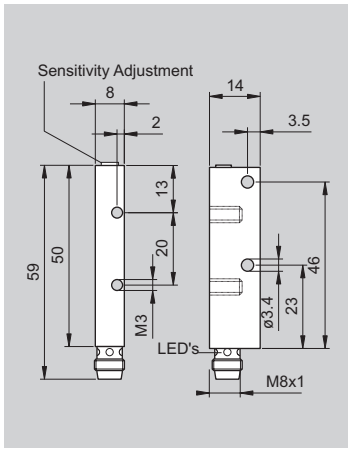
① = Number indicates wiring diagram

Wiring Diagrams



Body Style	8x8 mm Block	8x8 mm Block
Type	90° optics	90° optics

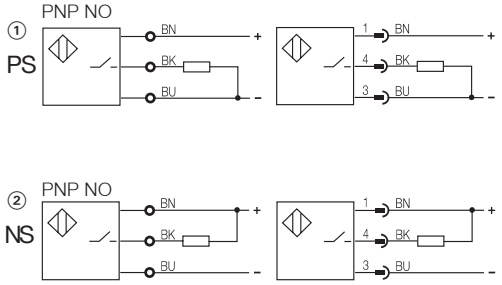




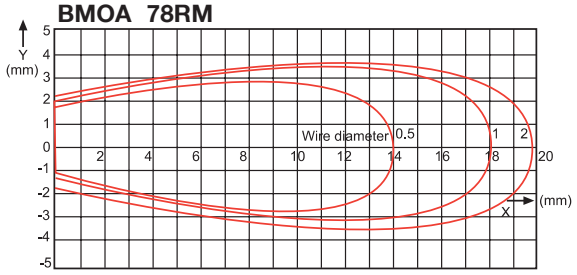
Diffuse		
PNP NO Light-on 50 mm 270° Pot. ①	BMOA 78RM-X50-PS-C-S49	
NPN NO Light-on 50 mm 270° Pot. ②	BMOA 78RM-X50-NS-C-S49	
Polarized Retroreflective		
PNP NO Dark-on 550 mm ①		BMOA 148RM-X50-PS-C-S49/S81
PNP NC Light-on 550 mm ②		BMOA 148RM-X50-NS-C-S49/S81

Supply Voltage	10…30 Vdc
Ripple	≤ 15%
Voltage Drop U_d at I_e	≤ 2 V
Rated Output Current I_e	100 mA
Current Consumption I_O (No Load)	30 mA
Utilization Category (IEC 60-947-4-1)	DC 13
Output Duty Cycle	
Emitter Light Source	Infrared 880 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux
Output Indicator	Red LED
Switching Frequency	500 Hz
Response Time (On/Off Delay)	1 ms
Operating Temperature Range	-10° C to +55° C
Degree of Protection per IEC 60529	IP 65
Housing Material	Nickel plated brass
Sensing Face Material	PMMA
Connection	M8 3-pin connector
Recommended Connector	C49 ANE-00-VY-050M
Weight	15 g

Wiring Diagrams



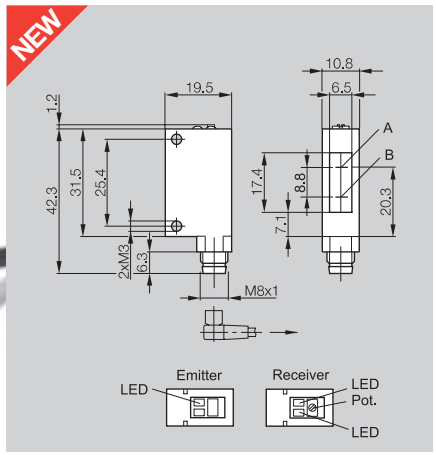
BMOA 78RM

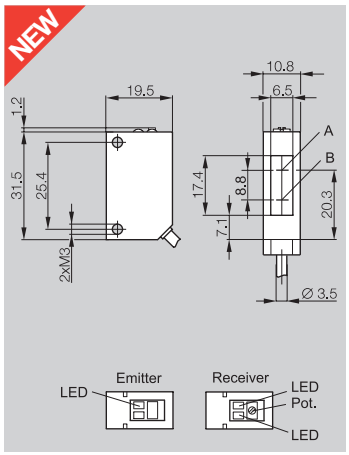


BOS 5K Economical Series

Designed to meet the supply chain needs of OEMs, the BOS 5K series offers a basic package of sensing modes in the same housing as our popular 6K series. The BOS 5K series features a simple potentiometer adjustment for applications that need part detection at an economical price.

A = Thru-Beam—Emitter/Receiver Lens
A = Diffuse/Retro—Receiver Lens
B = Diffuse/Retro—Emitter Lens





Features

- Simple Potentiometer Adjustment
- Miniature housing with M8 quick disconnect or cable connections
- Highly visible status LED's for Output and Stability/ Contamination
- Complete short circuit protection and reverse polarity protection
- Now with background suppression

Applications

- Packaging machinery
- Assembly machinery
- Material handling equipment
- General purpose automation

Body Style	Small block	Small block	Small block
Type	90° optics	90° optics	90° optics
Background Suppression	**Pin 2 Output**	**Pin 4 Output**	**Cable out**
PNP NO Light-on 50...200 mm ②Ⓐ		BOS 5K-PS-RH12-S75	BOS 5K-PS-RH12-02
PNP NO Dark-on 50...200 mm ⑤Ⓐ		BOS 5K-PO-RH12-S75	BOS 5K-PO-RH12-02
NPN NO Light-on 50...200 mm ④Ⓐ		BOS 5K-NS-RH12-S75	BOS 5K-NS-RH12-02
NPN NO Dark-on 50...200 mm ⑥Ⓐ		BOS 5K-NO-RH12-S75	BOS 5K-NO-RH12-02
Diffuse			
PNP NO Light-on 200 mm ②Ⓒ		BOS 5K-PS-RD11-S75	BOS 5K-PS-RD11-02
PNP NC Dark-on 200 mm ①⑤Ⓒ	BOS 5K-PO-RD11-S75	BOS 5K-PO-RD11-S75-S	BOS 5K-PO-RD11-02
NPN NO Light-on 200 mm ④Ⓒ		BOS 5K-NS-RD11-S75	BOS 5K-NS-RD11-02
NPN NC Dark-on 200 mm ③⑥Ⓒ	BOS 5K-NO-RD11-S75	BOS 5K-NO-RD11-S75-S	BOS 5K-NO-RD11-02
PNP NO Light-on 900 mm ②Ⓑ		BOS 5K-PS-ID10-S75	BOS 5K-PS-ID10-02
PNP NC Dark-on 900 mm ①⑤Ⓑ	BOS 5K-PO-ID10-S75	BOS 5K-PO-ID10-S75-S	BOS 5K-PO-ID10-02
NPN NO Light-on 900 mm ④Ⓑ		BOS 5K-NS-ID10-S75	BOS 5K-NS-ID10-02
NPN NC Dark-on 900 mm ③⑥Ⓑ	BOS 5K-NO-ID10-S75	BOS 5K-NO-ID10-S75-S	BOS 5K-NO-ID10-02

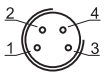
Supply Voltage	10...30 Vdc		
Ripple	≤ 10%		
Voltage Drop U_d at I_e	≤ 1.2 V		
Rated Output Current I_e	100 mA		
Current Consumption I_O (No Load)	≤ 30 mA Retroreflective, Diffuse, BGS		
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13		
Emitter Light Source	Infrared 880 nm Long Range Diffuse/ Visible Red 640nm Polarized, Short Range Diffuse, BGS		
Ambient Light Immunity (EN 60947-5-2)	Sunlight: 10,000 lux maximum, Incandescent lamp: 3,000 lux maximum (at receiver)		
Power Indicator	Green LED (Emitter Only)		
Stability Indicator	Green LED (Except Emitter)		
Output Indicator	Yellow LED (Except Emitter)		
Switching Frequency	500 Hz		
Response Time (On/Off Delay)	1 ms		
Operating Temperature Range	-25° C to +55° C		
Electrical Shock Protection	Class 2		
Degree of Protection per IEC 60529	IP 67		
Short Circuit Protection	Yes		
Overload Protection	Yes		
Housing Material	PC/PBT		
Sensing Face Material	PMMA		
Emitter Life	Average 100,000 hr with Ta=+25° C		
Connection	M8 4-pin Connector	M8 4-pin connector	Cable 2 m, PVC, 3 x 24 AWG
Recommended Connector	C75 ANL-00-VY-050M	C75 ANL-00-VY-050M	
Weight	10 g	10 g	30 g

Note: Pin 4 output is the most common

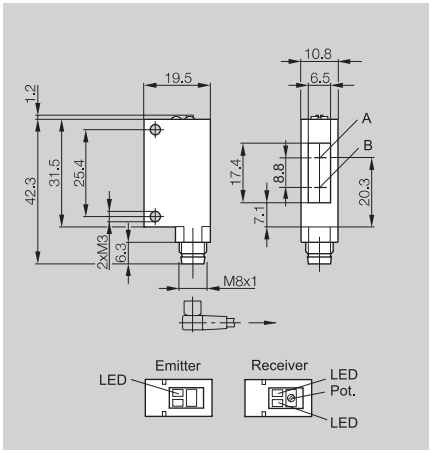
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

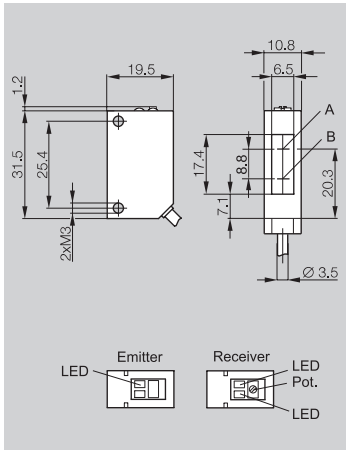
See page 2.63 for diagrams

S75 Connector Pinout



Body Style	Small block	Small block	Small block
Type	90° optics	90° optics	90° optics





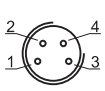
A = Thru-Beam—Emitter/Receiver Lens
A = Diffuse/Retro—Receiver Lens
B = Diffuse/Retro—Emitter Lens

Polarized Retroreflective (270° Pot.)	**Pin 2 Output**	**Pin 4 Output**	**Cable out**
PNP NO Dark-on 4 m ②Ⓓ		BOS 5K-PS-RR10-S75	BOS 5K-PS-RR10-02
PNP NC Light-on 4 m ①⑤Ⓓ	BOS 5K-PO-RR10-S75	BOS 5K-PO-RR10-S75-S	BOS 5K-PO-RR10-02
NPN NO Dark-on 4 m ④Ⓓ		BOS 5K-NS-RR10-S75	BOS 5K-NS-RR10-02
NPN NC Light-on 4 m ③⑥Ⓓ	BOS 5K-NO-RR10-S75	BOS 5K-NO-RR10-S75-S	BOS 5K-NO-RR10-02
Thru-beam (Emitter-Receiver Pair)*			
PNP NO Dark-on 10 m 270° Pot. ②⑦Ⓔ		BOS 5K-PS-IX10-S75	BOS 5K-PS-IX10-02
PNP NC Light-on 10 m 270° Pot. ①⑤⑦Ⓔ	BOS 5K-PO-IX10-S75	BOS 5K-PO-IX10-S75-S	BOS 5K-PO-IX10-02
NPN NO Dark-on 10 m 270° Pot. ④⑦Ⓔ		BOS 5K-NS-IX10-S75	BOS 5K-NS-IX10-02
NPN NC Light-on 10 m 270° Pot. ③⑥⑦Ⓔ	BOS 5K-NO-IX10-S75	BOS 5K-NO-IX10-S75-S	BOS 5K-NO-IX10-02

Supply Voltage	10…30 Vdc		
Ripple	≤ 10%		
Voltage Drop U_d at I_e	≤ 1.2 V		
Rated Output Current I_e	100 mA		
Current Consumption I_O (No Load)	≤ 15 mA Receiver / ≤ 20 mA Emitter / ≤ 30 mA Retroreflective		
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13		
Emitter Light Source	Infrared 880 nm Thru-beam/ Visible Red 640nm Polarized		
Ambient Light Immunity (EN 60947-5-2)	Sunlight: 10,000 lux maximum, Incandescent lamp: 3,000 lux maximum (at receiver)		
Power Indicator	Green LED (Emitter Only)		
Stability Indicator	Green LED (Except Emitter)		
Output Indicator	Yellow LED (Except Emitter)		
Switching Frequency	500 Hz		
Response Time (On/Off Delay)	1 ms		
Operating Temperature Range	-25° C to +55° C		
Electrical Shock Protection	Class 2		
Degree of Protection per IEC 60529	IP 67		
Short Circuit Protection	Yes		
Overload Protection	Yes		
Housing Material	PC/PBT		
Sensing Face Material	PMMA		
Emitter Life	Average 100,000 hr with Ta=+25° C		
Connection	M8 4-pin connector	M8 4-pin connector	Cable 2 m, PVC, 3 x 24 AWG
Recommended Connector	C75 ANL-00-VY-050M	C75 ANL-00-VY-050M	
Weight	10 g	10 g	30 g

Note: Thru-beam types are sold as a set containing one emitter and one receiver.

S75 Connector Pinout

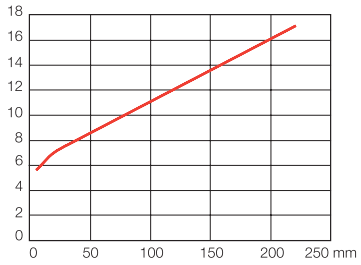


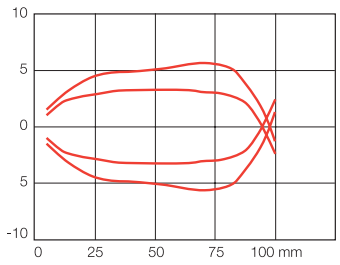
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

See page 2.63 for diagrams

Ⓐ Background Suppression

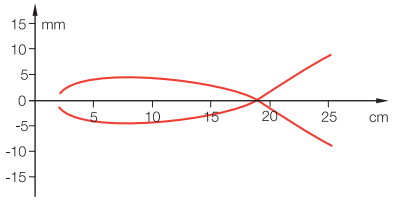
BOS 5K-_ _-RH12-_ _



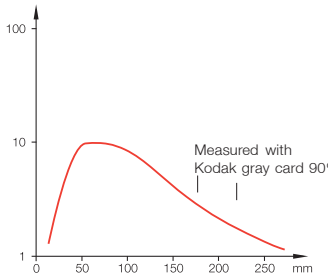


Ⓒ Diffuse small beam

BOS 5K-_ _-RD10-_ _



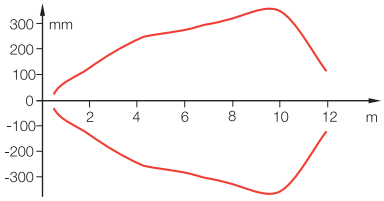
Range measured with lateral travel and Kodak gray card 90%.



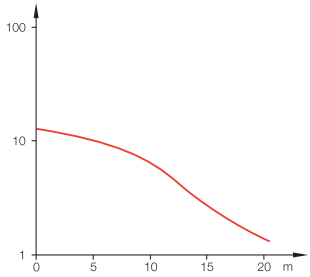
Function Reserve

Ⓔ Thru-beam

BOS 5K-__-IX10-__



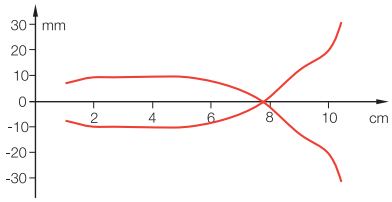
With the thru-beam sensor, the maximum possible offset between emitter and receiver is measured.



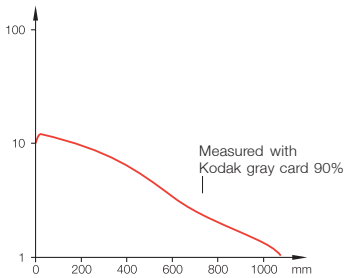
Function Reserve

Ⓑ Diffuse

BOS 5K-_ _-ID10-_ _



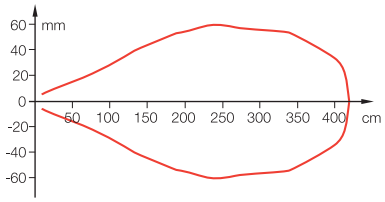
Range measured with lateral travel and Kodak gray card 90%.



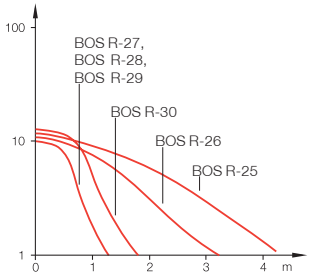
Function Reserve

Ⓓ Retroreflective

BOS 5K-__-RR10-__

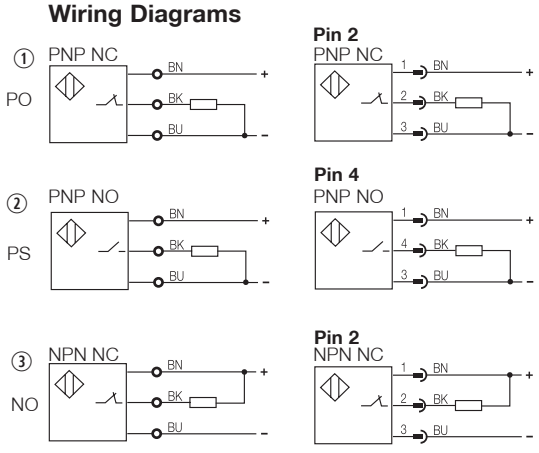


Range measured using lateral travel and BOS R-1 reflector.



Function Reserve

Wiring Diagrams



BOS 6K Advanced Series

Balluff advanced series contains a microprocessor that automatically adjusts the sensor for optimum performance in each application. The advanced microprocessor simplifies set-up with a simple push-button or remote teach-in process that automatically learns the target—even if the target is moving at full production speed. Balluff calls this dynamic teach-in; our customers call it dynamic improvement.

Features

– One button teach-in programmability
– Remote access to teach-in capabilities
– Dynamic teach-in learns running processes
– Laser & Visible red light source aids in alignment
– Highly visible status LEDs for output function and stability/contamination
– Programmable light-on or dark-on mode
– Sealed to IP 67 standards
– Full range of sensing modes
– Special versions for clear glass detection (1QA)
– Electronic background suppresion models for tight locations (1HA)

Applications

– Packaging machinery
– Assembly machinery
– Material handling equipment
– Paper/printing/bindery machinery

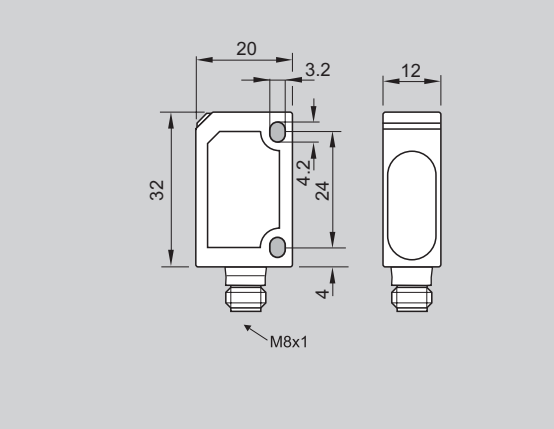
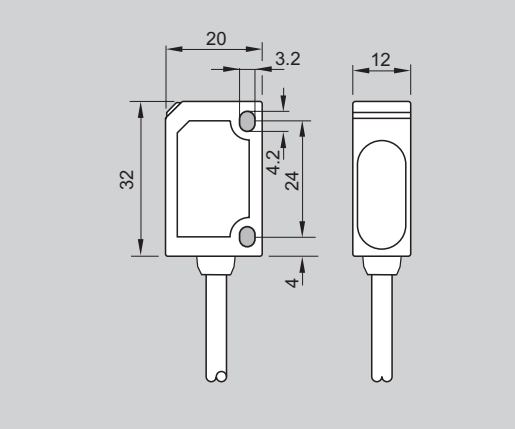
Note:
Diffuse values referenced to Kodak test card. Retroreflective values referenced to BOS R-1 (non-laser) or BOS R-13 (laser) reflectors.

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.68 for diagrams

Body Style	
Type	

Background Suppression	
PNP Light-on/Dark-on 30...100 mm	①Ⓔ
NPN Light-on/Dark-on 30...100 mm	②Ⓔ
Diffuse	
PNP Light-on/Dark-on 5...300 mm	①Ⓐ
NPN Light-on/Dark-on 5...300 mm	②Ⓐ
Polarized Retroreflective	
PNP Light-on/Dark-on 2.5 m	①Ⓑ
NPN Light-on/Dark-on 2.5 m	②Ⓑ
Transparent Detection Retroreflective	
PNP Light-on/Dark-on 0.5 m	①Ⓒ
NPN Light-on/Dark-on 0.5 m	②Ⓒ
Thru-Beam	
PNP Light-on/Dark-on 6 m Receiver	①Ⓖ
NPN Light-on/Dark-on 6 m Receiver	②Ⓖ
6 m Emitter	③Ⓖ

Supply Voltage	
Voltage Drop U_d at I_e	
Rated Isolation Voltage U_i	
Rated Operational Current I_e	
No-load Supply Current I_0	
Protected Against Polarity Reversal	
Short Circuit Protected	
Permissible Capacitance	
On/Off Delay	
Operating Frequency	
Utilization Category	
Output	
Output Function	
Permissible Ambient Light	
Sensitivity/Range Adjustment	
Output Function Indication	
Stability/Contamination Indication	
Emitter Light Source	
Light Spot Diameter	
Hysteresis (18 %/18 %)	
Gray value shift (90 %/18 %)	
Operating Temperature Range	
Temperature Drift	
Degree of Protection per IEC 60529	
Housing Material	
Material of Sensing Face	
Connection	
Weight	
Recommended Connector	

Small block 90° optics	Small block 90° optics
	
BOS 6K-PU-1HA-S75-C BOS 6K-NU-1HA-S75-C	BOS 6K-PU-1HA-C-02 BOS 6K-NU-1HA-C-02
BOS 6K-PU-1OC-S75-C BOS 6K-NU-1OC-S75-C	BOS 6K-PU-1OC-C-02 BOS 6K-NU-1OC-C-02
BOS 6K-PU-1QC-S75-C BOS 6K-NU-1QC-S75-C	BOS 6K-PU-1QC-C-02 BOS 6K-NU-1QC-C-02
BOS 6K-PU-1QA-S75-C BOS 6K-NU-1QA-S75-C	BOS 6K-PU-1QA-C-02 BOS 6K-NU-1QA-C-02
BLE 6K-PU-1E-S75-C BLE 6K-NU-1E-S75-C BLS 6K-XX-1E-S75-C	BLE 6K-PU-1E-C-02 BLE 6K-NU-1E-C-02 BLS 6K-XX-1E-C-02
10...30 Vdc	10...30 Vdc
≤ 2.4 V	≤ 2.4 V
250 Vdc	250 Vdc
100 mA	100 mA
≤ 35 mA	≤ 35 mA
Yes	Yes
Yes	Yes
0.33 µF	0.33 µF
0.5 ms	0.5 ms
1000 Hz	1000 Hz
DC 13	DC 13
PNP/NPN	PNP/NPN
Light-on/Dark-on	Light-on/Dark-on
5000 Lux	5000 Lux
Teach-In	Teach-In
Yellow LED	Yellow LED
Green LED	Green LED
Visible Red 660 nm	Visible Red 660 nm
See page 2.62	See page 2.62
See page 2.62	See page 2.62
< 10% (for 1HA only)	< 10% (for 1HA only)
–20...+60 °C	–20...+60 °C
IP 67	IP 67
ABS impact resistant	ABS impact resistant
PMMA	PMMA
M8 4-pin connector*	2 m cable, 4 x 26 AWG
40 g	120 g
C75 ANL-00-VY-050M	

*Some models also available in M8 3-pin connector. Consult factory for details.

Class II Laser

Block

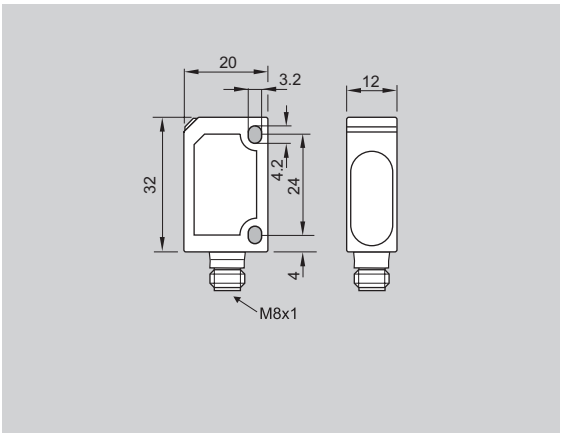
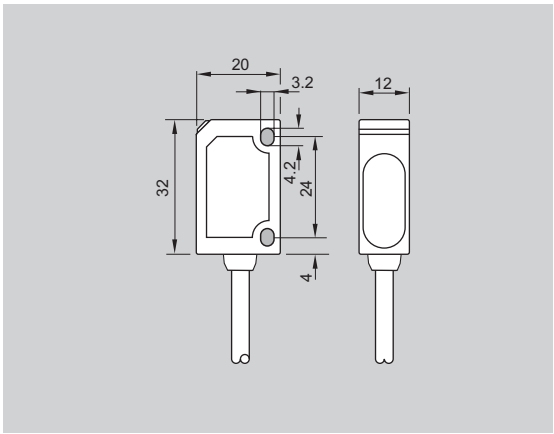
BOS 6K Precision Class II Laser Series

When the need for greater precision arises, step away from standard photoelectric sensors and up to Class II Laser emission with Balluff's BOS 6K precision series. Using a microprocessor that automatically adjusts the sensor for application-specific optimum performance, the 6K series is known to solve the most difficult problems. The BOS 6K contrast sensor is designed to reliably detect small area contrast differences that standard contrast sensors typically miss. The advanced microprocessor simplifies set-up with a simple push-button and a remote teach-in process that automatically learns the target—even if the target is moving at full production speed! Balluff calls this dynamic teach-in; our customers call it a dynamic improvement.

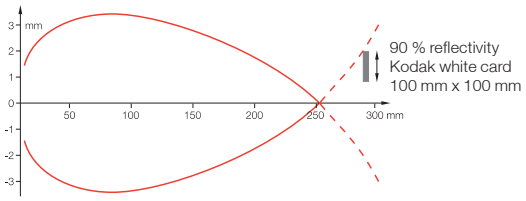
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.68 for diagrams

Body Style	
Type	
Background Suppression	
PNP Light-on/Dark-on 30...110 mm	②
NPN Light-on/Dark-on 30...110 mm	②
PNP Light-on/Dark-on 20...60 mm	①Ⓕ
NPN Light-on/Dark-on 20...60 mm	②Ⓕ
Polarized Retroreflective	
PNP Light-on/Dark-on 0.1...1 m	①Ⓓ
NPN Light-on/Dark-on 0.1...1 m	②Ⓓ
Supply Voltage	
Voltage Drop U_d at I_e	
Rated Isolation Voltage U_i	
Rated Output Current	
Current Consumption I_o (no load)	
Protected Against Polarity Reversal	
Short Circuit Protected	
Permissible Capacitance	
On/Off Delay	
Operating Frequency	
Utilization Category	
Output	
Output Function	
Permissible Ambient Light	
Sensitivity/range Adjustment	
Function Indicator (receiver sees light)	
Operating/contamination Indicator	
Operating Temperature Range	
Degree of Protection per IEC 60529	
Insulation Class	
Laser Protection Class	
Housing Material	
Material of Sensing Face	
Connection	
No. of Wires × Gauge	
Recommended Connector	
Weight	
Emitter Light Source	
Light Spot Diameter	
Hysteresis (18 %/18 %)	
Gray Value Shift (90 %/18 %)	

Diffuse values referenced to Kodak gray card 18 % reflection, 100 × 100 mm.
Contrast sensor values referenced to Kodak gray card 90 % reflection, 100 × 100 mm.

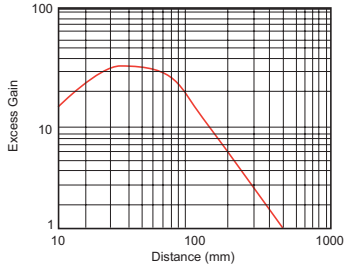
Small block 90° optics	Small block 90° optics
	
BOS 6K-PU-1LHA-SA1-S75-C BOS 6K-NU-1LHA-SA1-S75-C BOS 6K-PU-1LHA-S75-C BOS 6K-NU-1LHA-S75-C	BOS 6K-PU-1LHA-SA1-C-02 BOS 6K-NU-1LHA-SA1-C-02 BOS 6K-PU-1LHA-C-02 BOS 6K-NU-1LHA-C-02
BOS 6K-PU-1LQA-S75-C BOS 6K-NU-1LQA-S75-C	BOS 6K-PU-1LQA-C-02 BOS 6K-NU-1LQA-C-02
10...30 Vdc	10...30 Vdc
≤ 2.4 V	≤ 2.4 V
250 Vac	250 Vac
100 mA	100 mA
≤ 30 mA	≤ 30 mA
Yes	Yes
Yes	Yes
0.1 µF	0.1 µF
0.5 ms	0.5 ms
1000 Hz	1000 Hz
DC 13	DC 13
PNP/NPN	PNP/NPN
Light-on/Dark-on selectable	Light-on/Dark-on selectable
5000 Lux	5000 Lux
Teach-in	Teach-in
Yellow LED	Yellow LED
Green LED	Green LED
-20...+60° C	-20...+60° C
IP 67	IP 67
⧈	⧈
2	2
ABS impact resistant	ABS impact resistant
PMMA	PMMA
M8 4-pin connector	2 m cable, PVC 4 x 26 AWG
C75 ANL-00-VY-050M	
40 g	120 g
Visible red class II laser 650nm	Visible red class II laser 650nm
0.7 mm at focal point (85 mm ± 15 mm)	0.7 mm at focal point (85 mm ± 15 mm)
< 5%	< 5%
< 7%	< 7%

Ⓐ Diffuse (1OC)

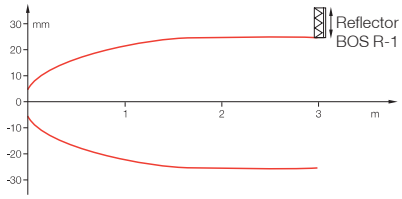


Sensing distance measured with lateral approach using Kodak white card.

Diffuse (1OC)

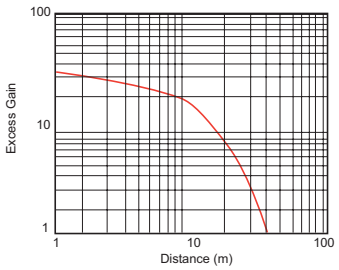


Ⓑ Polarized Retroreflective (1QC)

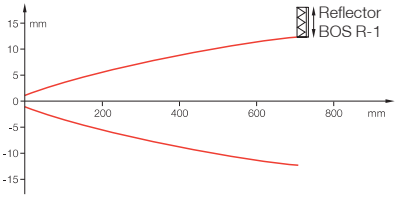


Sensing distance measured with lateral approach using reflector.

Polarized Retroreflective (1QC)

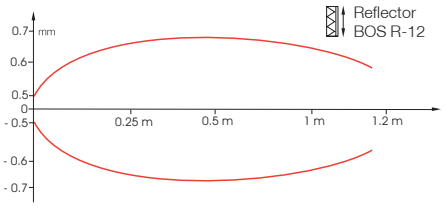


Ⓒ Polarized Retroreflective (1QA)



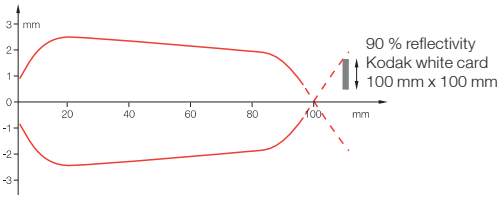
Sensing distance measured with lateral approach using reflector.

Ⓓ Laser Polarized Retroreflective (LQA)



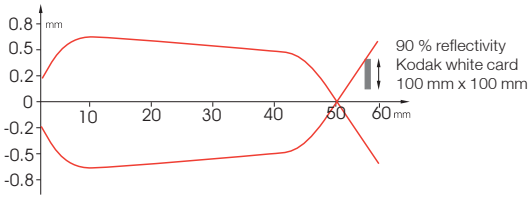
Sensing distance measured with lateral approach using reflector.

Ⓔ Background Suppression (1HA)



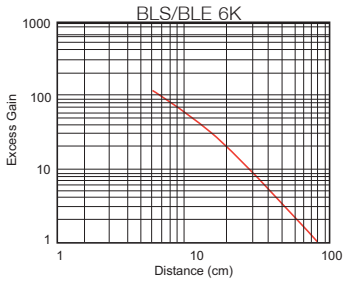
Sensing distance measured with lateral approach using Kodak white card.

Ⓕ Laser Background Suppression (LHA)



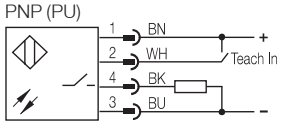
Sensing distance measured with lateral approach using Kodak white card.

Ⓖ Thru-Beam (1E)

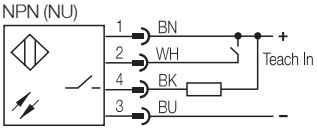


Wiring Diagrams

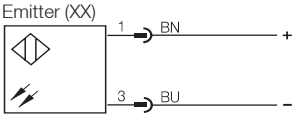
① PNP (PU)



② NPN (NU)



③ Emitter (XX)

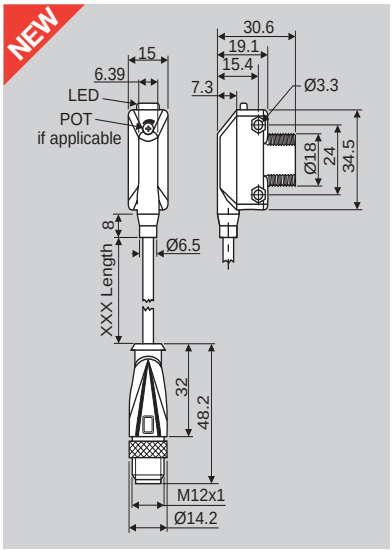


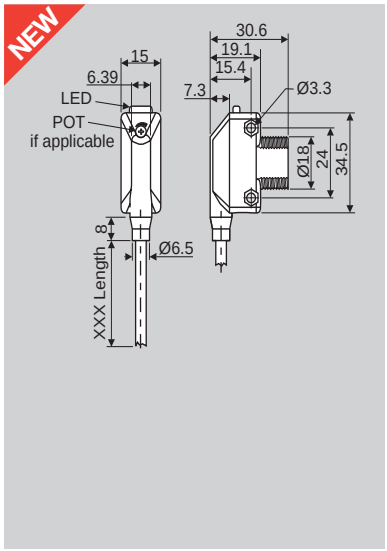
Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	90° optics	90° optics

BOS 11K Series

Now available in the world's most popular form-factor for packaging applications, the BOS 11K offers traditional sensing modes in a compact, flexible mounting package.

Reduce downtime and increase your savings with this dependable series of sensors.





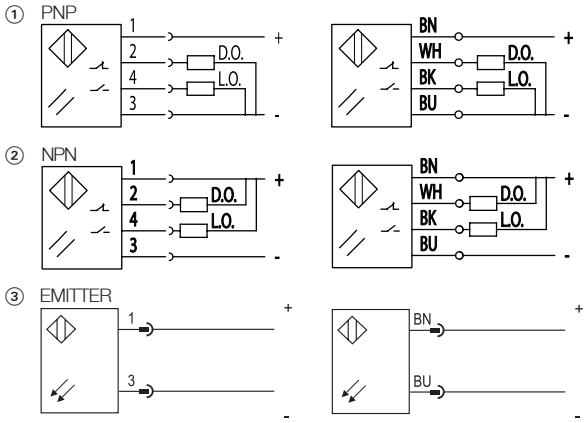
Diffuse			
PNP Light-on/Dark-on 450mm	①Ⓐ	BOS 11K-PA-ID10-00,15-S4	BOS 11K-PA-ID10-02
NPN Light-on/Dark-on 450mm	②Ⓐ	BOS 11K-NA-ID10-00,15-S4	BOS 11K-NA-ID10-02
Polarized Retroreflective			
PNP Light-on/Dark-on 3.5m	①Ⓒ	BOS 11K-PA-PR10-00,15-S4	BOS 11K-PA-PR10-02
NPN Light-on/Dark-on 3.5m	①Ⓒ	BOS 11K-NA-PR10-00,15-S4	BOS 11K-NA-PR10-02
Non-polarized Retroreflective			
PNP Light-on/Dark-on 6.5m	①Ⓑ		BOS 11K-PA-RR10-02
NPN Light-on/Dark-on 6.5m	①Ⓑ		BOS 11K-NA-RR10-02
Thru-Beam			
PNP Light-on/Dark-on 20m, Receiver	①Ⓓ	BOS 11K-PA-IE11-00,15-S4	BOS 11K-PA-IE11-02
NPN Light-on/Dark-on 20m, Receiver	②Ⓓ	BOS 11K-NA-IE11-00,15-S4	BOS 11K-NA-IE11-02
Emitter 20m	③Ⓓ	BOS 11K-X-IS11-00,15-S4	BOS 11K-X-IS11-02

Supply Voltage	10...30 Vdc	
Voltage Ripple	Max 10%	
Voltage Drop U_d	≤ 2 Vdc	
Rated Output Current I_e	100 mA max.	
Current Consumption I_o (no load)	≤ 25 mA	
Leakage Current	≤ 100 µA	
Reverse Polarity Protection	Yes	
Short Circuit Protection	Yes	
Output Function	PNP or NPN	
Emitter Light Source	Infrared (950 nm)/Visible Red (626nm), Polarized retro only	
Operating Temperature Range	-20°C to +55°C	
Switching Frequency	500 Hz (Diffuse, Retro) / 150 Hz (Thru-Beam)	
Response Time	≤ 1ms	
Switching Current	Max. 100 mA	
Sensitivity Adjustment	Yes (Diffuse, Retro) / No (Thru-Beam)	
Function Indication	Power - Green, Output - Yellow	
Environmental Protection per IEC 60529	IP 67	
Housing Material	ABS	
Sensing Face Material	PMMA	
Connection	M12 4-pin, 150 mm pigtail connector	2 m cable
No. of Wires x Gauge		4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Approvals	CE, cULus	

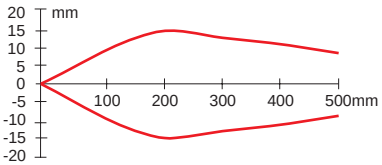
Diffuse values based upon standard white 100 mm x 100 mm reference card.
Retroreflective values based upon BOS R-1 reflector.

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.70 for diagrams

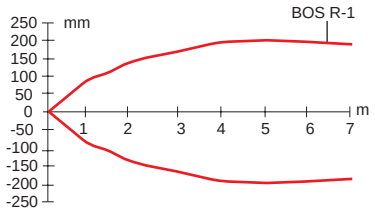
Wiring Diagrams



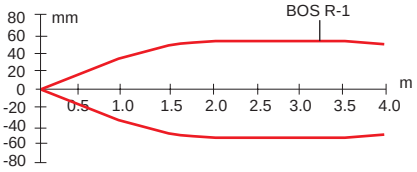
Ⓐ **Diffuse BOS 11K-...-ID10-...**



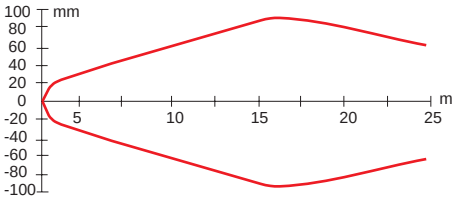
Ⓒ **Non-Polarized Retroreflective BOS 11K-...-RR10-...**



Ⓑ **Polarized Retroreflective BOS 11K-...-PR10-...**



Ⓓ **Thru-Beam BOS 11K-...-IE11-.../BOS 11K-X-IS11...**



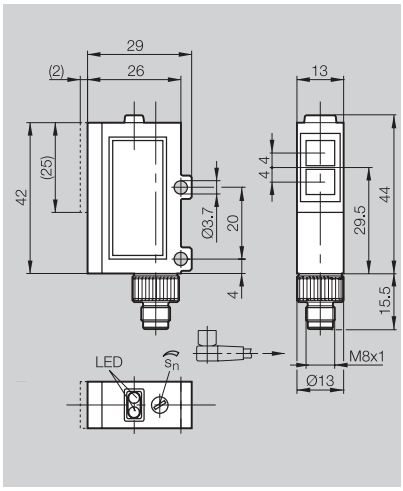
Recommended Reflectors

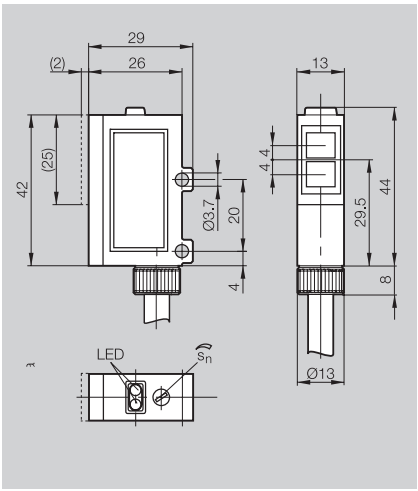
BOS 18R - Standard
BOS R1 - High Efficiency

BOS R26 - Standard
BOS R9 - High Efficiency

BOS 15K

The BOS 15K series is an economical choice for those applications that simply require a replacement sensor.





Body Style	Mid-size block	Mid-size block
Type	90° optics	90° optics
Diffuse (Infrared)		
PNP/NPN, PNP Light-on/Dark-on 100 mm ①②Ⓐ	BOS 15K-R-C10-P-S 75	BOS 15K-R-C10-02
PNP/NPN, PNP Light-on/Dark-on 500 mm ①②Ⓑ	BOS 15K-R-C50-P-S 75	BOS 15K-R-C50-02
Fixed Focus (Visible Red)		
PNP/NPN, PNP Light-on/Dark-on 12 mm ①②Ⓒ	BOS 15K-R-D12-P-S 75	BOS 15K-R-D12-02
Polarized Retroreflective (Visible Red)		
PNP/NPN, PNP Light-on/Dark-on 2 m ①②Ⓓ	BOS 15K-R-B2-P-S 75	BOS 15K-R-B2-02
Thru-beam (Infrared)		
PNP/NPN, PNP Light-on/Dark-on 5 m receiver ③	BLE 15K-R-F5-P-S 75	BLE 15K-R-F5-02
5 m emitter ④	BLS 15K-R-G5-S 75	BLS 15K-R-G5-02
Supply Voltage	10...30 Vdc	10...30 Vdc
Voltage Drop U_d at I_e	≤ 1.5 V	≤ 1.5 V
Rated Isolation Voltage U_i	75 Vdc	75 Vdc
Rated Operational Current I_e	≤ 100 mA	≤ 100 mA
No-load Supply Current I_o max.	≤ 30 mA	≤ 30 mA
Protected Against Polarity Reversal	Yes	Yes
Short Circuit Protected	Yes	Yes
Permissible Capacitance	0.5 µF	0.5 µF
On/Off Delay (Standard)	≤ 1 ms	≤ 1 ms
Switching Frequency	500 Hz	500 Hz
Utilization Category	DC 13	DC 13
Output	PNP	PNP/NPN selectable
Output Function	Light-on/Dark-on selectable	Light-on/Dark-on selectable
Permissible Ambient Light	3000 lux	3000 lux
Sensitivity/range Adjustment	Potentiometer 0...270°	Potentiometer 0...270°
Function Indicator (receiver sees light)	Red LED	Red LED
Contamination Indicator	Green LED	Green LED
Operating Temperature Range	-15...+55° C	-15...+55° C
Degree of Protection per IEC 60529	IP 66	IP 66
Housing Material	ABS	ABS
Material of Sensing Face	PMMA	PMMA
Connection	M8 4-pin connector	2 m cable, PVC
No. of Wires x Conductor Cross Section		4 x 22 AWG
Recommended Connector	C75 ANL-00-VY-050M	
Weight	30 g	85 g

Features

- Supply voltage 10...30 Vdc, reverse polarity protected
- Output short circuit protected
- Light-On/Dark-On selectable
- Sensitivity Adjustment with potentiometer
- Setup aid and stability display with green LED
- IP 66
- Flat window discourages dust accumulation
- Can be DIN rail mounted (fiber optic version)

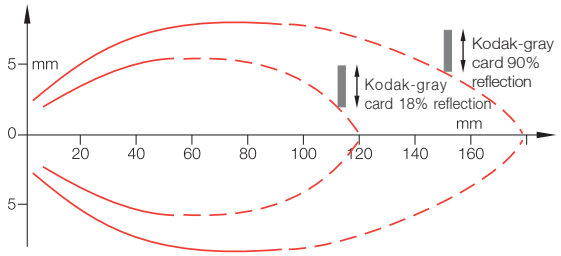
Applications

- Direct object sensing
- Parts counting in machine design and conveying, packaging machinery, and assembly lines

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.72 for diagrams

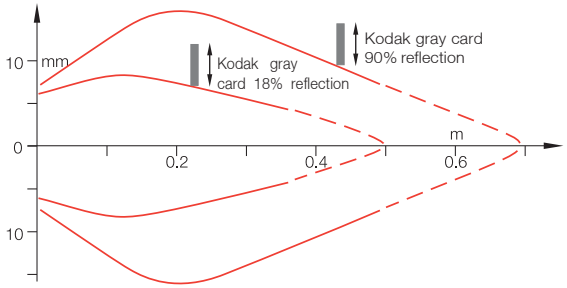
Detection Diagrams

Ⓐ Diffuse BOS 15K-..-C10-...



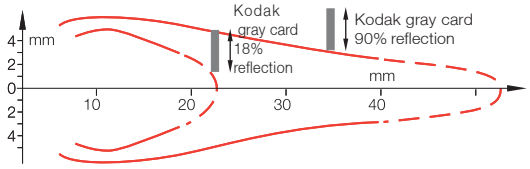
Sensing distance measured with lateral approach using Kodak gray card.

Ⓑ Diffuse BOS 15K-..-C50-...



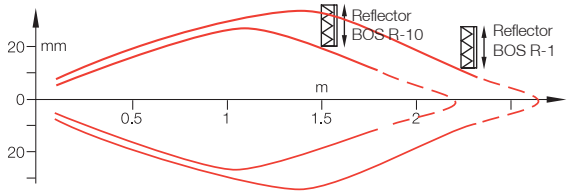
Sensing distance measured with lateral approach using Kodak gray card.

Ⓒ Diffuse with focused beam BOS 15K-..-D12-...



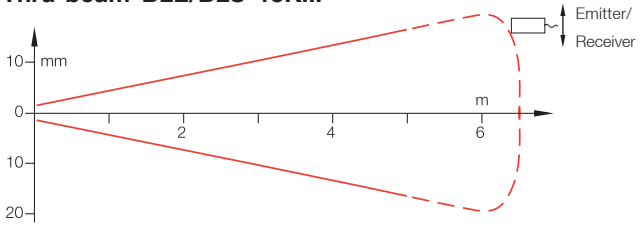
Sensing distance measured with lateral approach using Kodak gray card.

Ⓓ Retroreflective BOS 15K-..-D12-...



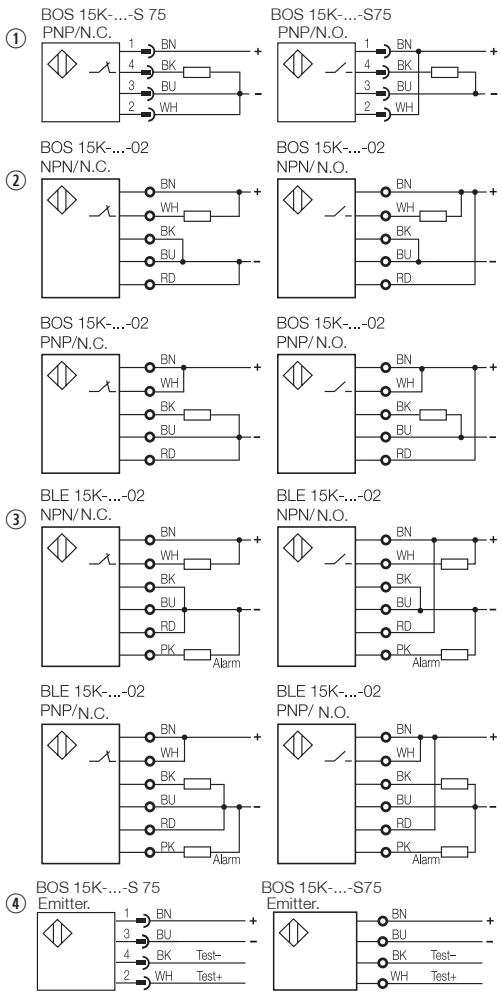
Sensing distance measured with lateral approach using reflector.

Ⓔ Thru-beam BLE/BLS 15K...



For the thru-beam sensor the maximum possible offset between emitter and receiver is measured.

Wiring Diagrams



BOS 16K MiniPro

The BOS 16K MiniPro is an exact match for one of the industry's most popular body styles, making it the ideal solution for reducing inventory and replacing many sensors with one body style. The BOS 16K MiniPro can be mounted as a 18 mm tubular or as a block style photoelectric sensor. Its rugged, one-piece design is rated for 1200 psi washdown and tolerates a high degree of physical abuse.

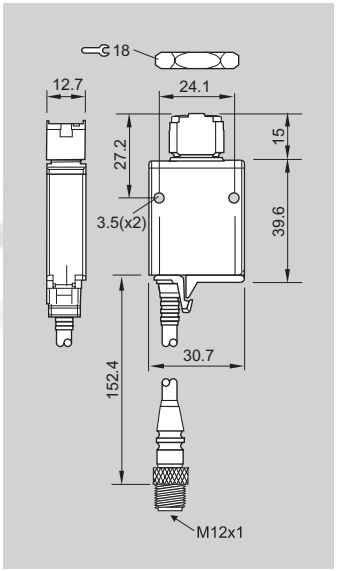
Features

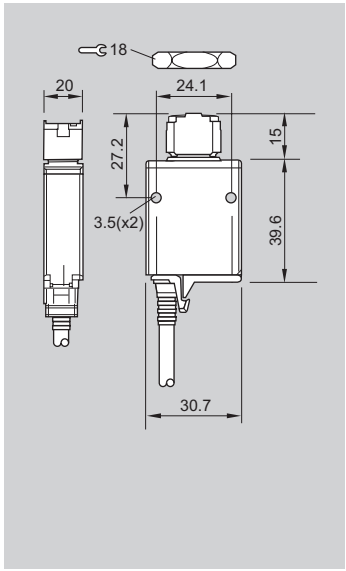
- Flexible Housing
- Plastic housing sealed to IP-67 standards and with-stands 1200 psi wash-down
- Available in 3-wire DC (PNP & NPN) or 2-wire AC/DC, short circuit protected
- 300 µs Response Time handles high-speed applications
- Captive cover allows quick access to Sensitivity Adjustment and Light/Dark selection
- Status LEDs
- Cable strain relief protects cable from pulling and yanking on both cable-out and pigtail versions
- Enhanced sensitivity adjustment
- Five-turn, clutch protected potentiometer is easier than the competition's 15-turn version

Applications

- Packaging Machines
- Food and beverage filling
- Folder/Glue machines
- Printing/bindery
- Color mark detection
- Assembly equipment
- General purpose automation

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics



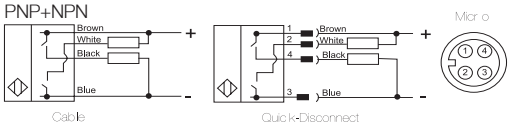


Ordering Code

Standard Diffuse, 380 mm	Ⓓ	BOS 16K-UU-1PD-0.2-S4	BOS 16K-UU-1PD-02
Standard Diffuse, 190 mm, high-speed	Ⓓ	BOS 16K-VU-1PB-0.2-S4	BOS 16K-VU-1PB-02
Fixed Focus Diffuse, VR, 43 mm	Ⓗ	BOS 16K-UU-1LW-0.2-S4	BOS 16K-UU-1LW-02
Fixed Focus Diffuse, VR, 43 mm high-speed	Ⓗ	BOS 16K-VU-1LW-0.2-S4	BOS 16K-VU-1LW-02
Fixed Focus Diffuse, VR 16 mm	Ⓕ	BOS 16K-UU-1LX-0.2-S4	BOS 16K-UU-1LX-02
Fixed Focus Diffuse, VR 16 mm, high-speed	Ⓕ	BOS 16K-VU-1LX-0.2-S4	BOS 16K-VU-1LX-02
Fixed Focus Diffuse, VG, 16 mm	Ⓖ	BOS 16K-UU-1MX-0.2-S4	BOS 16K-UU-1MX-02
Fixed Focus Diffuse, VG 16 mm, high speed	Ⓖ	BOS 16K-VU-1MX-0.2-S4	BOS 16K-VU-1MX-02
Wide Angle Diffuse, 180 mm	Ⓔ	BOS 16K-UU-1AB-0.2-S4	BOS 16K-UU-1AB-02
Wide Angle Diffuse, 90 mm, high-speed	Ⓔ	BOS 16K-VU-1AA-0.2-S4	BOS 16K-VU-1AA-02

Supply Voltage	11...30 Vdc	11...30 Vdc
Voltage Drop, Output	0.7 Vdc max	0.7 Vdc max
Rated Isolation Voltage	300 V	300 V
Rated Output Current	100 mA	100 mA
Supply Current	35 mA	35 mA
Protections	Short circuit, polarity reversal, false pulse	Short circuit, polarity reversal, false pulse
On/Off Delay	Standard 1 ms, High-speed 3 ms	Standard 1 ms, High-speed 0.3 ms
Switching Frequency	Standard 500 Hz, High-speed 1666 Hz	Standard 500 Hz, High-speed 1666 Hz
Output Type	PNP and NPN	PNP and NPN
Output Function	Selectable Light/Dark (switch)	Selectable Light/Dark (switch)
Sensitivity/Range Adjustment	5-turn potentiometer, clutch protected	5-turn potentiometer, clutch protected
Power indication	Green LED	Green LED
Output Function Indication	Yellow LED	Yellow LED
Stability/Short Circuit Indication	Orange LED	Orange LED
Emitter Light Source, diffuse and wide angle	Infrared 880 nm	Infrared 880 nm
Emitter Light Source, fixed focus VR	Visible Red 660 nm	Visible Red 660 nm
Emitter Light Source, fixed focus VG	Visible Green 525 nm	Visible Green 525 nm
Light Field of View	Diffuse 5°, Wide-angle 18°	Diffuse 5°, Wide-angle 18°
Operating Temperature Range	-20° C to +70° C (-4° F to +158° F)	-20° C to +70° C (-4°F to +158°F)
Degree of Protection per IEC 60529	IP67; 1200 psi washdown	IP67; 1200 psi washdown
Shock/vibration	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2
Relative Humidity	95%	95%
Housing Material	Noryl 190X	Noryl 190X
Sensing Face Material	Acrylic	Acrylic
Recommended Connector	C04 AEL-00-VY-050M	
Connection	M12 4-pin Micro, 150 mm pigtail	2 m, PVC jacket, 4 x 22 AWG

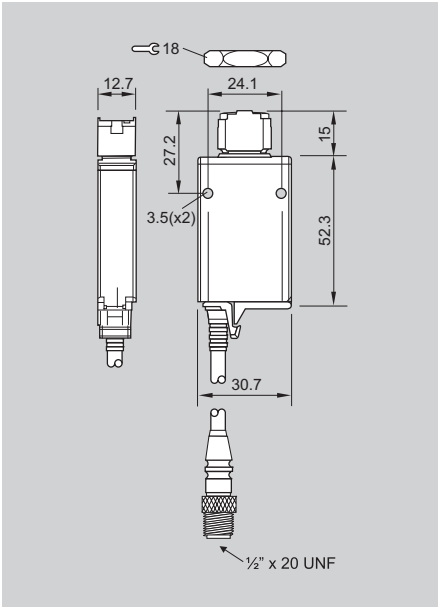
PNP+NPN

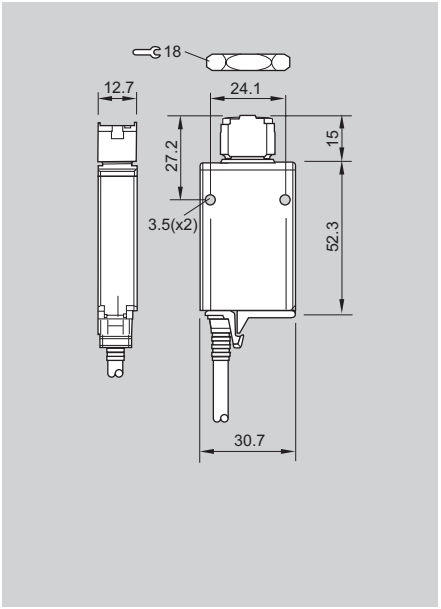


Ⓐ = Letter indicates detection diagrams

See pages 2.77-2.78 for diagram

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics





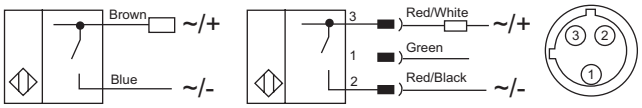
Ordering Code

Standard Diffuse, 380 mm	Ⓓ	BOS 16K-AU-0PD-0.2-S21	BOS 16K-AU-0PD-02
Fixed Focus Diffuse, VR, 43 mm	Ⓗ	BOS 16K-AU-0LW-0.2-S21	BOS 16K-AU-0LW-02
Fixed Focus Diffuse, VR, 16 mm	Ⓕ	BOS 16K-AU-0LX-0.2-S21	BOS 16K-AU-0LX-02
Wide Angle Diffuse, 180 mm	Ⓔ	BOS 16K-AU-0AB-0.2-S21	BOS 16K-AU-0AB-02

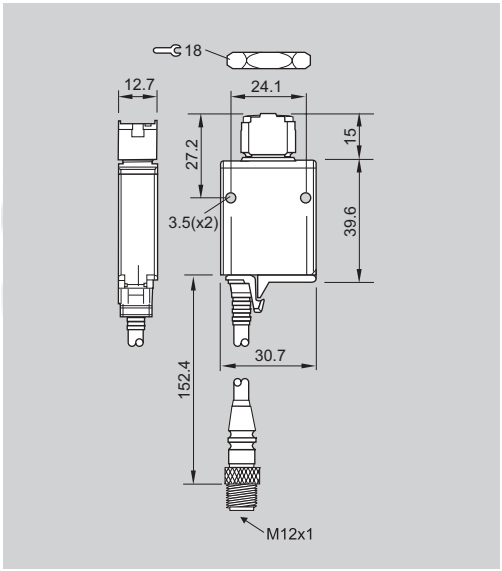
Supply Voltage	22...250 Vac/Vdc	22...250 Vac/Vdc
Voltage Drop, Output	8 Vac	8 Vac
Rated Isolation Voltage	300 V	300 V
Rated Output Current	100 mA	100mA
Supply Current	Leakage 1.7 mA	Leakage 1.7 mA
Power Consumption	4 VA max	4 VA max
Protections	Short circuit, polarity reversal, false pulse	Short circuit, polarity reversal, false pulse
On/Off Delay	8.3ms	8.3ms
Switching Frequency	60 Hz	60 Hz
Output Type	Two-wire	Two-wire
Output Function	Selectable Light/Dark (switch)	Selectable Light/Dark (switch)
Sensitivity/Range Adjustment	5-turn potentiometer, clutch protected	5-turn potentiometer, clutch protected
Power indication	Green LED	Green LED
Output Function Indication	Yellow LED	Yellow LED
Stability/Short Circuit Indication	Orange LED	Orange LED
Emitter Light Source, diffuse and wide angle	Infrared 880 nm	Infrared 880 nm
Emitter Light Source, fixed focus VR	Visible Red 660 nm	Visible Red 660 nm
Light Field of View	Diffuse 5°, Wide-angle 18°	Diffuse 5°, Wide-angle 18°
Operating Temperature Range	-20° C to +70° C (-4°F to +158°F)	-20° C to +70° C (-4°F to +158°F)
Degree of Protection per IEC 60529	IP 67; 1200 psi washdown	IP 67; 1200 psi washdown
Shock/vibration	30 G/10-55 Hz, 1mm; Meets IEC 947-5-2	30 G/10-55 Hz, 1mm; Meets IEC 947-5-2
Relative Humidity	95%	95%
Housing Material	Noryl 190X	Noryl 190X
Sensing Face Material	Acrylic	Acrylic
Recommended Connector	C21 AE3-00-VY-150F	
Connection	M12 3-pin Micro (2-keys), 150 mm pigtail	2m, PVC jacket, 3 x 22 AWG

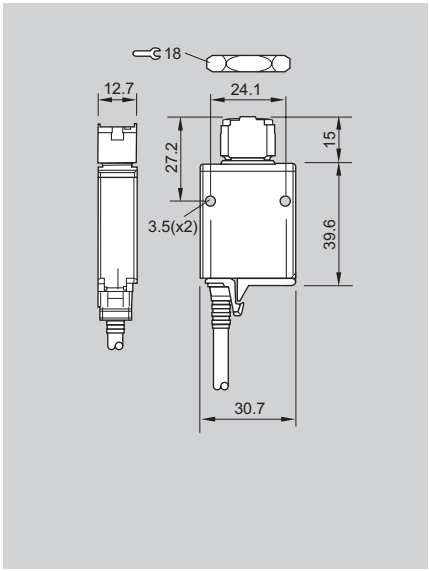
Ⓐ = Letter indicates detection diagram
See pages 2.77-2.78 for diagrams

AC Wiring



Series	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics

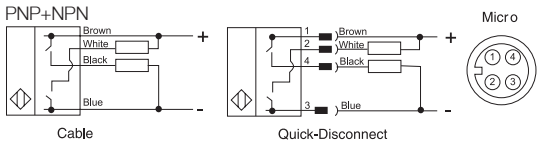


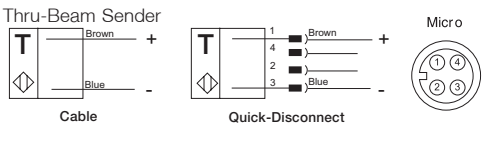


Ordering Code

Retroreflective, VR, 5 m	Ⓐ	BOS 16K-UU-1ZD-0.2-S4	BOS 16K-UU-1ZD-02
Retroreflective, VR, 2.5 m, high-speed	Ⓐ	BOS 16K-VU-1ZB-0.2-S4	BOS 16K-VU-1ZB-02
Polarized Retroreflective, VR, 2 m	Ⓑ	BOS 16K-UU-1QB-0.2-S4	BOS 16K-UU-1QB-02
Polarized Retroreflective, VR, 1 m, high-speed	Ⓑ	BOS 16K-VU-1QA-0.2-S4	BOS 16K-VU-1QA-02
Thru-Beam, IR, 30 m, emitter	Ⓒ	BLS 16K-XX-1R-0.2-S4	BLS 16K-XX-1R-02
Thru-Beam, IR, 10 m, emitter, high-speed	Ⓒ	BLS 16K-VX-1J-0.2-S4	BLS 16K-VX-1J-02
Thru-Beam, IR, 30 m receiver	Ⓒ	BLE 16K-UU-1R-0.2-S4	BLE 16K-UU-1R-02
Thru-Beam, IR, 10 m receiver, high-speed	Ⓒ	BLE 16K-VU-1J-0.2-S4	BLE 16K-VU-1J-02

Supply Voltage	11...30 Vdc	11...30 Vdc
Voltage Drop, Output	0.7 Vdc max	0.7 Vdc max
Rated Isolation Voltage	300 V	300 V
Rated Output Current	100 mA	100 mA
Supply Current	35 mA	35 mA
Protections	Short circuit, polarity reversal, false pulse	Short circuit, polarity reversal, false pulse
On/Off Delay, Retroreflective	Standard 1 ms, High-speed 0.3 ms	Standard 1ms, High-speed 0.3ms
Switching Frequency, Retroreflective	Standard 500 Hz, High-speed 1666 Hz	Standard 500Hz, High-speed 1666Hz
On/Off Delay, Thru-Beam	Standard 16 ms, High-speed 0.9 ms	Standard 16ms, High-speed 0.9ms
Switching Frequency, Thru-Beam	Standard 30 Hz, High-speed 555 Hz	Standard 30Hz, High-speed 555Hz
Output Type	PNP and NPN	PNP and NPN
Output Function	Selectable Light/Dark (switch)	Selectable Light/Dark (switch)
Sensitivity/Range Adjustment	5-turn potentiometer, clutch protected	5-turn potentiometer, clutch protected
Power indication	Green LED	Green LED
Output Function Indication	Yellow LED	Yellow LED
Stability/Short Circuit Indication	Orange LED	Orange LED
Emitter Light Source, Retroreflective	Visible Red 660 nm	Visible Red 660 nm
Emitter Light Source, Thru-Beam	Infrared 880 nm	Infrared 880 nm
Light Field of View	Retroreflective 1.5°, Thru-Beam 7°	Retroreflective 1.5°, Thru-Beam 7°
Operating Temperature Range	-20° C to +70° C (-4°F to +158°F)	-20° C to +70° C (-4° F to +158° F)
Degree of Protection per IEC 60529	IP67; 1200 psi washdown	IP67; 1200 psi washdown
Shock/vibration	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2
Relative Humidity	95%	95%
Housing Material	Noryl 190X	Noryl 190X
Sensing Face Material	Acrylic	Acrylic
Recommended Connector	C04 AEL-00-VY-050M	
Connection	M12 4-pin Micro, 150 mm pigtail	2 m, PVC jacket, 4 x 22 AWG

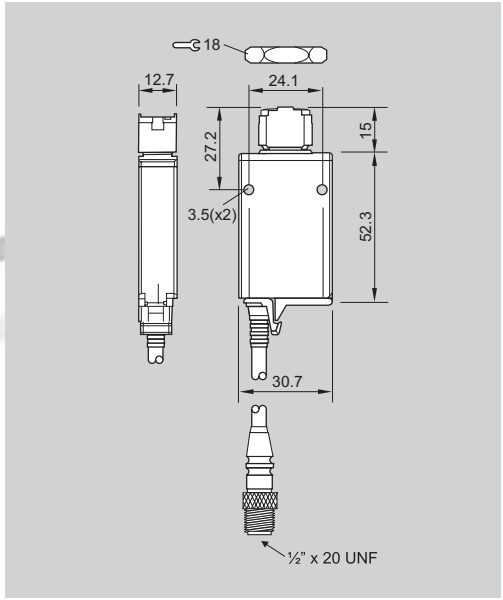


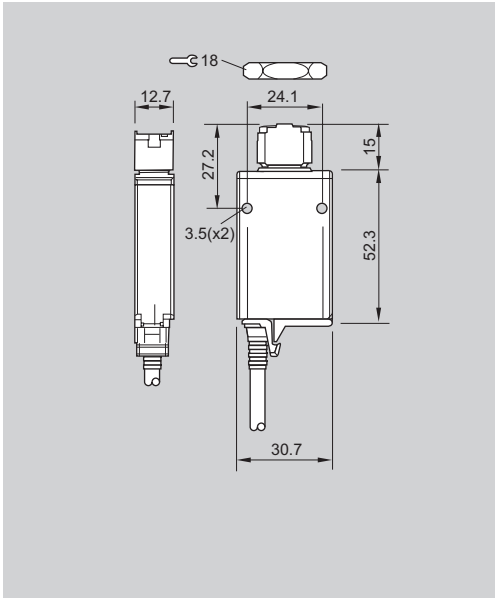


Ⓐ = Letter indicates detection diagrams

See pages 2.77-2.78 for diagrams

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics



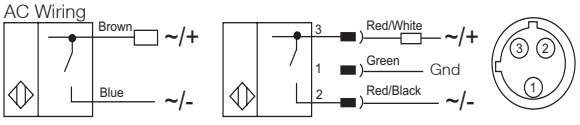


Ordering Code

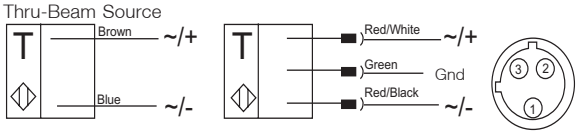
Retroreflective, VR, 5 m	Ⓐ	BOS 16K-AU-0ZD-0.2-S21	BOS 16K-AU-0ZD-02
Polarized Retroreflective, VR, 2 m	Ⓑ	BOS 16K-AU-0QB-0.2-S21	BOS 16K-AU-0QB-02
Thru Beam, IR, 30 m, sender	Ⓒ	BLS 16K-XX-0R-0.2-S21	BLS 16K-XX-0R-02
Thru Beam, IR, 30 m receiver	Ⓒ	BLE 16K-AU-0R-0.2-S21	BLE 16K-AU-0R-02

Supply Voltage	22...250 Vac/Vdc	22...250 Vac/Vdc
Voltage Drop, Output	8 Vac	8 Vac
Rated Isolation Voltage	300 V	300 V
Rated Output Current	100 mA	100 mA
Supply Current	Leakage 1.7 mA	Leakage 1.7 mA
Power Consumption	4 mA max.	4 mA max.
Protections	Short circuit, polarity reversal, false pulse	Short circuit, polarity reversal, false pulse
On/Off Delay, Retroreflective	8.3 ms	8.3 ms
Switching Frequency, Retroreflective	60 Hz	60 Hz
On/Off Delay, Thru-Beam	16 ms	16 ms
Switching Frequency, Thru-Beam	30 Hz	30 Hz
Output Type	Two-wire	Two-wire
Output Function	Selectable Light/Dark (switch)	Selectable Light/Dark (switch)
Sensitivity/Range Adjustment	5-turn potentiometer, clutch protected	5-turn potentiometer, clutch protected
Power indication	Green LED	Green LED
Output Function Indication	Yellow LED	Yellow LED
Stability/Short Circuit Indication	Orange LED	Orange LED
Emitter Light Source, Retroreflective	Visible Red 660 nm	Visible Red 660 nm
Emitter Light Source, Thru-Beam	Infrared 880 nm	Infrared 880 nm
Light Field of View	Retroreflective 1.5°, Thru-Beam 7°	Retroreflective 1.5°, Thru-Beam 7°
Operating Temperature Range	-20° C to +70° C (-4°F to +158°F)	-20° C to +70° C (-4°F to +158°F)
Degree of Protection per IEC 60529	IP 67; 1200 psi washdown	IP 67; 1200 psi washdown
Shock/vibration	30 G/10-55 Hz, 1mm; Meets IEC 947-5-2	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2
Relative Humidity	95%	95%
Housing Material	Noryl 190X	Noryl 190X
Sensing Face Material	Acrylic	Acrylic
Recommended Connector	C21 AE3-00-VY-150F	
Connection	M12 3-pin Micro (2-keys), 150 mm pigtail	2 m, PVC jacket, 3 x 22 AWG

AC Wiring



Thru-Beam Source

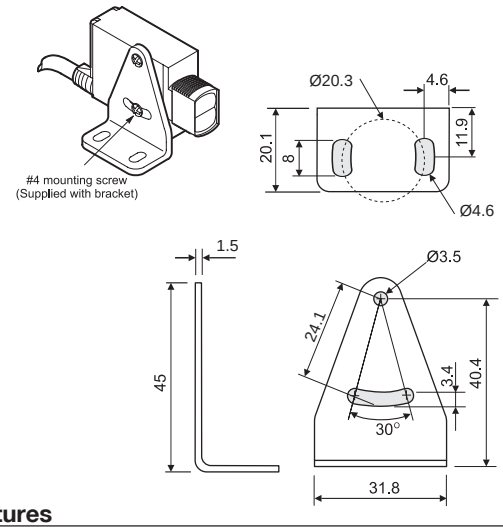


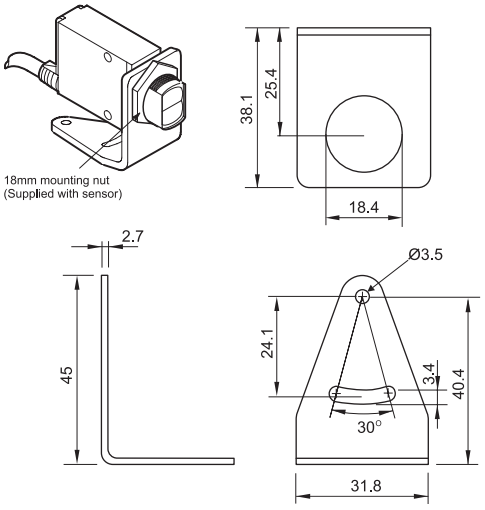
Ⓐ = Letter indicates detection diagram
See pages 2.77-2.78 for diagrams

Recommended Reflectors:
(See section 7)
2m or less: BOS R-2
Over 2m: BOS R-1

Mounting Brackets

Side Mount	Nose Mount
BOS 16-HW-1	BOS 16-HW-2



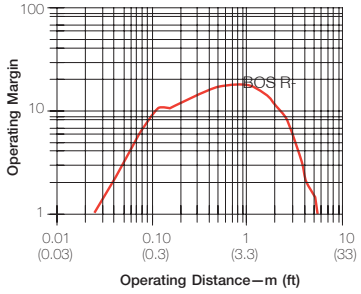


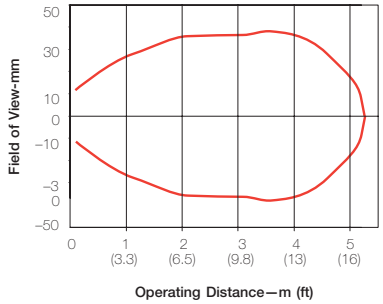
Apertures

Description	Max. sensing range		Ordering code
	standard	high-speed	
1mm slit, qty 20	2.1 m	.7 m	BOS 16K-AP1
2mm slit, qty. 20	10.5 m	3.5 m	BOS 16K-AP2
4mm slit,qty. 20	18.6 m	6.1 m	BOS 16K-AP4
Assortment, qty. 4 each above			BOS 16K-APA

Ⓐ Retroreflective

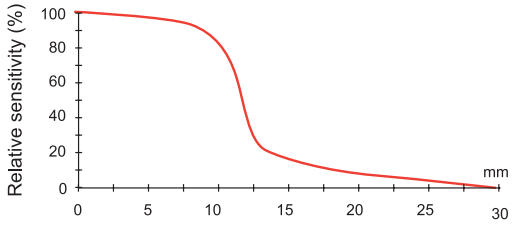
1 ZB..., 1ZD..., 0ZD...





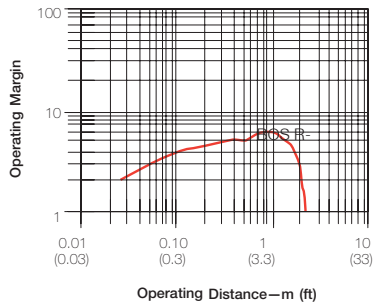
Ⓒ Thru-Beam

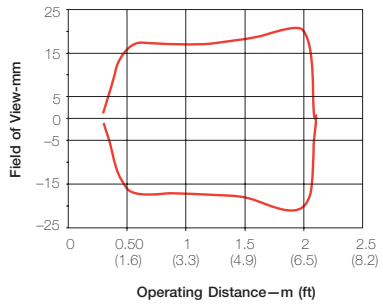
1R...,1J...,0R...



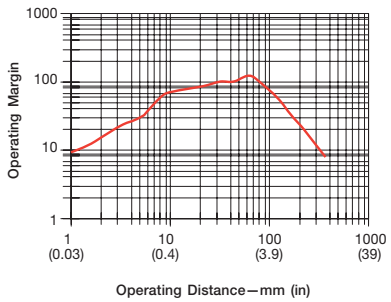
Ⓑ Polarized Retroreflective

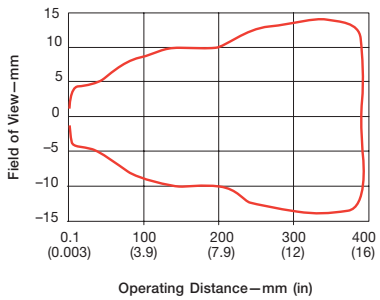
1QA...,1QB...,0QB...



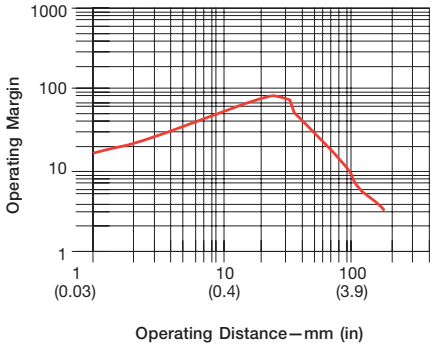


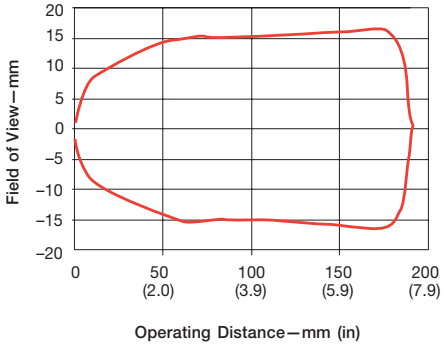
Ⓓ Standard Diffuse 1PD...,1PB...,0PD



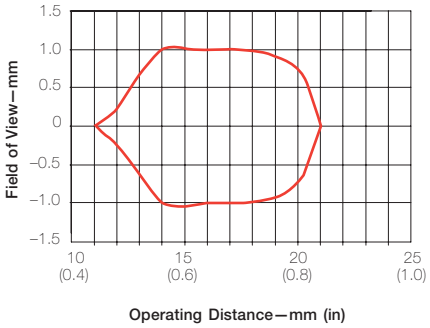


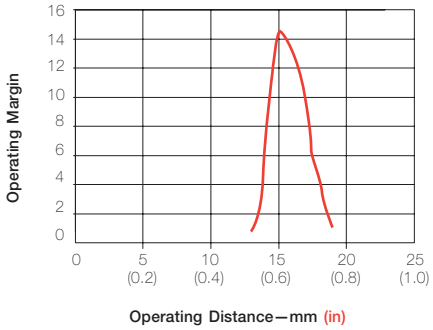
Ⓔ Wide Angle Diffuse 1AA...,1AB...,0AB



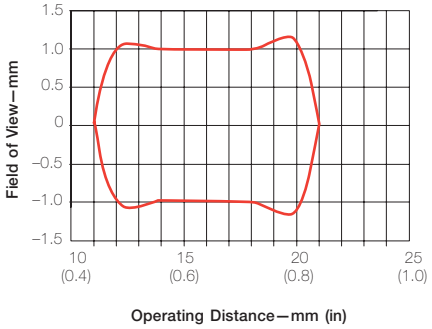


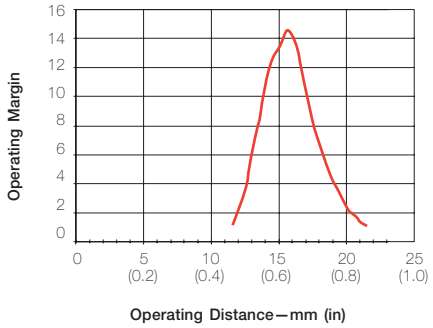
Ⓕ Fixed Focus Diffuse 16 mm Red LED



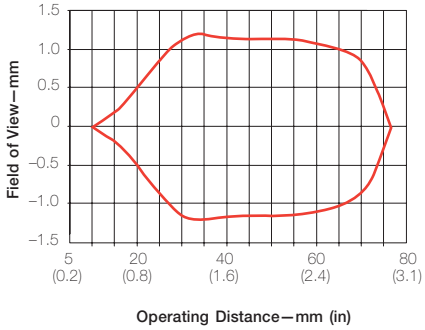


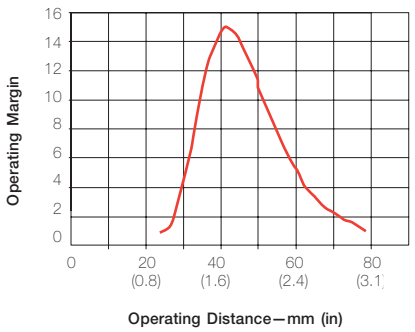
Ⓖ Fixed Focus Diffuse 16 mm Green LED 1MX...





Ⓗ Fixed Focus Diffuse 43 mm Red LED 1LW..., 0LW...





BOS 21M Advanced Rugged Metal Series

The BOS 21M series represents the broadest and most technologically advanced photoelectric family in the world housed in a rugged metal 50x43 mm housing. The BOS 21M is a true platform approach to fulfilling all of your sensing needs with a single body style and includes almost all sensing modes demanded by the most difficult applications. Set-up has never been easier with the choice of a simple potentiometer or a simple one touch teach-in push-button.

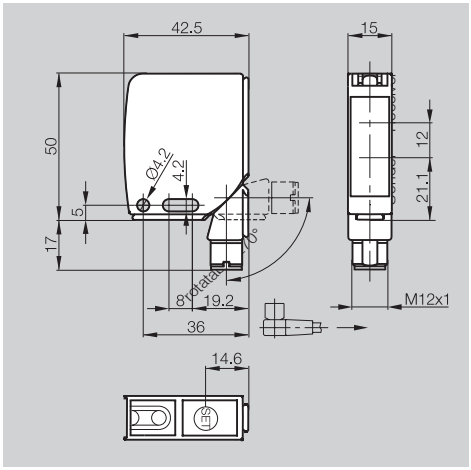
Features

- Rugged Metal 50x43 mm body style
- 10 to 30 Vdc supply voltage
- Simple potentiometer adjustment or a simple one touch teach-in push button.
- Rotable M12 connector
- Highly visible LED's aid in set-up and troubleshootiing

Applications

- Assembly machines
- Inspection machines
- Error proofing
- Packaging machines
- Automotive assembly
- Automatic storage and retrival systems

Body Style	Mid-size block
Type	90° optics

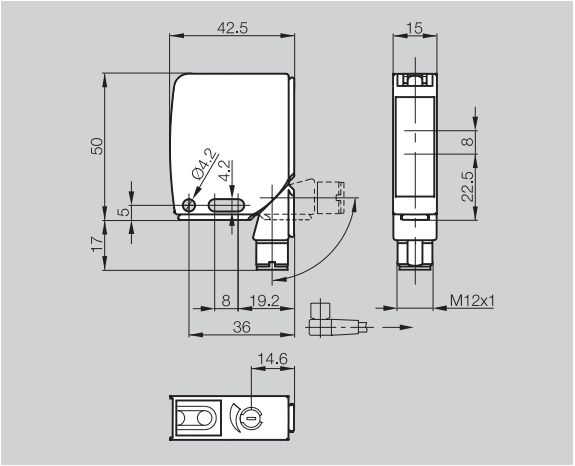


Background Suppression		
PNP NO+NC Light-on 70...200 mm Teach-in	④Ⓓ	BOS 21M-PUS-RH12-S4
NPN NO+NC Light-on 70...200 mm Teach-in	⑤Ⓓ	BOS 21M-NUS-RH12-S4
Foreground/Background Suppression		
PNP NO+NC Light-on 70...200 mm Teach-in	④Ⓕ	BOS 21M-PUS-RV13-S4
NPN NO+NC Light-on 70...200 mm Teach-in	⑤Ⓕ	BOS 21M-NUS-RV13-S4
Long Range Diffuse		
PNP NO+NC Light-on 2 m 270°Pot.	①Ⓑ	BOS 21M-PA-ID10-S4
NPN NO+NC Light-on 2 m 270° Pot.	②Ⓑ	BOS 21M-NA-ID10-S4
Short Range Diffuse		
PNP NO+NC Light-on 1 m 270° Pot.	①Ⓐ	BOS 21M-PA-RD10-S4
NPN NO+NC Light-on 1 m 270°Pot	②Ⓐ	BOS 21M-NA-RD10-S4

Supply Voltage	10…30 Vdc
Ripple	≤ 10%
Voltage Drop U_d at I_e	≤ 2 V
Rated Output Current I_e	100 mA
Current Consumption I_O (No Load)	≤ 35 mA/ ≤ 50 mA (BGS, FGBGS)
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	Visible Red 670 nm BGS, FGBGS/ Visble Red 650 nm Short Range Diffuse/ Infrared 880 nm Long Range Diffuse
Ambient Light Immunity (EN 60947-5-2)	10000 Lux/ 5000 Lux BGS, FGBGS
Output Indicator	Yellow LED
Stability/Error Indicator	Green/Red LED
Switching Frequency	1 kHz BGS, FGBGS, 500 Hz Diffuse
Response Time (On/Off Delay)	≤ 0.5 ms BGS, FGBGS, ≤ 1 ms Diffuse
Operating Temperature Range	-25°C to +55°C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	GD-Zn/Al Metal
Sensing Face Material	PMMA
Emitter Life	Average 100,000 hr with Ta=+25°C
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	78 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.82-2.84 for diagrams

Body Style	Mid-size block
Type	90° optics



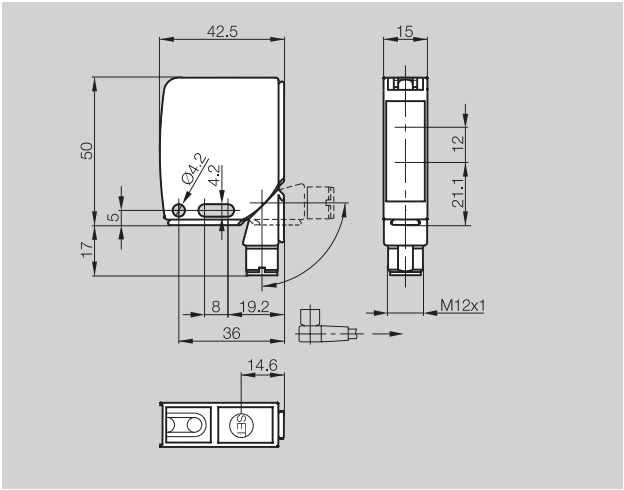
Polarized Retroreflective		
PNP NO+NC Dark-on 8 m 270° Pot.	①Ⓖ	BOS 21M-PA-PR10-S4
NPN NO+NC Dark-on 8 m 270° Pot.	②Ⓖ	BOS 21M-NA-PR10-S4
PNP NO+NC Dark-on 4 m 270° Pot. Autocollimation	①Ⓚ	BOS 21M-PA-PK10-S4
NPN NO+NC Dark-on 4 m 270° Pot. Autocollimation	②Ⓚ	BOS 21M-NA-PK10-S4
Transparent Detection Retroreflective		
PNP NO+NC Dark-on 2 m 270° Pot.	①Ⓗ	BOS 21M-PA-PT10-S4
NPN NO+NC Dark-on 2 m 270° Pot.	②Ⓗ	BOS 21M-NA-PT10-S4
Thru-beam		
PNP NO+NC Dark-on 20 m Receiver 270° Pot.	①Ⓙ	BOS 21M-PA-IE10-S4
NPN NO+NC Dark-on 20 m Receiver 270° Pot.	②Ⓙ	BOS 21M-NA-IE10-S4
Emitter	③Ⓙ	BOS 21M-XT-IS11-S4

Supply Voltage	10…30 Vdc
Ripple	≤ 10%
Voltage Drop U_d at I_e	≤ 2 V
Rated Output Current I_e	100 mA
Current Consumption I_O (No Load)	≤ 35 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	Visible Red 650 nm Polarized retroreflective, Transparent/Infrared 880 nm Thru-beam
Ambient Light Immunity (EN 60947-5-2)	10000 Lux/ 5000 Lux Polarized
Power Indicator	Green LED (Emitter Only)
Output Indicator	Yellow LED (Except Emitter)
Stability/Error Indicator	Green/Red LED
Switching Frequency	500 Hz Thru-beam, 1 kHz Polarized, transparent, 1.5 Hz Autocollimation
Response Time (On/Off Delay)	≤ 1 ms Thru-beam, ≤ 0.5 ms Polarized, transparent, ≤ 0.333 ms Autocollimation
Operating Temperature Range	-25° C to +55° C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	GD-Zn/Al Metal
Sensing Face Material	PMMA
Emitter Life	Average 100,000 hr with Ta=+25°C
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	78 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

See pages 2.82-2.84 for diagrams

Body Style	Mid-size block
Type	90° optics

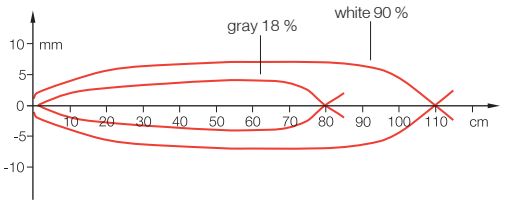


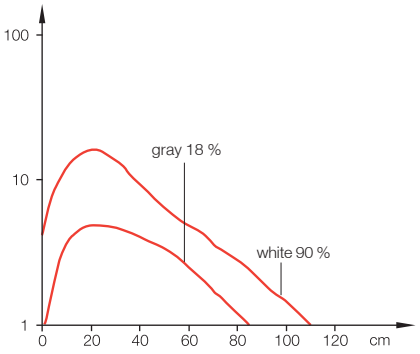
Background Suppression Class I Laser		
PNP NO+NC Light-on 50...100 mm Teach-in	④Ⓔ	BOS 21M-PUS-LH12-S4
NPN NO+NC Light-on 50...100 mm Teach-in	⑤Ⓔ	BOS 21M-NUS-LH12-S4
Diffuse Class I Laser		
PNP NO+NC Light-on 600 mm 270° Pot.	①Ⓒ	BOS 21M-PA-LD10-S4
NPN NO+NC Light-on 600 mm 270° Pot.	②Ⓒ	BOS 21M-NA-LD10-S4
Polarized Retroreflective Class I Laser		
PNP NO+NC Dark-on 20 m 270° Pot.	①Ⓘ	BOS 21M-PA-LR10-S4
NPN NO+NC Dark-on 20 m 270° Pot.	②Ⓘ	BOS 21M-NA-LR10-S4
Thru-beam Class I Laser		
PNP NO+NC Dark-on 60 m Receiver 270° Pot.	①Ⓛ	BOS 21M-PA-LE10-S4
NPN NO+NC Dark-on 60 m Receiver 270° Pot.	②Ⓛ	BOS 21M-NA-LE10-S4
Emitter	③Ⓛ	BOS 21M-XT-LS11-S4

Supply Voltage	10...30 Vdc
Ripple	≤ 10%
Voltage Drop U_d at I_e	≤ 2 V
Rated Output Current I_e	100 mA
Current Consumption I_O (No Load)	≤ 35 mA/ ≤ 60 mA BGS, Diffuse
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	Visible Class I Laser 650 nm
Ambient Light Immunity (EN 60947-5-2)	5000 Lux
Power Indicator	Green LED (Emitter Only)
Output Indicator	Yellow LED (Except Emitter)
Stability/Error Indicator	Green/Red LED
Switching Frequency	1.5 kHz Thru-beam, 2 kHz Polarized, Diffuse, 1 kHz BGS
Response Time (On/Off Delay)	≤ 0.333 ms Thru-beam, ≤ 0.25 ms Polarized, Diffuse, ≤ 0.5 ms BGS
Operating Temperature Range	-10° C to + 50° C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	GD-Zn/Al Metal
Sensing Face Material	PMMA
Emitter Life	Average 100,000 hr with Ta=+25°C
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	78 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.82-2.84 for diagrams

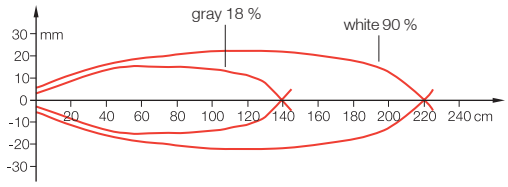
Ⓐ **Short Range Diffuse**
BOS 21M-_A-RD10-S4

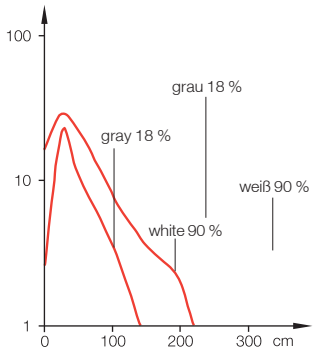




Excess Gain

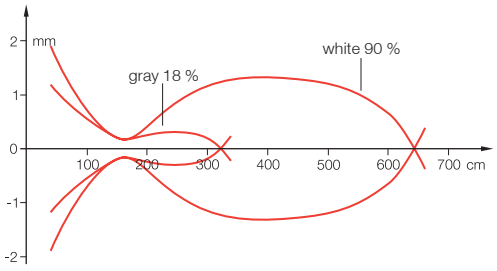
Ⓑ **Long Range Diffuse**
BOS 21M-_A-ID10-S4

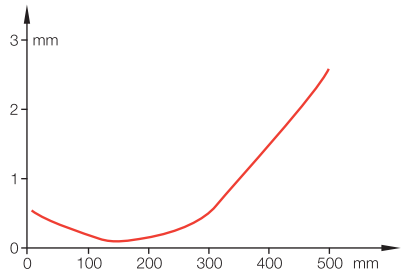




Excess Gain

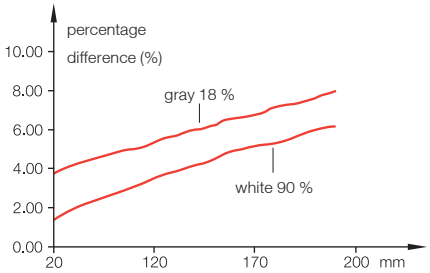
Ⓒ **Diffuse Class I Laser**
BOS 21M-_A-LD10-S4





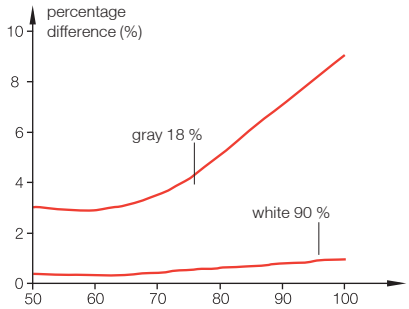
Resolution

Ⓓ **Diffuse with Background Suppression**
BOS 21M-_US-RH12-S4



Setting against white background 90 %

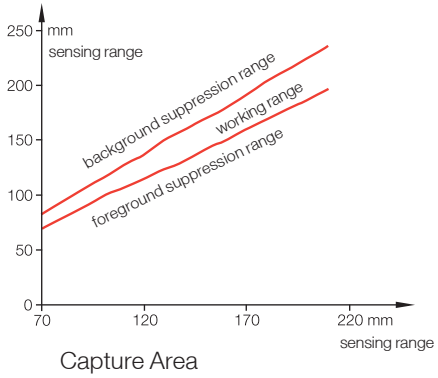
Ⓔ **Diffuse with Background Suppression Class I Laser**
BOS 21M-_US-LH12-S4



setting against white background 90 %

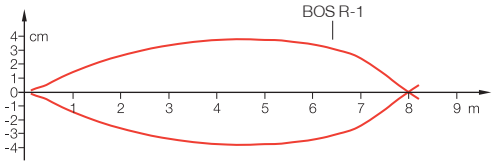
Tolerance with Standard Setting

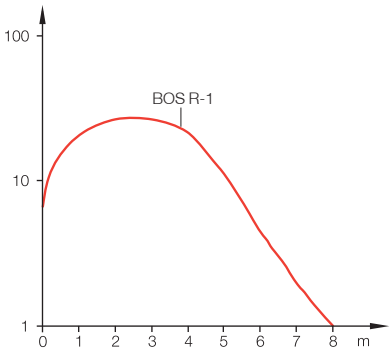
Ⓕ **Diffuse with Foreground/Background Suppression**
BOS 21M-_US-RV13-S4



Capture Area

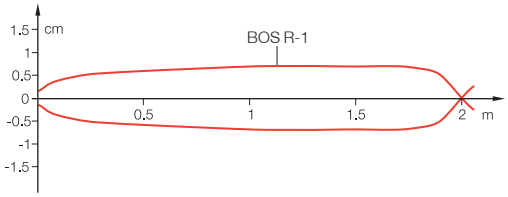
Ⓖ **Polarized Retroreflective**
BOS 21M-_A-PR10-S4

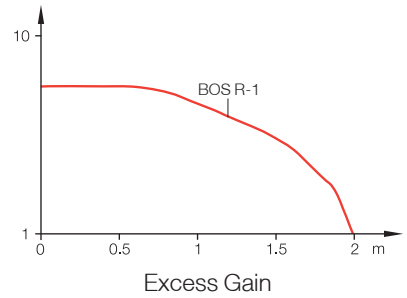




Excess Gain

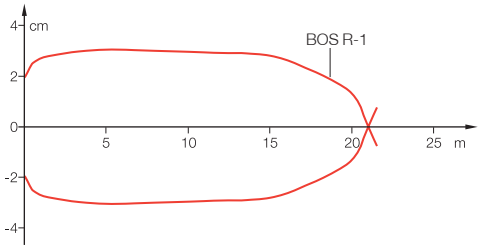
Ⓗ **Transparent Detection Retroreflective**
BOS 21M-_A-PT10-S4

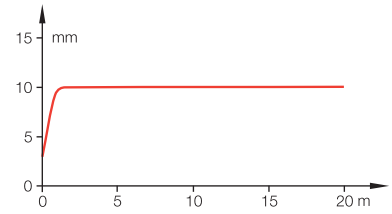




Excess Gain

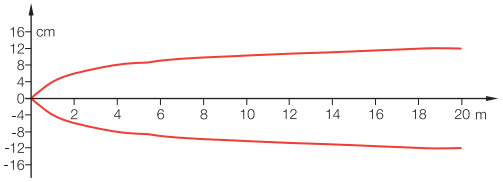
Ⓘ **Retroreflective Polarized Class I Laser**
BOS 21M-_A-LR10-S4

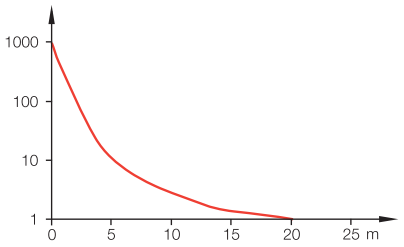




Resolution

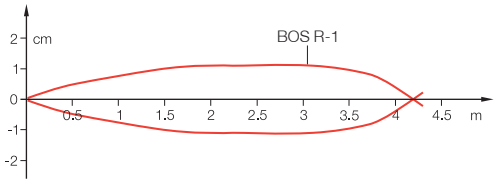
Ⓙ **Thru-beam**
BOS 21M-_A-IE10-S4

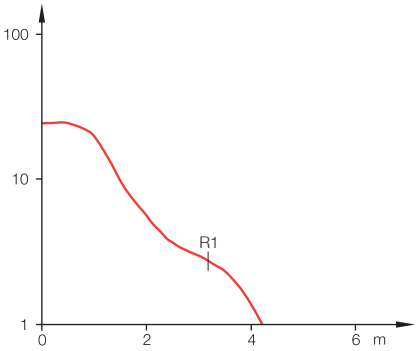




Excess Gain

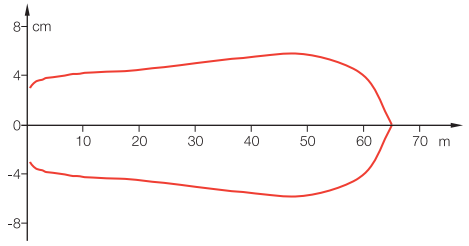
Ⓚ **Autocollimation Polarized Retroreflective**
BOS 21M-_A-PK10-S4

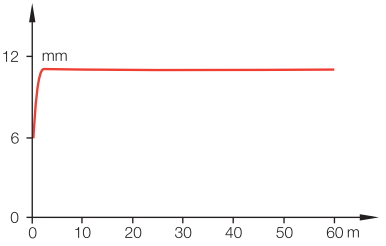




Excess Gain

Ⓛ **Thru-beam Class I Laser**
BOS 21M-_A-LE10-S4

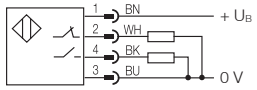




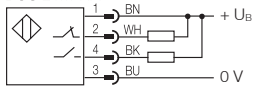
Resolution

Wiring Diagrams

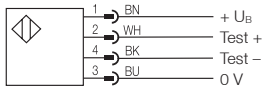
① BOS 21M-PA-...



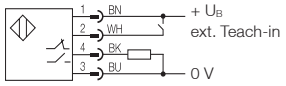
② BOS 21M-NA-...



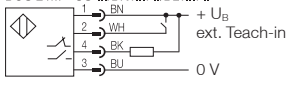
③ BOS 21M-XT-...



④ BOS 21M-PUS-.../BKT...P../BLT...P..



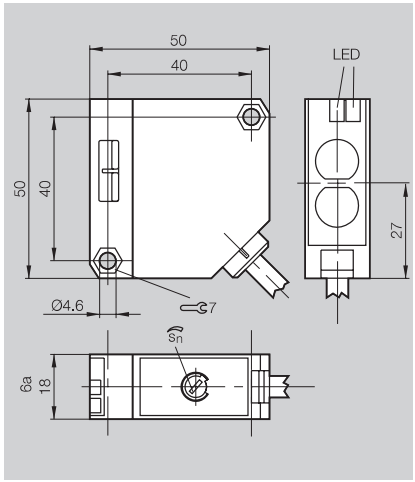
⑤ BOS 21M-NUS-.../BKT...P../BLT...P..

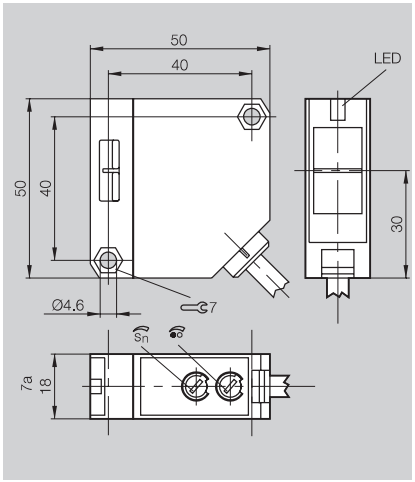


Body Style	Mid-size block	Mid-size block
Type	90° optics	90° optics

BOS 25K Economical Series

The Balluff 25K series represents an economical family of AC/DC and DC cableout photoelectric sensors housed in a standard 50 x 50 mm body style that can be used in almost any application.





Background Suppression			
PNP/NPN NO/NC Light-on 50...250 mm, multi-turn Pot. ①Ⓔ		BOS 25K-5-M25-02	
Diffuse			
PNP/NPN NO/NC Light-on 2 m 270° Pot.	①Ⓒ	BOS 25K-5-C200-02	
AC/DC Relay NO/NC Light-on 2 m 270° Pot.	④Ⓒ		BOS 25K-1-C200-02
Polarized Retroreflective			
PNP/NPN NO/NC Dark-on 5 m 270° Pot.	①Ⓐ	BOS 25K-5-B5-02	
AC/DC Relay NO/NC Dark-on 5 m 270° Pot.	④Ⓐ		BOS 25K-1-B5-02
Transparent Detection Retroreflective			
PNP/NPN NO/NC Dark-on 1 m 270° Pot.	①Ⓓ	BOS 25K-5-T1-02	
AC/DC Relay NO/NC Dark-on 1 m 270° Pot.	④Ⓓ		BOS 25K-1-T1-02
Thru-beam			
PNP/NPN NO/NC Dark-on 20 m 270° Pot.	②Ⓑ	BLE 25K-5-F20-02	
Emitter DC	③Ⓑ	BLS 25K-5-G20-02	
AC/DC Relay NO/NC Dark-on 20 m 270° Pot.	④Ⓑ		BLE 25K-1-F20-02
Emitter AC/DC	⑤Ⓑ		BLS 25K-1-G20-02

Supply Voltage	10…30 Vdc	15…264 Vac/Vdc
Voltage Drop U_d at I_e	≤ 1.5 V	
Rated Isolation Voltage Ui	75 Vdc	250 Vac
Rated Output Current I_e	≤ 100 mA	≤ 3A max. Resistive Load
Current Consumption I_O (No Load)	≤ 30 mA	≤ 40 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	AC 140
Emitter Light Source	Infrared 880nm Thru-beam, Background Suppression/Visible Red 660nm Polarized, Transparent Detection	
Ambient Light Immunity (EN 60947-5-2)	10,000 Lux	10,000 Lux
Power Indicator	Red LED (Emitter Only)	
Stability Indicator	Green LED (Background Suppression Only)	
Output Indicator	RED LED (Except Emitter)	
Switching Frequency	500 Hz (250 Hz Thru-beam)	16 Hz
Response Time (On/Off Delay)	1ms (2ms Thru-beam)	30ms
Operating Temperature Range	-25°C to +55°C	
Electrical Shock Protection	Class 2	Class 1
Degree of Protection per IEC 60529	IP 65	IP 65
Short Circuit Protection	Yes	No
Housing Material	ABS	ABS
Sensing Face Material	PMMA	PMMA
Emitter Life	Average 100,000 hr with Ta=+25°C	
Connection	Cable 2 m, PVC, 4 x 22 AWG	Cable 2 m, PVC, 5 x 24 AWG
Weight	160 g	160 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

See pages 2.86 for diagrams

Features

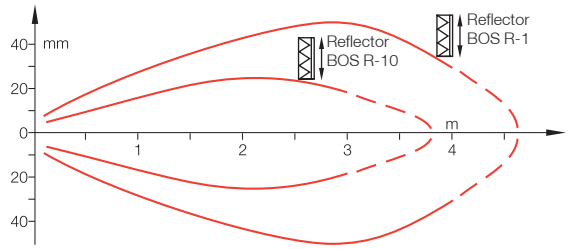
- Universal 15...264 Vac/Vdc with relay output or 10…30Vdc, PNP, NPN
- Normally open/ Normally Closed selectable

Applications

- Elevators
- Machine tools
- Gate controls
- Robots
- Small parts recognition
- Handling automation

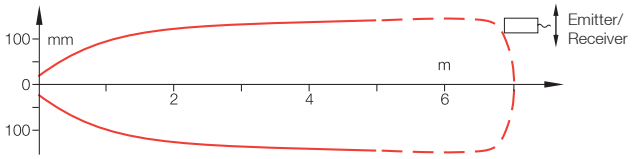
Detection Diagrams

Ⓐ Retroreflective with Polarizing Filter BOS 25K-..-B5-...



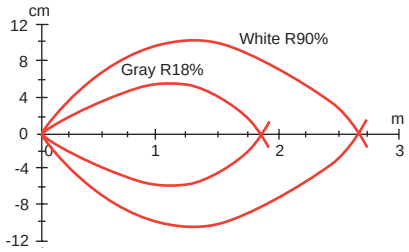
Sensing distance measured with lateral approach using reflector.

Ⓑ Thru-beam BLE/BLS 25K-...

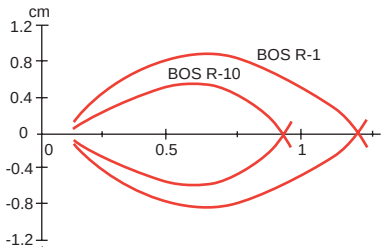


For the Thru-beam sensor, the maximum possible offset between emitter and receiver is measured.

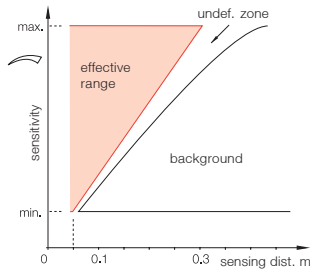
Ⓒ Diffuse BOS 25K-..-C200-..



Ⓓ Diffuse BOS 25K-..-T1-..

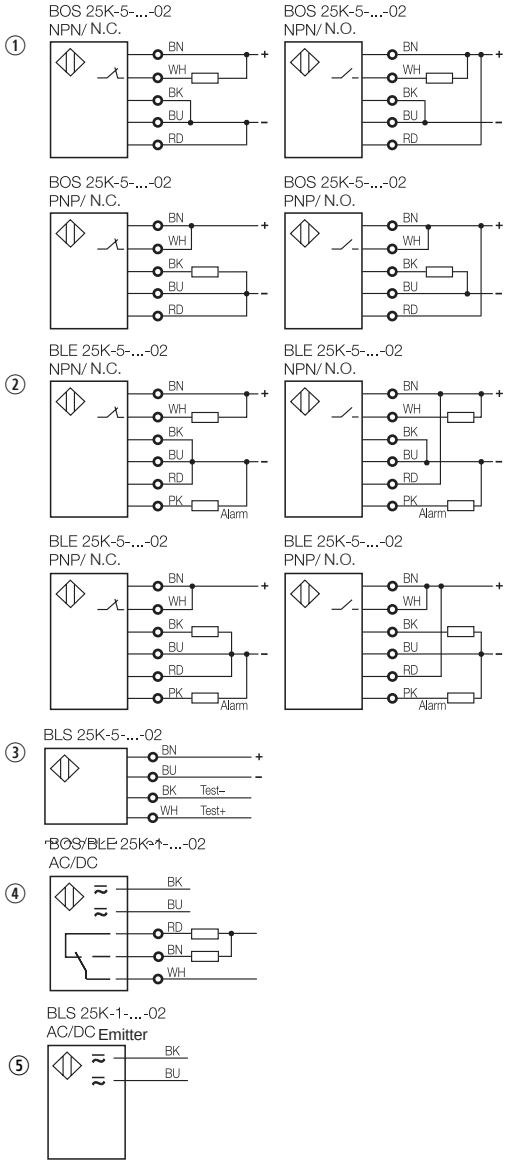


Ⓔ Diffuse BOS 25K with Background Suppression



The "undefined zone" in the diffuse BOS 25K-5-M25-... is the zone between the effective range and the background. The sensing distance can be set between 50 mm and 250 mm using a spindle of the unit. Remember, the "undefined zone" also changes proportionally to the sensing distance.

Wiring Diagrams



BOS 26K Precision Series

The BOS 26K is a standard 50x50 mm body style that can be used in almost any application. The BOS 26K series precision background suppression is designed specifically to solve tough applications that cause typical sensors to fail. The single-eye optical design of the auto collimation, polarized retroreflective version offers a precise switching point, increased sensing distance and faster switching frequencies when compared with traditional systems.

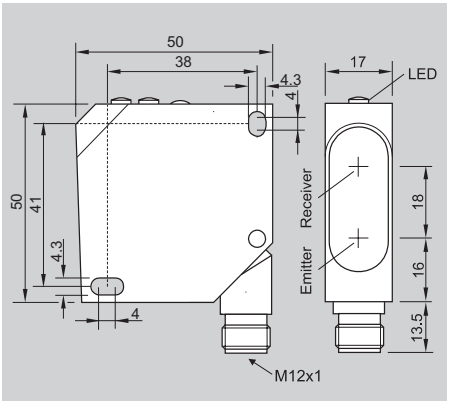
Features

- Rotatable M12 connector
- Precise two-turn adjustment control
- Clear character display for adjustment setting
- Optimal design to resist contamination of the lens
- Complementary discrete outputs

Applications

- Precise small part detection
- Positioning tasks
- Detail checking
- Conveyor inspection
- Automation
- Handling equipment

Body Style	Mid-size block
Type	90° optics



Background Suppression		
PNP NO/NC Light-on 30…300 mm Two-turn Pot	①Ⓐ	BOS 26K-PA-1HC-S4-C
NPN NO/NC Light-on 30…300 mm Two-turn Pot.	②Ⓐ	BOS 26K-NA-1HC-S4-C
PNP NO/NC Light-on 150…600 mm Two-turn Pot.	①Ⓒ	BOS 26K-PA-1IE-S4-C
NPN NO/NC Light-on 150…600 mm Two-turn Pot.	②Ⓒ	BOS 26K-NA-1IE-S4-C
Polarized Retroreflective (Auto Collimation)		
PNP NO/NC Dark-on 5.5 m Two-turn Pot.	①Ⓑ	BOS 26K-PA-1QE-S4-C
NPN NO/NC Dark-on 5.5 m Two-turn Pot.	②Ⓑ	BOS 26K-NA-1QE-S4-C

Supply Voltage		10…30 Vdc
Voltage Drop U_d at I_e		≤ 2.4 V
Rated Isolation Voltage		250 Vdc
Rated Output Current I_e		≤ 250 mA
Current Consumption I_O (No Load)	BGS (1HC)	≤ 35 mA
Current Consumption I_O (No Load)	BGS (1IE)	≤ 70 mA
Current Consumption I_O (No Load)	Polarized (1QE)	≤ 30 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13
Emitter Light Source	BGS (1HC)	Visible Red 660 nm
Emitter Light Source	BGS (1IE)	Infrared 880 nm
Emitter Light Source	Polarized (1QE)	Visible Red 660 nm
Light Spot Diameter		20 x 20 mm at S_n 400 mm
Hystersis (18%/18% Reflectivity)	BGS VR/IR	≤ 5%/≤ 15%
Gray shift value (90%/18% Reflectivity)	BGS VR/IR	≤ 8%/≤ 12%
Ambient Light Immunity (EN 60947-5-2)		5000 Lux.
Stability Indicator		Green LED/ Red LED
Output Indicator		Yellow LED
Switching Frequency/Response Time (On/Off Delay)	BGS (VR)	1000 Hz/0.5 ms
Switching Frequency/Response Time (On/Off Delay)	BGS (IR)	800 Hz/0.625 ms
Switching Frequency/Response Time (On/Off Delay)	Polarized	1000 Hz/0.5 ms
Operating Temperature Range		-20°C to +60°C
Electrical Shock Protection		Class 2
Degree of Protection per IEC 60529		IP 67
Short Circuit Protection		Yes
Overload Protection		Yes
Reverse Polarity Protection		Yes
Housing Material		ABS
Sensing Face Material		PMMA
Connection		M12 4-pin connector
Recommended Connector		C04 AEL-00-VY-050M
Weight		40 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

See pages 2.89-2.90 for diagrams

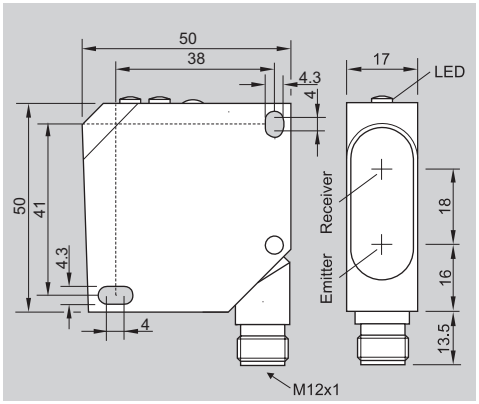
BOS 26K Class II Laser

When extreme precision and fast switching speeds are needed, the BOS 26K Class II Laser is the best choice. The BOS 26K Class II Laser is housed in a standard 50x50mm body style that can be used in almost any application.

Features

- Extreme precision
- Extended sensing distance and range
- Brilliant red light
- High Switching Frequency
- Protection class 2 laser

Body Style	Mid-size block
Type	90° optics



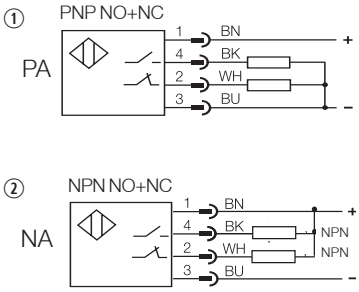
Background Suppression — Class II Laser		
PNP NO/NC Light-on 40...60 mm Two-turn Pot.	①	BOS 26K-PA-1LHA-SA1-S4-C
NPN NO/NC Light-on 40...60 mm Two-turn Pot.	②	BOS 26K-NA-1LHA-SA1-S4-C
PNP NO/NC Light-on 30…150 mm Two-turn Pot.	①Ⓔ	BOS 26K-PA-1LHB-S4-C
NPN NO/NC Light-on 30…150 mm Two-turn Pot.	②Ⓔ	BOS 26K-NA-1LHB-S4-C
PNP NO/NC Light-on 50…300 mm Two-turn Pot	①	BOS 26K-PA-1LHC-S4-C
NPN NO/NC Light-on 50…300 mm Two-turn Pot.	②	BOS 26K-NA-1LHC-S4-C
Polarized Retroreflective — Class I Laser (Auto Collimation)		
PNP NO/NC Dark-on 20 m Two-turn Pot.	①Ⓓ	BOS 26K-PA-1LQP-S4-C
NPN NO/NC Dark-on 20 m Two-turn Pot.	②Ⓓ	BOS 26K-NA-1LQP-S4-C

Supply Voltage		10…30 Vdc
Voltage Drop U_d at I_e		≤ 2.5 V
Rated Isolation Voltage		250 Vdc
Rated Output Current I_e		≤ 200 mA
Current Consumption I_O (No Load)	BGS (1LHA/B/C)	≤ 50 mA
Current Consumption I_O (No Load)	Polarized (1LQP)	≤ 40 mA
Utilization Category (IEC 60-947-4-1)	Output Duty Cycle	DC 13
Emitter Light Source	BGS (1LHA/B/C)	Visible Red Class II Laser 660 nm
Emitter Light Source	Polarized (1LQP)	Visible Red Class II Laser 670 nm
Light Spot Diameter		See chart below
Hystersis (18%/18% Reflectivity)	BGS (1LHA/B/C)	≤ 5%
Gray shift value (90%/18% Reflectivity)	BGS (1LQP)	≤ 8%
Ambient Light Immunity (EN 60947-5-2)		5000 Lux.
Stability Indicator		Green LED/ Red LED
Output Indicator		Yellow LED
Switching Frequency		2500 Hz
Response Time (On/Off Delay)		0.2 ms
Operating Temperature Range		-20°C to +60°C
Electrical Shock Protection		Class 2
Degree of Protection per IEC 60529		IP 67
Short Circuit Protection		Yes
Overload Protection		Yes
Reverse Polarity Protection		Yes
Housing Material		ABS
Sensing Face Material		PMMA
Connection		M12 4-pin connector
Recommended Connector		C04 AEL-00-VY-050M
Weight		40 g

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram

See pages 2.89-2.90 for diagrams

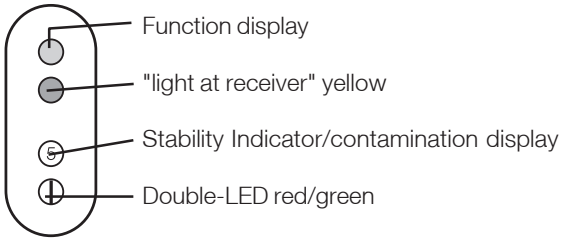
BOS 26K



Contamination Display/ Stability Display

The BOS 26K features 2 display LEDs: yellow for function display and green/red for stability and function display. When the received light intensity drops below a certain level, the red stability LED will illuminate indicating that the sensor is not adjusted correctly or that the lens is contaminated. This is an early indication that the sensor is not in a stable condition and may not function properly.

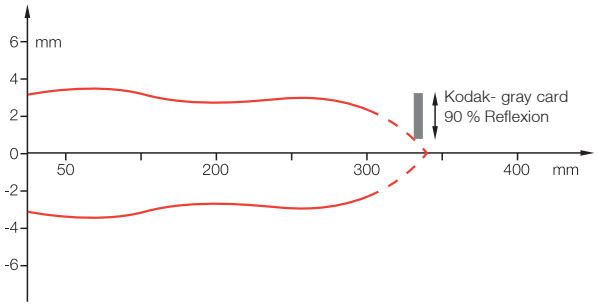
Display and Operating Elements



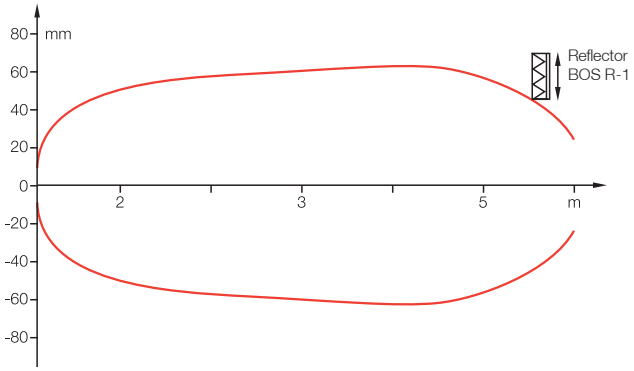
	BOS 26K-.-1LHA-...	BOS 26K-.-1LHB-...	BOS 26K-.-1LHC-...	BOS 26K-.-1LQP-...
Wavelength (l)	660 nm	660 nm	660 nm	670 nm
Beam divergence (q)	0.5 mrad	0.5 mrad	0.5 mrad	0.5 mrad
Pulse power (Pp)	≤ 2 mW	≤ 2 mW	≤ 4 mW	≤ 3.5 mW
Pulse width (t)	12 µs	12 µs	6 µs	6 µs
Pulse repetition frequency (F)	10 kHz	11 kHz	12 kHz	14 kHz
Tme base (T)	250 ms	250 ms	80 µs	250 ms

Mounting Bracket BOS 26-HW-1
Please order separately.
See section 7.

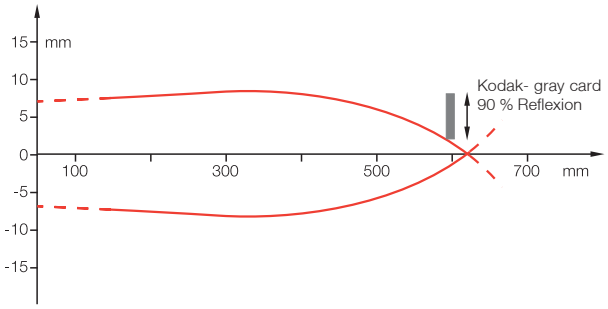
Ⓐ Diffuse with BGS BOS 26K-..-1HC-...



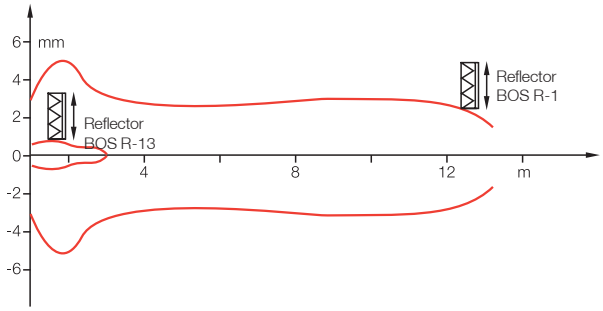
Ⓑ VR Retroreflective BOS 26K-..-1QE-..



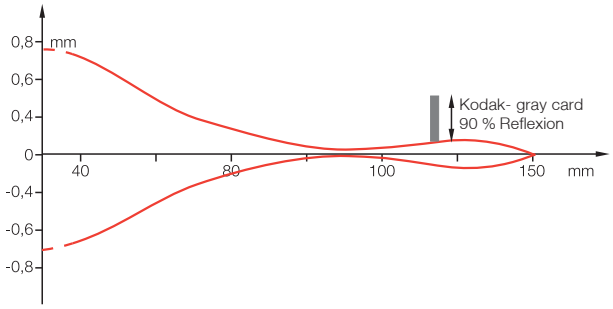
Ⓒ Diffuse with BOS 26K-..-1IE-...



Ⓓ Laser Retroreflective BOS 26K-..-1LQP-..

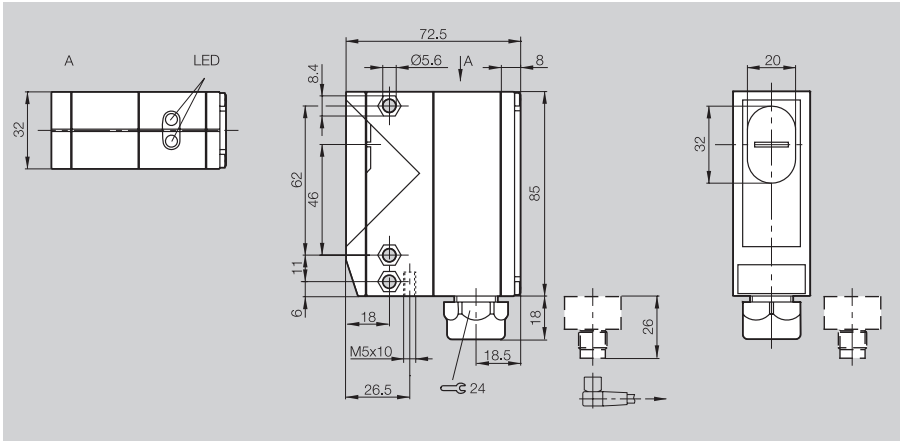


Ⓔ Laser diffuse with BGS BOS 26K-..-1LHB-...



BOS 65K Universal Series

When your application calls for more power, the BOS 65K high power series is the photoelectric sensor to choose. The BOS 65K high power series has a high excess gain designed for dirty, rugged environments that cause most sensors to fail.



Features

- Universal 15...264 Vac/Vdc with relay output or 10…30Vdc
- Light-on/Dark-on selectable
- Programmable multifunction time delay output (0.6s to 12s)
- Simple potentiometer sensitivity adjustment
- M12 Connector or wiring chamber
- Alarm output and test input (DC Versions)

Applications

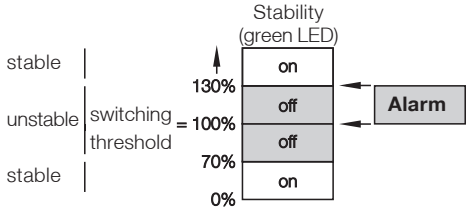
- Conveying
- Packaging
- Elevators
- Machine tools
- Car Wash
- Robots
- Parts counting
- Assembly and handling automation

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See page 2.92 for diagrams

Body Style		Large block	Large block	Large block
Type		90° optics	90° optics	90° optics
Background Suppression (270° Pot.)				
PNP/NPN NO/NC Light/Dark-on 200…1100 mm, Timer		BOS 65K-5-M110T-2P-S4	BOS 65K-5-M110T-1	
AC/DC Relay NO/NC Light/Dark-on 200..1100 mm, Timer				BOS 65K-1-M110T-1
Diffuse (270° Pot.)				
PNP/NPN NO/NC Light/Dark-on 2 m, Timer	Ⓐ	BOS 65K-5-C200T-2P-S4	BOS 65K-5-C200T-1	
AC/DC Relay NO/NC Light/Dark-on 2 m, Timer	Ⓐ			BOS 65K-1-C200T-1
Polarized Retroreflective (270° Pot.)				
PNP/NPN NO/NC Light/Dark 8 m, Timer	Ⓑ	BOS 65K-5-B8T-2P-S4	BOS 65K-5-B8T-1	
AC/DC Relay NO/NC Light/Dark 8 m, Timer	Ⓑ			BOS 65K-1-B8T-1
Thru-beam (270° Pot.)				
PNP/NPN NO/NC Light/Dark 70 m, Timer	Ⓒ	BLE 65K-5-F50T-2P-S4	BLE 65K-5-F50T-1	
Emitter DC	Ⓒ	BLS 65K-5-G50-2-S4	BLS 65K-5-G50-1	
AC/DC Relay NO/NC Light/Dark 70 m, Timer	Ⓒ			BLE 65K-1-F50T-1
Emitter AC/DC	Ⓒ			BLS 65K-1-G50-1
Supply Voltage		10…30 Vdc		15…264 Vac/Vdc
Voltage Drop U_d at I_e		≤ 2.0 V		
Rated Isolation Voltage Ui		75 Vdc		250 Vac
Rated Output Current I_e		≤ 200 mA		≤3A max. Resistive Load
Current Consumption I_O (No Load)		≤ 40 mA		≤ 60 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13		AC 140
Emitter Light Source		Infrared 880 nm		Infrared 880 nm
Ambient Light Immunity (EN 60947-5-2)		3000 Lux		3000 Lux
Power Indicator		Red LED (Emitter Only)		Red LED (Emitter Only)
Stability Indicator		Green LED		Green LED
Output Indicator		RED LED (Except Emitter)		RED LED (Except Emitter)
Switching Frequency		500 Hz		10 Hz
Response Time (On/Off Delay)		1 ms		20 ms
Operating Temperature Range		-20°C to +55°C		-20°C to +55°C
Electrical Shock Protection		Class 2		Class 1
Degree of Protection per IEC 60529		IP 66		IP 66
Short Circuit Protection		Yes		No
Housing Material		PC		PC
Sensing Face Material		PMMA		PMMA
Emitter Life		Average 100,000 hr with Ta=+25°C		Average 100,000 hr with Ta=+25°C
Connection		M12 4-pin C04A or C04B	Screw Terminals	Screw Terminals
Weight		165 g	165 g	165 g

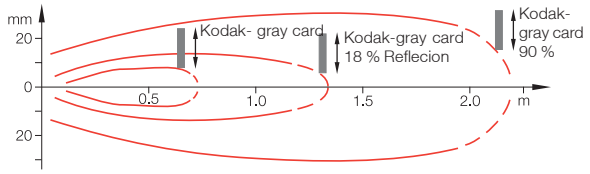
Alarm output for receiver, diffuse and retroreflective (DC)

The alarm output (PNP open collector 30 mA) for DC versions generates a warning signal when there are malfunctions caused by contamination or improper alignment. The alarm output is activated if the receiver signal stays in the alarm range for at least 3 seconds.



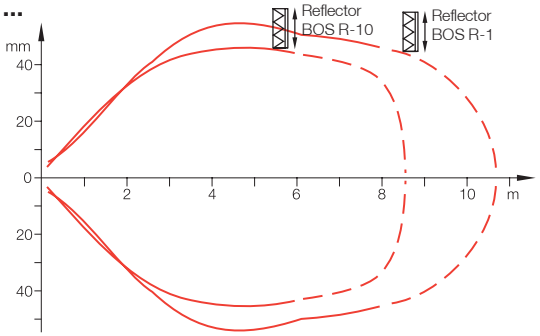
Detection Diagrams

Ⓐ Diffuse BOS 65K-.-C200T-...



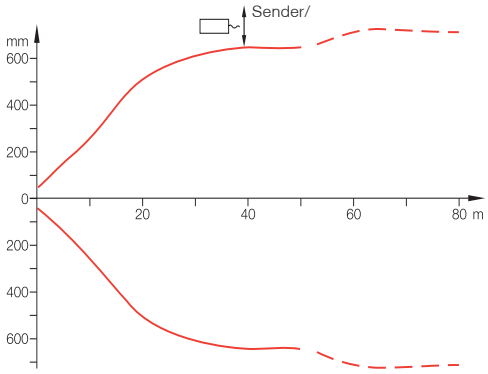
Sensing distance measured with lateral approach using Kodak gray card..

Ⓑ Retroreflective with Polarizing Filter BOS 65K-.-B8T-...



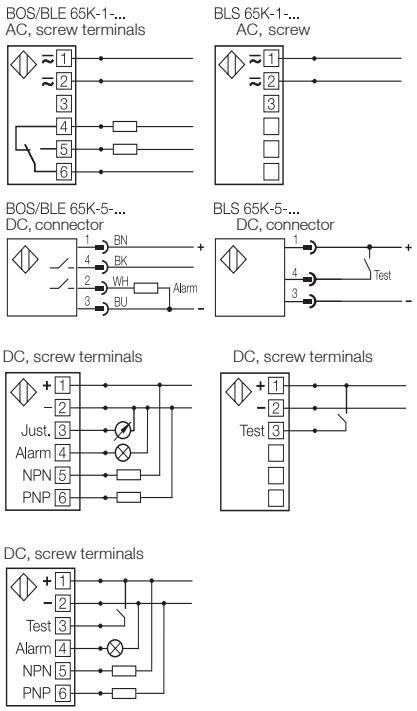
Sensing distance measured with lateral approach using reflector.

Ⓒ Thru-beam BLE/BLS 65K-...

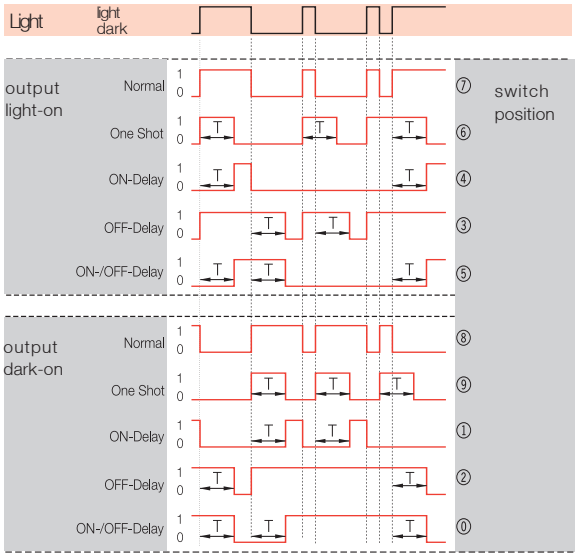


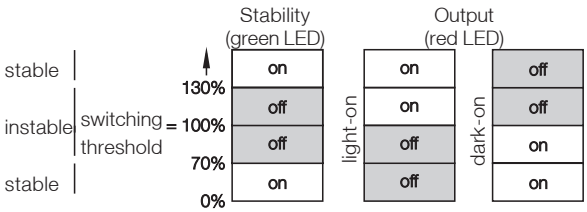
For the Thru-beam sensor, the max. possible offset between emitter & receiver is measured.

Wiring Diagrams



Programmable Time Functions

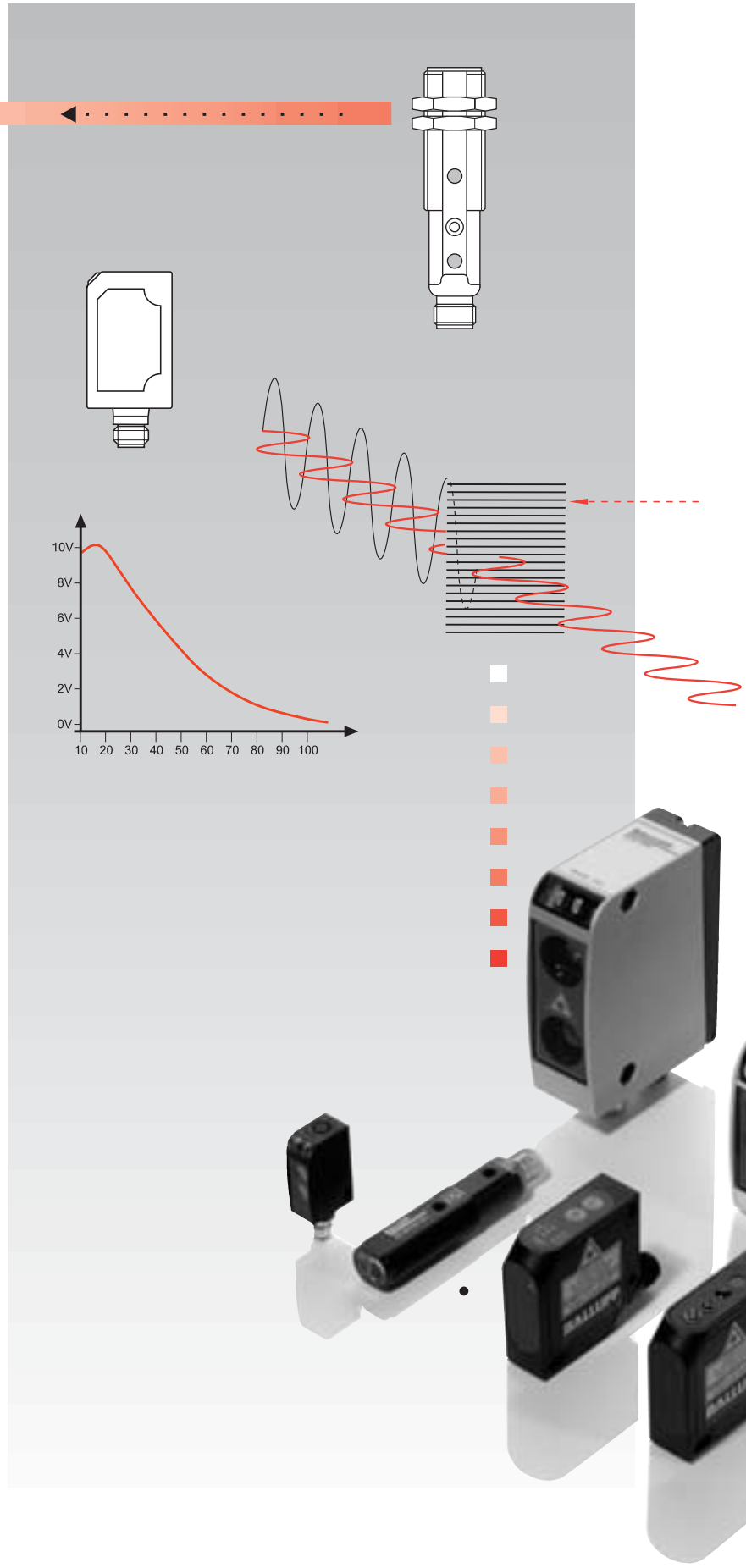




Green Stability Display

The green stability display illuminates in the "safe" range, where the input energy is at least 30% over or under the "threshold energy."
The "threshold energy," at which a signal change is effected, is defined at 100%.

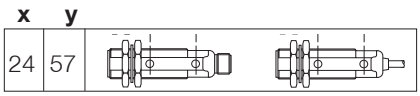
The "safe" range is therefore reached when:
– The input signal is at 130% or more of the threshold energy
– The input signal is at 70% or less than the threshold energy

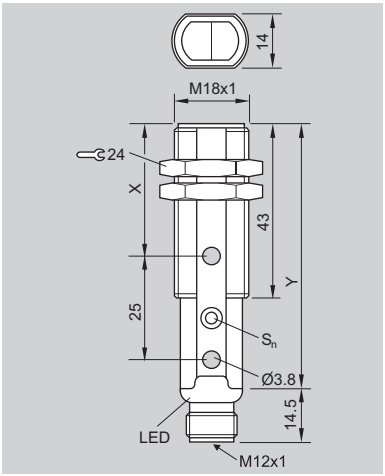


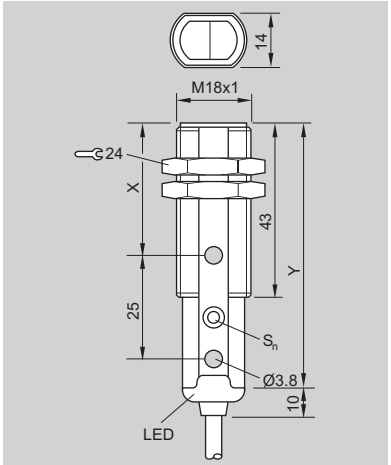
Distance Measurement (Analog) Sensors

Distance measurement sensors emit visible red or laser light to detect target position, than generate an analog output signal. Some types use triangulation, based on the incoming angle of light returned, to determine the distance to the target. Longer-range models use pulsed laser light in a time-of-flight configuration. The time of light travel corresponds to the target distance. Their visible light spot assures simple and easy set up in most applications. Some models offer teachable setpoint outputs for interfacing to discrete I/O without an analog input card.

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Sensing range	50...100 mm	50...100 mm
Resolution	1 mm	1 mm

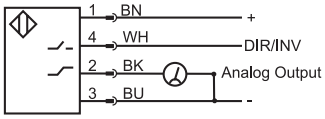




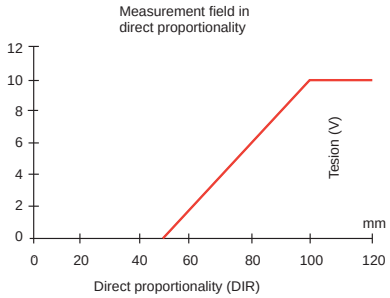


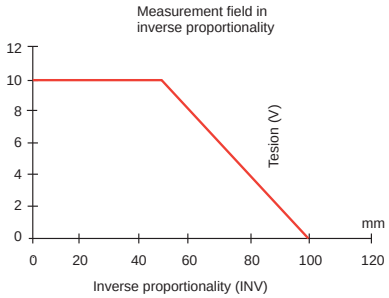
Measurement Sensor 50...100 mm 1 mm Resolution Triangulation	BOD 18KF-RA01-S4-C	BOD 18KF-RA01-C-02
Supply Voltage	18…30 Vdc	18…30 Vdc
Voltage Drop Ud at Ie	± 2 V	± 2 V
Rated Isolation Voltage	250 Vac	250 Vac
Current Consumption Io (No Load)	< 30 mA	< 30 mA
Analog Output Type	0-10 Vdc	0-10 Vdc
Discrete Output Type	None	None
Discrete Output Current (max.)	N/A	N/A
Sensing Mode	Diffuse, Light-on	Diffuse, Light-on
Additional Features	Invertable analog output	Invertable analog output
Emitter Light Source	Visible Red LED	Visible Red LED
Wavelength	630 nm	630 nm
Spot Size	8 mm @ 100 mm	8 mm @ 100 mm
Operating Temperature Range	-25 … +55 °C	-25 … +55 °C
Temperature Drift	Compensated	Compensated
Linearity	5%	5%
Gray Shift Value (90%/18% reflectivity)	10%	10%
Switching Frequency	150 Hz	150 Hz
Response Time	3.33 ms	3.33 ms
Supply Voltage Indicator	Green LED	Green LED
Output Function Indicator	Yellow LED	Yellow LED
Connection	M12 4-pin connector	2 m cable
Wire Information		4 x 26 AWG
Recommended Connector	C04 ANL-00-PG-050MS	
Housing Material	PBT	PBT
Sensing Face Material	PMMA	PMMA
Weight	75 g	110 g
Degree of Protection per IEC 60529	IP67	IP67
Short Circuit Protection	Yes	Yes
Reverse Polarity Protection	Yes	Yes

Wiring Diagram

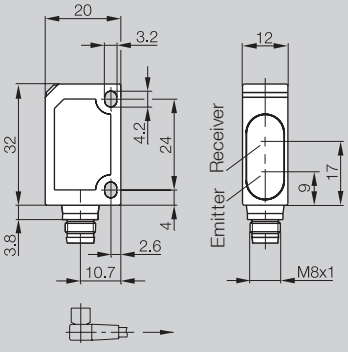


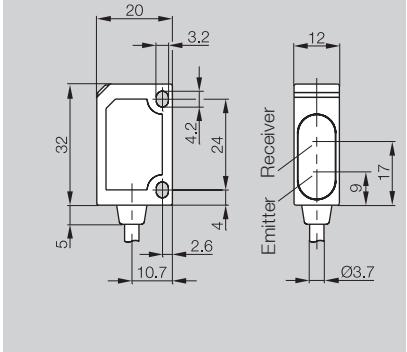
Detection Diagrams





Body Style	Small Block	Small Block
Sensing range	20 … 80 mm	20 … 80 mm
Resolution	0.5 mm	0.5 mm

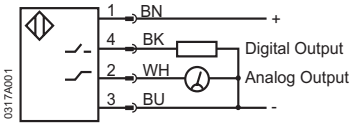




Measurement Sensor 20...80 mm 0.5 mm Resolution Triangulation	BOD 6K-RA01-S75-C	BOD 6K-RA01-C-02
Supply Voltage	15…30 Vdc	15…30 Vdc
Voltage Drop Ud at Ie	± 2.4 V	± 2.4V
Rated Isolation Voltage	250 Vac	250 Vac
Current Consumption Io (No Load)	<30 mA	<30mA
Analog Output Type	0 - 10 Vdc	0 - 10 Vdc
Discrete Output Type	PNP NO	PNP NO
Discrete Output Current (max.)	± 100 mA	± 100mA
Sensing Mode	Diffuse, Light-on	Diffuse, Light-on
Additional Features	NO/NC selectable output	NO/NC selectable output
Emitter Light Source	Visible Red LED	Visible Red LED
Wavelength	660 nm	660 nm
Spot Size	5 mm x 5 mm @ 60 mm	5mm x 5mm @ 60 mm
Operating Temperature Range	-25 … +60 °C	-25 … +60 °C
Temperature Drift	Compensated	Compensated
Linearity	1%	1%
Gray Shift Value (90%/18% reflectivity)	±1%	± 1%
Switching Frequency	Analog 200 Hz/Discrete 1 kHz	Analog 200 Hz/Discrete 1 kHz
Response Time	Analog 2.5 ms/Discrete 0.5 ms	Analog 2.5 ms/Discrete 0.5 ms
Supply Voltage Indicator	Green LED	Green LED
Output Function Indicator	Yellow LED	Yellow LED
Connection	M8 4-pin connector	2m cable
Wire Information		4 x 26 AWG
Recommended Connector	BKS S75-14-03	
Housing Material	ABS	ABS
Sensing Face Material	PMMA	PMMA
Weight	10 g	40 g
Degree of Protection per IEC 60529	IP67	IP67
Short Circuit Protection	Yes	Yes
Reverse Polarity Protection	Yes	Yes

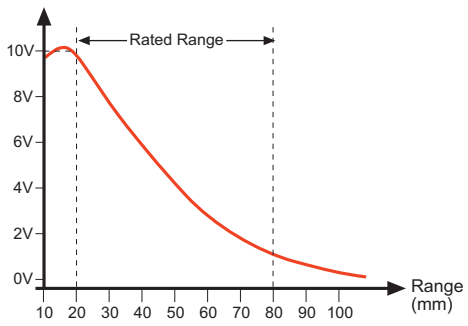
* depending on object reflectivity

Wiring Diagram

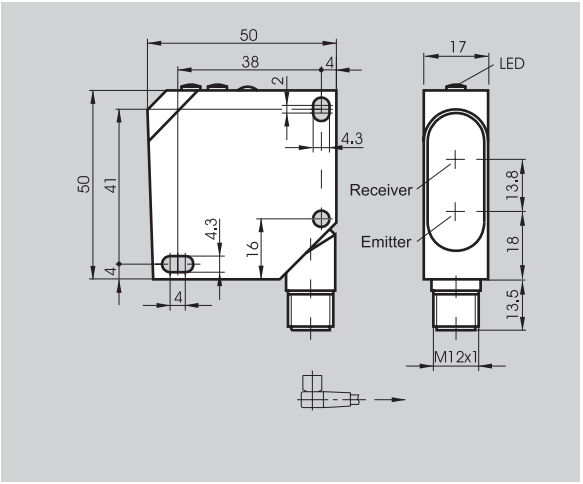


Detection Diagram

Analog Output



Body Style	Mid-size Block
Sensing range	45... 85 mm
Resolution	down to 20µm



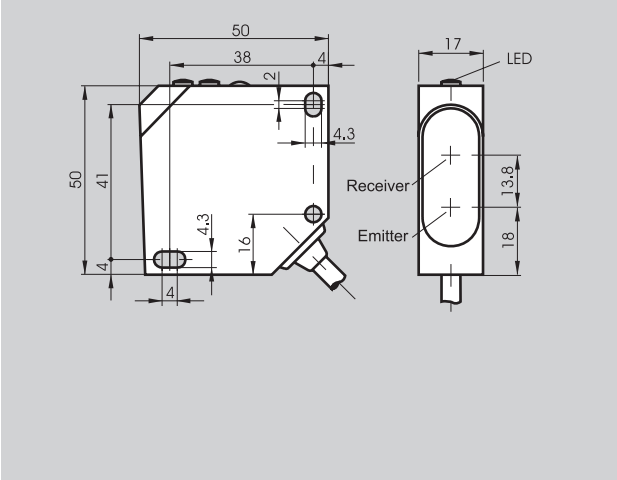
Measurement	Sensor			
45...85 mm	20 µm Resolution	Triangulation	①	BOD 26K-LA01-S4-C
45...85 mm	80 µm Resolution	Triangulation	①	BOD 26K-LA02-S4-C
30...100 mm	70 µm Resolution	Triangulation	②	
80...300 mm	220 µm Resolution	Triangulation	②	
30...100 mm	70 µm Resolution	Triangulation	③	
80...300 mm	200 µm Resolution	Triangulation	③	

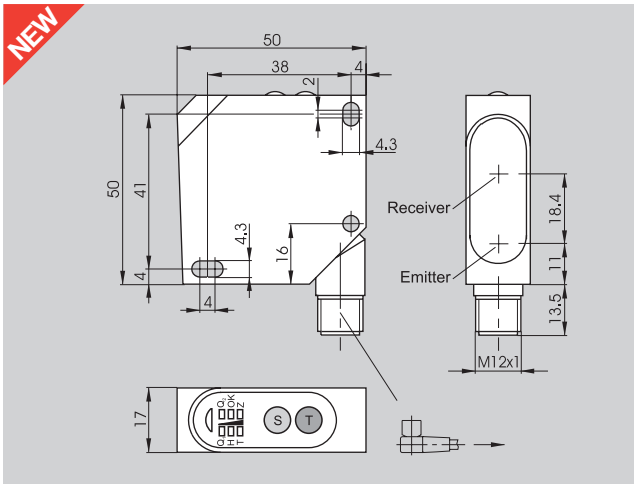
Supply Voltage	18...28 Vdc
Voltage Drop Ud at Ie	≤ 2.4 V
Rated Isolation Voltage	250 Vac
Current Consumption Io (No Load)	<35 mA
Analog Output Type	0 - 10 Vdc
Discrete Output Type	None
Discrete Output Current (max.)	N/A
Sensing Mode	Diffuse, Light-on
Additional Features	None
Emitter Light Source	Laser Red LED
Wavelength	670 nm
Spot Size	0.8 mm @ 65 mm
Operating Temperature Range	0 ... +45 °C
Temperature Drift	18 µm/°C
Linearity	1%
Gray Shift Value (90%/18% reflectivity)	± 3%
Switching Frequency	400 Hz -LA01/40 Hz -LA02
Response Time	1.25 ms -LA01/12.5 ms -LA02
Supply Voltage Indicator	Green LED
Output Function Indicator	N/A
Connection	M12 4-pin connector
Wire Information	
Recommended Connector	C04 ANL-00-PG-050MS
Housing Material	ABS
Sensing Face Material	PMMA
Weight	40 g
Degree of Protection per IEC 60529	IP67
Short Circuit Protection	Yes
Reverse Polarity Protection	Yes

① = Number indicates wiring diagram

See pages 2.98 for diagrams

Mid-size Block	Mid-size Block
45... 85mm	30...100 mm or 80...300 mm
down to 20µm	down to 70µm



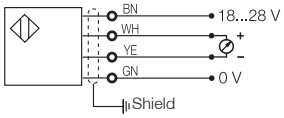


BOD 26K-LA01-C-06	
BOD 26K-LA02-C-06	
	BOD 26K-LB04-S115-C*
	BOD 26K-LB05-S115-C*
	BOD 26K-LB06-S92-C
	BOD 26K-LB07-S92-C
18…28 Vdc	18…30 Vdc
≤ 2.4 V	≤ 2.4 V
250 Vac	250 Vac
<35 mA	<35mA
0 - 10 Vdc	4 - 20 mA
None	PNP NO (2 - LB04/05; 1 - LB06/07)
N/A	100 mA
Diffuse, Light-on	Diffuse, Light-on
None	Programmable modes and setpoints
Laser Red LED	Laser Red LED
670 nm	650 nm
0.8 mm @ 65 mm	± 2 mm x 4.5 mm
0 … +45 °C	-10 … +60 °C
18 µm/°C	<1.4 µm/°C -LB04/06; < 4.4 µm/°C -LB05/07
1%	0.25%
± 3%	± 8%
400 Hz -LA01/40 Hz -LA02	1 kHz
1.25 ms -LA01/12.5 ms -LA02	0.4 ms
Green LED	Green LED
N/A	Yellow LED
6 m cable, PVC	M12 8-pin connector -LB04/05; M12 5-pin connector -LB06/07
4 x 24 AWG	
	C04 ANT-00-PB-050MS-LB04/05; C04 ANQ-00-PB-050MS -LB06/07
ABS	ABS
PMMA	PMMA
40 g	43 g
IP67	IP67
Yes	Yes
Yes	Yes

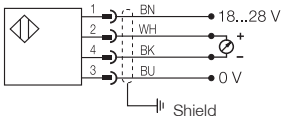
* Also available with RS485 port. Consult factory for details.

① BOD 26K-LA..

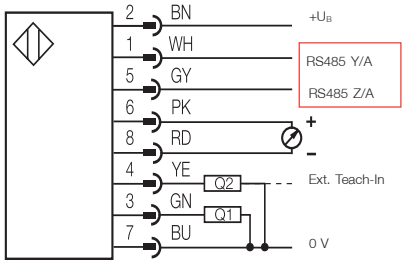
CABLE



CONECTOR

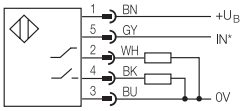


② BOD 26K-LB04/05



Only model BOD 26K-LBR...

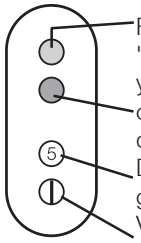
③ BOD 26K-LB06/07...



Contamination Display/Stability Display

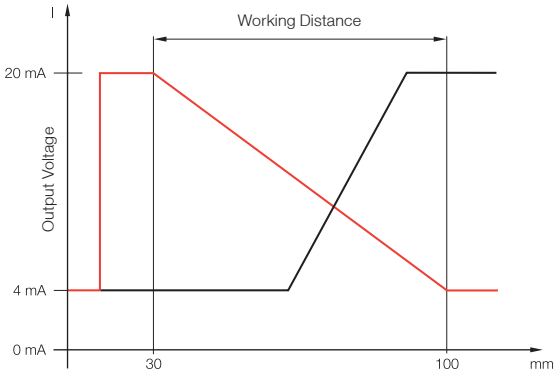
The BOS 26K features 2 display LEDs: yellow for function display and green/red for stability and function display. Should the received light intensity drop below a certain level, this condition will be indicated by a red LED signal. This permits environmental contamination or poor adjustment to be quickly detected.

Display and Operating Elements

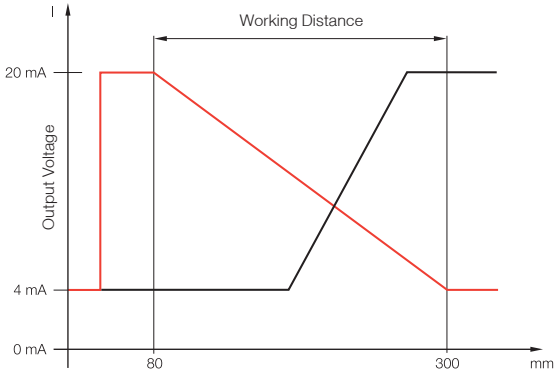


Function display "light at receiver"
yellow LED Stability/ contamination display.
Double-LED red/ green
Visualizing switching

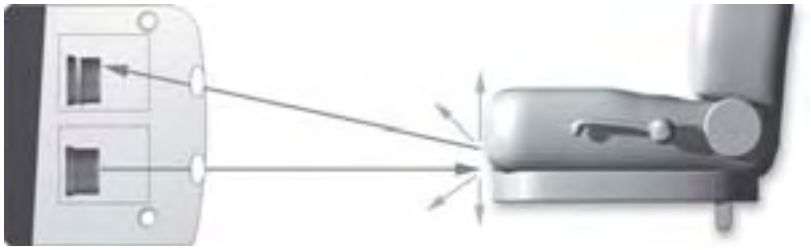
Analog Output BOD 26K-LB(R)04/LB06

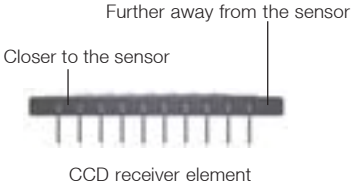


Analog Output BOD 26K-LB(R)05/LB07



Triangulation Principle





In triangulation, the angle of the arriving light is evaluated. The emitter sends a light beam out to the object, which reflects it back where is passes through a lens and strikes a photoelement. Processing electronics determine the focal point of the intensity and thereby the distance.

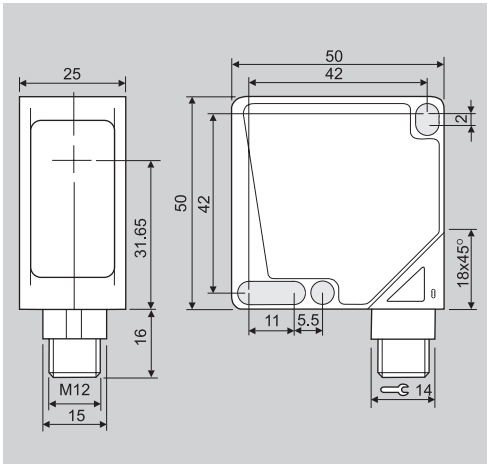
BOL 27K Advanced Measuring Line Sensor

Balluff's BOL 27K Advanced Measuring Line sensor is designed to solve difficult measurement applications where space is at a premium. The BOL 27K uses retroreflective tape as a point of reference. It uses infrared emission and precision photo-array diode offering a high resolution (0.15 mm) at an economical price. The BOL 27K offers 3 modes of operation to solve most applications. Edge position mode detects the position of an object, center position mode detects the center of an object independent of an objects width, and the width measurement mode detects the distance between two edges.

Features

— Teachable discrete or analog output

Body Style	Mid-size Block
Sensing range	200 mm
Resolution	0.15mm



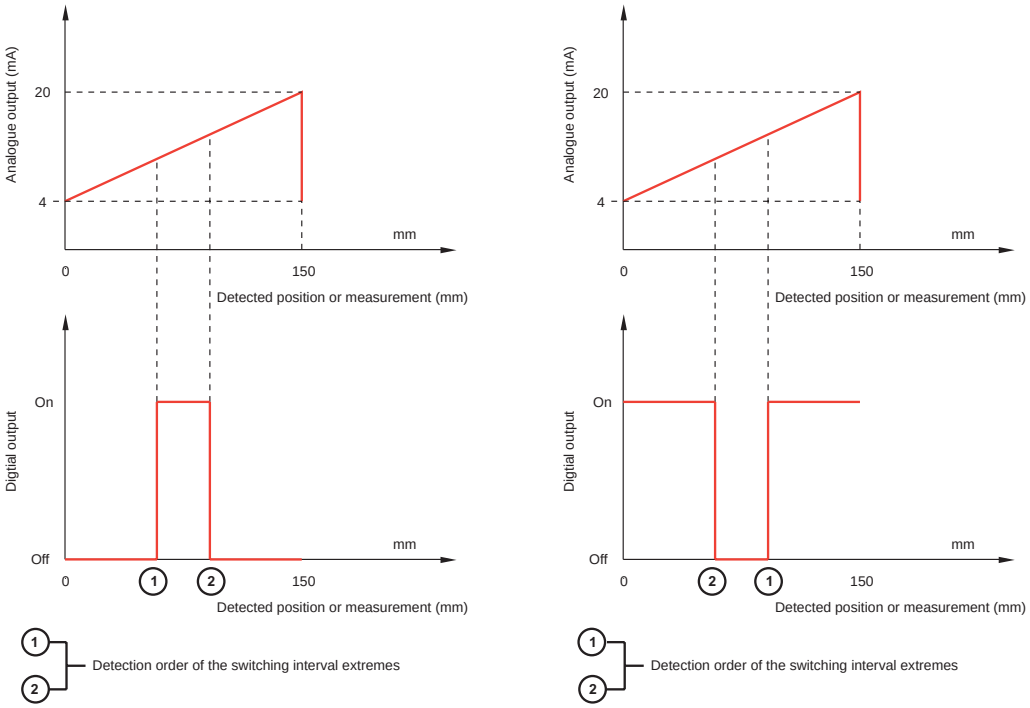
Measurement Sensor				
0...200 mm	Retroflective	PNP	①Ⓐ	BOL 27K-PS-01-S115
0...200 mm	Retroflective	NPN	②Ⓐ	BOL 27K-NS-01-S115

Supply Voltage	10…30 Vdc
Voltage Drop Ud at Ie	± 2 V
Rated Isolation Voltage	250 Vac
Current Consumption Io (No Load)	± 70 mA
Analog Output Type	4 - 20 mA
Discrete Output Type	2 PNP or NPN NO
Discrete Output Current (max.)	100 mA
Sensing Mode	Retro-reflective, Dark-on
Additional Features	Programmable modes and setpoints
Emitter Light Source	Infrared
Wavelength	875 nm
Spot Size	150 mm x 3 mm @ 200 mm
Operating Temperature Range	-10 … +55 °C
Temperature Drift	N/A
Linearity	N/A
Gray Shift Value (90%/18% reflectivity)	N/A
Switching Frequency	130 Hz Ø
Response Time	± 3 ms
Supply Voltage Indicator	Green LED
Output Function Indicator	Yellow LED
Connection	M12 8-pin connector
Wire Information	
Recommended Connector	C04 ANT-00-PB-050MS
Housing Material	ABS
Sensing Face Material	PMMA
Weight	100 g
Degree of Protection per IEC 60529	IP67
Short Circuit Protection	Yes
Reverse Polarity Protection	Yes

Note: Includes 1 m reflective tape

① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.100 for diagrams

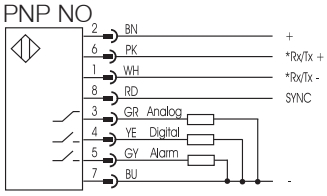
Ⓐ Detection Diagrams



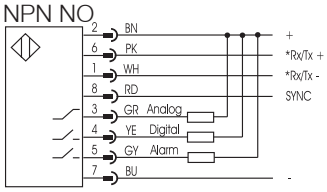
Note: The digital output is activated inside the switching range if the inferior limit is acquired first and then the superior limit. The inverse logic functioning is obtained by inverting the acquisition order.

Wiring Diagrams

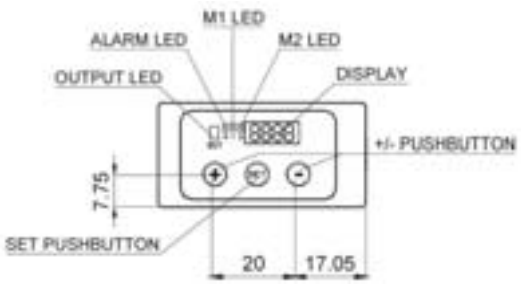
① PNP NO



② NPN NO



Top View of Sensor



BOD 63M Time-of-Flight Distance Sensor

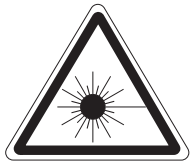
Designed for the most demanding applications, the Balluff BOD 63M combines precision measurement and discrete sensing in one unit using time of flight technology.

The BOD 63M's rugged metal housing has a working range of 500...6000 mm and is an ideal supplement to the BOD 26K (45...85 mm) and BOD 66M (200...2000 mm) families. It features adjustable background suppression and an analog output of 0...10 V or 4...20 mA.

A multi-turn potentiometer sets the discrete output. Its highly focused, easily visible red light enables long range sensing with very low gray shift value changes and hysteresis.

Laser Safety Regulation

The emitter corresponds to Laser Safety class 2 per EN 60825-1:2001-11. Therefore, no additional safety measures are required.



The device must be mounted so that the laser warning label is easily visible.

Features

– Measuring the propagation time of light allows for greater ranges than with sensors using triangulation or energetic diffuse technologies

– Small laser spot for detecting small objects over large distances

– Virtually unaffected by the reflective properties of the object within a particular sensing range

– Background suppression is adjustable over the entire working range

– Discrete sensing and alarm outputs

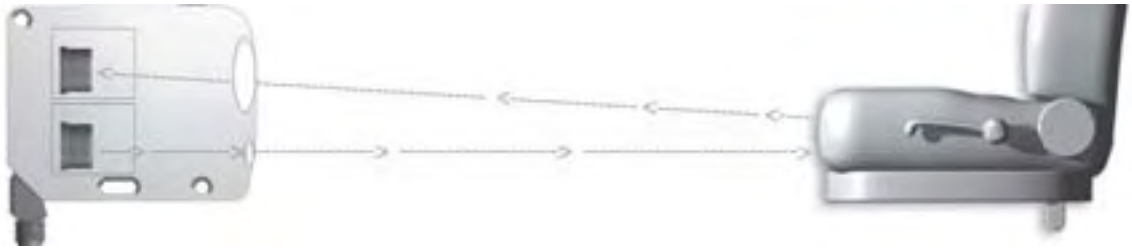
Applications

– Precise detection over large distances (e. g., installation constraints or when local temperatures are very high)

– Detecting objects with changing colors, reflective surfaces or at unfavorable angles to the light beam

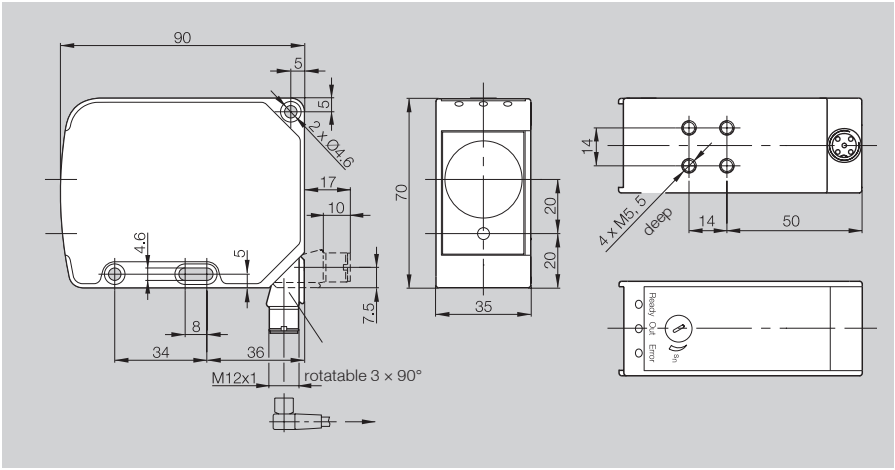
– Flexible solutions for position sensing, level control, distance or height measurement, quality assurance

Time-of-Flight Principle



In time-of-flight measurement, short light pulses are emitted by the laser diode. The target bounces light pulses back to the receiver, where they are processed to determine the object distance. In other words, when the light is sent an "electronic clock" is started which is then stopped when the light pulse arrives back at the receiver. This principle is extremely insensitive to ambient light.

Body Style	Large Block	Large Block
Sensing range	200...2000 or 200…6000 mm	200...2000 or 200…6000 mm
Resolution	<1 mm	<1 mm



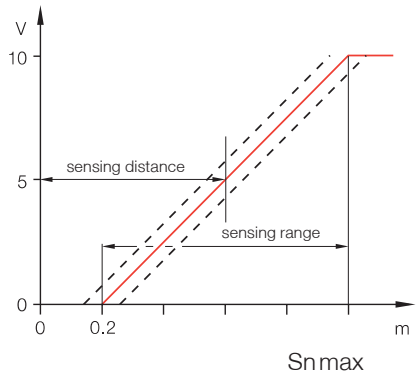
Measurement	Sensor				
2 m Range	TOF	PNP	①	BOD 63M-LA02-S115	BOD 63M-LB02-S115
2 m Range	TOF	NPN	②	BOD 63M-LA03-S115*	BOD 63M-LB03-S115*
6 m Range	TOF	PNP	①	BOD 63M-LA04-S115	BOD 63M-LB04-S115
6 m Range	TOF	NPN	②	BOD 63M-LA05-S115*	BOD 63M-LB05-S115*

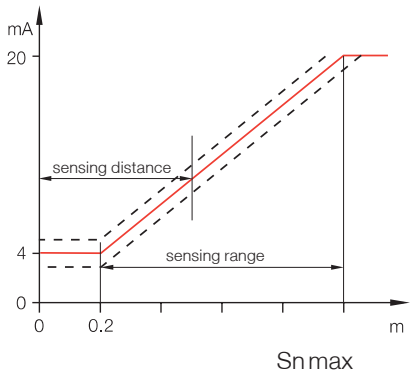
Supply Voltage	15…30 Vdc	15…30 Vdc
Voltage Drop Ud at Ie	± 2.5 V	± 2.5 V
Rated Isolation Voltage	250 Vac	250 Vac
Current Consumption Io (No Load)	± 75 mA	± 75 mA
Analog Output Type	0 - 10 Vdc	4 - 20 mA
Discrete Output Type	3 PNP or NPN NO	3 PNP or NPN NO
Discrete Output Current (max.)	200 mA	200 mA
Sensing Mode	Diffuse, Light-on	Diffuse, Light-on
Additional Features	Programmable setpoint	Programmable setpoint
Emitter Light Source	Laser Red LED	Laser Red LED
Wavelength	650 nm	650 nm
Spot Size	10 mm @ 6 m	10 mm @ 6 m
Operating Temperature Range	-10 … +55 °C	-10 … +55 °C
Temperature Drift	1.5 mm/°C	1.5mm/°C
Linearity	1%	1%
Gray Shift Value (90%/18% reflectivity)	± 1.5%	± 1.5%
Switching Frequency	100 Hz	100 Hz
Response Time	± 5 ms	± 5 ms
Supply Voltage Indicator	Green LED	Green LED
Output Function Indicator	Yellow LED	Yellow LED
Connection	M12 8-pin connector	M12 8-pin connector
Wire Information		
Recommended Connector	C04 ANT-00-PB-050MS	C04 ANT-00-PB-050MS
Housing Material	Anodized Aluminum	Anodized Aluminum
Sensing Face Material	Glass	Glass
Weight	260 g	260 g
Degree of Protection per IEC 60529	IP67	IP67
Short Circuit Protection	Yes	Yes
Reverse Polarity Protection	Yes	Yes

* Availability is September 2008.

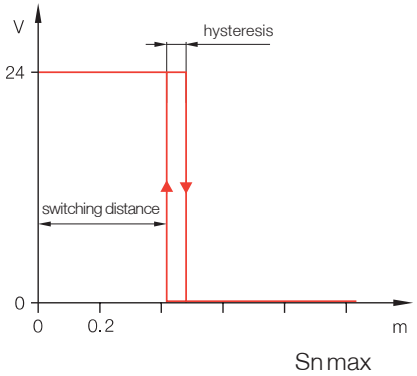
① = Number indicates wiring diagram
Ⓐ = Letter indicates detection diagram
See pages 2.103 for diagrams

Ⓐ Analog output

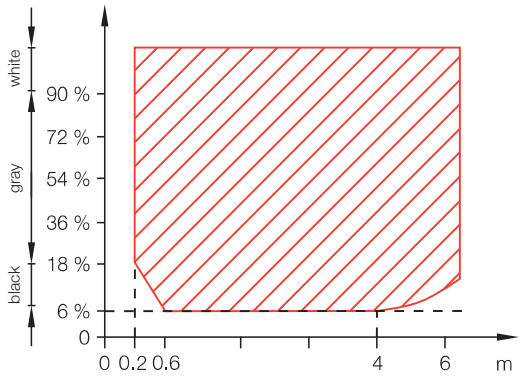




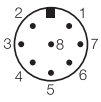
Switching output



Measuring range as a function of object reflection

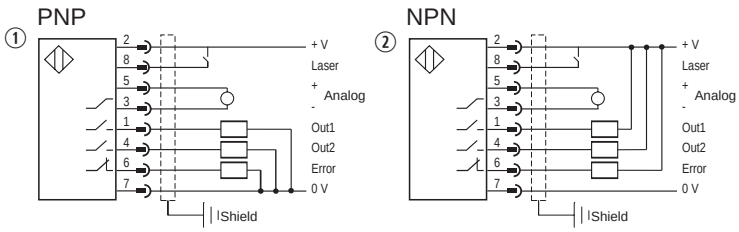


Connector diagram (C04 ANT-00-PB-050MS)

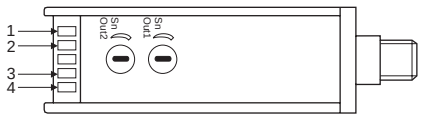


Pin configuration	Wire color	Function
1	white	output 1
2	brown	$+U_B$
3	green	output 2
4	yellow	not used
5	gray	+analog output
6	pink	Alarm output
7	blue	$-U_B$ 0 V
8	red	Laser Test
knurled ring	braided shield	shield

Wiring Diagrams



Adjustment and LEDs Display



1 Green LED: Ready
2 Yellow LED: Out1
3 Yellow LED: Out2
4 Red LED: Error

Recommended accessories
Please order separately
See sections 6 & 7

Connector
C04 ANT-00-PB-050MS

Mounting bracket
BOD 63-HW-1

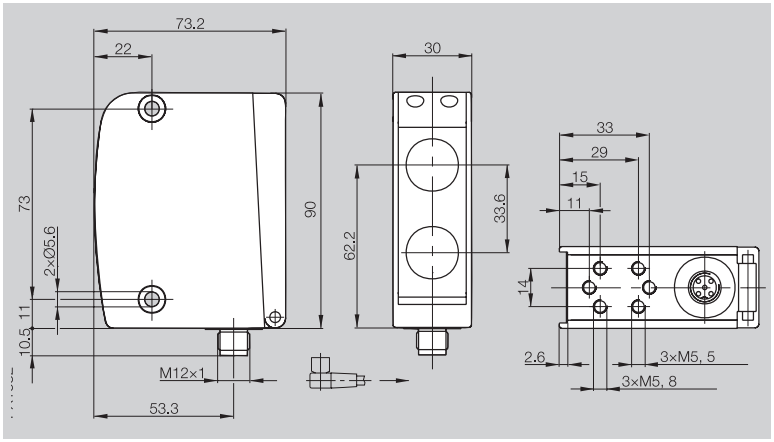
BOD 66M
Red Light Distance Sensor
Class II Laser Distance Sensor

Class II Laser

Analog

BOD 66M Distance Measurement Sensor

The BOD 66M distance sensor with teachable background suppression and accurate distance measurement is like having two sensors in one. Highly visible red and class II laser emission illuminates the target over the complete sensing range. Using the latest in CCD background suppression technology, the BOD 66M sensor can detect both black and white targets at the same range with no loss of sensing distance.



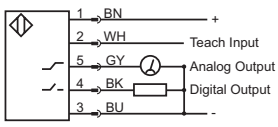
Body Style	Large Block	Large Block
Sensing range	100…600 mm	200…2000 mm
Resolution	0.5mm	5mm
Measurement Sensor		
100...600 mm 0.5 mm Resolution Triangulation	BOD 66M-RA01-S92-C	
100...600 mm 0.5 mm Resolution Triangulation	BOD 66M-RB01-S92-C	
200...2000 mm 5 mm Resolution Triangulation		BOD 66M-LA01-S92-C
200...2000 mm 5 mm Resolution Triangulation		BOD 66M-LB01-S92-C
Supply Voltage	18…30 Vdc	18…30 Vdc
Voltage Drop Ud at Ie	± 2.5 V	± 2.5 V
Rated Isolation Voltage	250 Vac	250 Vac
Current Consumption Io (No Load)	± 250 mA	± 250 mA
Analog Output Type	1 - 10 Vdc -RA; 4 - 20 mA -RB	1 - 10 Vdc -LA; 4 - 20 mA -LB
Discrete Output Type	PNP NO	PNP NO
Discrete Output Current (max.)	± 150 mA	± 150 mA
Sensing Mode	Diffuse, Light-on	Diffuse, Light-on
Additional Features	Programmable setpoint	Programmable setpoint
Emitter Light Source	Visible Red LED 660 nm	Laser Red LED 660 nm
Wavelength	660 nm	660 nm
Spot Size	10 mm	10 mm
Operating Temperature Range	-20 … +50 °C	-20 … +50 °C
Temperature Drift	0.2 mm/°C	0.2 mm/°C
Linearity	0.5%	0.5%
Gray Shift Value (90%/18% reflectivity)	± 1%	± 1%
Switching Frequency	100 HZ	100 HZ
Response Time	± 5 ms	± 5 ms
Supply Voltage Indicator	Green LED	Green LED
Output Function Indicator	Yellow LED	Yellow LED
Connection	M12 5-pin connector	M12 5-pin connector
Recommended Connector	C04 ANQ-00-88-050MS	C04 ANQ-00-PB-050MS
Housing Material	Anodized Aluminum	Anodized Aluminum
Sensing Face Material	Glass	Glass
Weight	250 g	250 g
Degree of Protection per IEC 60529	IP65	IP65
Short Circuit Protection	Yes	Yes
Reverse Polarity Protection	Yes	Yes

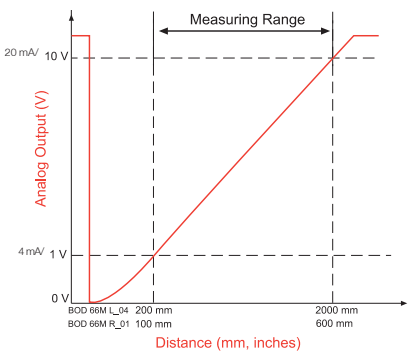
Features

- Highly visible red or Class II Laser emission
- Teachable, discrete PNP output
- Accurate distance measurement analog output
- 1…10 Vdc or 4…20 mA analog output
- Linear analog measurement (0.5% linearity)
- Rugged metal housing
- Scratch-resistance glass optics
- M12 connector for simple error-free wiring

Applications

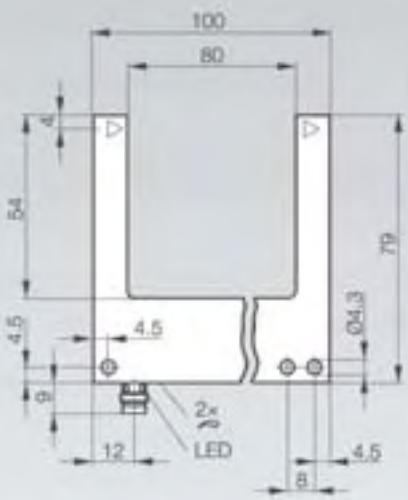
- Level monitoring
- Error-proofing applications
- Positioning
- Thickness gauging
- Profile measurement
- Stack height control
- Quality control

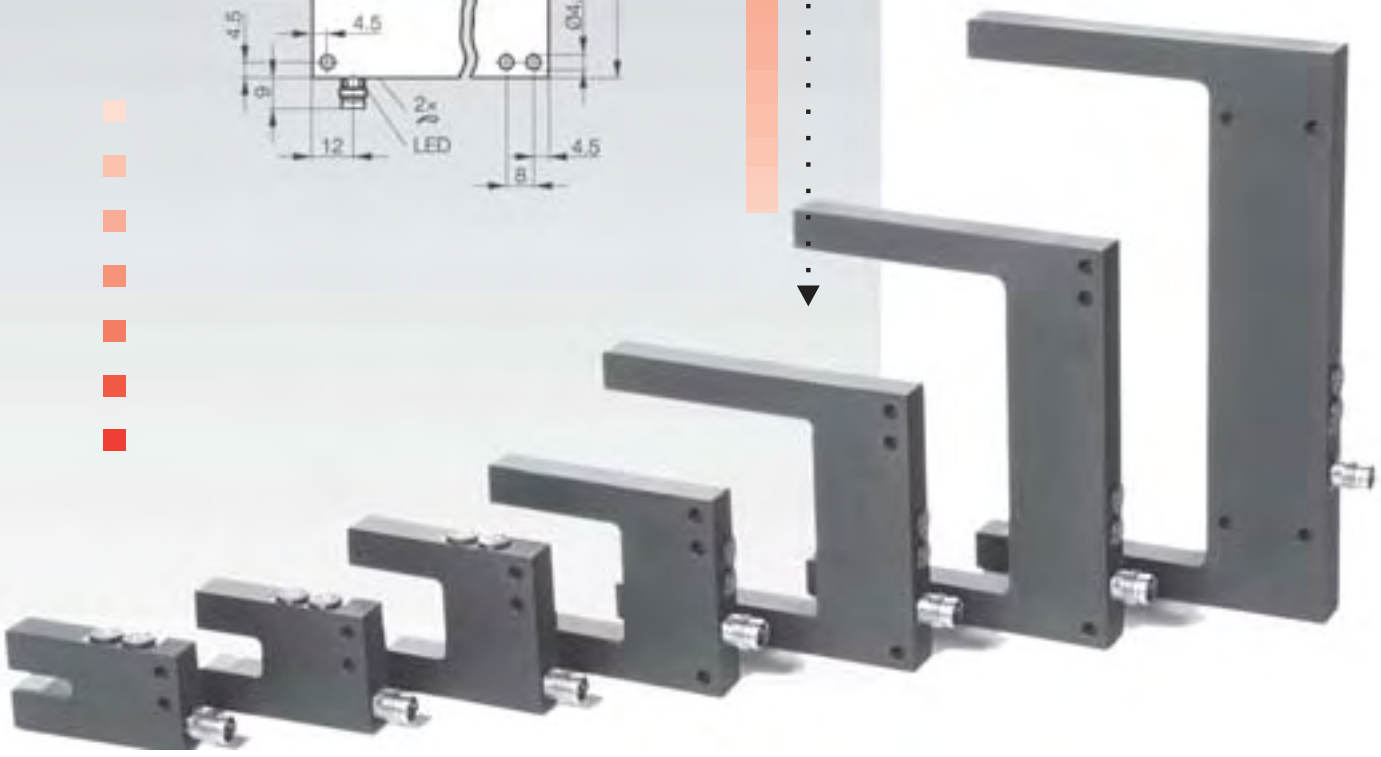




Self-contained Thru-beam Sensors

Balluff self-contained thru-beam sensors are configured in rugged, U- or L-shaped housings. Mechanically rigid, self-contained thru-beam sensors save time mounting and setting up in your machine by eliminating the tedious task of aligning an emitter and receiver pair.





BGL Series

Balluff's BGL series of photoelectric slot/fork sensors offer pinpoint accuracy with highly visible red LED or Class II laser emission for resolutions down to 0.3mm. These self-contained thru-beam sensors, configured in a simple "U" shaped housing, save mounting and machine setup time. The BGL slot sensors are completely self-contained, it replaces the two thru-beam cables and the fiber optic amplifier, eliminating the need for special mounting brackets.

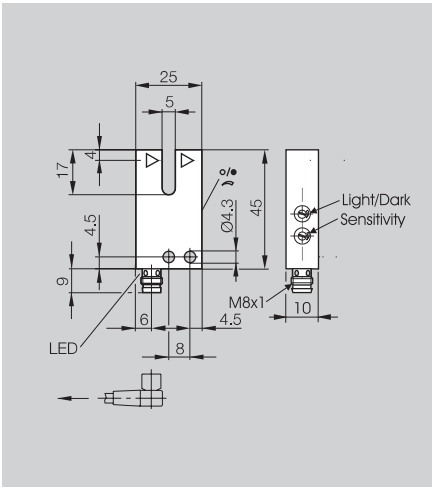
Features

- Highly visible emission
- Extremely rugged single piece metal housing
- High resolution
- Light/Dark operation selectable
- High switching frequency
- Adjustable sensitivity
- M8 connection with 360° LED indicator

Applications

- Parts sensing on conveyor rails and conveying belts
- Label discrimination with transparent substrates
- Parts dimension verification
- Parts counting in assembly lines
- Tool break monitoring
- Position verification
- Feed verification on automatic assembly equipment
- Checking for complete count
- Level monitoring in tanks
- Handling and assembly technology

Series		BGL
Slot Sensor	Slot Spacing	5 mm

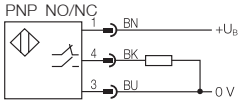


Visible Red		
PNP NO/NC Dark-on 270° Pot.	①	BGL 5A-001-S49
NPN NO/NC Dark-on 270° Pot.	②	BGL 5A-002-S49
Class II Visible Red Laser		
PNP NO/NC Dark-on 270° Pot. ⚠	①	
NPN NO/NC Dark-on 270° Pot. ⚠	②	

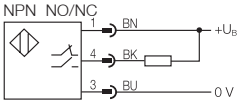
Supply Voltage		10…30 Vdc
Voltage Drop U_d at I_e		≤ 3.0 V PNP/ < 2.5 V
Rated Isolation Voltage Ui		75 Vdc
Rated Output Current I_e		≤ 200 mA
Current Consumption I_O (No Load)		≤ 35 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13
Emitter Light Source	Visible Red	Visible Red 640 nm
	Class II Laser	
Ambient Light Immunity (EN 60947-5-2)	Visible Red	10k Lux.
	Class II Laser	
LED Output		Red LED
Switching Frequency f	Visible Red	3000 Hz
	Class II Laser	
Response Time (On/Off Delay)	Visible Red	333 µs
	Class II Laser	
Switching Hysteresis	Visible Red	≤ 100 µm
	Class II Laser	
Resolution	Visible Red	≤ 300 µm
	Class II Laser	
Repeatability	Visible Red	≤ 20 µm
	Class II Laser	
Operating Temperature Range		-10° C to +60° C
Electrical Shock Protection		Class 2
Degree of Protection per IEC 60529		IP 65
Short Circuit Protection		yes
Reverse Polarity Protection		yes
Housing Material		anodized aluminum
Sensing Face Material		glass
Connection		M8 3-pin connector
Recommended Connector		C49 ANE-00-VY-050M
Weight		20 g

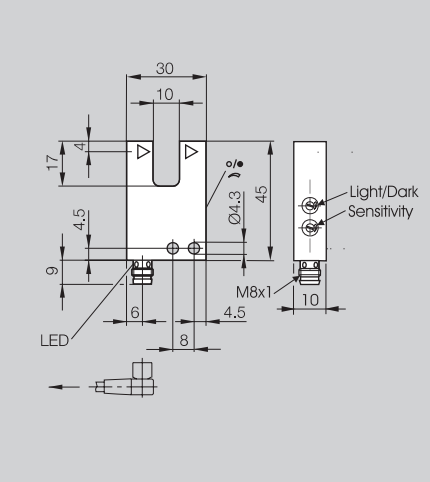
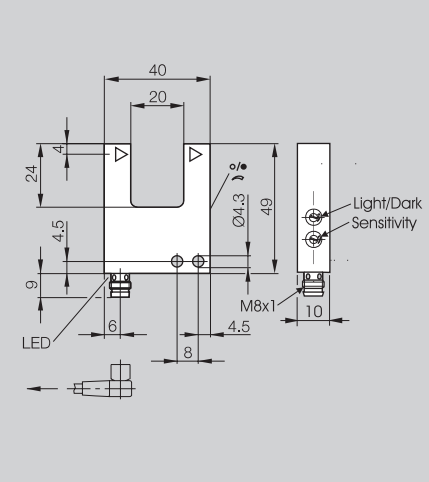
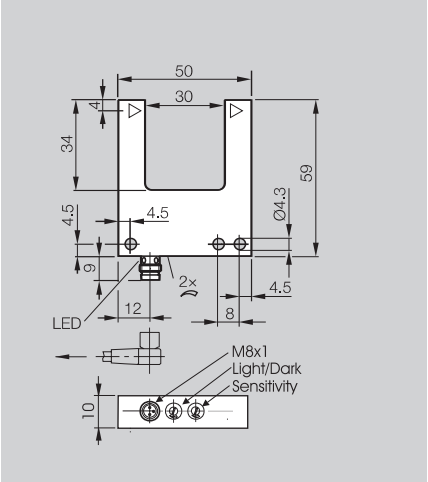
Wiring Diagrams

① PNP NO/NC

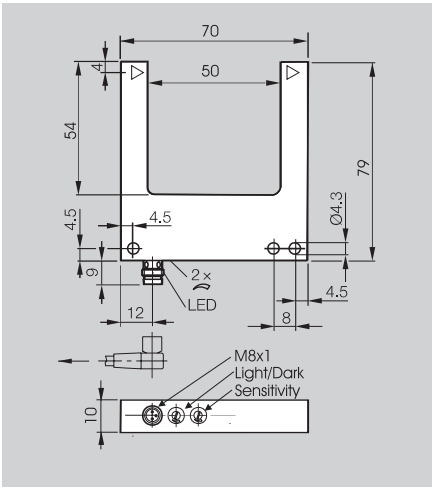


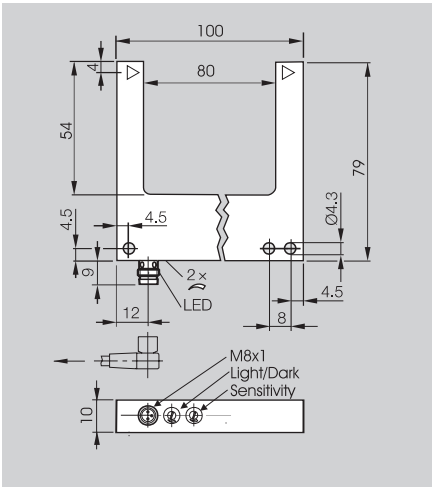
② NPN NO/NC



BGL 10 mm	BGL 20 mm	BGL 30 mm
		
BGL 10A-001-S49 BGL 10A-002-S49	BGL 20A-001-S49 BGL 20A-002-S49	BGL 30A-001-S49 BGL 30A-002-S49
		BGL 30A-003-S49 BGL 30A-004-S49
10…30 Vdc	10…30 Vdc	10…30 Vdc
≤ 3.0 V PNP/ < 2.5 V	≤ 3.0 V PNP/ < 2.5 V	≤ 3.0 V PNP/ < 2.5 V
75 Vdc	75 Vdc	75 Vdc
≤ 200 mA	≤ 200 mA	≤ 200 mA
≤ 35 mA	≤ 35 mA	≤ 35 mA
DC 13	DC 13	DC 13
Visible Red 640 nm	Visible Red 640 nm	Visible Red 640 nm
		Class II Visible Red Laser 650 nm
10k Lux.	10k Lux.	10k Lux.
		10k Lux.
Red LED	Red LED	Red LED
3000 Hz	1500 Hz	1500 Hz
		3000 Hz
333 µs	666 µs	666 µs
		333 µs
≤ 100 µm	≤ 100 µm	≤ 100 µm
		≤ 10 µm
≤ 300 µm	≤ 300 µm	≤ 300 µm
		≤ 60 µm
≤ 20 µm	≤ 20 µm	≤ 20 µm
		≤ 15 µm
-10° C to +60° C	-10° C to +60° C	-10° C to +60° C
Class 2	Class 2	Class 2
IP 65	IP 65	IP 65
yes	yes	yes
yes	yes	yes
anodized aluminum	anodized aluminum	anodized aluminum
glass	glass	glass
M8 3-pin connector	M8 3-pin connector	M8 3-pin connector
C49 ANE-00-VY-050M	C49 ANE-00-VY-050M	C49 ANE-00-VY-050M
23 g	28 g	36 g

Series		BGL	BGL
Slot Sensor	Slot Spacing	50 mm	80 mm



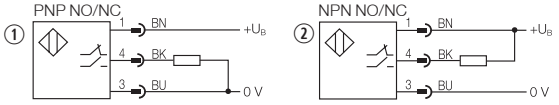


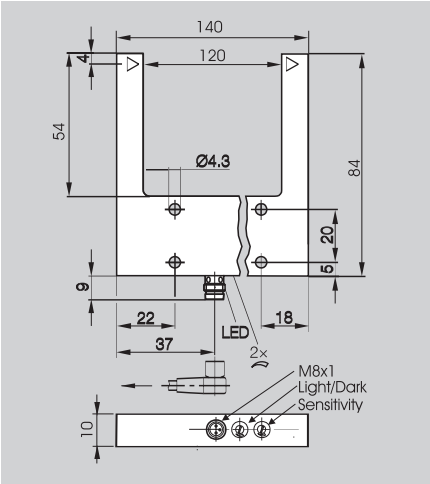
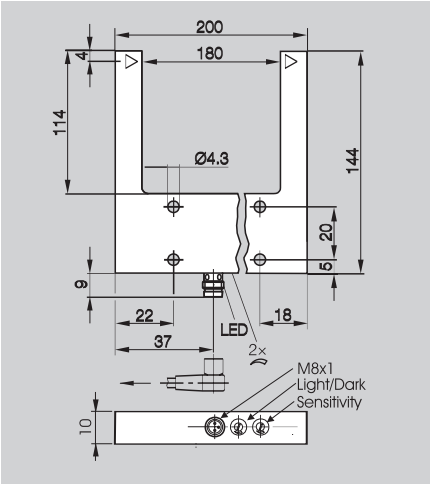
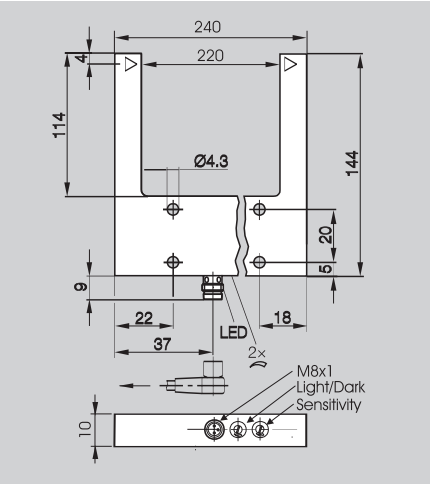
Visible Red

PNP NO/NC Dark-on 270° Pot.		①	BGL 50A-001-S49	BGL 80A-001-S49
NPN NO/NC Dark-on 270° Pot.		②	BGL 50A-002-S49	BGL 80A-002-S49
Class II Visible Red Laser				
PNP NO/NC Dark-on 270° Pot.	⚠	①	BGL 50A-003-S49	BGL 80A-003-S49
NPN NO/NC Dark-on 270° Pot.	⚠	②	BGL 50A-004-S49	BGL 80A-004-S49

Supply Voltage		10…30 Vdc	10…30 Vdc
Voltage Drop U_d at I_e		≤ 3.0 V PNP/ < 2.5 V	≤ 3.0 V PNP/ < 2.5 V
Rated Isolation Voltage		75 Vdc	75 Vdc
Rated Output Current I_e		≤ 200 mA	≤ 200 mA
Current Consumption I_O (No Load)		≤ 35 mA	≤ 35 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13	DC 13
Emitter Light Source	Visible Red	Visible Red 640 nm	Visible Red 640 nm
	Class II Laser	Class II Visible Red Laser 650 nm	Class II Visible Red Laser 650 nm
Ambient Light Immunity (EN 60947-5-2)	Visible Red	5k Lux.	5k Lux.
	Class II Laser	10k Lux.	10k Lux.
LED Output		Red LED	Red LED
Switching Frequency	Visible Red	1500 Hz	1500 Hz
	Class II Laser	3000 Hz	3000 Hz
Response Time (On/Off Delay)	Visible Red	666 µs	666 µs
	Class II Laser	333 µs	333 µs
Switching Hysteresis	Visible Red	≤ 150 µm	≤ 200 µm
	Class II Laser	≤ 10 µm	≤ 10 µm
Resolution	Visible Red	≤ 500 µm	≤ 800 µm
	Class II Laser	≤ 100 µm	≤ 200 µm
Repeatability	Visible Red	≤ 40 µm	≤ 60 µm
	Class II Laser	≤ 15 µm	≤ 15 µm
Operating Temperature Range		-10° C to +60° C	-10° C to +60° C
Electrical Shock Protection		Class 2	Class 2
Degree of Protection per IEC 60529		IP 65	IP 65
Short Circuit Protection		yes	yes
Reverse Polarity Protection		yes	yes
Housing Material		anodized aluminum	anodized aluminum
Sensing Face Material		glass	glass
Connection		M8 3-pin connector	M8 3-pin connector
Recommended Connector		C49 ANE-00-VY-050M	C49 ANE-00-VY-050M
Weight		54 g	77 g

Wiring Diagrams



BGL 120 mm	BGL 180 mm	BGL 220 mm
		
BGL 120A-001-S49	BGL 180A-001-S49	BGL 220A-001-S49
BGL 120A-002-S49	BGL 180A-002-S49	BGL 220A-002-S49
BGL 120A-003-S49		
BGL 120A-004-S49		
10…30 Vdc	10…30 Vdc	10…30 Vdc
≤ 3.0 V PNP/ < 2.5 V	≤ 3.0 V PNP/ < 2.5 V	≤ 3.0 V PNP/ < 2.5 V
75 Vdc	75 Vdc	75 Vdc
≤ 200 mA	≤ 200 mA	≤ 200 mA
≤ 35 mA	≤ 35 mA	≤ 35 mA
DC 13	DC 13	DC 13
Visible Red 640 nm	Visible Red 640 nm	Visible Red 640 nm
Class II Visible Red Laser 650 nm		
5k Lux.	5k Lux.	5k Lux.
10k Lux.		
Red LED	Red LED	Red LED
1500 Hz	1500 Hz	1500 Hz
3000 Hz		
666 µs	666 µs	666 µs
333 µs		
≤ 200 µm	≤ 200 µm	≤ 200 µm
≤ 10 µm		
≤ 800 µm	≤ 800 µm	≤ 800 µm
≤ 300 µm		
≤ 80 µm	≤ 80 µm	≤ 80 µm
≤ 15 µm		
-10° C to +60° C	-10° C to +60° C	-10° C to +60° C
Class 2	Class 2	Class 2
IP 65	IP 65	IP 65
yes	yes	yes
yes	yes	yes
anodized aluminum	anodized aluminum	anodized aluminum
glass	glass	glass
M8 3-pin connector	M8 3-pin connector	M8 3-pin connector
C49 ANE-00-VY-050M	C49 ANE-00-VY-050M	C49 ANE-00-VY-050M
118 g	190 g	220 g

Slot Sensors

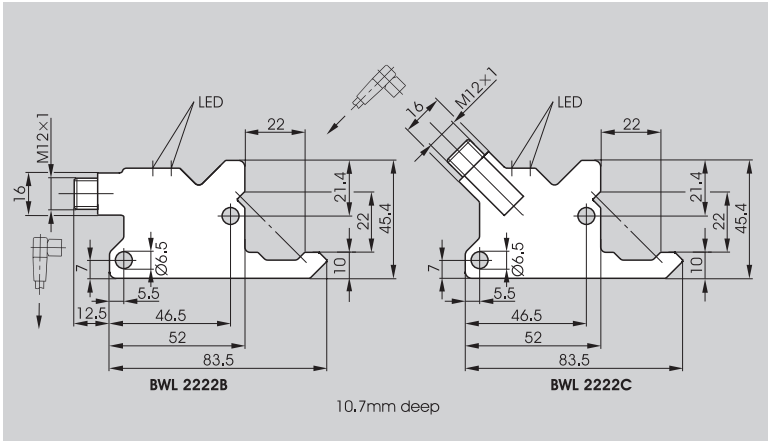
BWL Angle Sensor

Balluff BWL angle sensors are high performance thru-beam sensor for harsh industrial applications. Its housing is rugged and offers a variety of mounting variations. Objects are reliably detected even under extremely difficult conditions.
An intense infrared beam emitter ensures a high degree of function reserve. The BWL represents an effective solution to a variety of practical problems. Various configurations are available for increased versatility.

Applications

– Assembly and handling
– Robotics
– Position and orientation control

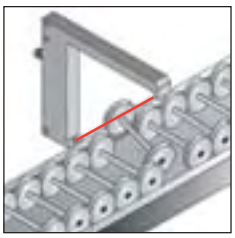
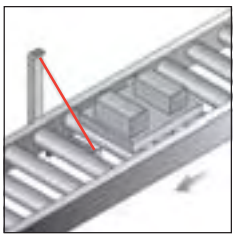
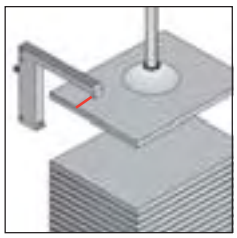
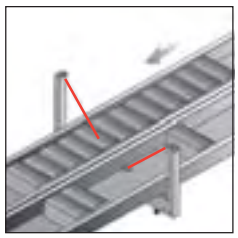
Series	BWL 2222
Optical axis	22 mm/22 mm



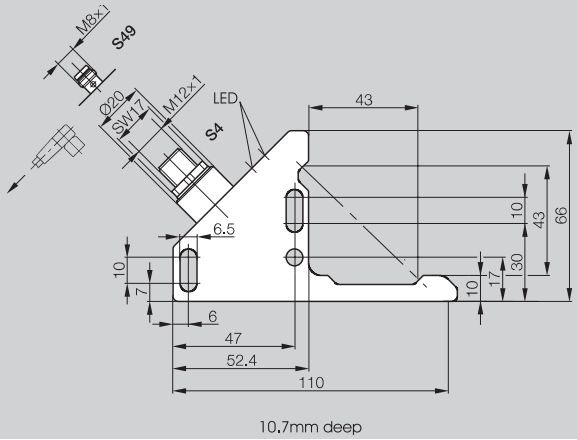
Ordering Code

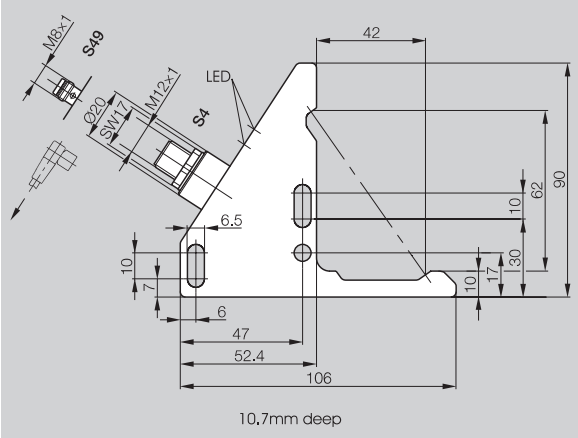
PNP	①	BWL 2222B-001-S4	BWL 2222C-001-S4

Supply Voltage	10...30 Vdc
Ripple	15%
Voltage drop U_d at I_e	≤ 2.5 V
No-Load Supply Current I_0 max.	≤ 35 mA
Short Circuit Protected	yes
On-Time Delay	100 ms
Switching Frequency	1000 Hz
Response Time	≤ 0.5 ms
Output	PNP
Output Current	≤ 200 mA
Switching Type	dark-on
Permissible Ambient Light	EN 60947-5-2
Power Indicator	Green LED
Output Function Indicator	Yellow LED
Operating Temperature Range	-10...+60° C
Degree of Protection per IEC 60529	IP 67
Protected Against Polarity Reversal	yes
Housing Material	corrosion-resistant steel
Lens Material	PMMA
Emitter, Light Type	Infrared (880 nm)
Dimensions	45.4x83.5x10.7 mm
Connection	M12 4-pin connector
Weight	120 g
Recommended Connector	C04 AEL-00-VY-050M

BWL 4241A 43 mm/43 mm	BWL 4260A 42 mm/62 mm

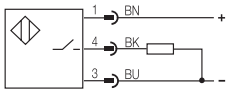




BWL 4241A-001-S49	BWL 4241A-001-S4	BWL 4260A-001-S49	BWL 4260A-001-S4
10...30 Vdc		10...30 Vdc	
15%		15%	
≤ 2.5 V		≤ 2.5 V	
≤ 35 mA		≤ 35 mA	
yes		yes	
100 ms		100 ms	
1000 Hz		1000 Hz	
≤ 0.5 ms		≤ 0.5 ms	
PNP		PNP	
≤ 200 mA		≤ 200 mA	
dark-on		dark-on	
EN 60947-5-2		EN 60947-5-2	
Green LED		Green LED	
Yellow LED		Yellow LED	
-10...+60° C		-10...+60° C	
IP 67		IP 67	
yes		yes	
corrosion-resistant steel		corrosion-resistant steel	
PMMA		PMMA	
Infrared (880 nm)		Infrared (880 nm)	
66x110x10.7 mm		90x106x10.7 mm	
M8 3-pin connector	M12 4-pin connector	M8 3-pin connector	M12 4-pin connector
150 g		150 g	
C49 ANE-00-VY-050M	C49 ANE-00-VY-050M	C49 ANE-00-VY-050M	C49 ANE-00-VY-050M

Wiring Diagram

① PNP NO

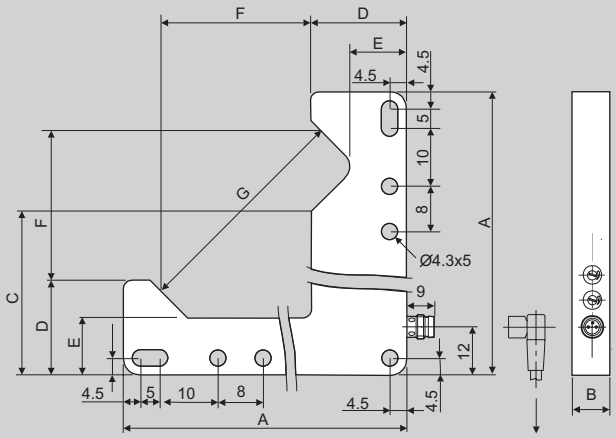


Slot Sensors

NEW

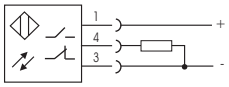
Unit Specific Dimensions

	4040D	5454D	6868D	9090D	110110D
A	75	90	105	125	150
B	10	10	10	12	12
C	43	43	43	43	45
D	25	25	25	25	30
E	15	17	17	17	19
F	40	54	68	90	110
G	60	80	100	130	160

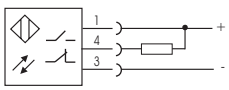


Gap Sizes		Visible Red PNP	Visible Red NPN	Laser PNP	Laser NPN
40 x 40 mm	①②	BWL 4040-D-R011-S49	BWL 4040-D-R012-S49	BWL 4040-D-L011-S49	BWL 4040-D-L012-S49
54 x 54 mm	①②	BWL 5454-D-R011-S49	BWL 5454-D-R012-S49	BWL 5454-D-L011-S49	BWL 5454-D-L012-S49
68 x 68 mm	①②	BWL 6868-D-R011-S49	BWL 6868-D-R012-S49	BWL 6868-D-L011-S49	BWL 6868-D-L012-S49
90 x 90 mm	①②	BWL 9090-D-R011-S49	BWL 9090-D-R012-S49	BWL 9090-D-L011-S49	BWL 9090-D-L012-S49
110 x 110 mm	①②	BWL 110110-D-R011-S49	BWL 110110-D-R012-S49	BWL 110110-D-L011-S49	BWL 110110-D-L012-S49
Supply Voltage		11...30 Vdc		10...30 Vdc	
Resolution		0.5 mm (40x40 & 54x54 models); 0.8 mm (all others)		0.1 mm (40x40); 0.2 mm (54x54 & 68x68); 0.3 mm (all others)	
Hysteresis		0.25 mm		0.02 mm	
Repeatability		≤ 0.04 mm (40x40); ≤ 0.06 mm (54x54); ≤ 0.08 mm (all others)		≤ 0.015 mm	
Sensitivity Adjustment		Potentiometer (270°)		Potentiometer (270°)	
Housing Material		anodized aluminum, glass lens		anodized aluminum, glass lens	
Degree of Protection		IP 67		IP 67	
Operating Temperature		-10...+60°C		-10...+60°C	
Switching Frequency		1.5 kHz		3 kHz	
Output		PNP or NPN (selectable light/dark operation)		PNP or NPN (selectable light/dark operation)	
Connection		M8 3-pin connector		M8 3-pin connector	
Recommended Connector		C49 ANE-00-VY-050M		C49 ANE-00-VY-050M	
Weight		160 g max.		160 g max.	

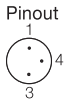
PNP

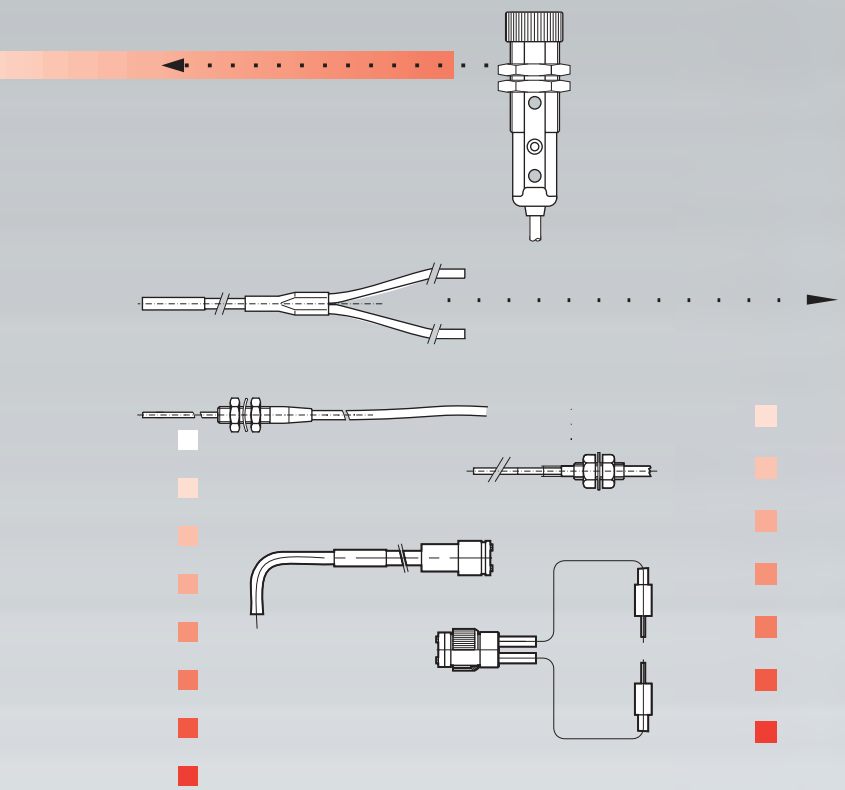
① 

NPN

② 

Pinout



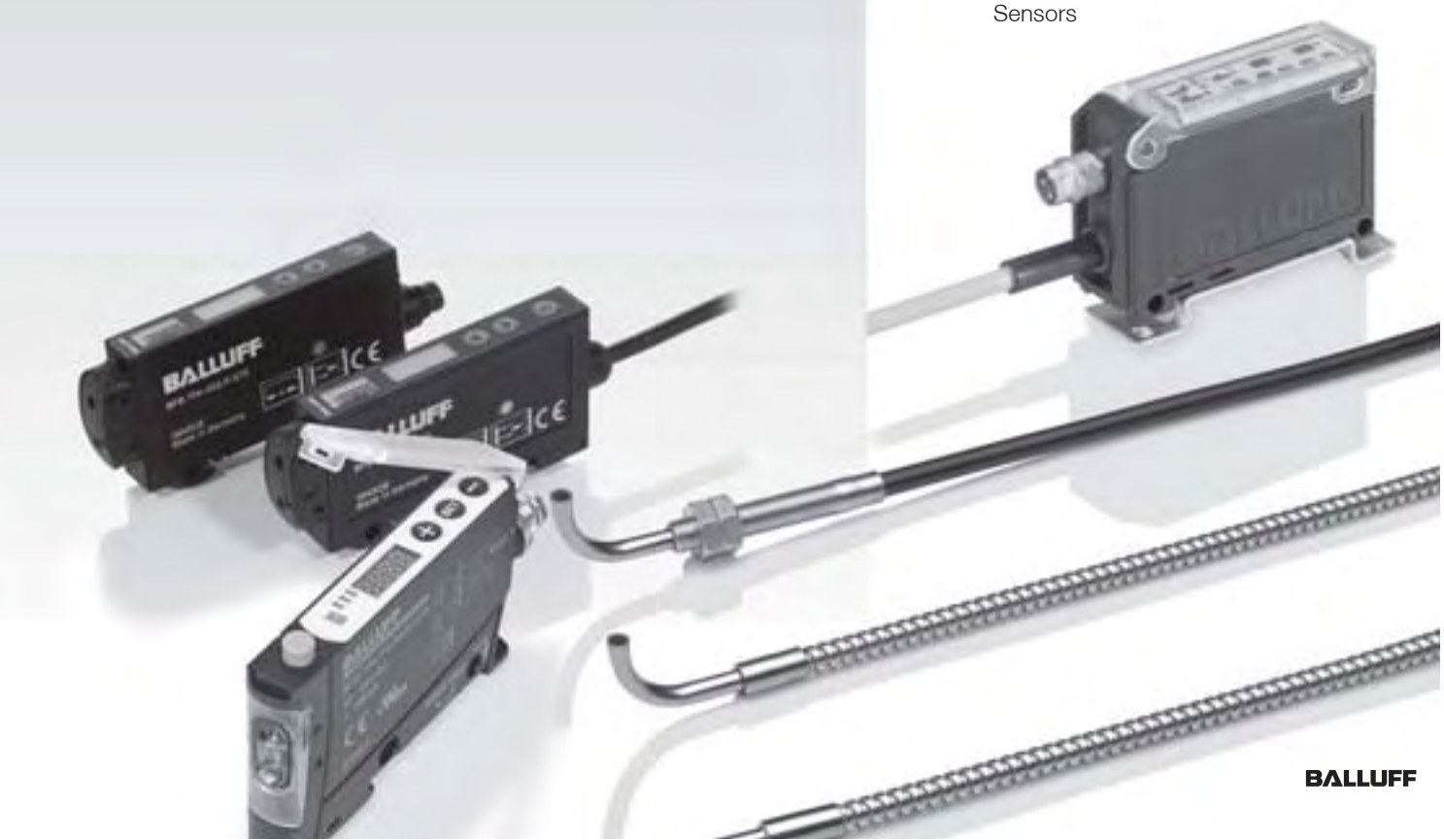


Fiber Optic Photoelectric Sensors

Designed for remote sensing, fiber optic cables and amplifiers offer reliable operation in difficult areas characterized by high temperatures, aggressive chemicals, or limited mounting space. Fiber optic cables conduct the light to and from the emitter/receiver amplifier, allowing the amplifier to be installed remotely, out of harm's way.

There are two basic types of fiber optic cables: diffuse (bifurcated) and thru-beam. Diffuse types have two separate control ends merged into one sensing tip. One half of the fiber bundle transmits light while the other returns it. Objects are detected when the emitted light is reflected from a target to the receiver. Using a reflector increases the sensing distance but creates a dead zone in front of the sensing tip.

Thru-beam fiber optic setups rely on two individual fiber optic cables facing each other. A beam is established between the two fiber cables and objects are detected when they pass through, breaking the beam from the emitter to the receiver.



Balluff offers a number of choices when it comes to fiber optic solutions. Whether the application requires standard plastic fiber optic cables, rugged duty glass cables or something special, we have the products you need.

The selection charts located on this page are designed to help you select the best sensor and cable match for your application. Follow the easy steps below:

1) Determine if your application requires diffuse or thru-beam cables.

2) Determine the maximum sensing range required.

3) Determine if the application needs standard plastic cables or rugged-duty glass cables.

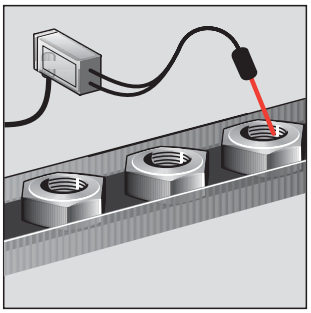
4) Refer to the cable pages in this section and select the cable best suited for your application.

5) Review the requirements for your amplifier (PNP, DC, etc.).

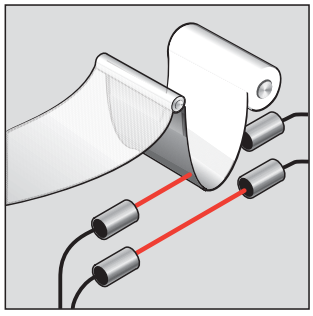
6) Refer to the compatibility charts on these two pages as you select your amplifier from the families located in this section.

NOTE: When ordering BFO 22G and BFO 48G thru-beam types of cables, you must order two pieces to get a complete set. These are packaged and sold individually.

Diffuse



Thru-beam



Standard Solutions (Plastic fiber optic cables)

The following amplifiers and cables are compatible

Amplifier
BOS 18KF-PA-1FR-S4-C
BOS 18KF-NA-1FR-S4-C
BOS 18KF-PA-1FR-C-02
BOS 18KF-NA-1FR-C-02
BOS 6K-PU-1FR-S75-C
BOS 6K-NU-1FR-S75-C
BOS 6K-PU-1FR-C-02
BOS 6K-NU-1FR-C-02
BOS 16K-UU-1FR-0.2-S4
BOS 16K-VU-1FR-0.2-S4
BOS 16K-UU-1FR-02
BOS 16K-VU-1FR-02
BOS 16K-AU-0FR-0.2-S21
BOS 16K-AU-0FR-02
BOS 72K-PU-RA10-S75
BOS 72K-NU-RA10-S75
BOS 72K-PU-RA20-S75
BOS 72K-NU-RA20-S75
BOS 72K-PU-RA10-02
BOS 72K-NU-RA10-02
BOS 72K-PU-RA20-02
BOS 72K-NU-RA20-02
BFB 75K-001-P-S75
BFB 75K-001-N-S75
BFB 75K-001-P-02
BFB 75K-001-N-02
BFB 75K-002-P-S75
BFB 75K-002-N-S75
BFB 75K-003-P-02
BFB 75K-003-N-02
Diffuse Cables
BFO D10-XA-GB-EAK-10-02
BFO D10-XA-HB-EAK-10-02
BFO D10-XA-RB-EAK-10-02
BFO D13-XA-JB-EAK-20-02
BFO D13-XB-KB-EAK-10-02
BFO D13-XB-RB-EAK-10-02
BFO D22-XA-CD-EAK-110-02
BFO D22-XA-DB-EAK-20-01
BFO D22-XA-ED-EAK-250-02
BFO D22-XAH-LB-EAK-20-02
BFO D22-XA-LB-EAK-20-02
BFO D22-XA-MB-PAK-10-02
BFO D22-XAP-LB-EAK-30-02
BFO D22-XA-SB-EAK-20-02
BFO D22-XAT-LB-EAK-20-02
BFO D22-XA-UB-EAK-20-02
BFO D22-XBF-LB-EAK-15-02
BFO D22-XB-LB-EAK-15-02
BFO D22-XB-UB-EAK-15-02
Thru-beam Cables (sold in pairs)
BFO D10-LA-CB-EAK-05-02
BFO D13-LA-QB-EAK-05-02
BFO D13-LA-WB-EAK-05-02
BFO D13-LG-05-EAK-30-02
BFO D13-LG-10-EAK-30-02
BFO D22-LA-AD-EAK-52-02
BFO D22-LA-BD-EAK-52-02
BFO D22-LAH-KB-EAK-10-02
BFO D22-LA-KB-EAK-10-02
BFO D22-LA-NB-PZK-10-02
BFO D22-LAP-KB-EAK-15-02
BFO D22-LA-QB-PAK-05-02
BFO D22-LA-RB-EAK-10-02
BFO D22-LAS-EB-EAK-10-02
BFO D22-LA-TB-EAK-10-02
BFO D22-LAT-KB-EAK-10-02
BFO D22-LD-EAK-10-20
BFO D25-LA-CD-EAK-110-02
BFO D25-LA-ED-EAK-250-02
BFO N22-LA-FB-EAK-05-01

Rugged-Duty Solutions (Glass fiber optic cables with 2.2 mm tips)

The following amplifiers and cables are compatible

Amplifier
BOS 72K-PU-RA10-S75
BOS 72K-NU-RA10-S75
BOS 72K-PU-RA20-S75
BOS 72K-NU-RA20-S75
BOS 72K-PU-RA10-02
BOS 72K-NU-RA10-02
BOS 72K-PU-RA20-02
BOS 72K-NU-RA20-02
Diffuse Cables
BFO 22G-DAN-SD-xx
BFO 22G-DA-SD-xx
BFO 22G-DAT-SD-xx
BFO 22G-DN-SD-xx
BFO 22G-DSF-SD-xx
BFO 22G-DS-SD-xx
BFO 22G-DSV-SD-xx
BFO 22G-DTA-SD-xx
BFO 22G-DT-SD-xx
Thru-beam Cables (sold individually)
BFO 22G-TAN-SD-xx
BFO 22G-TA-SB-xx
BFO 22G-TAT-SB-xx
BFO 22G-TN-SD-xx
BFO 22G-TSF-SB-xx
BFO 22G-TS-SB-xx
BFO 22G-TSV-SC-xx
BFO 22G-TTA-SB-xx
BFO 22G-TT-SB-xx

NOTE: Cables come in stainless steel or steel reinforced PVC jackets.
xx indicates cable length.
See pages 2.124 - 2.126 for more details.

Rugged-Duty Solutions (Glass fiber optic cables with 4.8 mm tips)

The following amplifiers and cables are compatible

Amplifier
BOS 16K-UU-1FI-0.2-S4
BOS 16K-VU-1FI-0.2-S4
BOS 16K-UU-1FI-02
BOS 16K-VU-1FI-02
BOS 16K-AU-0FI-0.2-S21
BOS 16K-AU-0FI-02
Diffuse Cables
BFO 48G-DAN-SD-xx
BFO 48G-DA-SB-xx
BFO 48G-DAT-SB-xx
BFO 48G-DLF-SB-xx
BFO 48G-DN-SD-xx
BFO 48G-DSF-SB-xx
BFO 48G-DS-SB-xx
BFO 48G-DSV-SC-xx
BFO 48G-DTA-SB-xx
BFO 48G-DT-SB-xx
Thru-beam Cables (sold individually)
BFO 48G-TAN-SD-xx
BFO 48G-TA-SB-xx
BFO 48G-TAT-SB-xx
BFO 48G-TLF-SB-xx
BFO 48G-TN-SD-xx
BFO 48G-TSF-SB-xx
BFO 48G-TS-SB-xx
BFO 48G-TSV-SC-xx
BFO 48G-TTA-SB-xx
BFO 48G-TT-SB-xx

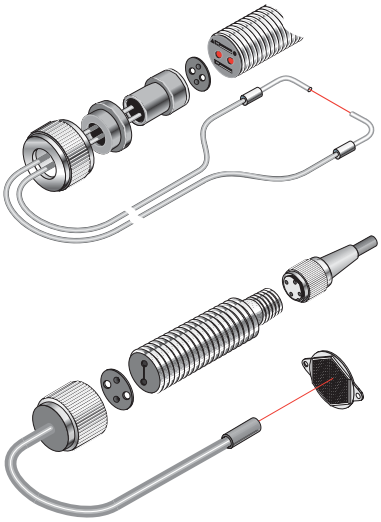
NOTE: Cables come in stainless steel or steel reinforced PVC jackets.
xx indicates cable length.
See pages 2.124 - 2.126 for more details.

Tubular Amplifier Solutions (Glass fiber optic cables)

The following amplifiers and cables are compatible

Amplifier
BOS 18M-GU-1PF-S4-Y
BOS 18M-PA-1PD-E5-C-S4
BOS 18M-PA-1PD-E4-C-03
BOS 18M-PA-1PF-E5-C-S4
BOS 18M-PU-1PD-SA4-C
BOS 18M-PU-1PD-SA5-C
BOS 30M-PU-1PH-SA1-C
BOS 30M-PU-1PH-SA3-C
Diffuse Cables
BFO 18A-XAA-MZG-30-xx
BFO 18A-XAA-SMG-30-xx
BFO 18A-XAA-UZG-30-xx
BFO 18A-XAC-SMG-30-xx
BFO 18A-XAE-MZG-30-xx
BFO 18A-XAE-SMG-30-xx
BFO 18A-XAE-UZG-30-xx
BFO 18A-XAF-MZG-15-xx
BFO 18A-XAF-SMG-15-xx
BFO 18A-XAG-MZG-15-xx
BFO 18V-XAC-MZG-30-xx
BFO 18V-XAC-SMG-30-xx
BFO 18V-XAD-MZG-30-xx
BFO 18V-XAD-SMG-30-xx
Thru-beam Cables
BFO 18A-LAA-MZG-20-xx
BFO 18A-LAA-UZG-20-xx
BFO 18A-LCC-SMG-20-xx
BFO 18A-LCC-UZG-20-xx
BFO 18A-LEE-MZG-20-xx
BFO 18A-LEE-SMG-20-xx
BFO 18A-LEE-UZG-20-xx
BFO 18A-LFF-MZG-10-xx
BFO 18A-LFF-SMG-10-xx
BFO 18A-LGG-MZG-10-xx
BFO 18A-LGG-SMG-10-xx
BFO 18V-LCC-MZG-23-xx
BFO 18V-LCC-SMG-23-xx
BFO 18V-LDD-MZG-23-xx
BFO 18V-LDD-SMG-23-xx
BFO 30S-LEE-SMG-20-xx*

*(BFS 30M only)
NOTE: xx indicates cable length.
See pages 2.139-2.143 for more details.



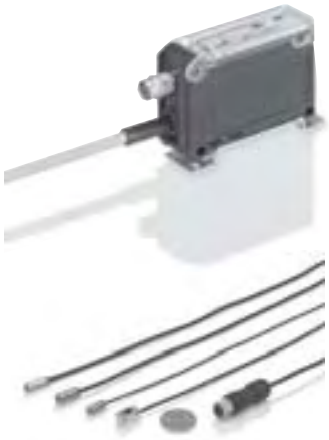
Miniature Remote Amplifier Sensors

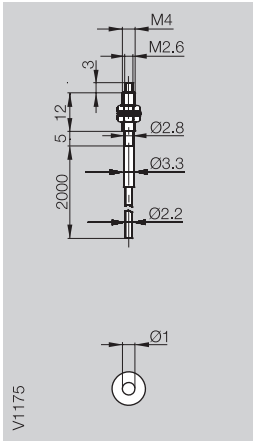
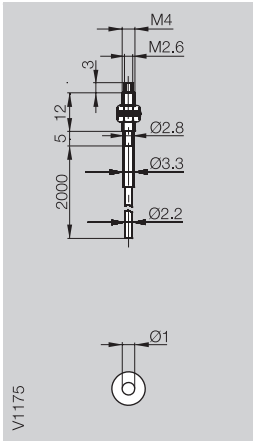
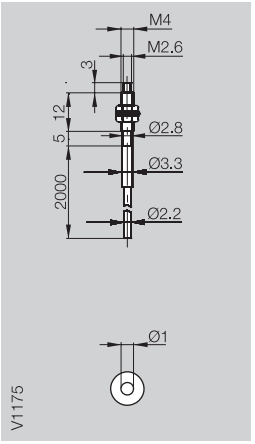
The following amplifiers and cables are compatible

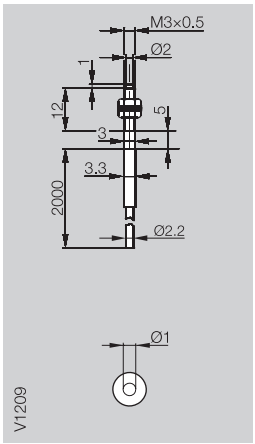
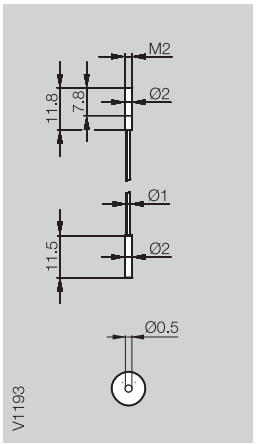
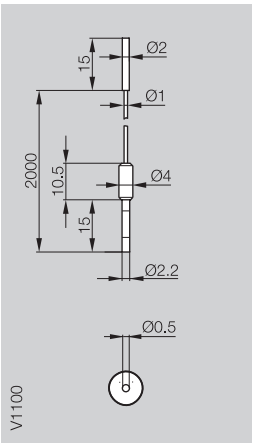
Amplifier
BMO A01-I-PU-C-02
BMO A01-I-NU-C-02
BMO A01-J-PU-C-02
BMO A01-J-NU-C-02
BMO A01-H-V1-C-02
BMO A01-H-C1-C-02
Diffuse Sensing Heads
BMOA 02SM-X12-1
BMOA 02SM-X12-F1
BMOA 03TM-X12-1
BMOA 03TM-X12-F1
BMOA 05SM-X63-1
BMOA 05SM-X63-R1
BMOA 06TM-X63-1
BMOA 06TM-X63-R1
BMOA 66RM-X63-1
BMOA 66RM-X63-R1
Thru-beam Sensing Heads
BMOA 02SM-B200-1
BMOA 02SM-B200-F1
BMOA 02SM-B200-R1
BMOA 03TM-B200-1
BMOA 03TM-B200-F1
BMOA 03TM-B200-R1
BMOA 04SM-B800-1
BMOA 04SM-B800-R1
BMOA 05TM-B800-1
BMOA 05TM-B800-R1
BMOA 06TM-B800-1
BMOA 06TM-B800-R1

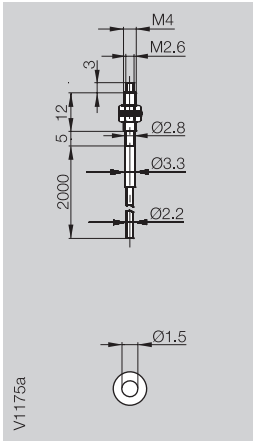
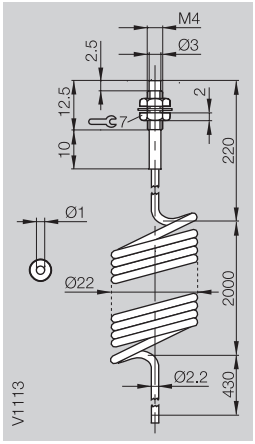
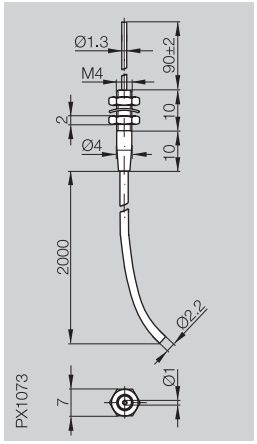
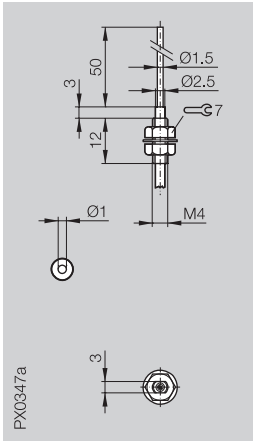
NOTE: Other lengths available, please consult factory.
See pages 2.139 - 2.142 for more details.

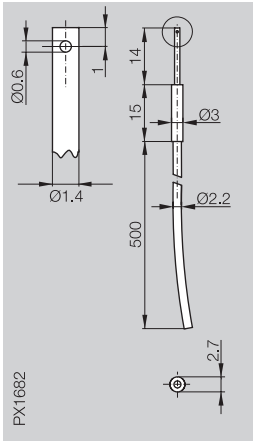
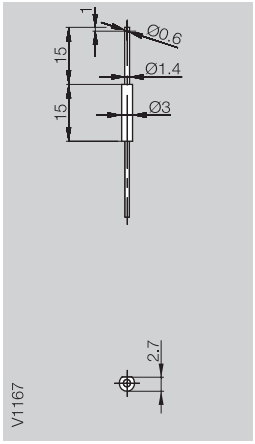
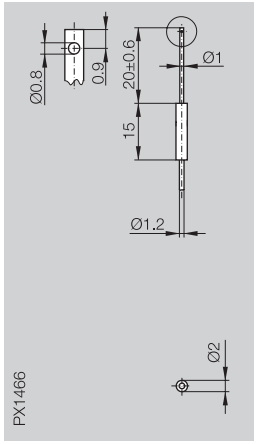
The BMOA miniature remote amplifier family by Balluff offers an alternative to traditional fiber optic solutions. The sensing heads contain the necessary optics for superior performance in a compact form factor. The connection from the head to the amplifier is through a ultra-high flex cable, which offers better durability over traditional fiber optic cables in applications where cables need to be "snaked" through a part of a machine.

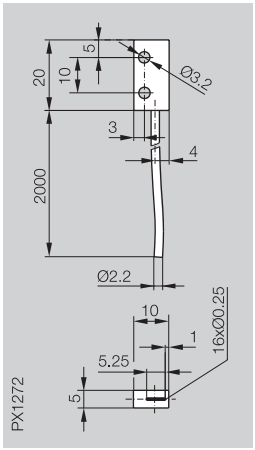
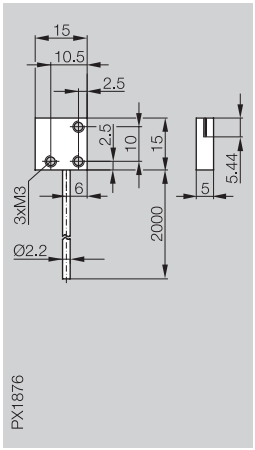
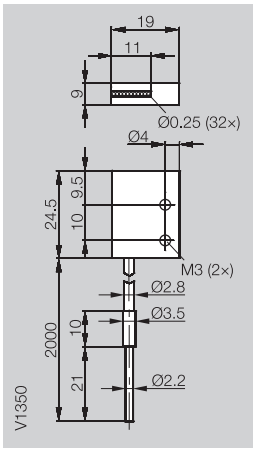


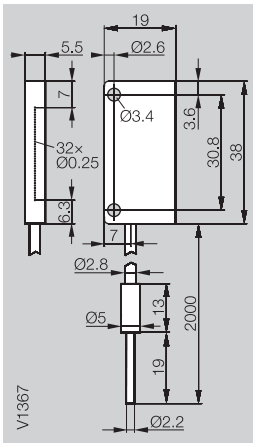
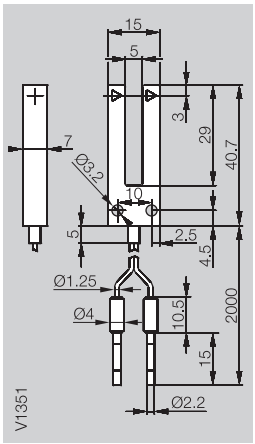
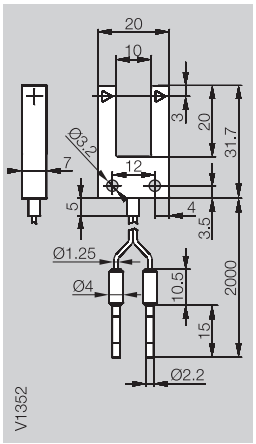
Head Type		M4-Threaded	M4-Threaded	M4-Threaded
Application		Standard	Hi-flex	High Temperature
Outer Jacket Diameter		2.2 mm	2.2 mm	2.2 mm
				
Ordering Code		BFO D22-LA-KB-EAK-10-02	BFO D22-LAH-KB-EAK-10-02	BFO D22-LAT-KB-EAK-10-02
Cable Bending Radius		≥ 25 mm	≥ 2 mm	≥ 25 mm
Head Bending Radius				
Operating Temperature Range		–55...+70 °C	–40...+70 °C	–55...+115 °C
Sensing Range	BFB 75K-001	500 mm	400 mm	600 mm
	BFB 75K-002/003	500 mm	400 mm	600 mm
	BOS 72K	525 mm	410 mm	625 mm
	BOS 16K	220 mm	200 mm	230 mm
	BOS 6K	220 mm	200 mm	230 mm
	BOS 18KF	120 mm	90 mm	120 mm

Head Type		M3-Threaded	M2-Threaded	Ø 2 mm
Application		Standard	Precision	Precision
Outer Jacket Diameter		2.2 mm	1.0 mm	1.0 mm
				
Ordering Code		BFO D22-LA-RB-EAK-10-02	BFO N22-LA-FB-EAK-05-01	BFO D10-LA-CB-EAK-05-02
Cable Bending Radius		≥ 25 mm	≥ 10 mm	≥ 15 mm
Head Bending Radius				
Operating Temperature Range		–55...+70 °C	–30...+60 °C	–55...+70 °C
Sensing Range	BFB 75K-001	500 mm	140 mm	130 mm
	BFB 75K-002/003	500 mm	140 mm	130 mm
	BOS 72K	525 mm	150 mm	140 mm
	BOS 16K	220 mm	50 mm	50 mm
	BOS 6K	220 mm	50 mm	50 mm
	BOS 18KF	100 mm	20 mm	20 mm

M4-Threaded Extended Range 2.2 mm	M4-Threaded Coiled Cable 2.2 mm	M4-Threaded Flexible Tip 2.2 mm	M4-Threaded Flexible Tip 2.2 mm
			
BFO D22-LAP-KB-EAK-15-02	BFO D22-LAS-EB-EAK-10-02	BFO D22-LA-TB-EAK-10-02	BFO D22-LA-NB-PZK-10-02
≥ 40 mm	≥ 25 mm	≥ 25 mm	≥ 25 mm
		≥ 10 mm	≥ 10 mm
–55...+70 °C	–30...+60 °C	–30...+60 °C	-55...+70°C
800 mm	400 mm	400 mm	500 mm
800 mm	400 mm	400 mm	500 mm
825 mm	410 mm	410 mm	525 mm
500 mm	190 mm	200 mm	250 mm
500 mm	190 mm	200 mm	250 mm
250 mm	100 mm	110 mm	120 mm

Ø 3 mm Side View Tip 2.2 mm	Ø 3 mm Side View Tip 1.3 mm	Ø 2 mm Side View Tip 1.3 mm
		
BFO D22-LA-QB-PAK-05-02	BFO D13-LA-WB-EAK-05-02	BFO D13-LA-QB-EAK-05-02
≥ 25 mm	≥ 25 mm	≥ 15 mm
–40...+70 °C	–40...+70 °C	35...+65 °C
120 mm	75 mm	110 mm
120 mm	75 mm	110 mm
630 mm	80 mm	120 mm
65 mm	40 mm	55 mm
65 mm	40 mm	55 mm
35 mm	20 mm	25 mm

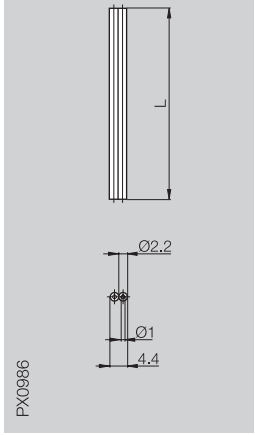
Head Type		20×10 mm	15×15 mm	19×25 mm
Application		Light Grid	Light Grid	Light Grid
Outer Jacket Diameter		2.2 mm	2.2 mm	2.8 mm
				
Ordering Code		BFO D22-LA-AD-EAK-52-02	BFO D22-LA-BD-EAK-52-02	BFO D25-LA-CD-EAK-110-02
Cable Bending Radius		≥ 25 mm	≥ 25 mm	≥ 60 mm
Head Bending Radius				
Operating Temperature Range		–35...+65 °C	–55...+70 °C	–55...+70 °C
Sensing Range	BFB 75K-001	450 mm	400 mm	600 mm
	BFB 75K-002/003	450 mm	400 mm	600 mm
	BOS 72K	475 mm	425mm	625 mm
	BOS 16K	220 mm	180 mm	350 mm
	BOS 6K	220 mm	180 mm	350 mm
	BOS 18KF	130 mm	110 mm	230 mm

Head Type		19×38 mm	15×41 mm	20×32 mm
Application		Light Grid	Fork	Fork
Outer Jacket Diameter		2.8 mm	2×1.25 mm	2×1.25 mm
				
Ordering Code		BFO D25-LA-ED-EAK-250-02	BFO D13-LG-05-EAK-30-02	BFO D13-LG-10-EAK-30-02
Cable Bending Radius		≥ 60 mm	≥ 10 mm	≥ 10 mm
Head Bending Radius				
Operating Temperature Range		–55...+70 °C	–55...+70 °C	–55...+70 °C
Sensing Range	BFB 75K-001	550 mm	5 mm	10 mm
	BFB 75K-002/003	550 mm	5 mm	10 mm
	BOS 72K	575 mm	5 mm	10 mm
	BOS 16K	360 mm	5 mm	10 mm
	BOS 6K	360 mm	5 mm	10 mm
	BOS 18KF	280 mm	5 mm	10 mm

Fiber Optic Cable and Connectors

Fiber optic cable can be user-cut to the desired length from a 20 m roll. Use as much plastic fiber optics cable as needed. A considerable saving, especially if multiple sensors are used. For simple applications, an end piece may not be needed. A simple clamp will suffice. Or for convenience and flexibility, select from among the available end pieces. The plastic fiber optic cable is simply crimped into the end piece. Tedious gluing is eliminated. The end piece can be removed at any time.

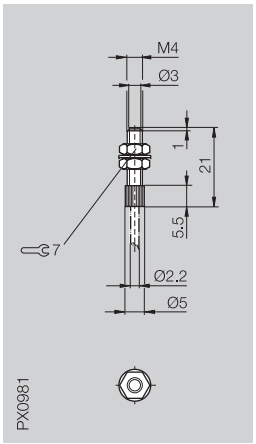
Housing size	**2.2×4.4 mm**
Through-beam	**duplex cable**
Range for L = 2 m	**150 mm**
Cable length	20 m

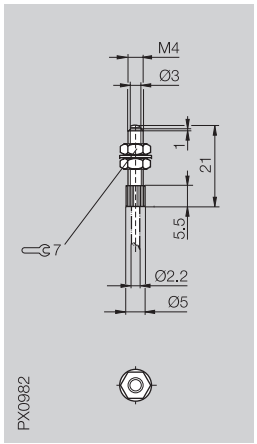


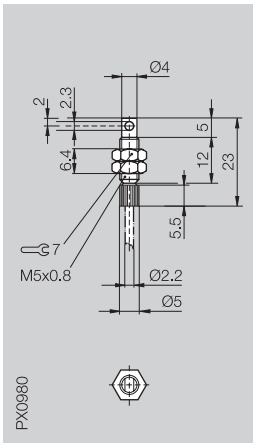
Ordering code	BFOD22-LD-EAK-10-20
Ambient temperature range T_a	–40...+70 °C
Pull force on fiber optics and connection parts at 20 °C	6 N
Core ∅	2×1 mm
Jacket ∅	2.2 mm

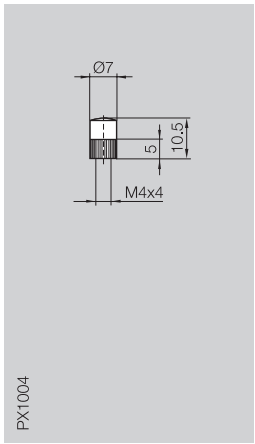
Cutting tool BFO CT is included.

Housing size	**M4**	**M4**	**∅ 4 mm**	**∅ 7 mm**
Features	End piece without lens	End piece with lens	90° end piece	Lens
Used with	BFO D22-LD-EAK-10-..	BFO D22-LD-EAK-10-..	BFO D22-LD-EAK-10-..	BFO D22-LA-BC-10
Range	**150 mm**	**450 mm**	**150 mm**	**1500 mm**
Range when used with 2 m plastic fiber cable.				



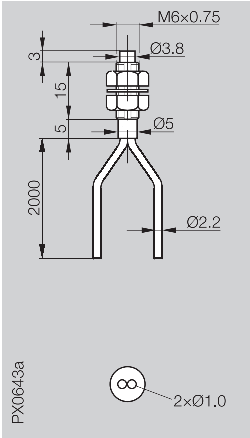


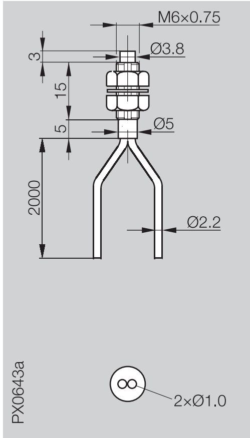


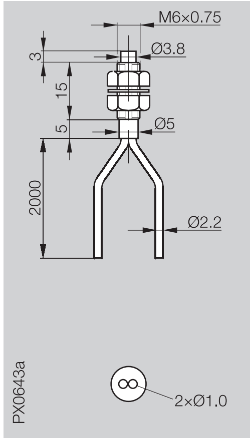


Ordering code	BFO D22-LA-BC-10	BFO D22-LA-CC-30	BFO D22-LA-AC-20	BFO 04-PK-1
Material				
– Optical surface	Plastic (fibers)	Glass	Glass	Glass
– Threaded tube	Stainless steel	Stainless steel	Stainless steel	Stainless steel

Head Type		M6-Threaded	M6-Threaded	M6-Threaded
Application		Standard	Hi-flex	High Temperature
Outer Jacket Diameter		2×2.2 mm	2×2.2 mm	2×2.2 mm

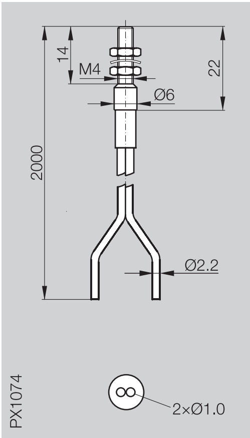


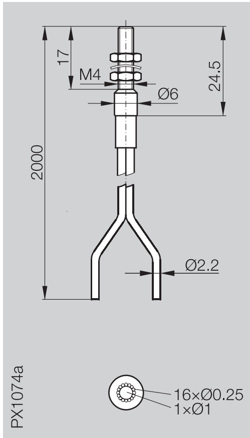


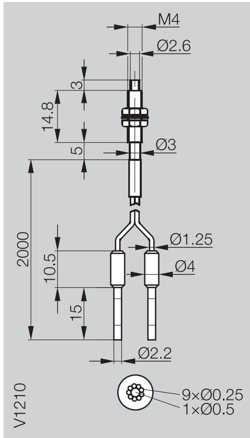


Ordering Code		BFO D22-XA-LB-EAK-20-02	BFO D22-XAH-LB-EAK-20-02	BFO D22-XAT-LB-EAK-20-02
Cable Bending Radius		≥ 25 mm	≥ 2 mm	≥ 25 mm
Head Bending Radius				
Operating Temperature Range		–55...+70 °C	–40...+70 °C	–55...+115 °C
Sensing Range	BFB 75K-001	150 mm	120 mm	130 mm
	BFB 75K-002/003	150 mm	120 mm	130 mm
	BOS 72K	175 mm	145 mm	155 mm
	BOS 16K	100 mm	70 mm	90 mm
	BOS 6K	100 mm	70 mm	90 mm
	BOS 18KF	50 mm	30 mm	50 mm

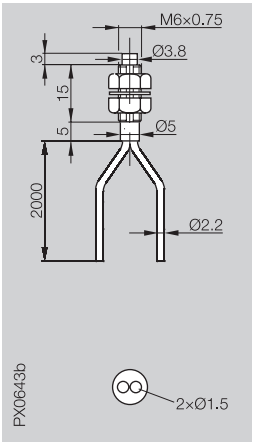
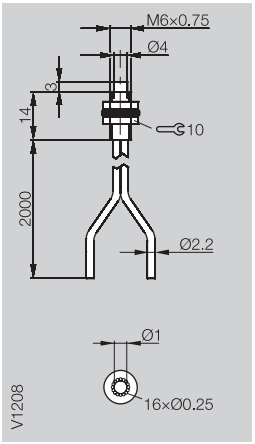
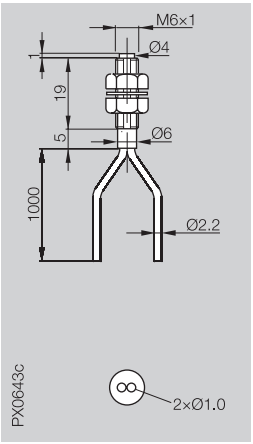
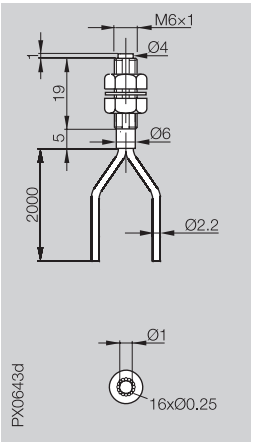
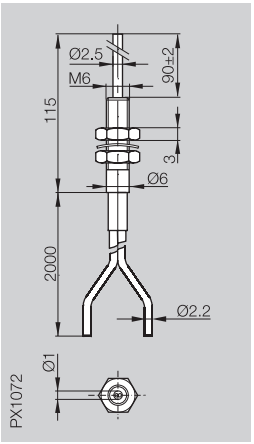
Head Type		M4-Threaded	M4-Threaded	M4-Threaded
Application		Standard	Co-axial	Co-axial
Outer Jacket Diameter		2×2.2 mm	2×2.2 mm	2×1.3 mm

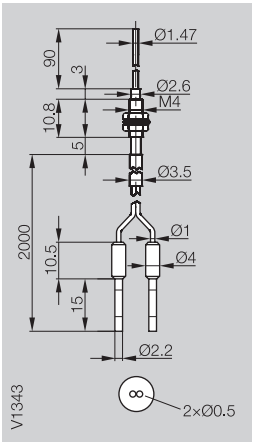
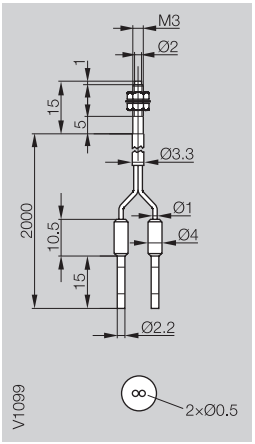
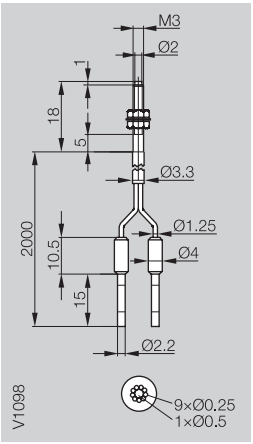
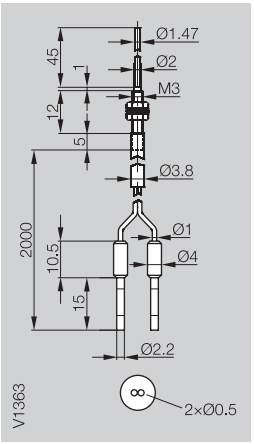
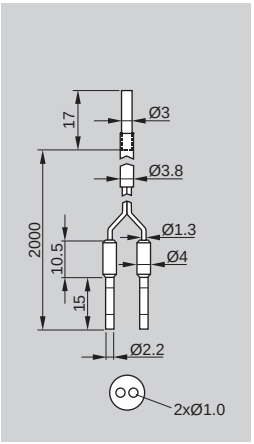


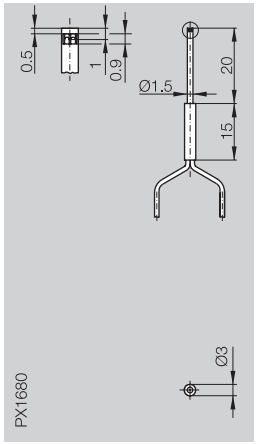
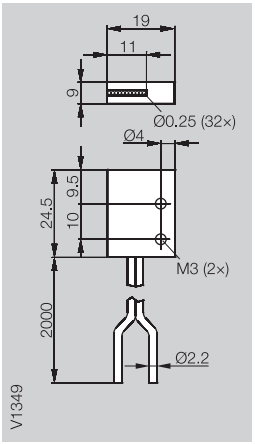
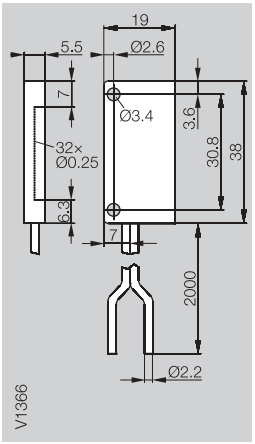


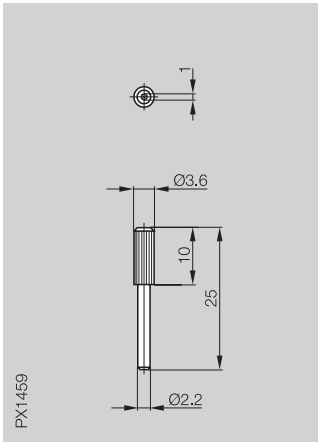
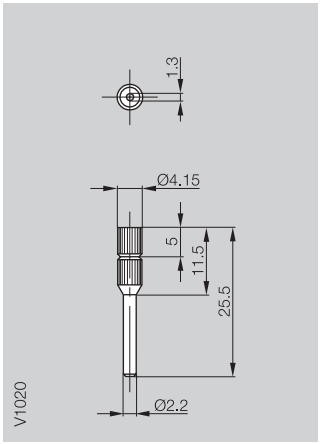
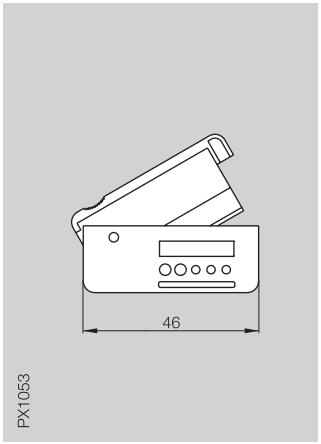


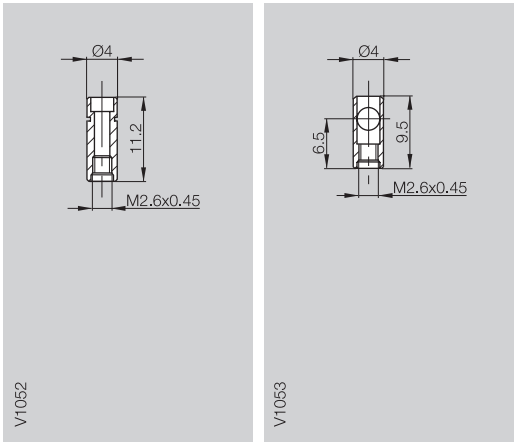
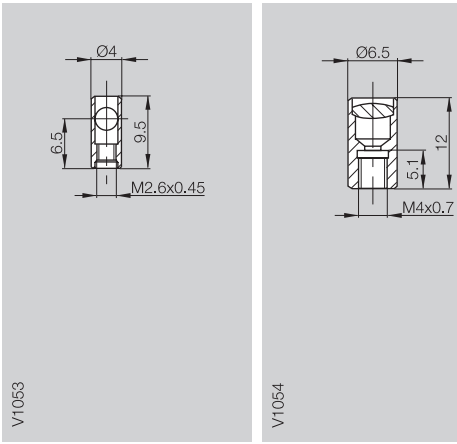
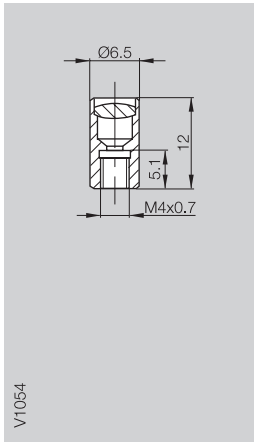
Ordering Code		BFO D22-XA-UB-EAK-20-02	BFO D22-XB-UB-EAK-15-02	BFO D13-XB-KB-EAK-10-02
Cable Bending Radius		≥ 25 mm	≥ 25 mm	≥ 15 mm
Head Bending Radius				
Operating Temperature Range		–35...+65 °C	–40...+60 °C	–55...+70 °C
Sensing Range	BFB 75K-001	120 mm	130 mm	60 mm
	BFB 75K-002/003	120 mm	130 mm	60 mm
	BOS 72K	145 mm	155 mm	85 mm
	BOS 16K	80 mm	90 mm	35 mm
	BOS 6K	80 mm	90 mm	35 mm
	BOS 18KF	40 mm	50 mm	20 mm

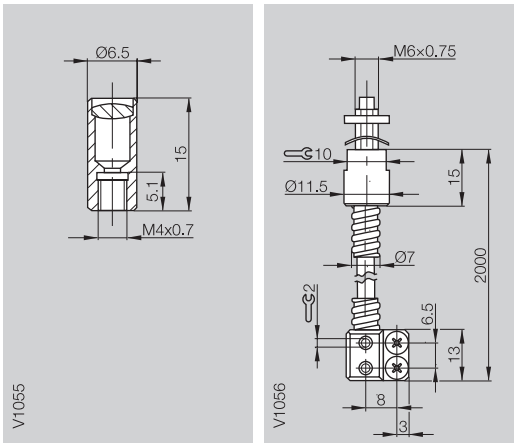
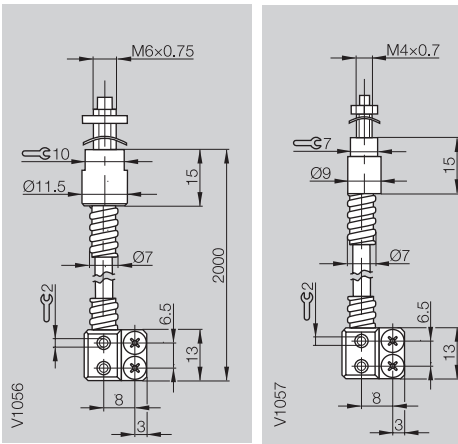
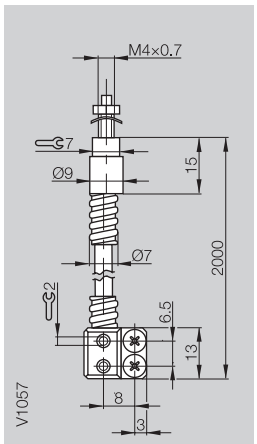
M6-Threaded	M6-Threaded	M6×1-Threaded	M6×1-Threaded	M6-Threaded
Extended Range	Co-axial	Standard	Co-axial	Flexible Tip
2×2.2 mm	2×2.2 mm	2×2.2 mm	2×2.2 mm	2×2.2 mm
				
BFO D22-XAP-LB-EAK-30-02	BFO D22-XB-LB-EAK-15-02	BFO D22-XA-DB-EAK-20-01	BFO D22-XBF-LB-EAK-15-02	BFO D22-XA-SB-EAK-20-02
≥ 40 mm	≥ 25 mm	≥ 25 mm	≥ 5 mm	≥ 25 mm ≥ 15 mm
–55...+70 °C	–55...+70 °C	–40...+60 °C	–40...+60 °C	–35...+65 °C
180 mm	120 mm	140 mm	110 mm	130 mm
180 mm	120 mm	140 mm	110 mm	130 mm
205 mm	145 mm	165 mm	135 mm	155 mm
130 mm	80 mm	100 mm	70 mm	80 mm
130 mm	80 mm	100 mm	70 mm	80 mm
100 mm	50 mm	50 mm	30 mm	40 mm

M4-Threaded	M3-Threaded	M3-Threaded	M3-Threaded	Ø 3 mm
Flexible Tip	Standard	Co-axial	Flexible Tip	Standard
2×1 mm	2×1 mm	2×1.3 mm	2×1 mm	2×2.2 mm
				
BFO D10-XA-HB-EAK-10-02	BFO D10-XA-RB-EAK-10-02	BFO D13-XB-RB-EAK-10-02	BFO D10-XA-GB-EAK-10-02	BFO D13-XA-JB-EAK-20-02
≥ 15 mm ≥ 10 mm	≥ 15 mm	≥ 5 mm	≥ 15 mm ≥10 mm	≥ 25 mm
–55...+70 °C	–55...+70 °C	–40...+60 °C	–35...+65 °C	–35...+65 °C
50 mm	50 mm	60 mm	50 mm	130 mm
50 mm	50 mm	60 mm	50 mm	130 mm
75 mm	75 mm	85 mm	75 mm	155 mm
20 mm	20 mm	35 mm	20 mm	100 mm
20 mm	20 mm	35 mm	20 mm	100 mm
10 mm	10 mm	20 mm	10 mm	50 mm

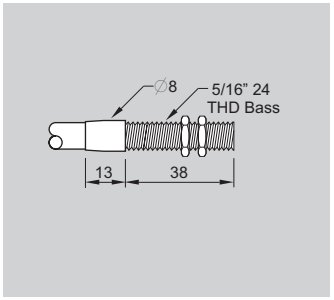
Head Type		∅ 3 mm	19×25 mm	19×38 mm
Application		Side View Tip	Light Grid	Light Grid
Outer Jacket Diameter		2×1 mm	2.25 mm	2.25 mm
				
Ordering Code		BFO D22-XA-MB-PAK-10-02	BFO D22-XA-CD-EAK-110-02	BFO D22-XA-ED-EAK-250-02
Head Bending Radius		≥ 25 mm	≥ 25 mm	≥ 25 mm
Operating Temperature Range		–40...+70 °C	–55...+70 °C	–55...+70 °C
Sensing Range	BFB 75K-001	35 mm	100 mm	90 mm
	BFB 75K-002/003	35 mm	100 mm	90 mm
	BOS 72K	25 mm	100 mm	90 mm
	BOS 16K	10 mm	60 mm	50 mm
	BOS 6K	10 mm	70 mm	60 mm
	BOS 18KF	8 mm	40 mm	30 mm

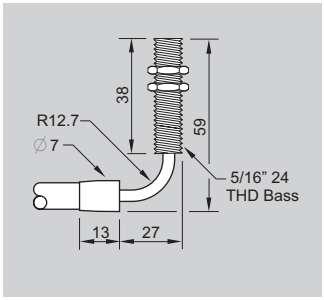
Description	**Adapter**	**Adapter**	**Cutting Tool**
Use	for plastic fiber optics ∅ 1 mm for connecting to fiber optic base units	for plastic fiber optics ∅ 1.3 mm for connecting to fiber optic base units	for trimming Plastic Fiber Optics ∅ 1 mm to ∅ 2.2 mm
			
Ordering Code	BFO D10-LA-DC-10	BFO D13-LA-EC-10	BFO CT

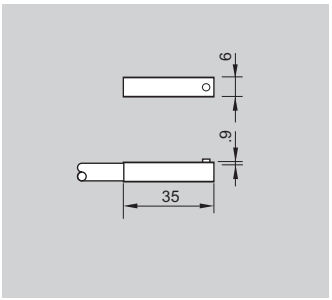
Description	Lens for through-beam fiber optics M2.6×0.45	90° Rotatable head for through-beam fiber optics M2.6×0.45	Focusing lens for coaxial diffuse fiber optics M4×0.7
				
Ordering code	BFO 02-PK-1	BFO 02-UK-1	BFO 04-FL-1
Range/sensing distance with corresponding fiber optic cable	×10	×0.7	19 mm ±2 mm
Packaging Unit	2 pieces	2 pieces	2 pieces

Description	Focusing lens for coaxial diffuse fiber optics M4×0.7	Metal corrugated tube (stainless steel) for fiber optics M6×0.75	Metal corrugated tube (stainless steel) for fiber optics M4×0.7
				
Ordering code	BFO 04-FL-2	BFO 06-FS-1	BFO 04-FS-1
Range/sensing distance with corresponding fiber optic cable	7 mm ±2 mm		
Packaging Unit	1 piece	1 piece	1 piece

Sensing Mode		Thru-beam	Diffuse	Thru-beam	Diffuse	Thru-beam	Diffuse
Nominal	BOS 72K (22G)	600 mm	140 mm	600 mm	140 mm	600 mm	80 mm
Sensing Range	BOS 16K (48G)	500 mm	80 mm	500 mm	80 mm	350 mm	40 mm







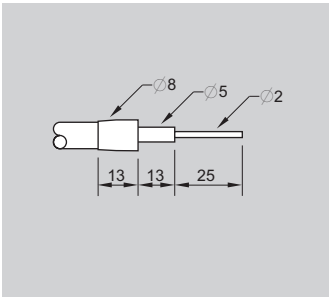
Diffuse			
Universal 0.187" (4.75mm) Amplifier Tip			
Stainless Steel Jacket (Type 302)	BFO 48G-DT-SB-1	BFO 48G-DTA-SB-1	BFO 48G-DSV-SC-1
PVC Jacket (Steel Reinforced	BFO 48G-DT-PB-1	BFO 48G-DTA-PB-1	BFO 48G-DSV-PC-1
Miniature 0.086" (2.18mm) Amplifier Tip			
Stainless Steel Jacket (Type 302)	BFO 22G-DT-SD-1	BFO 22G-DTA-SD-1	BFO 22G-DSV-SD-1
PVC Jacket (Steel Reinforced	BFO 22G-DT-PD-1	BFO 22G-DTA-PD-1	BFO 22G-DSV-PD-1
Thru-beam			
Universal 0.187" (4.75mm) Amplifier Tip			
Stainless Steel Jacket (Type 302)	BFO 48G-TT-SB-1	BFO 48G-TTA-SB-1	BFO 48G-TSV-SC-1
PVC Jacket (Steel Reinforced	BFO 48G-TT-PB-1	BFO 48G-TTA-PB-1	BFO 48G-TSV-PC-1
Miniature 0.086" (2.18mm) Amplifier Tip			
Stainless Steel Jacket (Type 302)	BFO 22G-TT-SD-1	BFO 22G-TTA-SD-1	BFO 22G-TSV-SD-1
PVC Jacket (Steel Reinforced)	BFO 22G-TT-PD-1	BFO 22G-TTA-PD-1	BFO 22G-TSV-PD-1

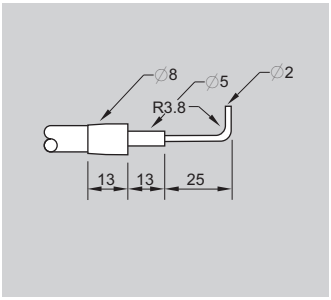
Sensing Tip	Straight threaded	Threaded to smooth right angle	Side view
Sensing Tip Material	Brass	Brass	Brass
Cable Length (Other Lengths available)	1 m	1 m	1 m
Bend Radius, Stainless Steel	>25 mm	>25 mm	>25 mm
Bend Radius, PVC	>12 mm	>12 mm	>12 mm
Operating Temperature, Steel	-45° C to +275° C	-45° C to +275° C	-45° C to +275° C
Operating Temperature, PVC	-40° C to +105° C	-40° C to +105° C	-40° C to +105° C
Fiber Core Diameter (48G Universal)	3.17 mm	3.17 mm	2.36 mm
Fiber Core Diameter (22G Miniature)	1.57 mm	1.57 mm	1.57 mm
Pull Force	6.81 kg	6.81 kg	6.81 kg

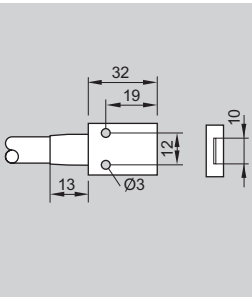
Note: Thru-beam fiber optics are sold as individual cables.
Two cables must be ordered to complete a pair.

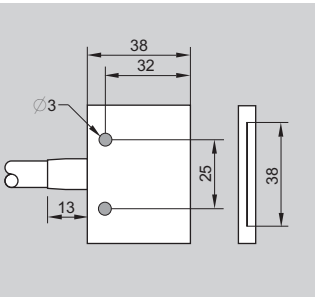
Consult factory for additional cable lengths.

Thru-beam	Diffuse	Thru-beam	Diffuse	Thru-beam	Diffuse	Thru-beam	Diffuse
600 mm	140 mm	375 mm	80 mm	350 mm	140 mm	400 mm	100 mm
230 mm	50 mm	140 mm	10 mm	100 mm	60 mm	150 mm	50 mm





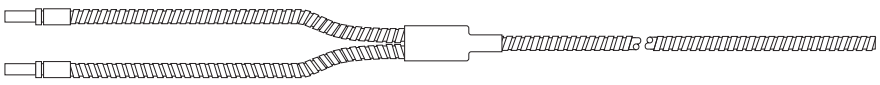




BFO 48G-DN-SD-1	BFO 48G-DAN-SD-1	BFO 48G-DSF-SB-1	BFO 48G-DLF-SB-1
BFO 48G-DN-PD-1	BFO 48G-DAN-PD-1	BFO 48G-DSF-PB-1	BFO 48G-DLF-PB-1
BFO 22G-DN-SD-1	BFO 22G-DAN-SD-1	BFO 22G-DSF-SD-1	
BFO 22G-DN-PD-1	BFO 22G-DAN-PD-1	BFO 22G-DSF-PD-1	
BFO 48G-TN-SD-1	BFO 48G-TAN-SD-1	BFO 48G-TSF-SB-1	BFO 48G-TLF-SB-1
BFO 48G-TN-PD-1	BFO 48G-TAN-PD-1	BFO 48G-TSF-PB-1	BFO 48G-TLF-PB-1
BFO 22G-TN-SD-1	BFO 22G-TAN-SD-1	BFO 22G-TSF-SD-1	
BFO 22G-TN-PD-1	BFO 22G-TAN-PD-1	BFO 22G-TSF-PD-1	
Needle	Angled needle	Small flare	Large flare
Stainless Steel (Type 302)	Stainless Steel (Type 302)	Stainless Steel (Type 302)	Stainless Steel (Type 302)
1 m	1 m	1 m	1 m
>25 mm	>25 mm	>25 mm	>25 mm
>12 mm	>12 mm	>12 mm	>12 mm
-45° C to +275° C	-45° C to +275° C	-45° C to +275° C	-45° C to +275° C
-40° C to +105° C	-40° C to +105° C	-40° C to +105° C	-40° C to +105° C
1.57 mm	1.57 mm	1.57 mm	3.17 mm
1.57 mm	1.57 mm	1.57 mm	1.57 mm
6.81 kg	6.81 kg	6.81 kg	6.81 kg

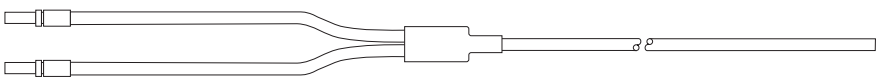
Application tip:
Keep your fiber optic cables as short as possible. Longer lengths mean longer distances for the emitted and received light to travel, which could lead to performance issues. Balluff does not recommended a fiber optic cable length of over 3 meters for any application.

Stainless Steel Diffuse

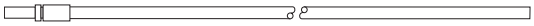


Stainless Steel Thru-Beam

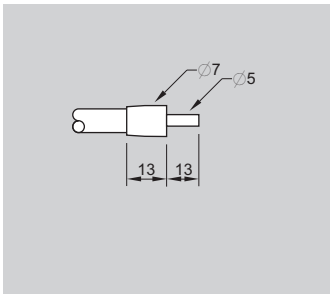
PVC Diffuse

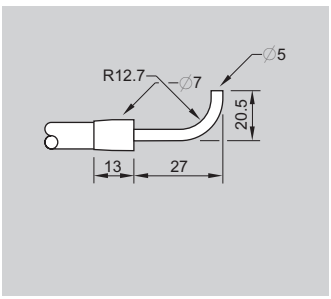


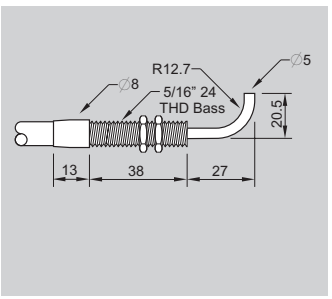
PVC Thru-Beam



Sensing Mode		Thru-beam	Diffuse	Thru-beam	Diffuse	Thru-beam	Diffuse
Nominal Sensing Range	BOS 72K (22G)	600 mm	140 mm	600 mm	140 mm	600 mm	140 mm
	BOS 16K (48G)	500 mm	80 mm	500 mm	80 mm	500 mm	80 mm





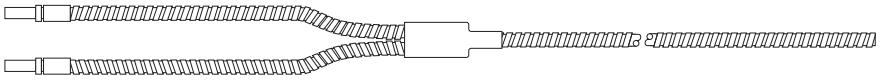


Diffuse			
Universal 0.187" (4.75mm) Amplifier Tip			
Stainless Steel Jacket (Type 302)	BFO 48G-DS-SB-1	BFO 48G-DA-SB-1	BFO 48G-DAT-SB-1
PVC Jacket (Steel Reinforced	BFO 48G-DS-PB-1	BFO 48G-DA-PB-1	BFO 48G-DAT-PB-1
Miniature 0.086" (2.18mm) Amplifier Tip			
Stainless Steel Jacket (Type 302)	BFO 22G-DS-SD-1	BFO 22G-DA-SD-1	BFO 22G-DAT-SD-1
PVC Jacket (Steel Reinforced	BFO 22G-DS-PD-1	BFO 22G-DA-PD-1	BFO 22G-DAT-PD-1
Thru-beam			
Universal 0.187" (4.75mm) Amplifier Tip			
Stainless Steel Jacket (Type 302)	BFO 48G-TS-SB-1	BFO 48G-TA-SB-1	BFO 48G-TAT-SB-1
PVC Jacket (Steel Reinforced	BFO 48G-TS-PB-1	BFO 48G-TA-PB-1	BFO 48G-TAT-PB-1
Miniature 0.086" (2.18mm) Amplifier Tip			
Stainless Steel Jacket (Type 302)	BFO 22G-TS-SD-1	BFO 22G-TA-SD-1	BFO 22G-TAT-SD-1
PVC Jacket (Steel Reinforced)	BFO 22G-TS-PD-1	BFO 22G-TA-PD-1	BFO 22G-TAT-PD-1
Sensing Tip	Straight, Smooth Barrel	Right Angle Smooth	Angle to Threaded
Sensing Tip Material	Brass	Brass	Brass
Cable Length (Other Lengths available)	1 m	1 m	1 m
Bend Radius, Stainless Steel	>25 mm	>25 mm	>25 mm
Bend Radius, PVC	>12 mm	>12 mm	>12 mm
Operating Temperature, Steel	-45° C to +275° C	-45° C to +275° C	-45° C to +275° C
Operating Temperature, PVC	-40° C to +105° C	-40° C to +105° C	-40° C to +105° C
Fiber Core Diameter (48G Universal)	3.17 mm	3.17 mm	3.17 mm
Fiber Core Diameter (22G Miniature)	1.57 mm	1.57 mm	1.57 mm
Pull Force	6.81 kg	6.81 kg	6.81 kg

Note: Thru-beam fiber optics are sold as individual cables. Two cables must be ordered to complete a pair.

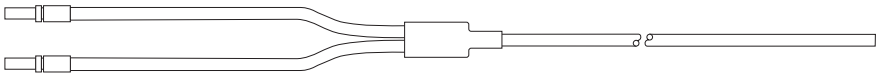
Consult factory for additional cable lengths.

Stainless Steel Diffuse

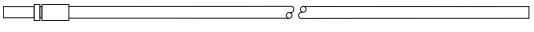


Stainless Steel Thru-Beam

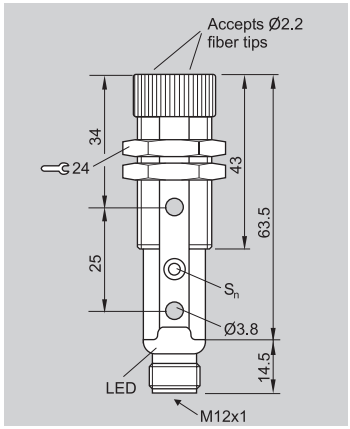
PVC Diffuse

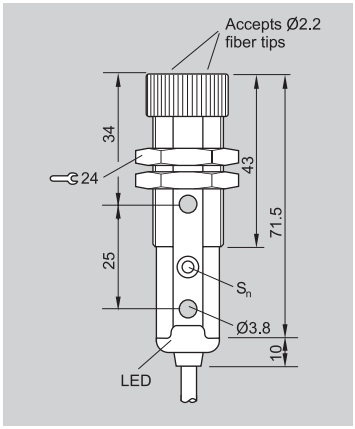


PVC Thru-Beam



Body Style	Combination 18 mm Threaded	Combination 18 mm Threaded
Type	Straight optics	Straight optics
Compatible Cables	For 2.2 mm Plastic Fibers	For 2.2 mm Plastic Fibers

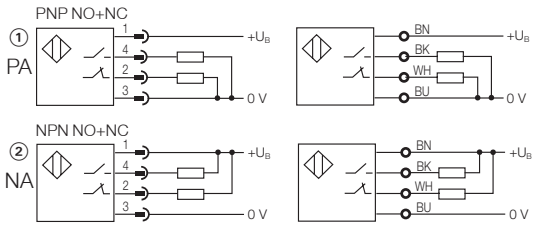




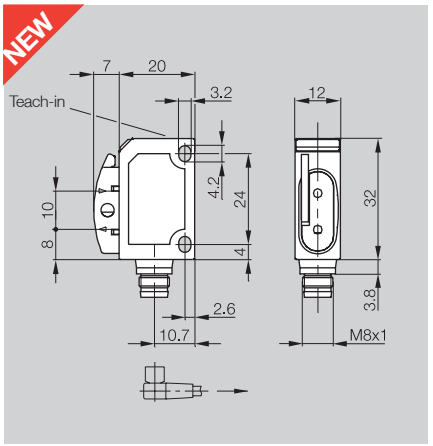
Fiber Optic Amplifier			
PNP NO+NC Light-on 270° Pot.	①	BOS 18KF-PA-1FR-S4-C	BOS 18KF-PA-1FR-C-02
NPN NO+NC Light-on 270° Pot	②	BOS 18KF-NA-1FR-S4-C	BOS 18KF-NA-1FR-C-02

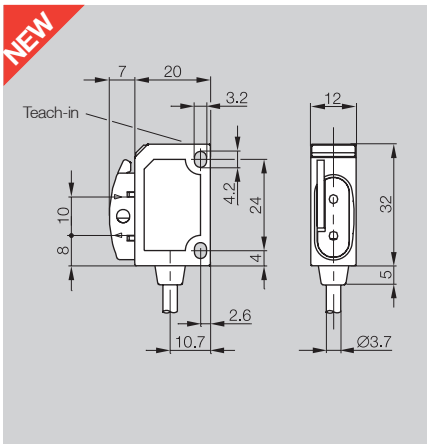
Supply Voltage U_B	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (No Load)	≤ 30 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Visible Red 660 nm	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
LED Output	Yellow LED	
LED Stability/Error	Green/Red LED	
Switching Frequency f	1 kHz	
Response Time (On/Off Delay)	≤ 0.5 ms	
Operating Temperature Range range T_a	-25° C to +55° C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	PBT	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 h with Ta=+25° C	
Connection	M12 4-pin connector	Cable 2m, PVC, 4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	25 g	75 g

Wiring Diagrams



Body Style	Small Block	Small Block
Type	Straight optics	Straight optics
Compatible Cables	For 2.2 mm Plastic Fibers	For 2.2 mm Plastic Fibers



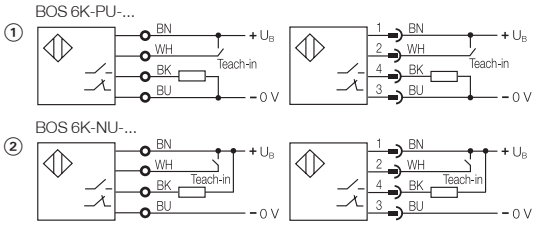


Ordering Code

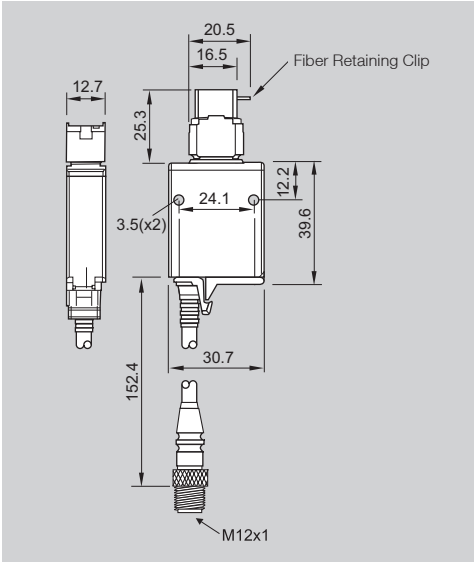
PNP	①	BOS 6K-PU-1FR-S75-C	BOS 6K-PU-1FR-C-02
NPN	②	BOS 6K-NU-1FR-S75-C	BOS 6K-NU-1FR-C-02

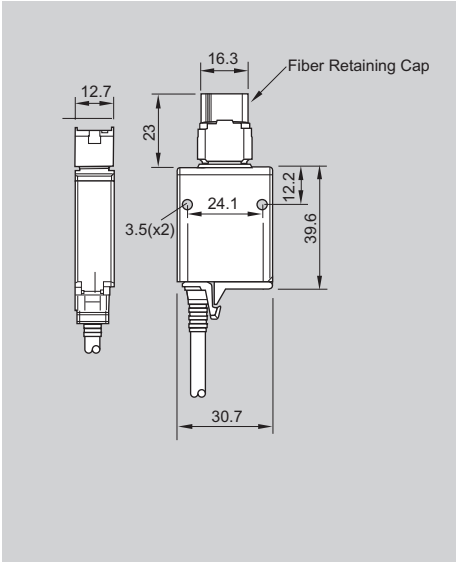
Supply Voltage	10...30 Vdc	10...30 Vdc
Ripple	≤ 15 %	≤ 15 %
Current Consumption I_0 max. (no load)	≤ 25 mA	≤ 25 mA
Rated Output Current	100 mA	100 mA
Voltage Drop U_d at I_e	≤ 2.4 V	≤ 2.4 V
Emitter Light Source	Red LED, 660 nm	Red LED, 660 nm
Response Time	0.5 ms	0.5 ms
Switching Frequency	1 kHz	1 kHz
Output Indicator	Yellow LED	Yellow LED
Stability Indicator	Green LED	Green LED
Connection	M8 4-pin connector	2 m cable PVC, 4 x 26 AWG
Recommended Connector	C75 ANL-00-VY-050M	
Housing Material	ABS	ABS
Weight	10 g	40 g
Degree of Protection per IEC 60529	IP 67	IP 67
Short Circuit Protection	Yes	Yes
Overload Protection	Yes	Yes
Operating Temperature Range	–20...+60 °C	–20...+60 °C

Wiring Diagrams



Body Style	Combination 18 mm Threaded	Combination 18 mm Threaded
Type	Straight optics	Straight optics
Compatible Fibers	For BFO 48G Glass Fiber	For BFO 48G Glass Fiber





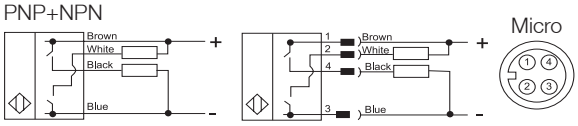
Ordering Code

Fiber Optic (Glass), IR	BOS 16K-UU-1FI-0.2-S4	BOS 16K-UU-1FI-02
Fiber Optic (Glass), IR, high-speed	BOS 16K-VU-1FI-0.2-S4	BOS 16K-VU-1FI-02

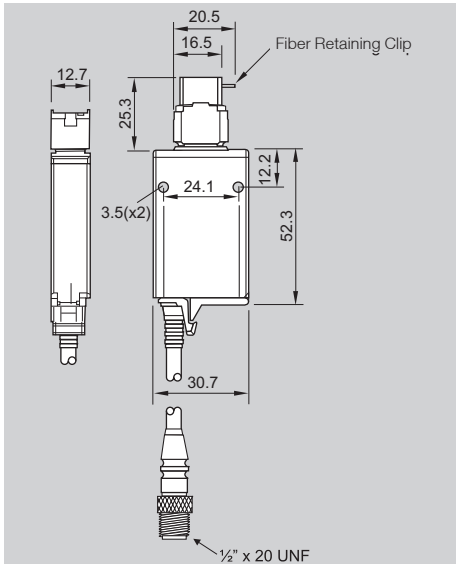
Supply Voltage	11...30 Vdc	11...30 Vdc
Voltage Drop U_d at I_e	0.7 V	0.7 V
Rated Isolation Voltage	300 V	300 V
Rated Output Current	100 mA	100 mA
Current Consumption I_o (No Load)	35 mA	35 mA
Protections	Short circuit, polarity reversal, false pulse	Short circuit, polarity reversal, false pulse
On/Off Delay	Standard 1 ms, High-speed 0.3 ms	Standard 1 ms, High-speed 0.3 ms
Switching Frequency	Standard 500 Hz, High-speed 1666 Hz	Standard 500 Hz, High-speed 166 6Hz
Output Type	PNP and NPN	PNP and NPN
Output Function	Selectable Light/Dark (switch)	Selectable Light/Dark (switch)
Sensitivity/Range Adjustment	5-turn potentiometer, clutch protected	5-turn potentiometer, clutch protected
Power Indication	Green LED	Green LED
Output Function Indication	Yellow LED	Yellow LED
Stability/Short Circuit Indication	Orange LED	Orange LED
Emitter Light Source	Infrared 880 nm	Infrared 880 nm
Light Field of View	Depends on fiber	Depends on fiber
Operating Temperature Range	-20° C to +70° C (-4° F to +158°F)	-20° C to +70° C (-4°F to +158°F)
Degree of Protection per IEC 60529	IP 67; 1200 psi washdown	IP 67; 1200 psi washdown
Shock/Vibration	30 G/10-55 Hz, 1mm; Meets IEC 947-5-2	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2
Relative Humidity	95%	95%
Housing Material	Noryl 190X	Noryl 190X
Sensing Face Material	Acrylic	Acrylic
Recommended Connector	C04 AEL-00-VY-050M	
Connection	M12 4-pin Micro, 6-inch Pig-tail	2 m PVC jacket, 4x22 AWG

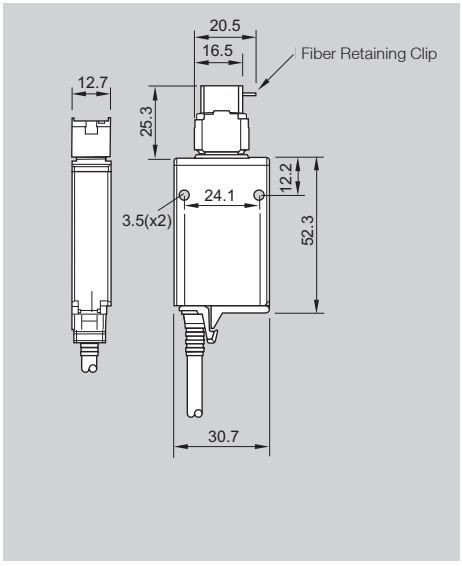
Note: Compatible with all BFO 48G Universal Glass Fiber.

PNP+NPN



Body style	Combination 18 mm Threaded	Combination 18 mm Threaded
Type	Straight optics	Straight optics
Compatible Fibers	For BFO 48G Glass Fiber	For BFO 48G Glass Fiber



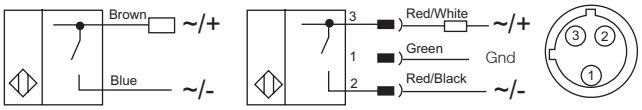


Ordering Code

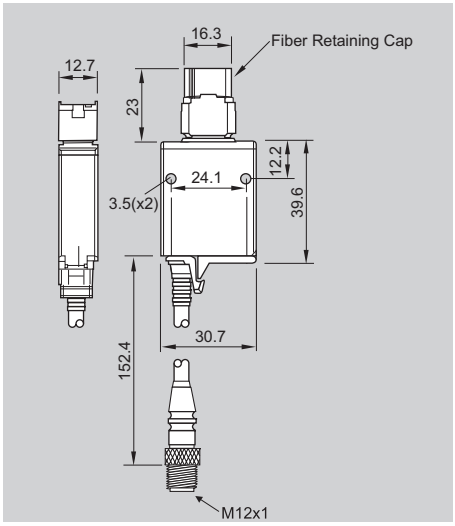
Fiber Optic (Glass), IR	BOS 16K-AU-0FI-0.2-S21	BOS 16K-AU-0FI-02
Supply Voltage	22...250 Vac/Vdc	22...250 Vac/Vdc
Voltage Drop U_d at I_e	8 V	8 V
Rated Isolation Voltage	300 V	300 V
Rated Output Current	100 mA	100 mA
Current Consumption I_o (no load)	Leakage 1.7 mA	Leakage 1.7 mA
Protections	Short circuit, polarity reversal, false pulse	Short circuit, polarity reversal, false pulse
On/Off Delay	8.3 ms	8.3 ms
Switching Frequency	60 Hz	60 Hz
Output Type	Two-wire	Two-wire
Output Function	Selectable Light/Dark (switch)	Selectable Light/Dark (switch)
Sensitivity/Range Adjustment	5-turn potentiometer, clutch protected	5-turn potentiometer, clutch protected
Power Indication	Green LED	Green LED
Output Function Indication	Yellow LED	Yellow LED
Stability/Short Circuit Indication	Orange LED	Orange LED
Emitter Light Source	Infrared 880nm	Infrared 880 nm
Light Field of View	Depends on fiber	Depends on fiber
Operating Temperature Range	-20° C to +70° C (-4°F to +158°F)	-20° C to +70° C (-4°F to +158°F)
Degree of Protection per IEC 60529	IP 67; 1200 psi washdown	IP 67; 1200 psi washdown
Shock/Vibration	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2
Relative Humidity	95%	95%
Housing Material	Noryl 190X	Noryl 190X
Sensing Face Material	Acrylic	Acrylic
Recommended Connector	C21 AE3-00-VY-150F	
Connection	3-pin Micro (2-keys), 6-inch Pig-tail	2 m PVC jacket, 3x22 AWG

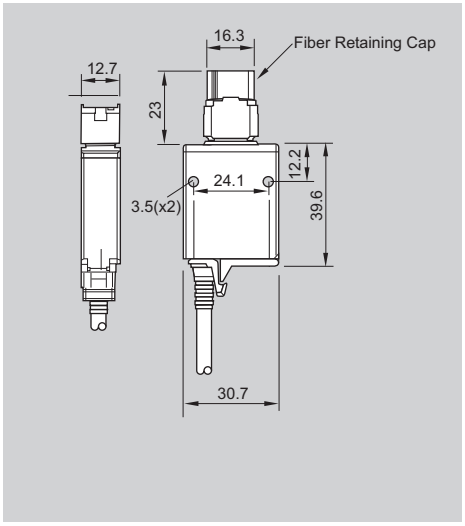
Note: Compatible with all BFO 48G Universal Glass Fibers.

AC Wiring



Body style	Combination 18 mm Threaded	Combination 18 mm Threaded
Type	Straight optics	Straight optics
Compatible Fibers	For 2.2 mm Plastic Fiber	For 2.2 mm Plastic Fiber

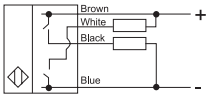


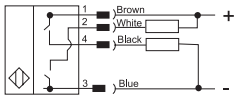


Ordering Code

Fiber Optic (Plastic), VR, cable	BOS 16K-UU-1FR-0.2-S4	BOS 16K-UU-1FR-02
Fiber Optic (Plastic), VR, cable, hi-spd.	BOS 16K-VU-1FR-0.2-S4	BOS 16K-VU-1FR-02
Supply Voltage	11...30 Vdc	11...30 Vdc
Voltage Drop U_d at I_e	0.7 V	0.7 V
Rated Isolation Voltage	300 V	300 V
Rated Output Current	100 mA	100 mA
Current Consumption I_o (no load)	35 mA	35 mA
Protections	Short circuit, polarity reversal, false pulse	Short circuit, polarity reversal, false pulse
On/Off Delay	Standard 1 ms, High-speed 0.3 ms	Standard 1 ms, High-speed 0.3 ms
Switching Frequency	Standard 500 Hz, High-speed 1666 Hz	Standard 500 Hz, High-speed 1666 Hz
Output Type	PNP and NPN	PNP and NPN
Output Function	Selectable Light/Dark (switch)	Selectable Light/Dark (switch)
Sensitivity/Range Adjustment	5-turn potentiometer, clutch protected	5-turn potentiometer, clutch protected
Power Indication	Green LED	Green LED
Output Function Indication	Yellow LED	Yellow LED
Orange LED	Orange LED	Orange LED
Emitter Light Source	Visible Red 660nm	Visible Red 660nm
Light Field of View	Depends on fiber	Depends on fiber
Operating Temperature Range	-20° C to +70° C (-4°F to +158°F)	-20° C to +70° C (-4°F to +158°F)
Degree of Protection per IEC 60529	IP 67; 1200 psi washdown	IP 67; 1200 psi washdown
Shock/Vibration	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2	30 G/10-55 Hz, 1 mm; Meets IEC 947-5-2
Relative Humidity	95%	95%
Housing Material	Noryl 190X	Noryl 190X
Sensing Face Material	Acrylic	Acrylic
Recommended Connector	C04 AEL-00-VY-050M	
Connection	M12 4-pin Micro, 6-inch Pig-tail	2 m PVC jacket, 4x22 AWG

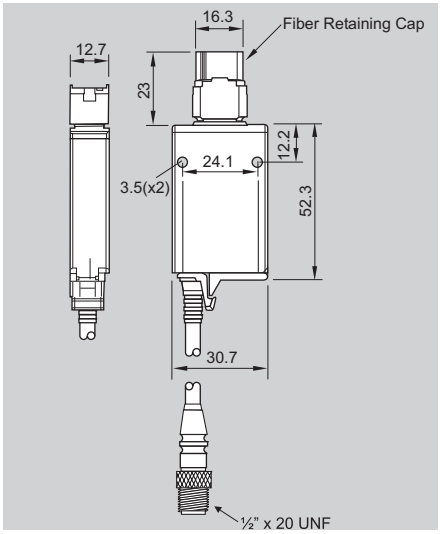
PNP+NPN

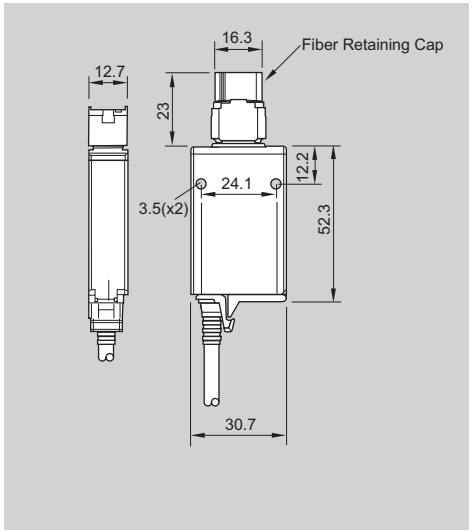




Micro

Series	BOS 16K Quick-Disconnect	BOS 16K Cable Out
	AC/DC	AC/DC
	For Plastic Fiber with	For Plastic Fiber with
	2.2 mm OD Plastic	2.2 mm OD Plastic

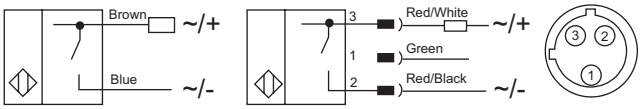




Ordering Code

Fiber Optic (Plastic), VR, cable	BOS 16K-AU-0FR-0.2-S21	BOS 16K-AU-0FR-02
Supply Voltage	22...250 Vac/Vdc	22...250 Vac/Vdc
Voltage Drop U_d at I_e	8 Vac max	8 Vac max
Rated Isolation Voltage	300 V	300 V
Rated Output Current	100 mA	100 mA
Current Consumption Io (no load)	1.7 mA	1.7 mA
Protections	Short circuit, polarity reversal, false pulse	Short circuit, polarity reversal, false pulse
On/Off Delay	8.3 ms	8.3 ms
Switching Frequency	60 Hz	60 Hz
Output Type	Two-wire	Two-wire
Output Function	Selectable Light/Dark (switch)	Selectable Light/Dark (switch)
Sensitivity/Range Adjustment	5-turn potentiometer, clutch protected	5-turn potentiometer, clutch protected
Power Indication	Green LED	Green LED
Output Function Indication	Yellow LED	Yellow LED
Orange LED	Orange LED	Orange LED
Emitter Light Source	Visible Red 660 nm	Visible Red 660 nm
Light Field of View	Depends on fiber	Depends on fiber
Operating Temperature Range	-20° C to +70° C (-4°F to +158°F)	-20° C to +70° C (-4°F to +158°F)
Degree of Protection per IEC 60529	IP 67; 1200 psi washdown	IP 67; 1200 psi washdown
Shock/Vibration	30G/10-55 Hz, 1 mm; Meets IEC 947-5-2	30G/10-55 Hz, 1mm; Meets IEC 947-5-2
Relative Humidity	95%	95%
Housing Material	Noryl 190X	Noryl 190X
Sensing Face Material	Acrylic	Acrylic
Recommended Connector	C21 AE3-00-VY-150F	
Connection	3-pin Micro (2-keys), 6-inch Pig-tail	2 m PVC jacket, 3x22 AWG

AC Wiring



BOS 72K Advanced Fiber Optic Amplifier

The BOS 72K fiber optic amplifier uses the latest microprocessor-based technology to solve the most difficult applications. It is available in a standard style without display as well as a version with display. The standard version without display has a 10-bit processor that offers over 1000 points of resolution and a fast operational speed up to 1000Hz. The version with display offers a 12-bit processor with over 4000 points of resolution, plus the convenience of a 4-digit display. The 4-digit display gives a clear indication of the received signal or threshold value.

Set-up has never been easier with the patented EASYtouch™ pushbutton teach-in process offered on the display version. It features two modes of operation— standard mode for 1kHz operation and fast mode for 5kHz operation. Additionally, pushbuttons for + and – allow the user to tweak in the application.

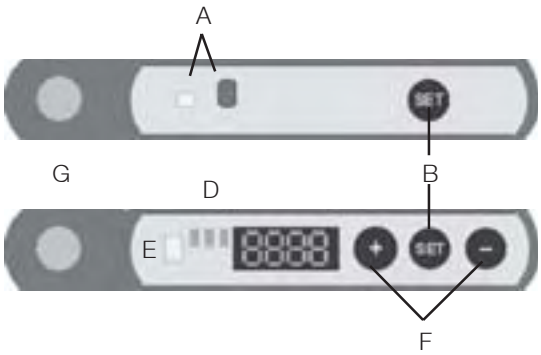
Features

– Accepts all 2.2mm diameter fiber optic cables
– Patented EASYtouch™ pushbutton teach-in process
– Remote teach for fast change over
– Powerful economical standard version without display
– Display version with over 4000 points of resolution
– Din rail or panel mountable
– M8 connector or cable out

Applications

– Small object detection
– Limited mounting space restrictions
– Chemically aggressive environments
– High temperature environments

Adjustment Indications



A OUTPUT status and READY/ERROR LED

B Teach-in button

C 4 digit display

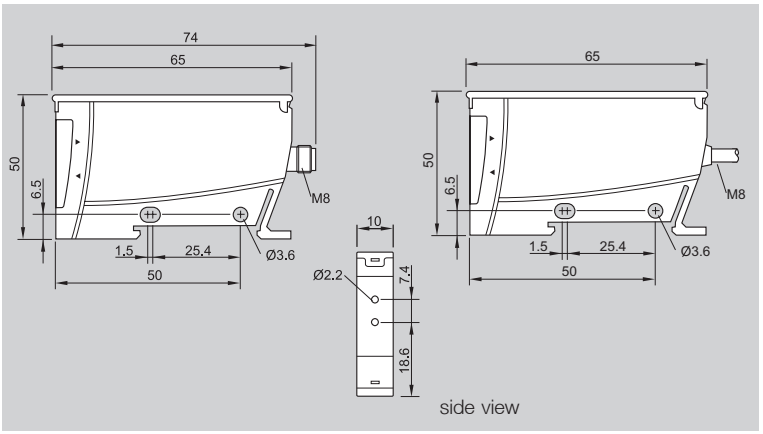
D STATUS signaling LED

E OUTPUT signaling LED

F '+' e '-' buttons (adjust/menu)

G Fiber lock/unlock button

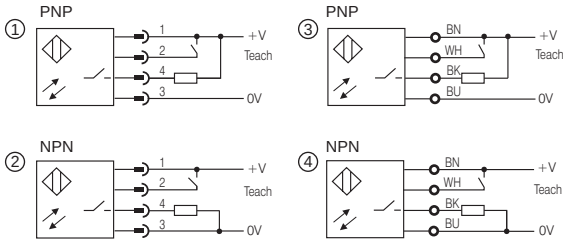
Series	BOS 72K, quick disconnect	BOS 72K, cable out
Type	Base unit for plastic fiber optics	



High Resolution with Display				
PNP Light-on/Dark-on	①	BOS 72K-PU-RA20-S75	③	BOS 72K-PU-RA20-02
NPN Light-on/Dark-on	②	BOS 72K-NU-RA20-S75	④	BOS 72K-NU-RA20-02
Std. Resolution without Display				
PNP Light-on/Dark-on	①	BOS 72K-PU-RA10-S75	③	BOS 72K-PU-RA10-02
NPN Light-on/Dark-on	②	BOS 72K-NU-RA10-S75	④	BOS 72K-NU-RA10-02

Supply Voltage	10...24 Vdc	
Voltage Drop at U_d at I_e	< 2 V	
Rated Output Current	100 mA	
Current Consumption I_o (no load)	70 mA with display / 40 mA without display	
Reverse Polarity Protection	Yes	
Short Circuit Protection	Yes	
Output Function	PNP or NPN	
Emitter Light Source	Visible Red 670 nm	
Operating Temperature Range	-10...+55° C	
On/Off Delay (standard)	100us High Resolution/500us Standard Resolution	
Operating Frequency (max.)	1Khz High resolution/5Khz standard resolution	
Sensitivity Adjustment	EASY touch Teach-in/Remote Teach-in	
Function Indication	Yellow	
Contamination Indication	2 bicolor Red/Green LEDs (SET and ERROR)	
Environmental Protection	IP 67	
Housing Material	ABS	
Sensing Face Material	Depends on fiber optics used	
Approvals	CE, cULus	
Connection	M8 4-pin connector	2 m cable
No. of wires & gauge		4 x 26 AWG
Recommended Connector	C75 ANL-00-VY-050M	
Weight	30 g	115 g

Wiring Diagrams



BFB 75K Basic

Balluff's BFB 75K-001 is considered the basic model of fiber optic base units for DIN rail mount. This economical sensor is ideally suited for standard applications. The sensor uses an external teach-in procedure for fast, easy setup.

Features

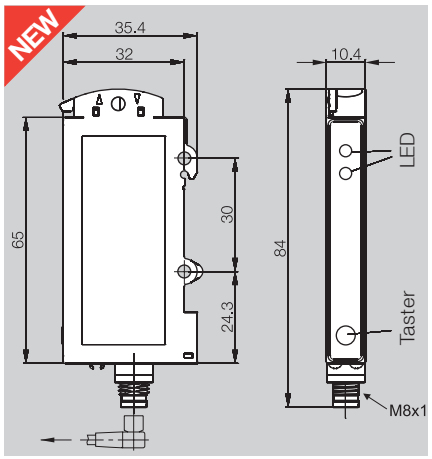
Red light
- Teach-in
- Connector and cable versions

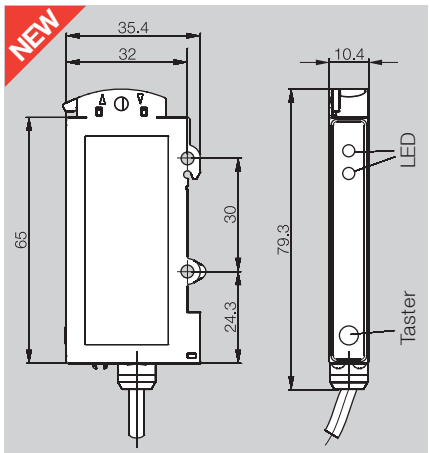
Mounting notes for fiber optics

The resistance of the sealing ring must be overcome when connecting the fiber optics to the base unit.

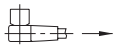
Control Panel

Series	BFB 75K	BFB 75K
Plastic fiber optic base unit	for plastic fiber optics with outside diameter 2.2 mm	for plastic fiber optics with outside diameter 2.2 mm
Sensing distance/range	depends on fiber optic cable	depends on fiber optics



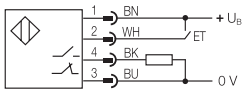


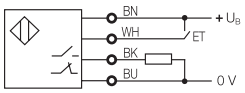
Base Unit		
PNP	BFB 75K-001-P-S75	BFB 75K-001-P-02
NPN	BFB 75K-001-N-S75	BFB 75K-001-N-02
Electrical Data		
Supply Voltage U_B	10...30 V DC	10...30 V DC
Ripple	≤ 10 %	≤ 10 %
No-load Supply Current I_0 max.	≤ 20 mA	≤ 20 mA
Switching Output	PNP- or NPN-Transistor	PNP- or NPN-Transistor
Switching Type	Light-/dark-on (selectable)	Light-/dark-on (selectable)
Output Current	100 mA	100 mA
Voltage Drop U_d at I_e	≤ 1.5 V	≤ 1.5 V
Settings	Teach-in	Teach-in
Optical Data		
Emitter, Light Type	LED, red light	LED, red light
Wave Length	660 nm	660 nm
Light Spot Diameter	depends on fiber optics	depends on fiber optics
Time Data		
Response Time		
Switching Frequency f	1.5 kHz	1.5 kHz
Indicators		
Power-on Indicator	LED green	LED green
Switching State Indicator	LED yellow	LED yellow
Mechanical Data		
Connection	M8 4-pin connector	2 m cable, PVC
No. of wires × cross-section		4 x 26 AWG
Recommended Connector	C75 ANL-00-VY-050M	
Housing Material	ABS	ABS
Optical Surface	depends on fiber optic cable	depends on fiber optic cable
Weight	20 g	50 g
Ambient Data		
Degree of Protection per IEC 60529	IP 64	IP 64
Polarity Reversal Protected	yes	yes
Short Circuit Protected	yes	yes
Ambient Temperature Range T_a	–20...+60 °C	–20...+60 °C

 Conector Orientation

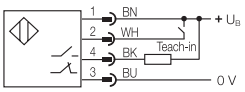
Wiring Diagrams

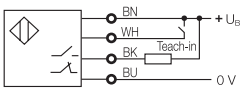
BFB 75K-001-P





BFB 75K-001-N





BFB 75K Advanced

Balluff's BFB 75K-002 offers perfect performance as a high-end amplifier with 12-bit resolution, a 4-digit display and a switching frequency of up to 8 kHz.

Various operating modes such as Fine or High Distance allow the sensor to be quickly adapted to a specific application.

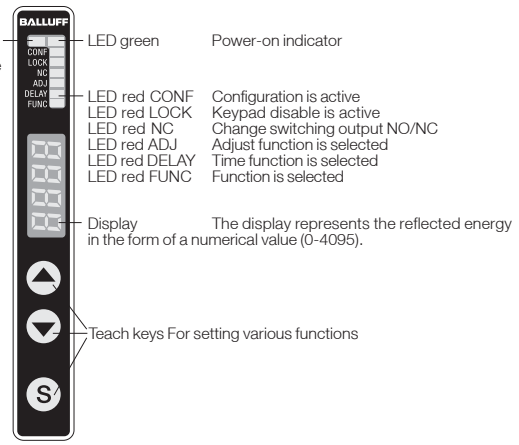
Configurable time functions, window programming, and fine adjustment of a switching point adjustment round out the sensor.

An additional analog output provides the BFB 75K-003 an output signal proportional to remission or to the distance from the target. All functions of the BFB 75K-02 are also included.

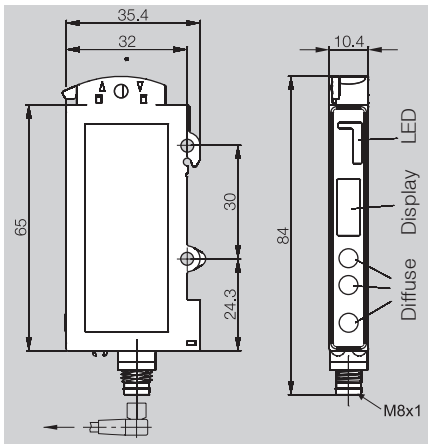
Operating mode	Standard	High resolution	High switching frequency	Long range
Sensing distance*	150 mm	70 mm	70 mm	300 mm
Switching frequency	1 kHz	125 Hz	8 kHz	125 Hz

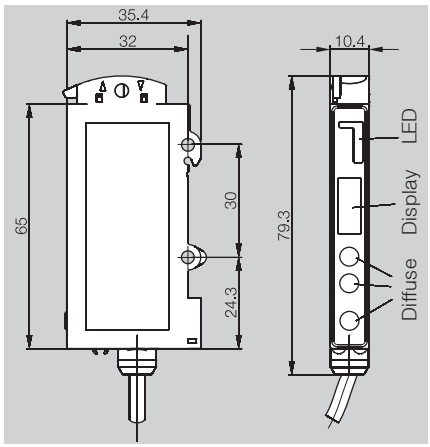
*depending on fiber optics used

Control panel



Series	BFB 75K	BFB 75K
Plastic fiber optic base unit	for plastic fiber optics with outside diameter 2.2 mm	for plastic fiber optics with outside diameter 2.2 mm
Sensing distance/range	depends on fiber optics	depends on fiber optics

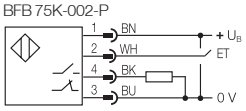




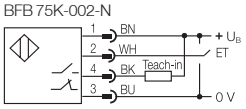
Base Unit			
PNP		BFB 75K-002-P-S75	BFB 75K-003-P-02
NPN		BFB 75K-002-N-S75	BFB 75K-003-N-02
Electrical Data			
Supply Voltage U_B		10...30 V DC	10...30 V DC
Ripple		≤ 10 %	≤ 10 %
No-load Supply Current I_0 max.		≤ 25 mA	≤ 25 mA
Analog Output			**0...10 V (max. 2 mA)**
Switching Output		PNP- or NPN-Transistor	PNP- or NPN-Transistor
Switching Type		Light-/dark-on (selectable)	Light-/dark-on (selectable)
Output Current		100 mA	100 mA
Voltage Drop U_d at I_e		≤ 2 V	≤ 2 V
Settings		Teach-in	Teach-in
Optical Data			
Emitter, Light Type		LED, red light	LED, red light
Wave Length		630 nm	630 nm
Light Spot Diameter		depends on fiber optics	depends on fiber optics
Time data			
Switching Frequency f	Standard	1 kHz	1 kHz
	Fast Mode	8 kHz	8 kHz
Time Function		On- and/or off-delay 1...2000 ms adjustable	On- and/or off-delay 1...2000 ms adjustable
Indicators			
Power-on Indicator		LED green	LED green
Switching State Indicator		LED yellow	LED yellow
Status Indicator		6× LED red	6× LED red
Display		4-digit	4-digit
Mechanical Data			
Connection		M8 4-pin connector	2 m cable, PVC
No. of Wires × Cross-Section			5 x 26 AWG
Reommended Connector		C75 ANL-00-VY-050M	
Housing Material		ABS	ABS
Optical Surface		depends on fiber optic cable	depends on fiber optic cable
Weight		20 g	50 g
Ambient Data			
Degree of Protection per IEC 60529		IP 64	IP 64
Polarity Reversal Protected		yes	yes
Short Circuit Protected		yes	yes
Ambient Temperature Range T_a		–20...+60 °C	–20...+60 °C

Wiring Diagrams

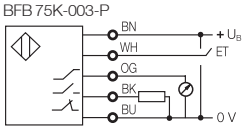
BFB 75K-002-P



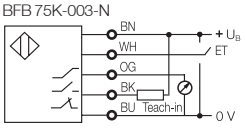
BFB 75K-002-N



BFB 75K-003-P



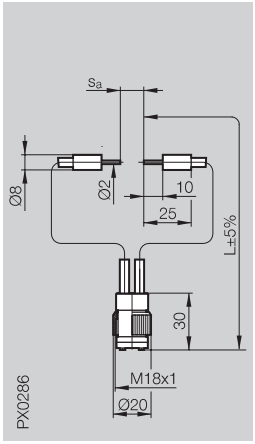
BFB 75K-003-N

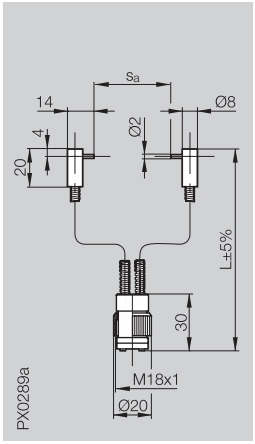


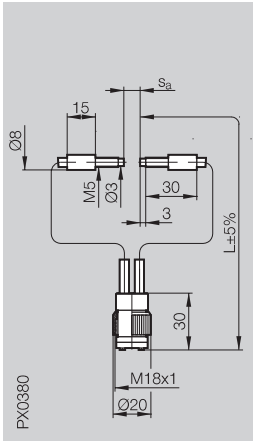
Sensing range with	BOS 18M-...-PD-...	**100 mm**	**100 mm**	**200 mm**
	BOS 18M-...-1PF-...	**400 mm**	**400 mm**	**700 mm**
	BOS 30M-...			

Specialty Fiber Optics

When the need arises, specialty fibers are available for high temperature or high impact areas.







Ordering code

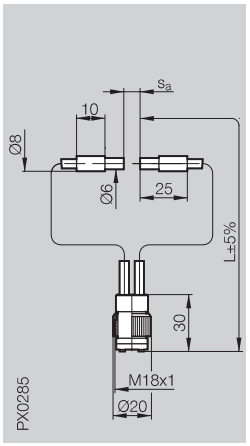
Type				
	UZG			BFO 18A-LAA-UZG-20-
	MZG	BFO 18A-LGG-MZG-10-	BFO 18A-LFF-MZG-10-	BFO 18A-LAA-MZG-20-
	SMG	BFO 18A-LGG-SMG-10-	BFO 18A-LFF-SMG-10-	

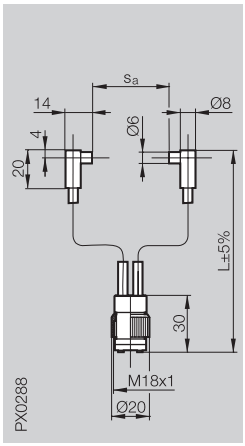
Diameter of glass fiber bundle		1 mm	1 mm	2 mm
Max. pull force on fiber optics and connection parts		80 N	80 N	80 N
Min. bending radius		60 mm	60 mm	60 mm
For use with	BOS 18M-PA-1PD-...	yes	yes	yes
	BOS 18M-PU-1PD-...	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-GU-1PF-...	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-PA-1PF-...	yes	yes	yes
	BOS 30M-...	no	no	no

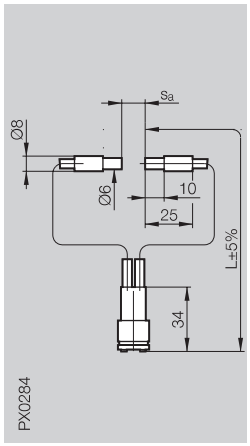
Please append the desired length L of the fiber optics cable to the ordering code.
Corrections from 0.5 m to max. 2 m possible. Example:
BFO 18...-20-**0.5** for **0.5 m** fiber length
BFO 18...-20-**2** for **2 m** fiber length

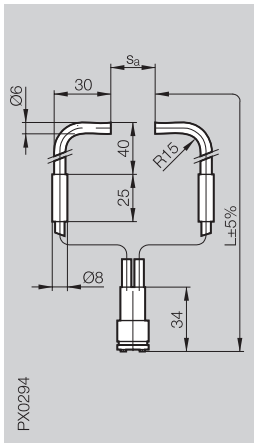
Note: With a through-beam fiber optic cable, the normally open signal of the base unit is converted into a normally closed signal!

Sensing range	BOS 18M-...-PD-...	**200 mm**	**200 mm**	**200 mm**	**200 mm**
	BOS 18M-...-1PF-...	**700 mm**	**700 mm**		
	BOS 30M-...			**2000 mm**	**2000 mm**









Ordering code

Type	UZG		BFO 18A-LEE-UZG-20-		
	MZG	BFO 18A-LCC-UZG-20-	BFO 18A-LEE-MZG-20-	BFO 18V-LCC-MZG-23-	BFO 18V-LDD-MZG-23-
	SMG	BFO 18A-LCC-SMG-20-	BFO 18A-LEE-SMG-20-	BFO 18V-LCC-SMG-23-	BFO 18V-LDD-SMG-23-

Diameter of glass fiber bundle		2 mm	2 mm	2 mm	2 mm
Max. pull force on fiber optics and connection parts		80 N	80 N	80 N	80 N
Min. bending radius		60 mm	60 mm	60 mm	60 mm
For use with	BOS 18M-PA-1PD-...	yes	yes	no	no
	BOS 18M-GU-1PF-...	yes (remove adapter disk)	yes (remove adapter disk)	no	no
	BOS 18M-PA-1PF-...	yes	yes	no	no
	BOS 30M-...	no	no	yes (remove adapter disk)	yes (remove adapter disk)

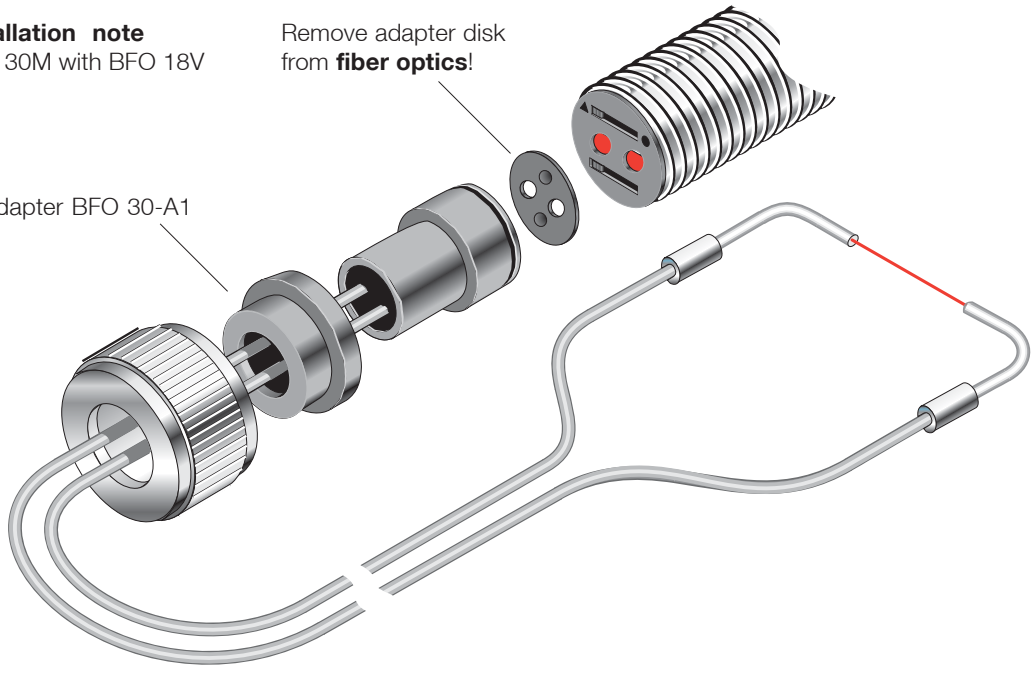
Please append the desired length L of the fiber optics cable to the ordering code.
Corrections from 0.5 m to max. 2 m possible. Example:
BFO 18...-20-**0.5** for **0.5 m** fiber length
BFO 18...-20-**2** for **2 m** fiber length

Note: With a through-beam fiber optic cable, the normally open signal of the base unit is converted into a normally closed signal!

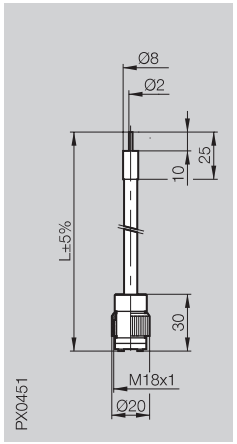
Installation note
BOS 30M with BFO 18V

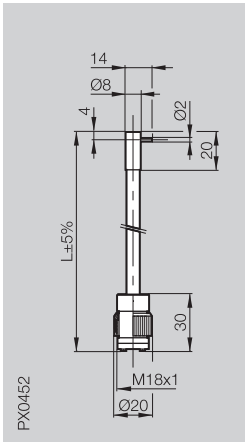
Remove adapter disk from **fiber optics**!

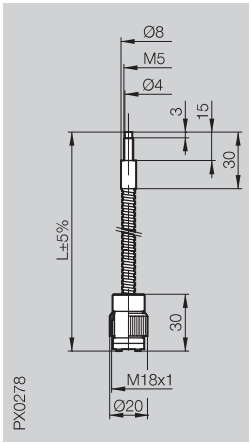
Adapter BFO 30-A1



Sensing Range	BOS 18M-...-PD-.../BOS 18M-...-1PF-...	**10 mm/50 mm**	**10 mm/50 mm**	**20 mm/100 mm**
Diffuse	BOS 30M-...			
Retroreflective	BOS 18M-...-PD-.../BOS 18M-...-1PF-...	**300 mm/1000 mm**	**300 mm/1000 mm**	**500 mm/1000 mm**
	BOS 30M-...			







Ordering code

Type	UZG			BFO 18A-XAA-UZG-30-
	MZG	BFO 18A-XAG-MZG-15-	BFO 18A-XAF-MZG-15-	BFO 18A-XAA-MZG-30-
	SMG		BFO 18A-XAF-SMG-15-	BFO 18A-XAA-SMG-30-

Diameter of glass fiber bundle		1.5 mm	1.5 mm	3 mm
Max. pull force on fiber optics and connection parts		80 N	80 N	80 N
Min. bending radius		60 mm	60 mm	60 mm
For use with	BOS 18M-PA-1PD-...	yes	yes	yes
	BOS 18M-GU-1PF-...	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-PA-1PF-...	yes	yes	yes
	BOS 30M-...	no	no	no
Sn with	BOS 18M-PA-1PD-...	10 mm	10 mm	20 mm
	BOS 18M-...-1PF-...	50 mm	50 mm	100 mm
	BOS 30M-...			
Range with with	BOS 18M-PA-1PD-...	300 mm	300 mm	500 mm
	BOS 18M-...-1PF-...	1000 mm	1000 mm	1000 mm
	BOS 30M-...			

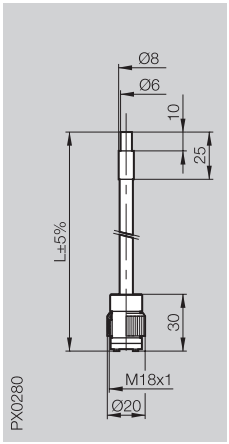
Sensing distances referenced to Kodak gray card 90 % Reflexion.

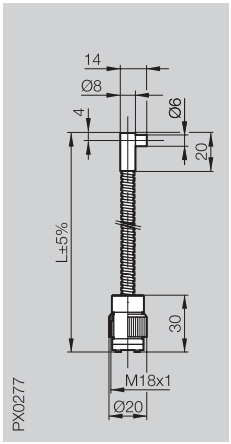
Diffuse with glass fiber optics used as retroreflective: Ranges are referenced to BOS R-1 reflector.

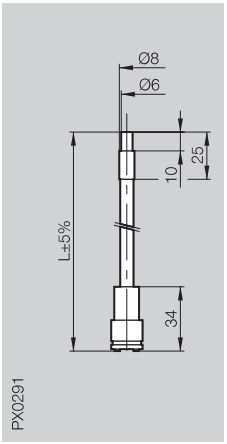
When using as a retroreflective type, twice the sensing distance must be used as the object dead zone.

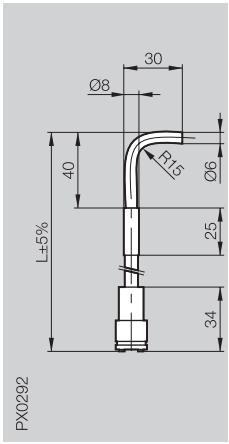
Please append the desired length L of the fiber optics cable to the ordering code!
Corrections from 0.5 m to max. 2 m possible.
Example:
BFO 18...-30-**0.5** for **0.5 m** fiber length
BFO 18...-30-**2** for **2 m** fiber length

Sensing Range	BOS 18M-...-PD-.../BOS 18M-...-1PF-...	**20 mm/100 mm**	**20 mm/100 mm**	**20 mm**	**20 mm**
Diffuse	BOS 30M-...			**200 mm**	**200 mm**
Retroreflective	BOS 18M-...-PD-.../BOS 18M-...-1PF-...	**500 mm/1000 mm**	**500 mm/1000 mm**	**500 mm**	**500 mm**
	BOS 30M-...			**2000 mm**	**2000 mm**







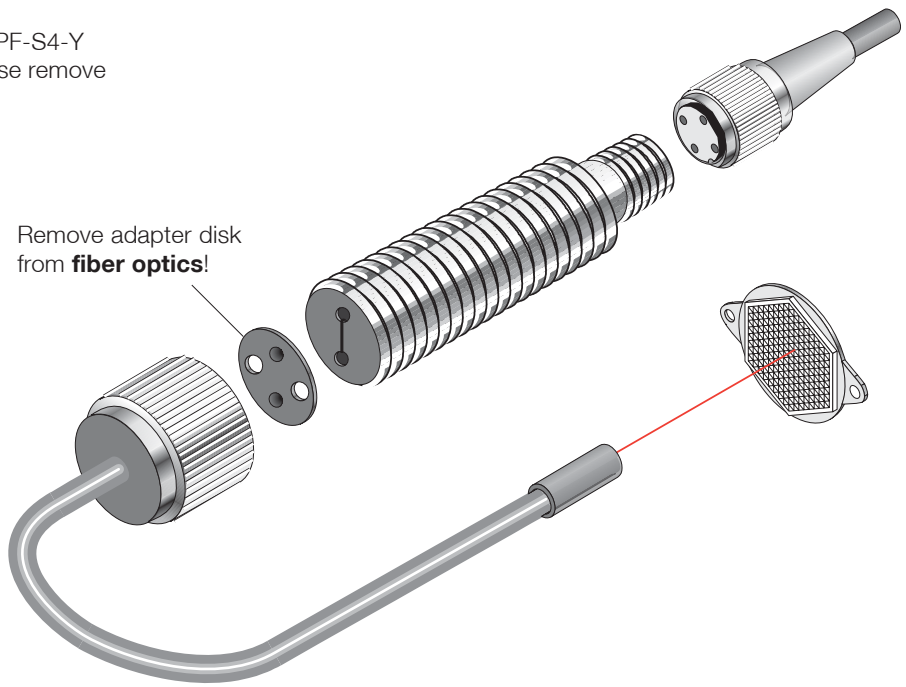


Ordering code

Type	UZG		BFO 18A-XAE-UZG-30-		
	MZG		BFO 18A-XAE-MZG-30-	BFO 18V-XAC-MZG-30-	BFO 18V-XAD-MZG-30-
	SMG	BFO 18A-XAC-SMG-30-	BFO 18A-XAE-SMG-30-	BFO 18V-XAC-SMG-30-	BFO 18V-XAD-SMG-30-
Diameter of glass fiber bundle		3 mm	3 mm	3 mm	3 mm
Max. pull force on fiber optics and connection parts		80 N	80 N	80 N	80 N
Min. bending radius		60 mm	60 mm	60 mm	60 mm
For use with	BOS 18M-PA-1PD-...	yes	yes	no	no
	BOS 18M-GU-1PF-...	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-PA-1PF-...	yes	yes	no	no
	BOS 30M-...	no	no	yes	yes
Sn	BOS 18M-PA-1PD-...	20 mm	20 mm	yes (remove adapter disk)	yes (remove adapter disk)
with	BOS 18M-...-1PF-...	100 mm	100 mm		
	BOS 30M-...			200 mm	200 mm
Range with	BOS 18M-PA-1PD-...	500 mm	500 mm		
with	BOS 18M-...-1PF-...	1000 mm	1000 mm		
	BOS 30M-...			500 mm	2000 mm

Installation note

When using the BOS 18M-GU-1PF-S4-Y or BOS 18M-PU-1PD-SA... please remove the adapter disk from the **fiber optic cable**!



BFO 18M Series

Balluff BFO 18M series fiber optic cables are designed for use with BOS 18M and BOS 30M sensors. These rugged-duty cables are ideal for applications where high excess gain, enhanced chemical resistance, or high temperature solutions are needed.

Rugged construction from the outside in

UZG type

Polyurethane jacket
Strain relief
Glass fiber bundle

-Enhanced chemical resistance
-High flexibility

-Does not get brittle in oils or coolants

MZG type

Polyurethane jacket
Strain relief
Glass fiber bundle

-High temperature rating (-20...+170°C)
-Crush resistant

-Resistant to hot chips

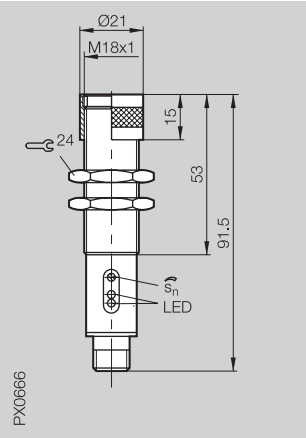
SMG type

Silicone cover stainless steel jacket
Strain relief
Glass fiber bundle

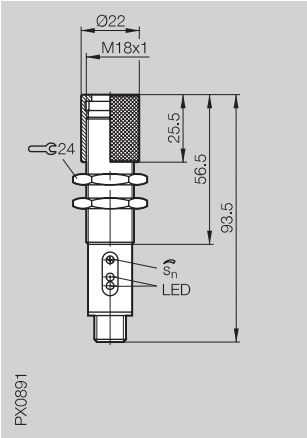
-Combined temperature chemical resistance
-Good crush resistance and flexibility

Recommended diffuse base units (can be used as amplifiers)

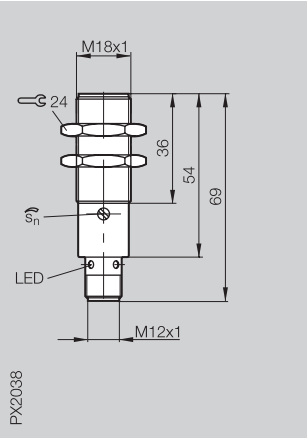
See Tubular section for technical data



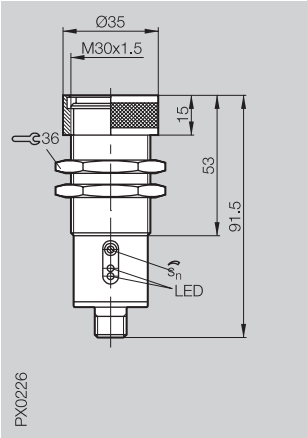
BOS 18M-GU-1PF-...



BOS 18M-PU-1PD-...



BOS 18M-PA/NA-1PF-...,
BOS 18M-PA/NA-1PD-...



BOS 30M-GA-1PH-...

BMOA Miniature Remote Amplifier Sensors

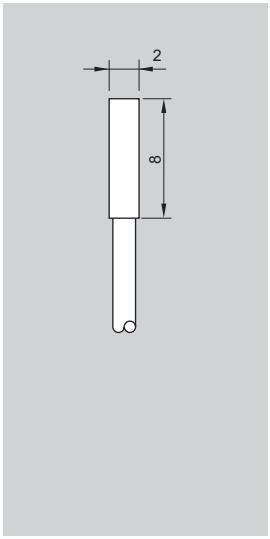
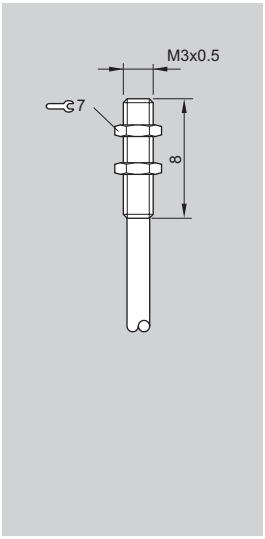
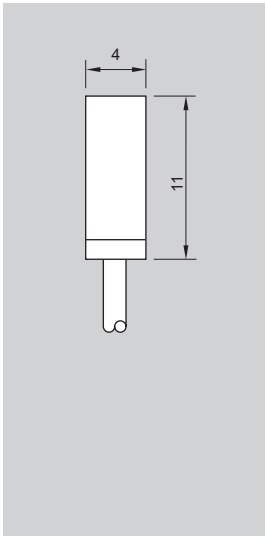
Need the precision of a laser photoelectric sensor, but have no room to mount something that big? Ultra miniature sensing heads down to 2 mm can fit into applications where most sensors won't. The BMOA component systems use an amplifier to power and control the signals from the sensing head, making it a unique alternative to typical fiber optic solutions. The BMOA component systems offer maximum flexibility with high flex cable versions for moving applications like robotic arms. The systems can detect targets as small as 0.05 mm. The BMOA amplifiers make set-up and operation easy, using a simple dynamic teach function, or a manual push-button adjustment mode. Available in economical discrete or advanced analog output versions to solve difficult applications.

Features

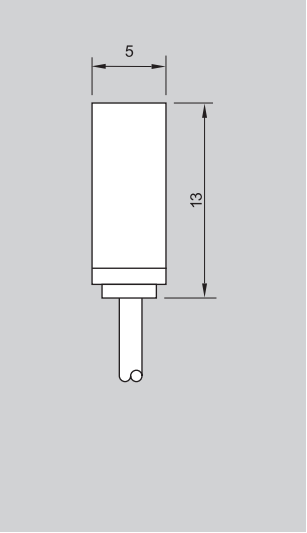
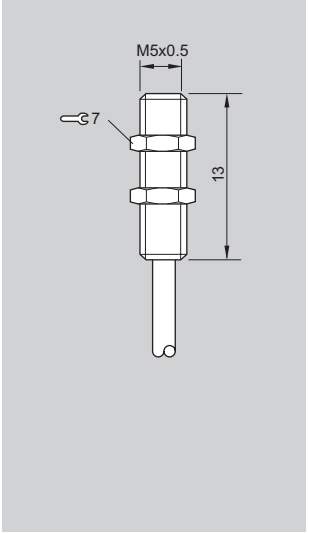
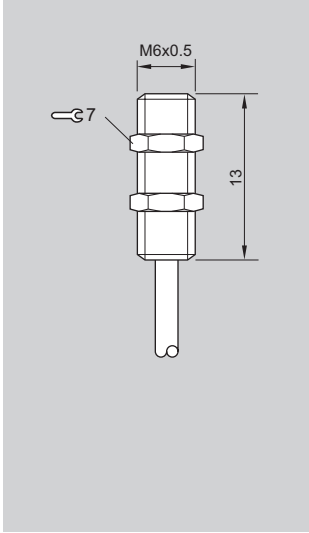
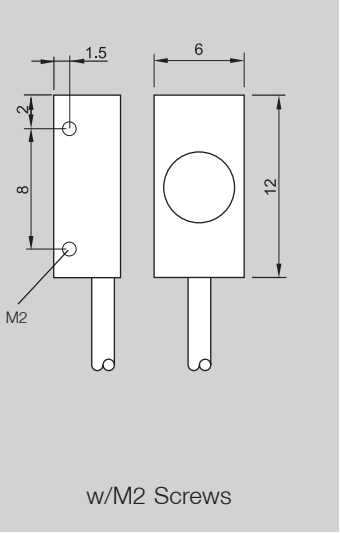
- Smallest sensing head in the industry
- Laser-like precision to detect targets as small as 0.05 mm
- High speed switching up to 5 kHz
- 50 ms pulse stretching delay
- Simple pushbutton adjustment of dynamic teach function
- Stability and Output Function LEDs
- Discrete output versions PNP and NPN
- Analog Output versions 0…10 Vdc and 4…20 mA
- Din-rail or panel mountable

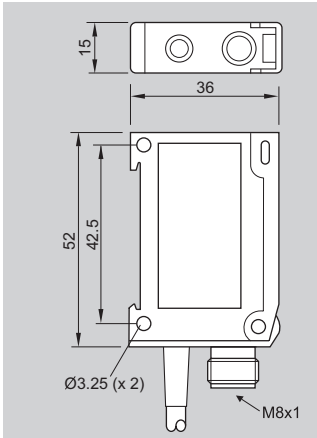
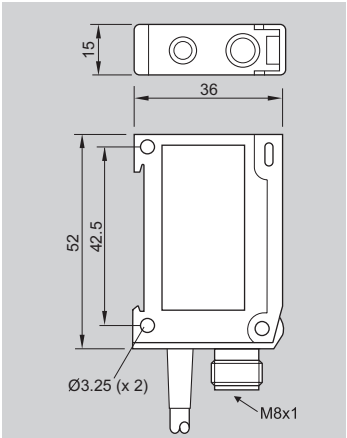
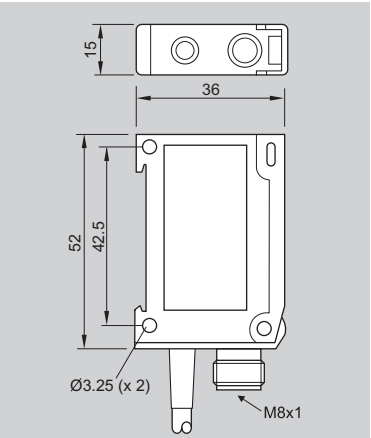
Applications

- Thread detection
- Small part profiling
- Robotic end-effectors
- Semiconductor component detection
- High performance alternative to fiber optics

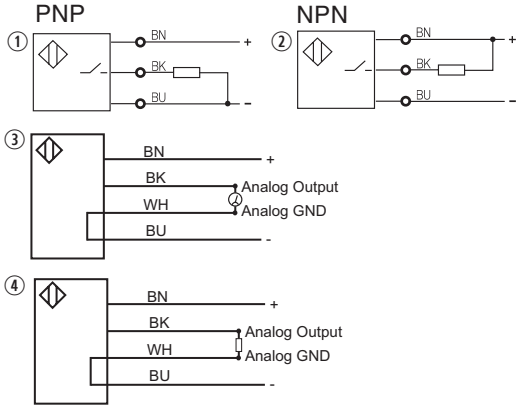
Series		2mm Smooth Tubular	3mm Threaded Tubular	4mm Smooth Tubular
Diffuse w/ standard resolution amp		12 mm	12mm	
Diffuse w/ high resolution amp		3 mm	3 mm	
Thru-Beam w/ standard resolution amp		200 mm	200 mm	800 mm
Thru-Beam w/ high resolution amp		80 mm	80 mm	250 mm
				
Diffuse				
PUR Cable	IR	BMOA 02SM-X12-1	BMOA 03TM-X12-1	
PVC High-Flex Cable	IR	BMOA 02SM-X12-F1	BMOA 03TM-X12-F1	
PUR Cable	visible red			
Thru-Beam				
PUR Cable	IR	BMOA 02SM-B200-1	BMOA 03TM-B200-1	BMOA 04SM-B800-1
PVC High-Flex Cable	IR	BMOA 02SM-B200-F1	BMOA 03TM-B200-F1	
PUR Cable	visible red	BMOA 02SM-B200-R1	BMOA 03TM-B200-R1	BMOA 04SM-B800-R1
Emitter Light Source, IR		Infrared 880 nm	Infrared 880 nm	Infrared 880 nm
Emitter Light Source, Visible Red		Visible red 660 nm	Visible red 660 nm	Visible red 660 nm
Operating Temperature Range		-10° C to + 55° C	-10° C to + 55° C	-10° C to + 55° C
Storage Remperature		-30° C to + 70° C	-30° C to + 70° C	-30° C to + 70° C
Degree of Protection per IEC 60529		IP 65	IP 65	IP 65
Relative Humidity		90% @ 20°C	90% @ 20° C	90% @ 20° C
Housing Material		Stainless Steel	Nickel plated brass	Stainless Steel
Sensing Face Material		PMMA	PMMA	PMMA
Weight, Diffuse Models		3.2 g (PUR cable) 1.2 g (PVC cable)	3.4 g (PUR cable) 1.4 g (PVC cable)	
Weight, Thru-beam Models		5.5 g (PUR cable) 2.5 g (PVC cable)	5.9 g (PUR cable) 2.9 g (PVC cable)	9 g
Connection		1 m cable with amplifier connector	1 m cable with amplifier connector	1 m cable with amplifier connector

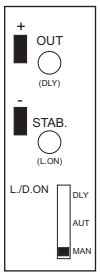
For use with BMO A01... amplifiers only.

5mm Smooth Tubular	5mm Threaded Tubular	6mm Threaded Tubular	6 x 6 x 12 mm Block
63 mm		63 mm	63mm
15mm		15mm	15mm
	800 mm		800 mm
	250 mm		250 mm
			 w/M2 Screws
BMOA 05SM-X63-1		BMOA 06TM-X63-1	BMOA 66RM-X63-1
BMOA 05SM-X63-R1		BMOA 06TM-X63-R1	BMOA 66RM-X63-R1
	BMOA 05TM-B800-1		BMOA 66RM-B800-1
	BMOA 05TM-B800-R1		BMOA 66RM-B800-R1
Infrared 880 nm	Infrared 880 nm	Infrared 880 nm	Infrared 880 nm
Visible red 660 nm	Visible red 660 nm	Visible red 660 nm	Visible red 660 nm
-10° C to + 55° C	-10° C to + 55° C	-10° C to + 55° C	-10° C to + 55° C
-30° C to + 70° C	-30°C to + 70° C	-30° C to + 70° C	-30° C to + 70° C
IP 65	IP 65	IP 65	IP 65
90% @ 20° C	90% @ 20° C	90% @ 20° C	90% @ 20° C
Stainless Steel	Nickel plated brass	Nickel plated brass	Nickel plated brass
PMMA	PMMA	PMMA	PMMA
7.5 g		9.5 g	6.6 g
	12 g		13.2 g
1 m cable with amplifier connector	1 m cable with amplifier connector	1 m cable with amplifier connector	1 m cable with amplifier connector

Series	High Speed	Standard	Advanced Analog Amplifier
				
Discrete Output			
PNP Normally-open ①	BMO A01-I-PU-C-02	BMO A01-J-PU-C-02	
NPN Normally-open ②	BMO A01-I-NU-C-02	BMO A01-J-NU-C-02	
Analog Output			
0...10 Vdc ③			BMO A01-H-V1-C-02
4...20 mA ④			BMO A01-H-C1-C-02
Supply Voltage	10…30 Vdc	10…30 Vdc	15…30 Vdc
Voltage Drop U_d at I_e	< 2 V	< 2 V	
Output Current (digital)	100 mA	100 mA	
Analog Output Type (Voltage)			0...10 V (10 bit)
Analog Output Type (Current)			4...20 mA (10 bit)
Analog Output Load (voltage) min load			2k Ω
Analog Output Load (current) Max Load			300 Ω <20 Vdc or 600 Ω >20 Vdc
Current Consumption I_o (no load)	45 mA	45 mA	50 mA
Protections	Short Circuit, Reverse Polarity	Short Circuit, Reverse Polarity	Short Circuit, Reverse Polarity
Response Time	100 µs	1 ms	1 ms
Switching Frequency	5 KHz	500 Hz	500 Hz
Pulsed/Non-Pulsed Light Source	Non-Pulsed	Pulsed	Pulsed
Output Function	Light/Dark Selectable	Light/Dark Selectable	Light/Dark Selectable
Operating Temperature Range	-10° C to +55° C	-10° C to +55° C	-10° C to +55° C
Degree of Protection per IEC 60529	IP 65	IP 65	IP 65
Sensitivity/Range Adjustment	Teach-in and Manual	Teach-in and Manual	Teach-in and Manual
Power/Stability Indication	Green LED	Green LED	Green LED
Alarm Indication			Red LED
Output LED	Yellow LED	Yellow LED	3 Yellow LEDs
Housing Material	ABS	ABS	ABS
Weight	55 g	55 g	60 g
Connection (to control system)	2 m PVC Cable , 3 x 26 AWG	2 m PVC Cable , 3 x 26 AWG	2 m PVC Cable , 4 x 26 AWG

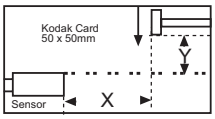
Wiring Diagrams



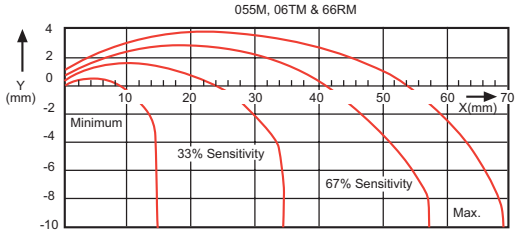


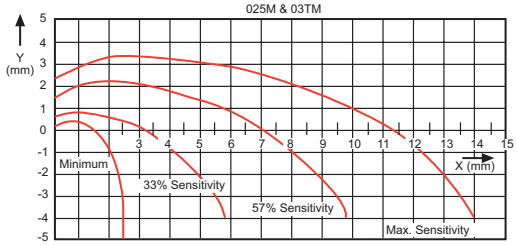
Sensitivity setting
AUT – the amplifier will determine the best setting for the application.
MAN – this allows you to fine-tune the settings or manually adjust the sensor for difficult applications.

Sensing Distance for Diffuse Sensors

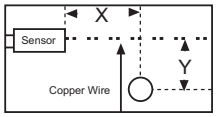


Measuring Arrangement:
The following charts are developed using a standard 50x50mm Kodak White Card moved at a 90⁰ angle, step by step in front of the diffuse sensor. Several levels of sensitivity are shown with a standard resolution amplifier.

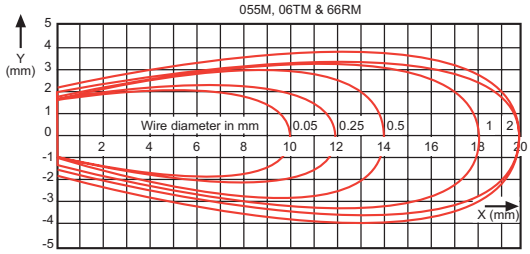


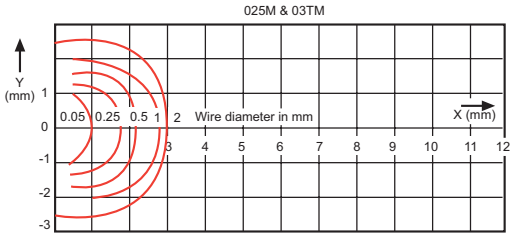


Object Resolution for Diffuse Sensors

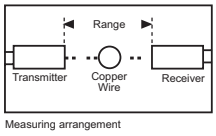


The following charts are developed using several different wire sizes as a target and a standard resolution amplifier.



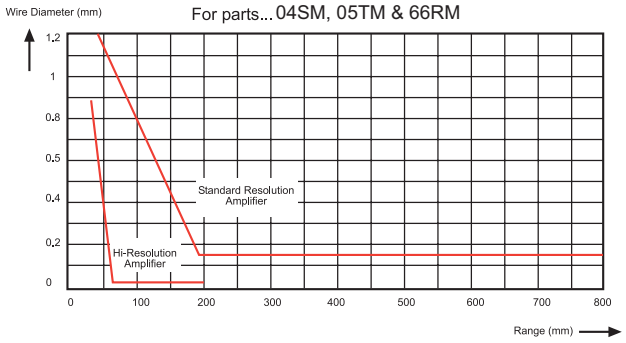


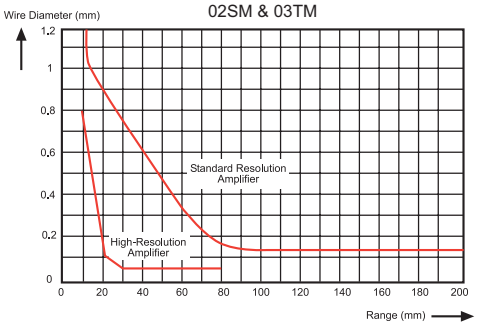
Object Resolution for Thru-Beam Sensors

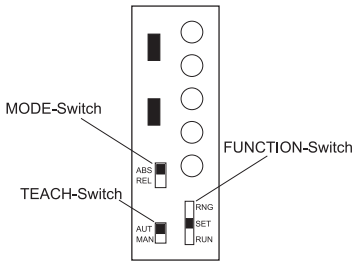


Measuring arrangement

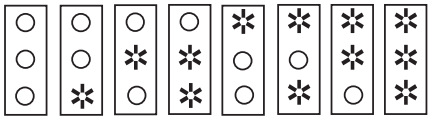
The following chart illustrates the approximate performance of different wire diameters breaking the beam at certain ranges.





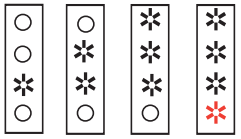


Absolute Mode (ABS)
This mode offers the maximum accuracy for all applications. The amplifier will offer 8 stages of amplification; each stage will differ by a factor of 2.



0	1	2	3	4	5	6	7
0.8%	1.6%	3.1%	6.3%	12.5%	25%	50%	100%

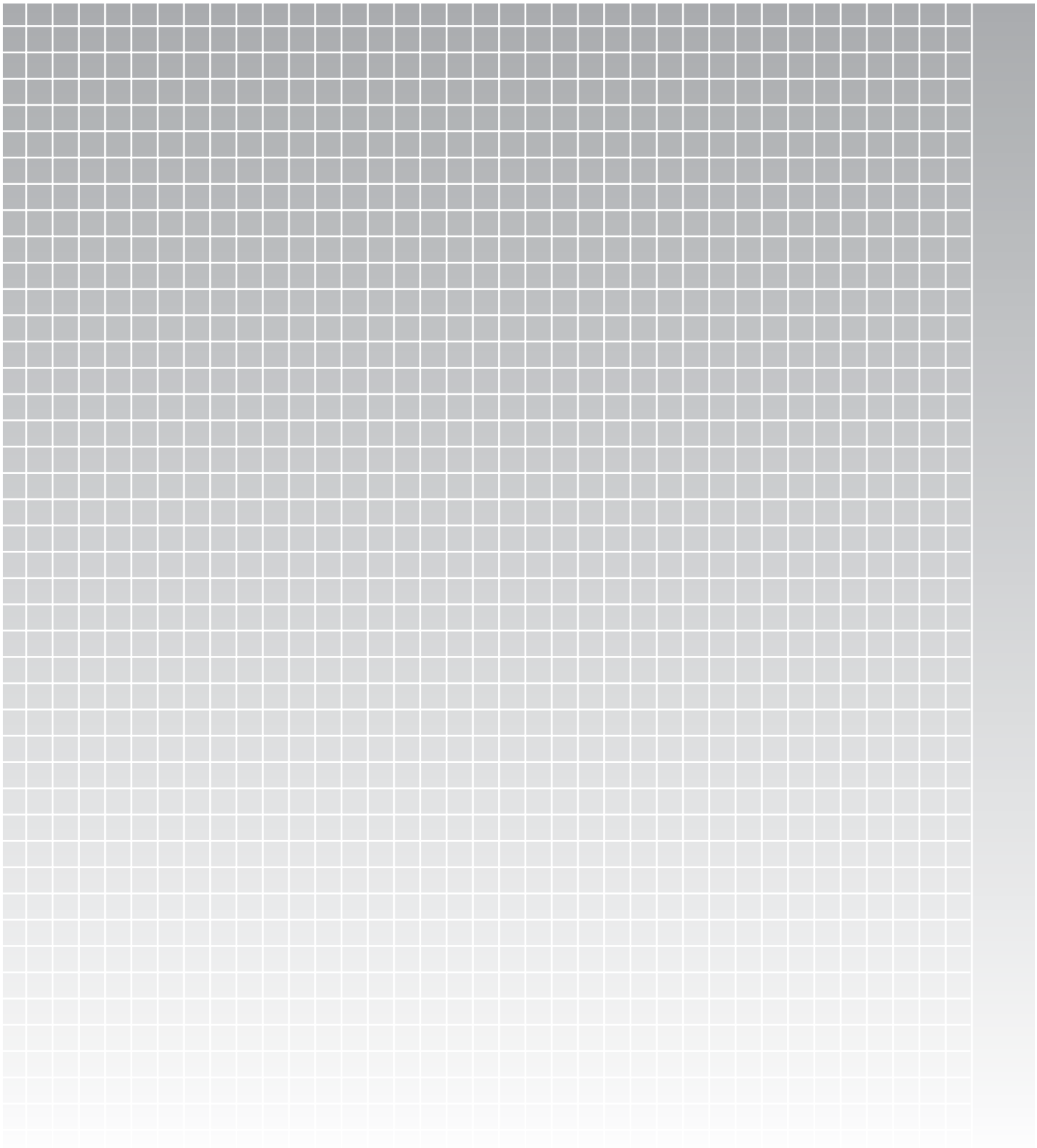
Relative Mode (REL)
This mode offers an output signal relative to the target. The amplifier offers 4 stages of amplification in steps of 2.5v or 4mA.



≥ 2.5V	≥5.0V	≥7.5V	≥10.0V
≥ 8mA	≥12mA	≥16mA	≥120mA

LED Info
✲ = LED illuminated
○ = LED is dark

Fiber Optics



Full Color Detection

Full color recognition sensors differentiate various colors by emitting pure white light and then measuring the level of red, blue, and green in the light that is reflected back. These measured levels are compared to values stored in the sensor's memory. If the value is within the tolerance limits, the color is confirmed and the sensor's output is triggered. Typical uses of full color recognition sensors include sorting by product color, confirming correct color, color matching, and quality control based on proper coloration of the finished product.

2.150 BFS 26K
2.151 BFS 27K
2.153 BFS 30M *NEW*

BFS 26K Color Sensors

Balluff BFS 26K uses pulsed white light, making it insensitive to ambient light. The light reflected from the object is registered by three different receivers (red, green, blue) and then evaluated.
The various light spot geometries of the individual sensors (round, square or rectangle) allow even the smallest color markings to be detected.
With dimensions of just 50x50x17 mm, as well as a rotatable connector, the BFS 26K fits into tight spots and can be easily programmed using a control line or a 2-button teach-in procedure.
Three channels with electronic output can be calibrated using five tolerance levels.
Numerous special functions such as color scanning, pulse expansion or blanking input, provide additional application flexibility.

Features

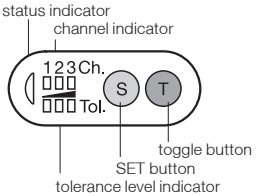
- Microprocessor controlled
- Pulsed white light
- Various light spot geometries
- Teach-in and programming
- M12 connector rotatable 270°
- 3 different colors can be distinguished at the same time
- 5-stage adjustable color tolerance
- 3 yellow LEDs for switching state indication
- 3 red LEDs for indicating tolerance level

Applications

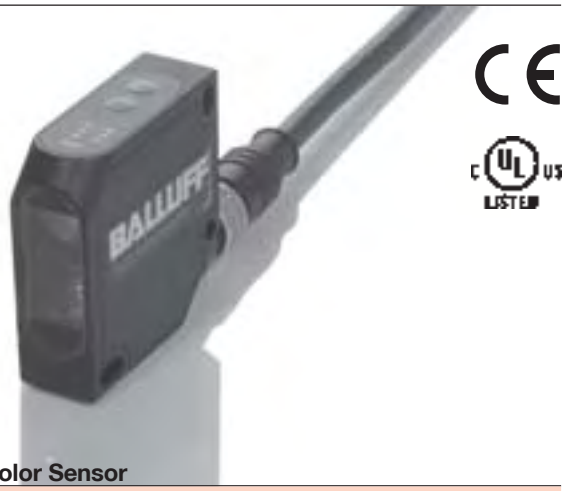
Color sensors are used throughout the fields of robotics, automation, quality assurance and in production processes.

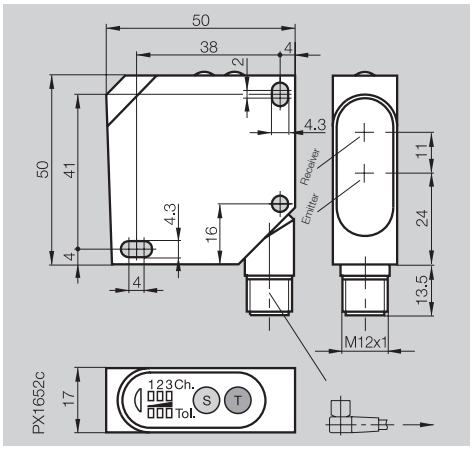
- Quality assurance checking
- Selecting parts by color
- Detecting different colored cables and wires

Indicators and Controls



Series		BFS 26K Full Color
Type		Plastic



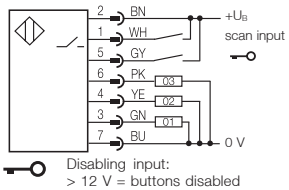


Full Color Sensor	
3 x PNP Light-on, 20...35 mm Diffuse (50…200 mm Retroreflective)	BFS 26K-PS-L01-S115
3 x PNP Light-on, 15…30 mm Diffuse	BFS 26K-PS-L02-S115
3 x PNP Light-on, 18…22 mm Diffuse	BFS 26K-PS-L03-S115

Supply Voltage U_B		12…28 Vdc
Ripple		≤ 10%
Voltage Drop U_d at I_e		≤ 2.4 V
Rated Output Current I_e		100 mA
Current Consumption I_O (No Load)		≤ 40 mA @ 24 Vdc
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13
Emitter Light Source		White Light LED 400…700 nm
Light Spot Dimensions	BFS 26K-PS-L01-....	4 mm @ 22 mm (Round Light Spot)
	BFS 26K-PS-L02-....	2X2 mm @ 22 mm (Square Light Spot)
	BFS 26K-PS-L03-....	5x1 mm @ 22 mm (Rectangular Light Spot)
Sensing Range Tolerance	BFS 26K-PS-L01-....	±6 mm @ Tolerance 3
	BFS 26K-PS-L02-....	±5 mm @ Tolerance 3
	BFS 26K-PS-L03-....	±2 mm @ Tolerance 3
Ambient Light Immunity (EN 60947-5-2)		10000 Lux
LED's	Output LEDs Channel 1, 2, 3	3 x Yellow LED's
	Output LEDs Tol 1, 2, 3, 4, 5	3 x Red LED's
	Supply Voltage Indication	Green LED
Switching Frequency		500 Hz
Response Time (On/Off Delay)		1 ms
Power-up Delay		300 ms
Other Functions	External synchronization input	Remote Sensor sync input
	Key lock	Tamper Proof setting
	Timing Functions	50 ms
	Tolerance Levels	5 Levels (from TOL1 to TOL5)
Operating Temperature Range		-10° C to +55° C
Electrical Shock Protection		Class 2
Degree of Protection per IEC 60529		IP 67
Short Circuit Protection		Yes
Overload Protection		Yes
Housing Material		Impact Resistant ABS
Sensing Face Material		PMMA
Emitter Life		Average 100,000 hr with Ta=+25° C
Connection		M12 8-pin connector
Recommended Connector		C04 AET-00-PB-050M
Weight		40 g

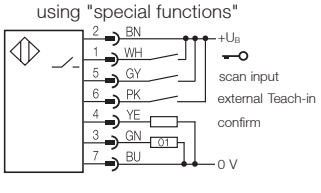
Wiring Diagrams

1. Normal mode "factory setting"

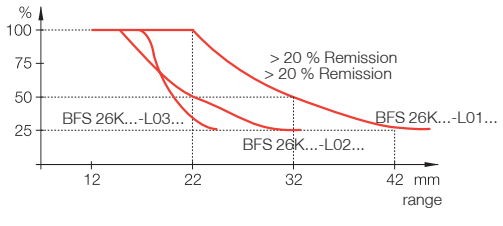


Disabling input:
> 12 V = buttons disabled
< 3 V = buttons not disabled

2. External Teach-in setting using "special functions"



Color resolution/range diagram



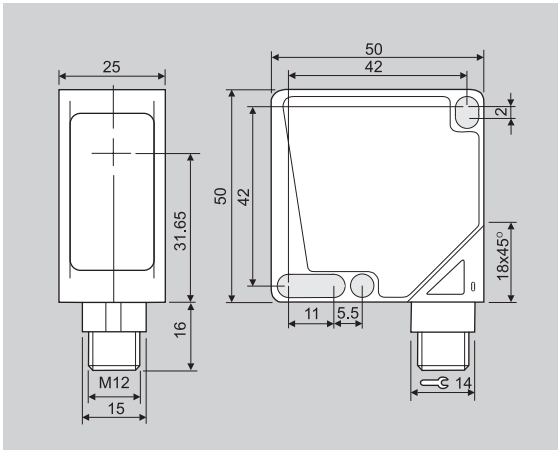
BFS 27K Advanced Full Color Photoelectric Sensor

The BFS 27K advanced full color photoelectric sensor uses a pulsed white LED light source and the latest full color receivers for the broadest detection of colors. It is insensitive to ambient light conditions. The reflected light is registered by three different receivers (red, green, blue), and then evaluated for the correct level of Chromaticity, or Chromaticity + Intensity, using three channels. The BFS 27K can detect up to three different colors at a time. It has ten tolerance levels, making it ideal for situations where colors are critical. The 50x50x25 mm dimensions make installation simple, even in tight locations.

The BFS 27K simplifies set-up and use with a 4-digit display and a simple two-button set-up procedure. Complete remote control is available on the RS485 serial interface versions. Other advanced features include programmable, pulse stretcher time delay up to 40ms for fast targets, key lock to prevent tampering, and a synchronization input or blanking feature that allows extensive application flexibility and a RGB (Red, Blue, and Green) value via RS485 offering millions of color combinations and color processing possibilities.

Features

– 3 channel color sensor with C (Chromaticity) or C+I (Chromaticity and Intensity) functions
– RGB value via RS485 offers millions of color combinations
– Wide spectrum white light LED emission improves color detection
– 3 independent NPN or PNP outputs
– RS485 interface used for:
  - remote set-up
  - teaching color
  - changing tolerance and timer settings
  - chromacity or chromacity and intensity settings
  - RGB output information

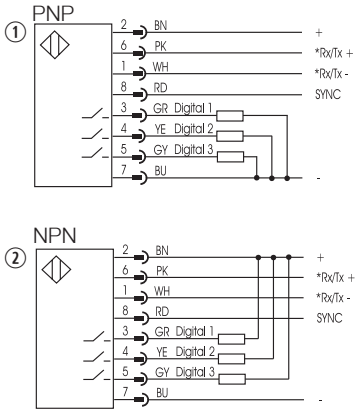


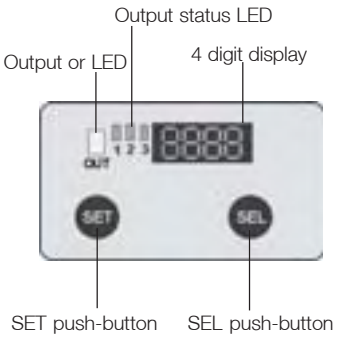
Series		BFS 27K Full Color
Type		Plastic
Full Color Sensor (Bright Colors)		
3 x PNP Light-on, 5…45 mm ①		BFS 27K-PS-L01-S115
3 x NPN Light-on, 5…45 mm ②		BFS 27K-NS-L01-S115
Full Color Sensor (Dark Colors and Subtle Contrast Changes)		
3xPNP, RS485 Remote Set-up+RGB Output, Light-on, 15...25 mm ①		BFS 27K-PSR-L02-S115
3xNPN,RS485 Remote Set-up+RGB Output, Light-on, 15...25 mm②		BFS 27K-NSR-L02-S115
Supply Voltage U_B		10…30 Vdc
Ripple		≤ 10%
Voltage Drop U_d at I_e		≤ 2 V
Rated Output Current I_e		100 mA
Current Consumption I_O (No Load)		≤ 60 mA @ 24 Vdc
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13
Emitter Light Source		White Light LED 400…700 nm
Light Spot Dimensions		4 mm @ 20 mm
Ambient Light Immunity (EN 60947-5-2)		10000 Lux
Display/ LED's	Output LED's	3 x Green LED's
	Output, OR Function LED	1 x Yellow LED
	Display	4 digit numerical display
Switching Frequency	Bright Colors	1500 Hz
	Dark Colors	500 Hz (FAST Mode)/ 100 Hz (NORM Mode)
Response Time (On/Off Delay)	Bright Colors	≤ 335 ms
	Dark Colors	≤ 1 ms (FAST Mode), ≤ 5 ms (NORM Mode)
Other Functions	External Synchronization Input	Remote Sensor sync input
	Key Lock	Tamper Proof setting
	Timing Functions	5, 10, 20, 30, 40 ms
	Tolerence Levels	10 Levels (from TOL0 to TOL9)
	Color Sensing Modes	Chromaticity (C) or Chromaticity + Intensity (C+I)
Operating Temperature Range		-10° C to +55° C
Electrical Shock Protection		Class 2
Degree of Protection per IEC 60529		IP 67
Short Circuit Protection		Yes
Overload Protection		Yes
Housing Material		ABS
Sensing Face Material		Glass
Emitter Life		Average 100,000 hr with Ta=+25° C
Connection		M12 8-pin connector
Recommended Connector		C04 AET-00-PB-050M
Weight		100 g

① = Number indicates wiring diagrams

See pages 2.152 for diagrams

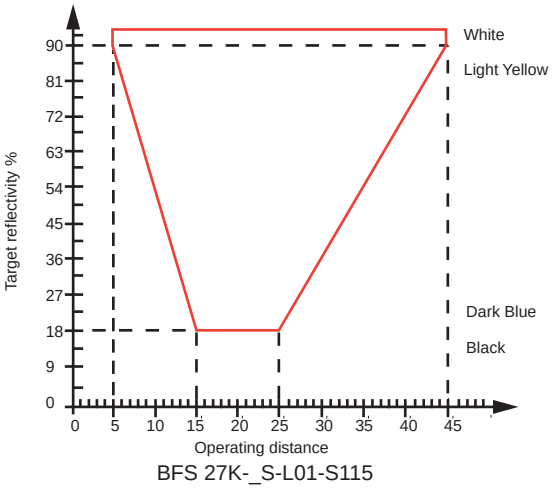
Wiring Diagrams (C04 AET-00-PB-050M Connector Cable)



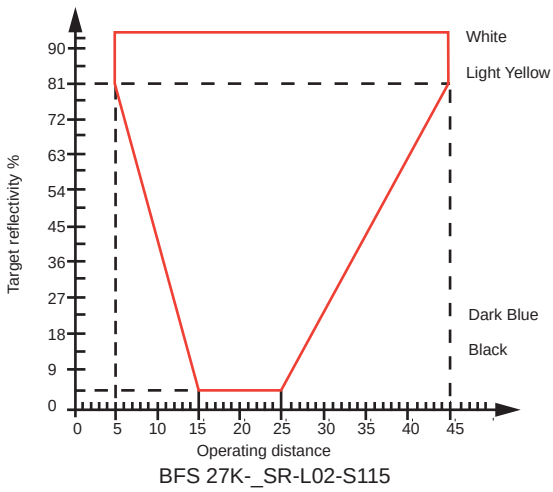


Detection Diagrams BFS 27K

Operating Distance According to Target Reflectivity Percentage

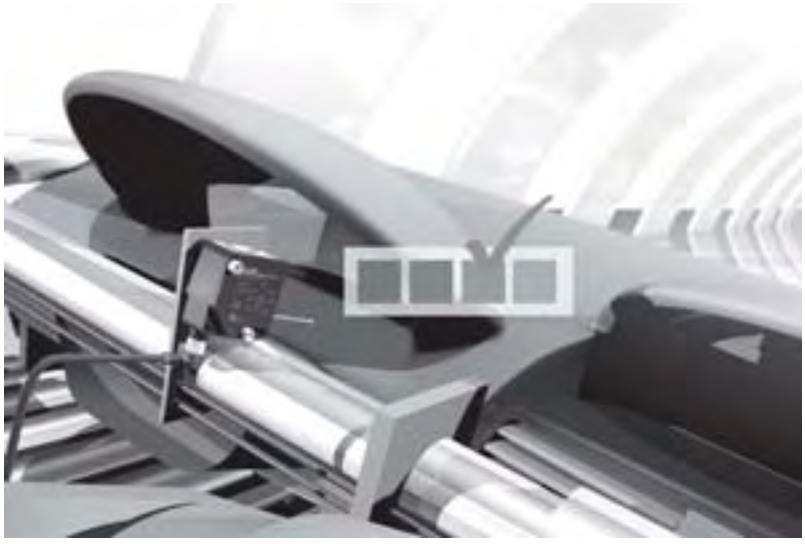


BFS 27K-_S-L01-S115



BFS 27K-_SR-L02-S115

BFS 27K Color Sensor



BFS 30M Programmable Full Color Sensor

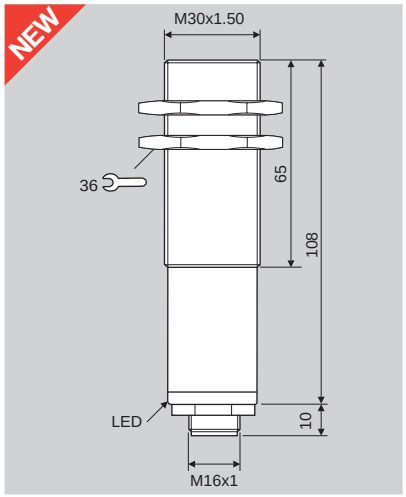
For those full color sensing applications where a longer range and 7 or 15 outputs is desirable, we now offer our new BFS 30M family. Packed in to a M30 tubular housing you will find a high-powered white LED, RGB receivers, and the latest in color-matching circuitry. Through the PC-based setup and configuration software, you will now have ability to teach individual outputs with tolerance levels as tight as 0.5%, set timing and triggering functions, and upload or download sensor parameters.

Features:

- Long Range Detection (Up to 100 mm)
- PC Based Configuration
- RGB Value Display
- RS 232 or USB Communications
- Adjustable Illumination Level (0…100%)
- Color Only or Color + Luminosity Modes
- Programmable Tolerance Levels (0.5%…50%)
- External Trigger (Level, Edge, Free Run)
- PNP/NPN Selectable Outputs

Body Style	30 mm Threaded
Type	Straight optics
Sensing range	30…100 mm
Recommended operating distance	50 mm

Software, connector cable, and programming cables must be ordered separately or as a kit. See accessories on next page.

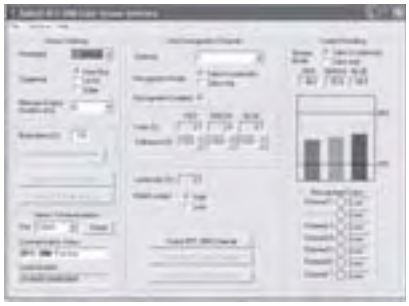


7 x PNP/NPN Selectable Outputs	BFS 30M-USS-L03-OD12
15 Hexadecimial (4 Binary Coded) Discrete Outputs	BFS 30M-USS-L04-OD12

Supply Voltage U_e	12…30 Vdc
Ripple	<10%
Rated Output Current I_e	<100 mA
Current Consumption I_o (no load)	100 mA
Emitter Light Source	White LED 400…700 nm
Tolerance (per color component)	0.5%…50%
Illumination	0…100%
Light Spot Diameter	10 mm @ 50 mm
Power Indicator	Green LED
Output Indicator	Red LED
Programming Indicator	Amber LED
LED Switching Frequency	20 kHz
Response Time (On/Off Delay)	<0.33 ms
Outputs	Selectable PNP/NPN
Set-up and Monitoring	BFS 30M Color Software
Communications	RS 232C and USB
Security	Remote Lock/Unlock
Operating Temperature Range	-10° C…+55° C
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	nickel plated brass
Lens Material	Glass
Emitter Life	100,000 Hours
Connection	M12 12-pin connector
Recommended Connector	CD 12-AL-22-VB-050M
Weight	180 g

BFS 30M Software

Programming control like you've never had before. Select your channel, your operating mode and teach your target. Need to make an adjustment? No problem. Easy windows-based interface screens help you make the changes you need. Save the parameters for a later date or a second sensor? Two clicks and you are done. Using the BFS 30M sensor gives you the highest level of sensor setup available for a full color sensor.



Part number	Description
BFS Z-IK-01	Color Sensor Kit with software CD, 12-Pin Connector Cable, I/O Box, USB and RS232 Programming Cables, and RS232 Adapter
BFS Z-SW-30M-01	Color Sensor Software CD
BFS Z-MU-30M-01	Color Sensor I/O Box
CD 12-AL-22-VB-050M	12 Pin Connector Cable – 5 Meters
BKS AD-03-USBA/USBB-01,8	USB Programming Cable
BKS AD-01-RJ11/RJ11-02,1	RS232 Programming Cable
BKS AD-02-RJ11/DB9	RJ11 to DB9 Adapter (for use with RS232 cable)

BFS Z-MU-30M-01
I/O Box
Included in Kit

CD 12-AL-22-VB-050M
12-pin connector cable
Included in Kit

BKS AD-02-RJ11/DB9
RJ11 to DB9 Adapter
Included in Kit

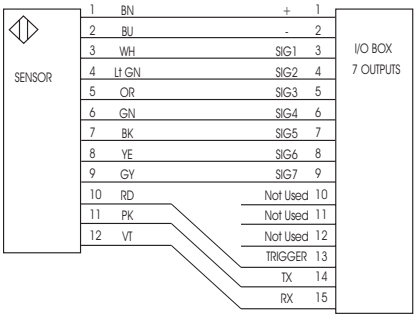
BKS AD-01-RJ11/RJ11-02,1
RS232 Programming Cable
Included in Kit

BKS AD-03-USBA/USBB-01,8
USB Programming Cable
Included in Kit

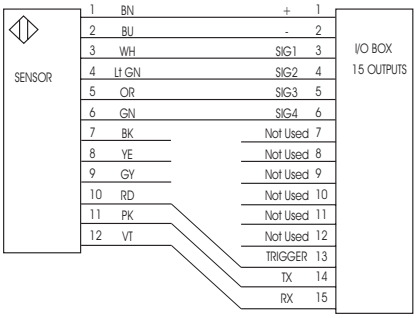
BFS 30M Spot Size vs. Distance

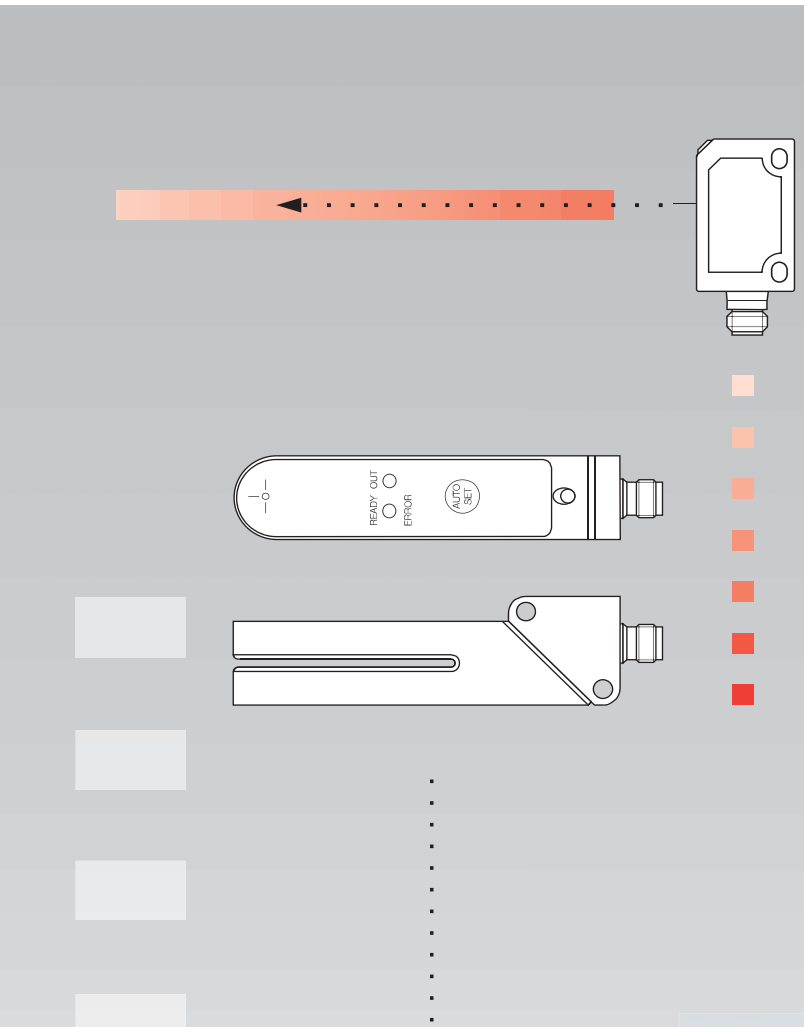
Sensing Distance	Spot Size
20 mm	5 mm
30 mm	6 mm
40 mm	8 mm
50 mm	10 mm
60 mm	12 mm
70 mm	14 mm
80 mm	16 mm
90 mm	18 mm
100 mm	20 mm

BFS 30M-USS-L03-OD12



BFS 30M-USS-L04-OD12

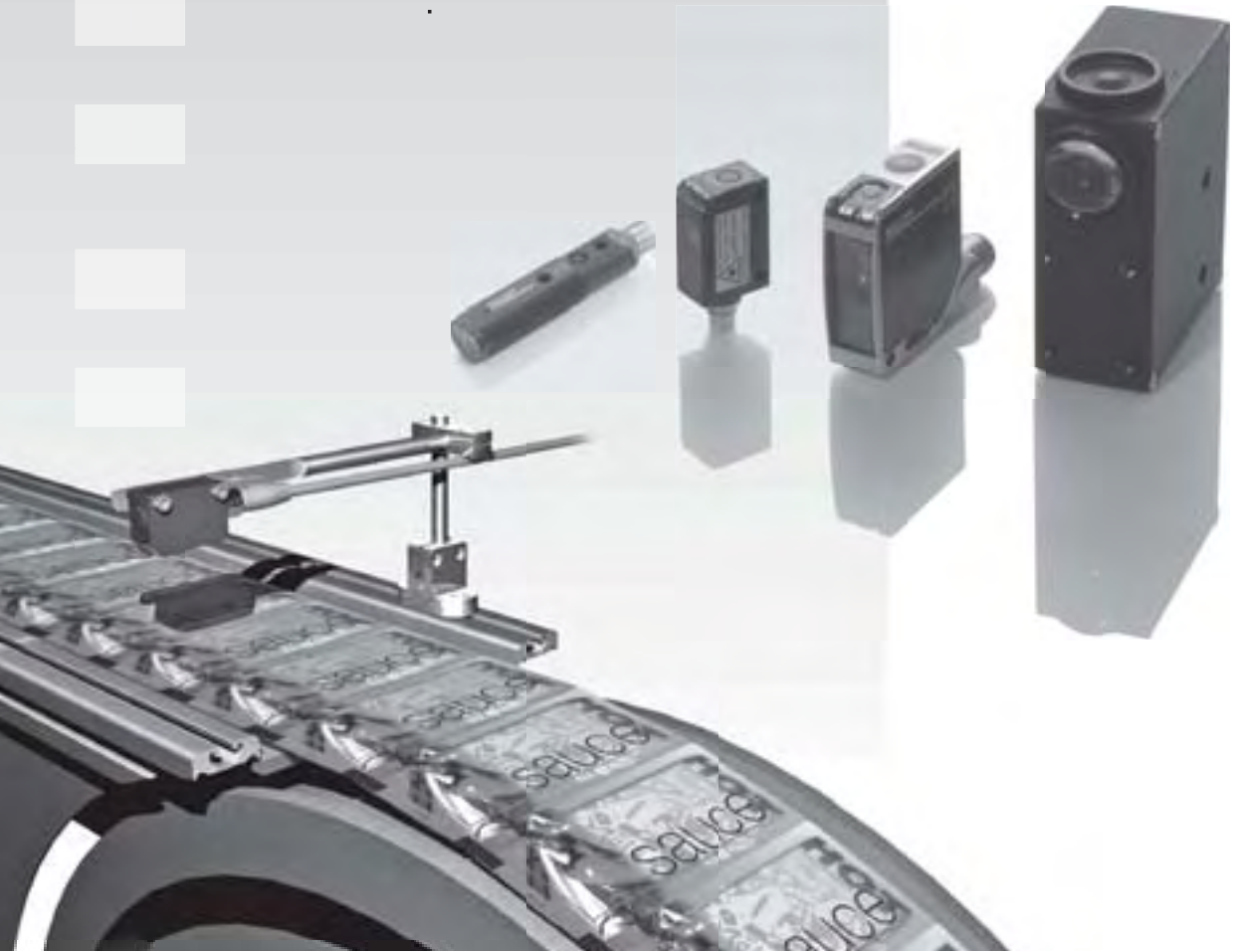




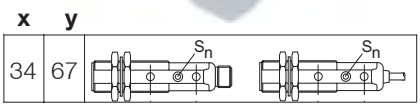
Color Mark Detection (Contrast) Sensors

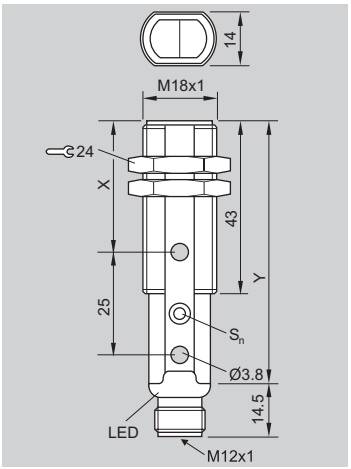
Color mark sensors, sometimes called contrast or registration sensors, are highly specialized diffuse proximity photoelectric sensors with the ability to detect subtle surface contrasts. Contrast detection is widely used in packaging and labeling operations to identify various colors of index marks or the presence of labels on shiny surfaces.

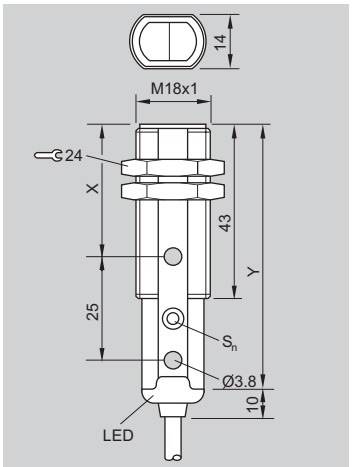
Unlike standard energetic diffuse photoelectric sensors, color mark sensors use a highly sensitive lens system positioned at a specific focal distance from a target. These sensors have fast response times and the can detect marks that pass by the sensor at extreme speeds.



Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics





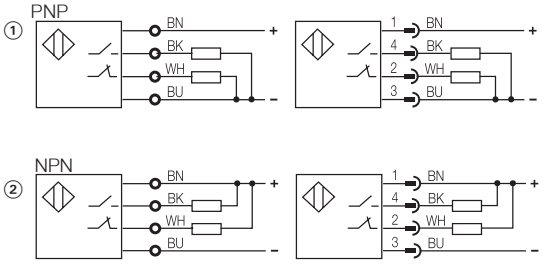


Color Mark (Contrast Detection)

PNP NO+NC Light-on 10 mm	①	BKT 18KF-001-P-S4	BKT 18KF-001-P-02
NPN NO+NC Light-on 10 mm	②	BKT 18KF-001-N-S4	BKT 18KF-001-N-02

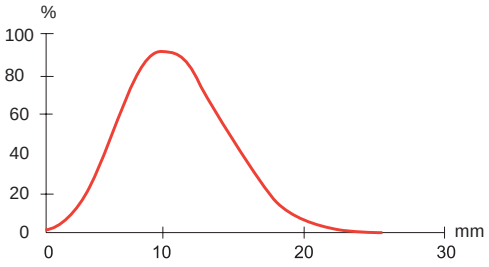
Supply Voltage U_B	10...30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_o (no load)	≤ 30 mA	
Utilization Category (IED 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	White LED 400 to 700 nm	
Light Spot Diameter	4.5 mm @ 10 mm	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Output Indicator	Yellow LED	
Stability Indicator	Green/Red LED	
Switching Frequency	5 kHz	
Response Time (On/Off Delay)	≤ 100 µs	
Operating Temperature Range	-25° C to +55° C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	yes	
Overload Protection	yes	
Housing Material	PBT	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 hr with Ta=+25° C	
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	25 g	75 g

Wiring Diagrams



Detection Diagram

Sensitivity/Operating Distance



BKT 6K Contrast Sensor

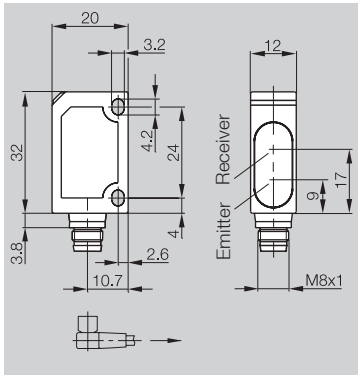
The Balluff BKT 6K contrast sensor is designed to reliably detect small area contrast differences typically missed by standard contrast sensors. The advanced microprocessor simplifies set-up with a push-button or remote teach-in process that automatically learns the target - even if the target is moving at full production speed.

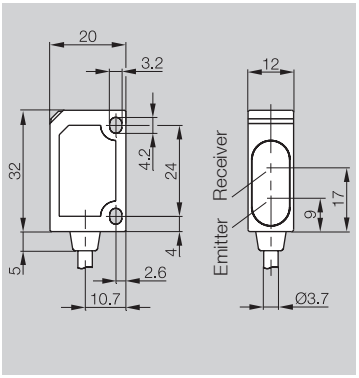
Features

- Simple one button or remote teach-in
- Dynamic teach-in learns applications on the fly
- Precision laser emission aids alignment
- Fast response time
- Programmable light/dark selection
- Long range mark detection up to 150 mm
- PNP or NPN versions
- Cable or M8 Connector

Applications

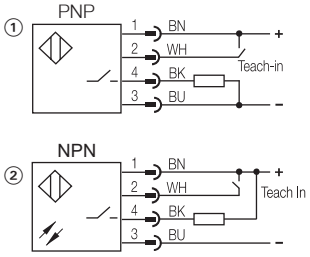
- Registration marks in packaging applications
- Standard energetic diffuse applications
- Print centering on packages
- Positioning based on detected contrast
- Small object detection



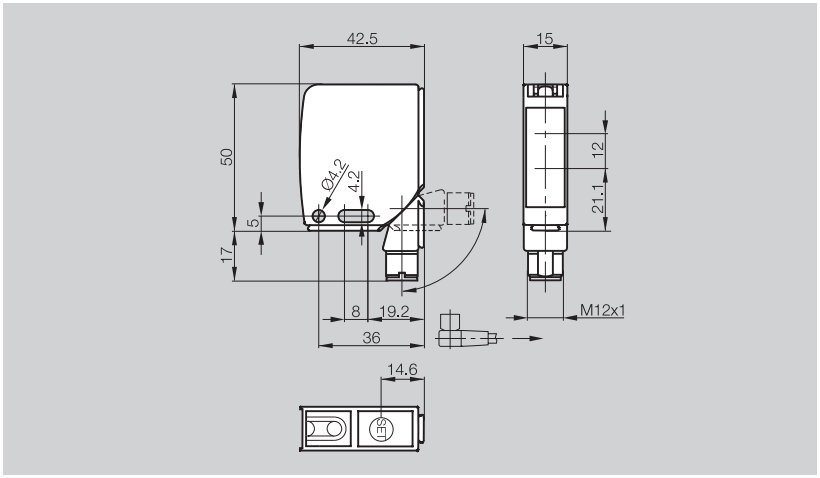


Body Style	Small block	Small block
Type	Straight optics	Straight optics
Color Mark (Contrast)		
PNP Light-on/Dark-on 40...150 mm ①	BKT 6K-001-P-S75	BKT 6K-001-P-02
NPN Light-on/Dark-on 40...150 mm ②	BKT 6K-001-N-S75	BKT 6K-001-N-02
Supply Voltage U_B	10...30 Vdc	10...30 Vdc
Voltage Drop U_d at I_e	≤ 2.4 V	≤ 2.4 V
Rated Isolation Voltage U_i	250 Vac	250 Vac
Rated Output Current I_e	100 mA	100 mA
Current Consumption I_o (no load)	≤ 30 mA	≤ 30 mA
Protected Against Polarity Reversal	yes	yes
Short Circuit Protected	yes	yes
Permissible Capacitance	0.1 µF	0.1 µF
On/Off Delay	0.5 ms	0.5 ms
Switching Frequency	1000 Hz	1000 Hz
Utilization Category	DC 13	DC 13
Output	PNP/NPN	PNP/NPN
Output Function	Light-on/Dark-on selectable	Light-on/Dark-on selectable
Permissible Ambient Light	5000 Lux	5000 Lux
Sensitivity/Range Adjustment	Teach-in	Teach-in
Function Indicator (receiver sees light)	Yellow LED	Yellow LED
Operating/Contamination Indicator	Green LED	Green LED
Operating Temperature Range	-20...+60°C	-20...+60°C
Degree of Protection per IEC 60529	IP 67	IP 67
Insulation Class	⧈	⧈
Laser Protection Class	2	2
Housing Material	ABS impact resistant	ABS impact resistant
Material of Sensing Face	PMMA	PMMA
Connection	M8 4-pin connector	2 m cable, PVC
No. of Wires × Gauge		4 x 26 AWG
Recommended connector	C75 ANL-00-VY-050M	
Weight	40 g	120 g
Emitter Type	Laser light red 650 nm	Laser light red 650 nm
Light Spot Diameter	0.7 mm at focal point (85 mm ± 15 mm)	0.7 mm at focal point (85 mm ± 15 mm)
Hysteresis (18 %/18 %)	< 5%	< 5%
Gray Value Shift (90 %/18 %)	< 7%	< 7%

Wiring Diagrams



Body Style	Mid-size block
Type	Straight optics

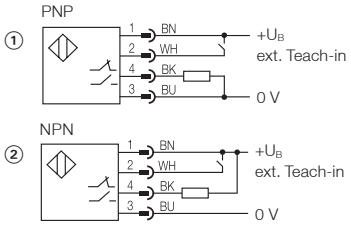


Color Mark (Contrast)

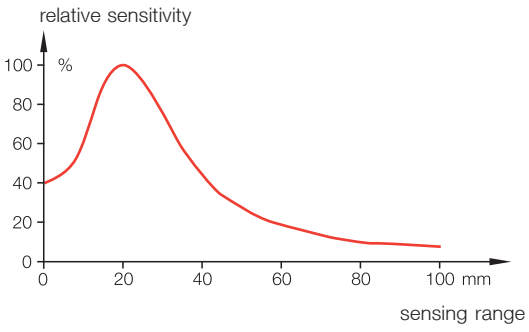
PNP NO+NC Light-on 19 mm ± 2 mm	①	BKT 21M-002-P-S4
NPN NO+NC Light-on 19 mm ± 2 mm	②	BKT 21M-002-N-S4

Supply Voltage U_B	10...30 Vdc
Ripple	≤ 10%
Voltage Drop U_d at I_e	≤ 2 V
Rated Output Current I_e	100 mA
Current Consumption I_o (no load)	≤ 35 mA
Utilization Category (IED 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	White LED 400 nm to 700 nm
Ambient Light Immunity (EN 60947-5-2)	10000 Lux
Output Indicator	Yellow LED
Stability Indicator	Green/Red LED
Switching Frequency	5 kHz
Response Time (On/Off Delay)	≤ 100 µs
Operating Temperature Range	-25° C to +55° C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	yes
Overload Protection	yes
Housing Material	GD-Zn/Al Metal
Sensing Face Material	PMMA
Emitter Life	Average 100,000 hr with Ta=+25° C
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	80 g

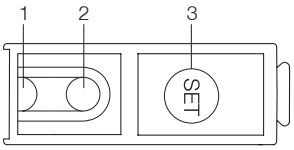
Wiring Diagrams



Function Diagram



Display and Operating Elements



1. Output LED
2. Stability LED
3. SET pushbutton

BKT Series Color Mark Detection (Contrast) Sensors

The BKT series is family of advanced microprocessor-based contrast detection sensors designed to solve the most difficult color and registration mark applications. A simple two-button set-up procedure to teach the mark and the background is coupled with the ability to store up to four settings at a time. The correct light source emission of red LED or green LED can be selected and stored in the EEPROM. By pressing the "MARK" key and then the "BKGD" key, the sensor can evaluate the best technical application conditions to auto-configure parameters, providing maximum operating performance. During this phase, the color mark sensor supplies the optimal threshold level and the output pulse, and it selects the best emission LED for detecting contrasts.

The two available models allow remote control through two wires, which duplicate the functions of the keys provided on the device. This makes setting easy, even when the mark reader is unattainable by the operator. By setting the sensor's internal dipswitches, the two wires can also be used to select four different contrast types remotely. This permits quick modification of the configuration of the device in situations where the contrast to be detected changes frequently. To further simplify the setup, two LED's provide information on the device's operating state.

The BKT mark reader series is available with objective versions and 9 or 18 mm lens options. Connection can be made through a cable or M12 connector with 3 positions, allowing adaptation of the sensor to the various mounting requirements of automatic machines. All versions of the BKT include an analog output capable of providing a signal in the setup phase proportional to the detected contrast. The IP67 protected metal housing makes it suitable for harsh industrial environments.

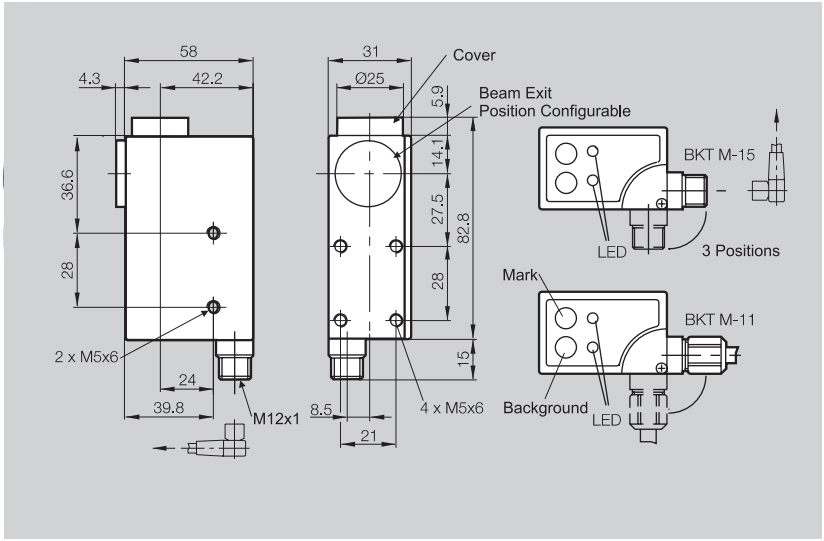
Features

- Automatic set-up with two pushbuttons
- Extremely fast response time
- Automatic selection of red/green emission
- Automatic light/dark selection
- Straight or 90° optics for simplified mounting
- Selectable pulse-stretching output delay
- Sensing distances up to 60mm using special lens
- Universal PNP/NPN output
- Analog output proportional to detected contrast
- Remote teach or selection of four different pre-stored contrast settings
- Settings are stored in EEPROM for error-free operation
- Rugged metal housing
- Rotatable three-position
- M12 connection

Applications

- Registration marks in packaging applications
- Print centering on packages
- Positioning based on detected contrast
- Small object detection

Body Style	Large block	Large block
Type	Configurable optics	Configurable optics



Advanced Color Mark (Contrast)

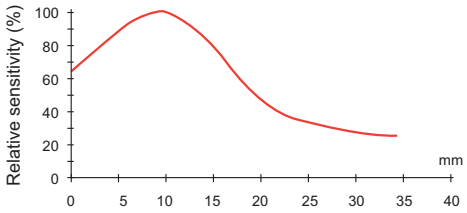
9 mm Light-on/Dark-on, NO, Red/green light Spot:	BKT M-15-U-S4	BKT M-11-U-03
9 mm Light-on/Dark-on, NO, Red/green light Spot:	BKT M-15L-U-S4	BKT M-11L-U-03
9 mm Light-on/Dark-on, NO, White light Spot: Circular	BKT M-15C-U-S4	BKT M-71-U-03
Fiber optic ready, Light-on/Dark-on, NO, Red/green light Spot: Fiber		BKT M-52-U-03

Supply Voltage U_B	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V PNP/ ≤ 1 V NPN	
Rated Output Current I_e	200 mA	
Current Consumption I_O (no load)	≤ 80 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	Red (635 nm), Green (565 nm), Blue (475 nm), White Light LED 400…700 nm	
Ambient Light Immunity (EN 60947-5-2)	3000 Lux artificial light 10000 Lux sunlight	
Output Indicator	Red LED	
Ready Indicator	Green LED	
Switching Frequency — BKT M-15C-U-S4	20 kHz	
Switching Frequency — All others	10 kHz	
Response Time (On/Off Delay) — BKT M-15C-U-S4	≤ 25 µs	
Response Time (On/Off Delay) — All others	≤ 50 µs	
Timing Function — Selectable On/Off	20 ms miniumum on output	
Ouputs PNP/NPN — Selectable (Rpull-down/up 10kW)	PNP default	
Ouputs PNP/NPN — Analog	0…5.5 Vdc 2.2 kW output resistance (2 Vdc on white 90%)	
Operating Temperature Range	-10° C to +55° C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	yes	
Overload Protection	yes	
Housing Material	ZAMA diecast zinc	
Sensing Face Material	Glass	
Emitter Life	Average 100,000 hr with Ta=+25°	
Connection	M12 4-pin connector	6 x 22 AWG shielded cable
Recommended Connector	C04 AEL-00-VY-050MS	
Weight	310 g	450 g

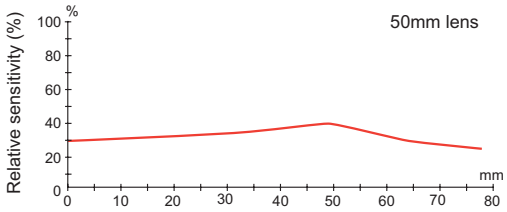
PNP/NPN Selectable- PNP Default

Accessories (See page 7.31)			
Lens	Ⓐ	9 mm sensing, 5 mm spot	BKT M-PK-2
Lens	Ⓑ	18 mm sensing, 7 mm spot	BKT M-PK-1
Lens	Ⓒ	28 mm sensing, 10 mm spot	BKT M-PK-3
Lens	Ⓓ	50 mm sensing, 12 mm spot	BKT M-PK-5
Fine Focusing Lens (Use with 9 mm lens)		9 mm sensing, 1 mm spot	BKT M-PK-4
Diffuse Fiber Optic Cable 1 m		3 mm sensing	BFO KTS-XBH-MZG-00-1

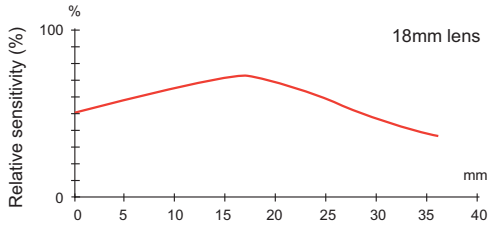
Ⓐ 9 mm lens



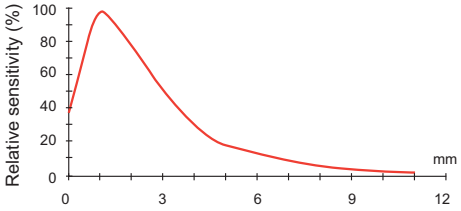
Ⓓ 50 mm lens



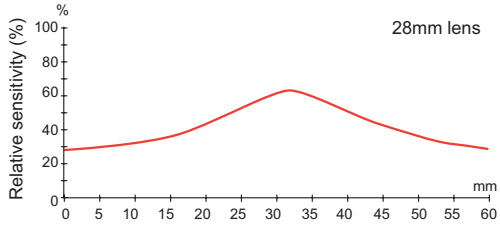
Ⓑ 18 mm lens



Diffuse Optic Fibers

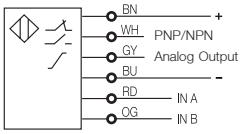


Ⓒ 28 mm lens

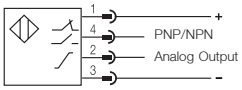


Wiring Diagrams

BKT M-71 M-52/M-11 Cable



BKT M-15... Connector



BGL 21 Advanced Series Slot Sensors

The BGL 21 advanced series is designed to solve difficult contrast mark applications with a microprocessor based set-up and an EEPROM to store settings. Using a single push button, the BGL 21 stores information about the contrast mark, background, and sensitivity settings. It will even select the color of the emission source (Red LED or Green LED), and store all the settings in the EEPROM for error-free operation. The BGL 21 offers extremely fast switching speeds up to 15 kHz in a rugged metal housing along with a small, controlled 2 mm sensing gap.

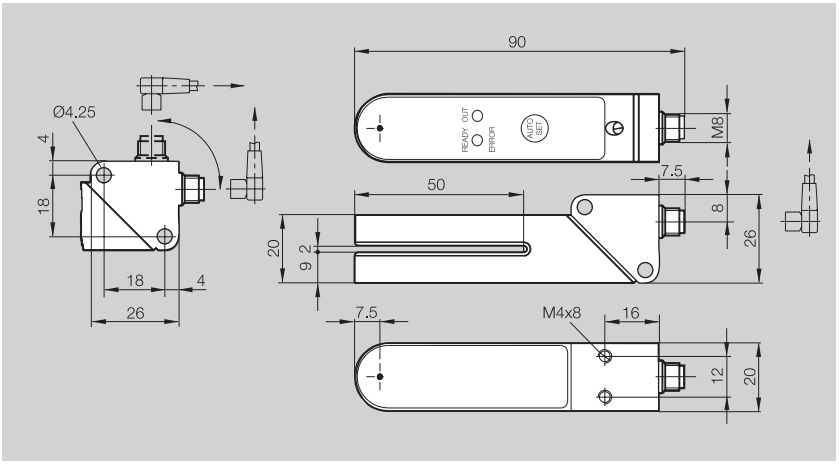
Features

- Automatic set-up with single pushbutton
- Extremely fast response time
- 2 mm sensing gap
- Universal PNP/NPN output
- Setting are stored in EEPROM for error-free operation
- Rugged metal housing
- Rotatable M8 connection

Applications

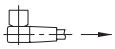
- Recognizing colored markings on transparent carrier material
- Label detection
- Guide control on tracks
- Tape break control
- Thread tear/slack monitoring
- Hole checking in thin materials

Body Style	Slot sensor
Type	Straight optics, 2 mm gap

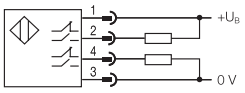


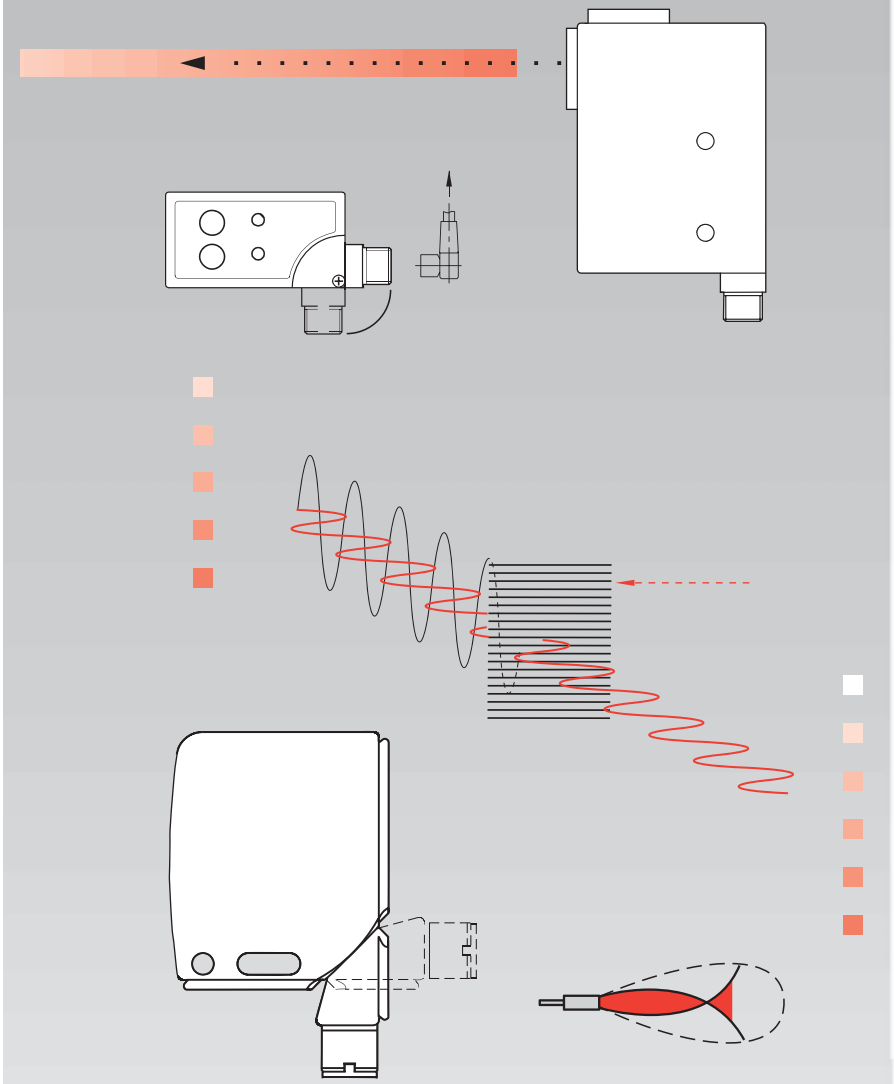
Typical targets Visible Red/Visible Green	BGL 21-AH	
Dark targets IR	BGL 21-AR	
Translucent targets IR (Low hysteresis)	BGL 21-AV	
Translucent targets IR		BGL 21-AS

Supply Voltage U_B	10...30 Vdc	
Voltage Drop U_d at I_e	1.2 V	
Rated Isolation Voltage U_i	75 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (no load)	55 mA	
Short-Circuit Protected	yes	
Permissible Capacitance	1 µF	
On/Off delay	66 µs	33 µs
Switching Frequency	7.5 KHz (AH, AR, AV)	15 KHz (AS)
Utilization Category	DC 13	
Output	PNP/NPN on separate pins	
Output Function	Light-on/Dark-on automatically switched	
Permissible Ambient Light	3000 Lux artificial light/10,000 Lux sunlight	
Sensitivity Adjustment	Auto set (teach-in)	
Output Function Indication	Yellow LED	
Operating/Error Indication	Red/Green LED	
Operating Temperature Range	0...55° C	
Degree of Protection per IEC 60529	IP 65	
Housing Material	Anodized aluminum	
Material of Sensing Face	Glass	
Emitter Light Source (AH)	Visible Red (635 nm) and Visible Green (835 nm)	
Emitter Light Source (AR, AV, AS)	Infrared (880 nm)	
Max. Object Width	1.5 mm	
Min. Object Width	1 mm	
Connection	M8 4-pin connector	
Recommended Connector	C75 ANL-00-VY-050M	
Weight	100 g	



Wiring Diagram



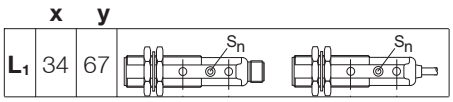


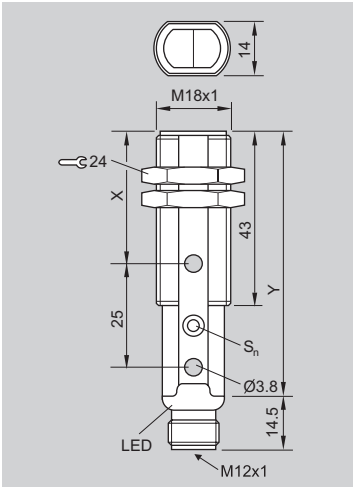
Luminescence (UV) Sensors

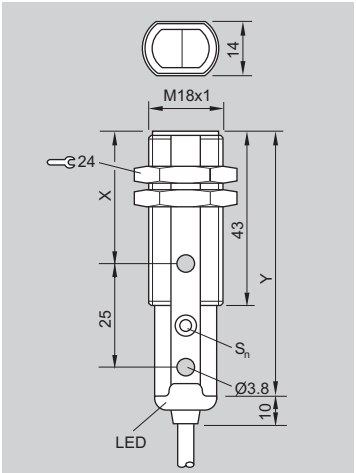
Luminescence or UV sensors can see invisible marks that do not appear to the naked eye without a black light. They are typically used to detect luminescent plastic safety seals on bottles and the presence of luminescent glue on boxes. They can even be used to detect the presence of grease in a bearing if luminescent material is part of the grease composition.

2.164 BLT 18KF
2.165 BLT 21M
2.166 BLT M
2.167 BLT 31M *NEW*

Body Style	Combination 18 mm threaded	Combination 18 mm threaded
Type	Straight optics	Straight optics





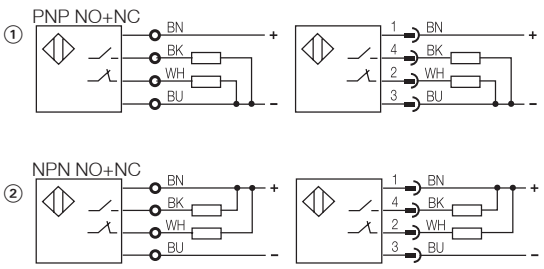


Luminescence Detection (UV)

PNP NO+NC	Light-on	8...20 mm	①	BLT 18KF-001-P-S4	BLT 18KF-001-P-02
NPN NO+NC	Light-on	8...20 mm	②	BLT 18KF-001-N-S4	BLT 18KF-001-N-02

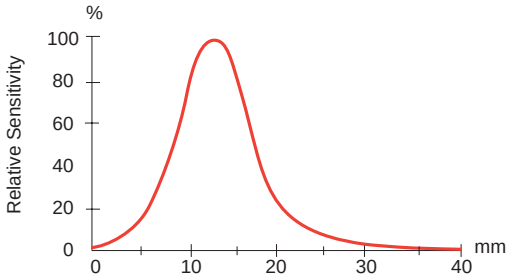
Supply Voltage U_B	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V	
Rated Output Current I_e	100 mA	
Current Consumption I_O (no Load)	≤ 30 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	UV 370 nm	
Light Spot Diameter	3 mm @ 20 mm	
Ambient Light Immunity (EN 60947-5-2)	5000 Lux	
Output Indicator	Yellow LED	
Stability/Error Indicator	Green/Red LED	
Switching Frequency	1 kHz	
Response Time (On/Off Delay)	≤ 0.5 ms	
Operating Temperature Range	-25° C to +55° C	
Electrical Shock Protection	Class 2	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	PBT	
Sensing Face Material	PMMA	
Emitter Life	Average 100,000 hr with Ta=+25° C	
Connection	M12 4-pin connector	Cable 2 m, PVC, 4 x 26 AWG
Recommended Connector	C04 AEL-00-VY-050M	
Weight	25 g	75 g

Wiring Diagrams

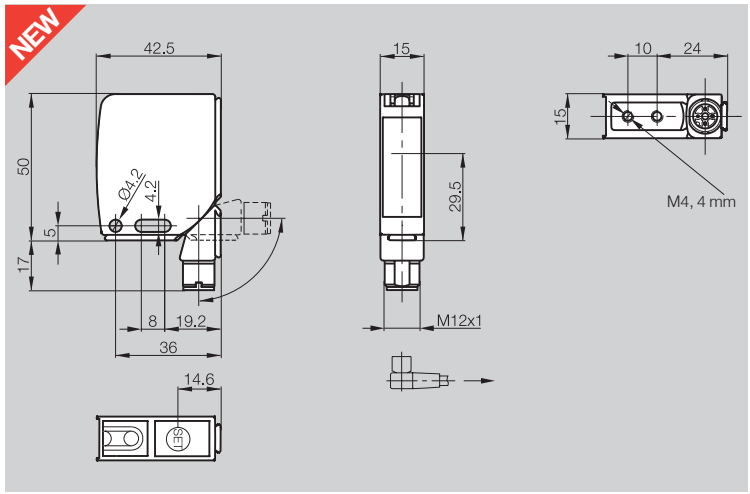


Detection Diagram

Sensitivity/Operating Distance



Body Style	Mid-size block
Type	Straight optics

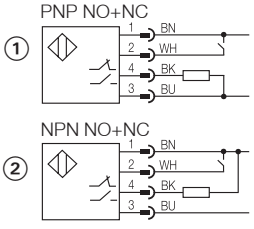


Luminescence Detection (UV)

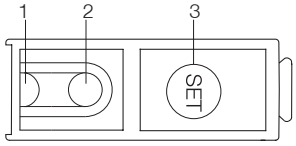
PNP NO+NC Light-on 0...40 mm	①	BLT 21M-001-P-S4
NPN NO+NC Light-on 0...40 mm	②	BLT 21M-001-N-S4

Supply Voltage U_B	10…30 Vdc
Ripple	≤ 10%
Voltage Drop U_d at I_e	≤ 2 V
Rated Output Current I_e	100 mA
Current Consumption I_O (No Load)	≤ 35 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13
Emitter Light Source	UV 370 nm
Light Spot Diameter	3 mm @ 20 mm
Ambient Light Immunity (EN 60947-5-2)	10000 Lux
Output Indicator	Yellow LED
Stability/Error Indicator	Green/Red LED
Switching Frequency	2 kHz
Response Time (On/Off Delay)	≤ 100 µs
Operating Temperature Range	-25° C to +55° C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 67
Short Circuit Protection	Yes
Overload Protection	Yes
Housing Material	GD-Zn/Al Metal
Sensing Face Material	PMMA
Emitter Life	Average 100,000 hr with Ta=+25° C
Connection	M12 4-pin connector
Recommended Connector	C04 AEL-00-VY-050M
Weight	80 g

Wiring Diagrams

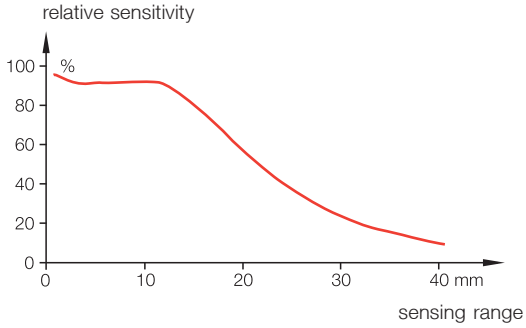


Display and Operating Elements



1. Output LED
2. Stability LED
3. SET pushbutton

Detection Diagram



BLT M & BLT 31M

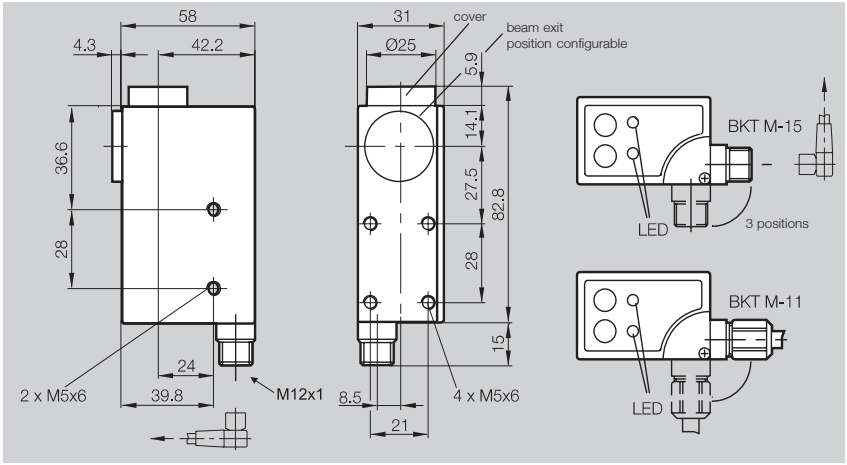
BLT M Series Luminescence sensors utilize the latest UV LED technology to solve the most difficult invisible mark applications. Both sensors offer advanced setup features and analog output signals proportional to the amount of luminescent material used in the mark.

Features

- UV source: LED 100,000 hour life
- Long sensing distance (up to 50 mm - BLT M, up to 300 mm - BLT 31M)
- Push-button setting
- Light-on/dark-on selectable
- Time delay setting
- PNP or NPN selectable
- Analog output standard
- Button lockout
- Metal housing
- Fiber optic cable available (BLT 31M)

Applications

- Logistics (marking, selecting)
- Assembly (guiding, monitoring, sorting)
- Packaging machines (to monitor cutting, folding)
- Ceramics (parts positioning)
- Wood industry (controlling the glue bead)
- Pharmaceuticals (control tasks in the manufacturing process)
- Textiles (cut guiding)
- Foods industry

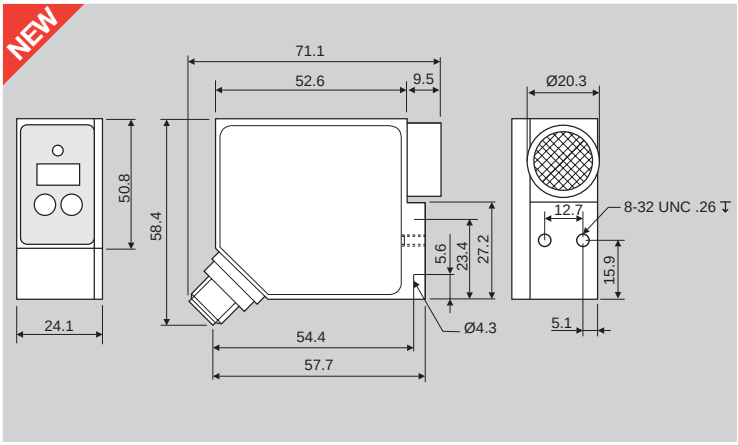


Body Style	Large block	Large block
Type	Configurable optics	Configurable optics
Advanced Luminescence Sensor		
Light-on/Dark-on, NO 9 mm — Normal Sensitivity ①②	BLT M-15-U-S4	BLT M-11-U-C-03
Light-on/Dark-on, NO 28 mm — High Power ②	BLT M-55-U-S4	
Supply Voltage U_B	10…30 Vdc	
Ripple	≤ 10%	
Voltage Drop U_d at I_e	≤ 2 V PNP/ ≤ 1 V NPN	
Rated Output Current I_e	200 mA	
Current Consumption I_O (No Load)	≤ 80 mA	
Utilization Category (IEC 60-947-4-1) Output Duty Cycle	DC 13	
Emitter Light Source	UV 370 nm	
Refernce object for sensing distance	Paper with Low grade 5 flourescent	
Ambient Light Immunity (EN 60947-5-2)	3000 Lux artificial Light 10000 Lux sunlight	
Output Indicator	Red LED	
Ready Indicator	Green LED	
Switching Frequency — High Power	2 kHz	
Switching Frequency — Normal Sensitivity	1 kHz	
Response Time (On/Off Delay) — High Power	≤ 250 ms	
Response Time (On/Off Delay) — Normal Sensitivity	≤ 500 ms	
Timing Function — Selectable On/Off	20 ms minimum on output	
Ouput — PNP/NPN Selectable	PNP default	
Ouput — Analog	0…7 Vdc	
Operating Temperature Range	-10° C to +55° C	
Electrical Shock Protection	Class 1	
Degree of Protection per IEC 60529	IP 67	
Short Circuit Protection	Yes	
Overload Protection	Yes	
Housing Material	ZAMA diecast zinc	
Lens Material	Glass	
Emitter Life	Average 100,000 hr with Ta=+25° C	
Connection	M12 4-pin connector	6x 22 awg shielded cable
Recommended Connector	C04 AEL-00-VY-050M	
Weight	310 g	450 g

Note: The BLT M can be used with additional lenses or fiber optic cables. See page 2.168 for more details.

① = Number indicates wiring diagrams
See page 2.168 for diagrams

Body Style	Mid-size block	Mid-size block
Type	Straight optics	Straight optics



Advanced Luminescence Sensor

Analog Output, PNP/NPN, NO/NC 100 mm ③		BLT 31M-001-U-S92
Analog Output, PNP/NPN, NO/NC 300 mm ③	BLT 31M-002-U-S92	
Supply Voltage U_B	10…24 Vdc	10…24 Vdc
Ripple	<10%	<10%
Rated Output Current I_e	100 mA	100 mA
Current Consumption I_o (no load)	< 60 mA	< 60 mA
Emitter Light Source	UV 370 nm	UV 370 nm
LED Intensity	3 levels (low, medium and high)	3 levels (low, medium and high)
Light Spot Diameter	5 mm @ 100 mm	16 mm @ 300 mm
Power Indicator	7 segment display indicator	7 segment display indicator
Relative Intensity Indication	00…50	00…50
Output Indicator	Red LED	Red LED
Programming Indicator	Green LED	Green LED
LED Switching Frequency	6 kHz	6 kHz
Response Time (on/off delay)	<150 µs	<150 µs
Outputs Digital	Auto-Detect PNP/NPN	Auto-Detect PNP/NPN
Outputs Analog	0-5 Vdc	0-5 Vdc
Output Function	NO/NC selectable	NO/NC selectable
Output Pulse Stretch	0…90 ms (10 steps)	0…90 ms (10 steps)
Sensitivity	2 Levels	2 Levels
Hysteresis	Programmable (10 steps)	Programmable (10 steps)
Operating Temperature Range	-20° C…+55° C	-20° C…+55° C
Degree of Protection per IEC 60529	IP 67	IP 67
Short circuit Protection	Yes	Yes
Overload Protection	Yes	Yes
Housing Material	Metal alloy	Metal alloy
Lens Material	Glass	Glass
Emitter Life	100,000 hours	100,000 hours
Connection	M12 5-pin connector	M12 5-pin connector
Recommended Connector	C04 AEQ-00-VY-050MS	C04 AEQ-00-VY-050MS
Weight	95 g	95 g

① = Number indicates wiring diagram See page 2.168 for diagrams

Light Spot Diameter with Standard Lens

	BLT 31M-001-U-S92	BLT 31M-002-U-S92
Sensing Distance	Spot Size	
20 mm	18 mm	18 mm
50 mm	6 mm	6 mm
100 mm	5 mm	5 mm
150 mm		4 mm
200 mm		8 mm
250 mm		15 mm
300 mm		16 mm

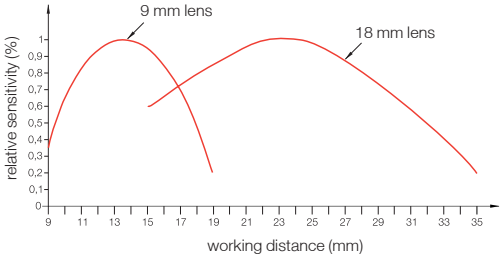
Light Spot Diameter with 50 mm Lens (BLT 31M-PK-1)

	BLT 31M-001-U-S92	BLT 31M-002-U-S92
Sensing Distance	Spot Size	
20 mm	8 mm	8 mm
38 mm	2 mm	2 mm
50 mm	4 mm	4 mm
75 mm	8 mm	8 mm
100 mm	13 mm	13 mm
150 mm		22 mm

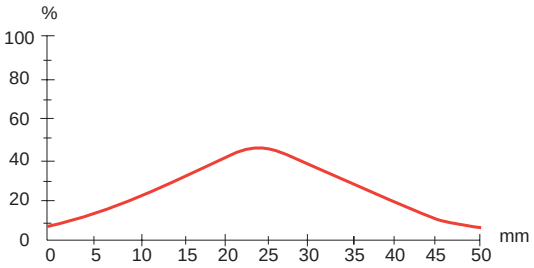
Accessories (See Section 7)		
Lens - for BLT M	9 mm sensing, 5 mm spot	BKT M-PK-2
Lens - for BLT M	18 mm sensing, 7 mm spot	BKT M-PK-1
Lens - for BLT M	28 mm sensing, 10 mm spot	BKT M-PK-3
Lens - for BLT M	50 mm sensing, 12 mm spot	BKT M-PK-5
Fine Focusing Lens - for BLT M	9 mm sensing, 1 mm spot	BKT M-PK-4
Fiber Optic Cable - for BLT M (Saline Solution in PET sheath)	30 mm sensing, 500 mm long	BFO LTS-XXX-TAF-00-0.5
Fiber Optic Cable - for BLT M (Saline Solution in PET sheath)	30 mm sensing, 1 m long cable	BFO LTS-XXX-TAF-00-1
Focusing Lens for Saline Fiber - for BLT M	5 mm spot @ 15 mm	BFO 07-FL-3
Focusing Lens - for BLT 31M	See chart with BLT 31 M	BLT 31M-PK-1

BLT M Sensitivity Curves

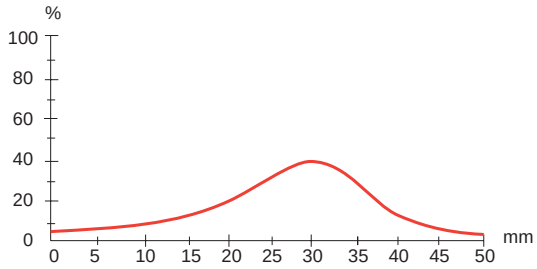
9 mm & 18 mm Lens -- Normal Sensitivity



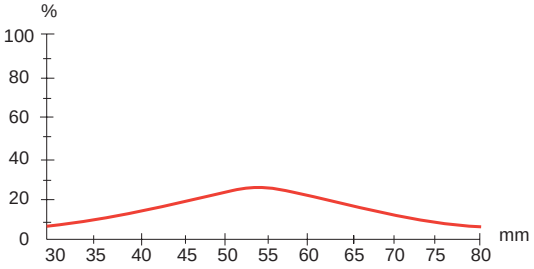
30 mm Lens -- Normal Sensitivity



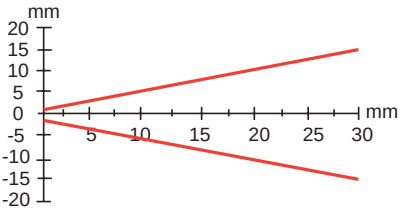
30 mm Lens -- High Power



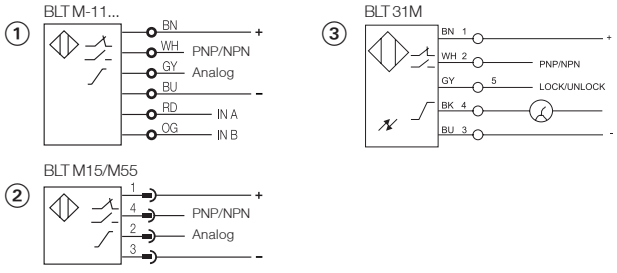
60 mm Lens -- High Power

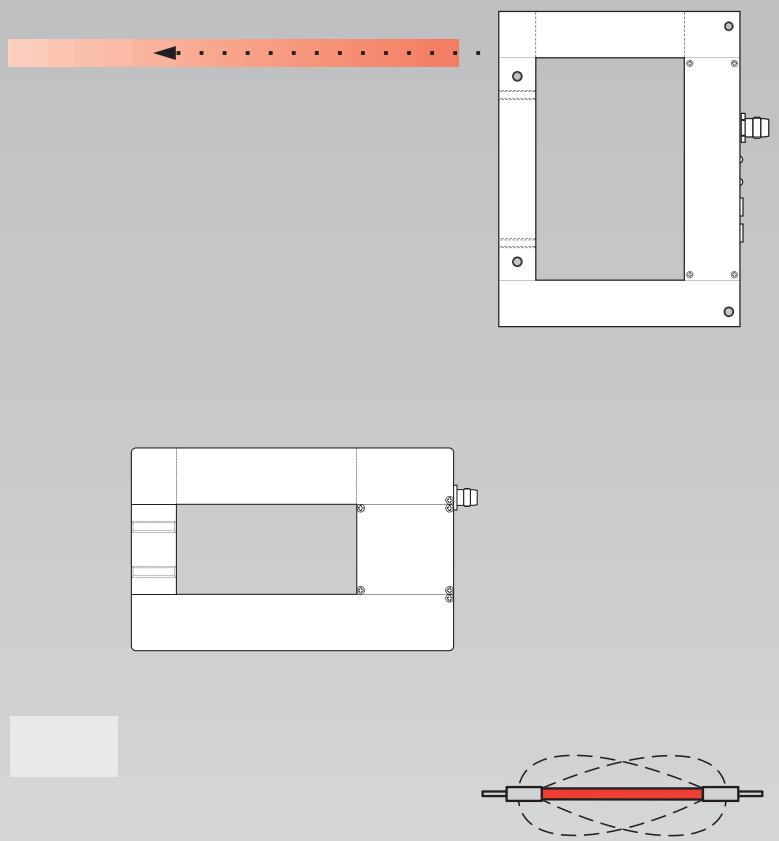


BLT with Saline Fiber



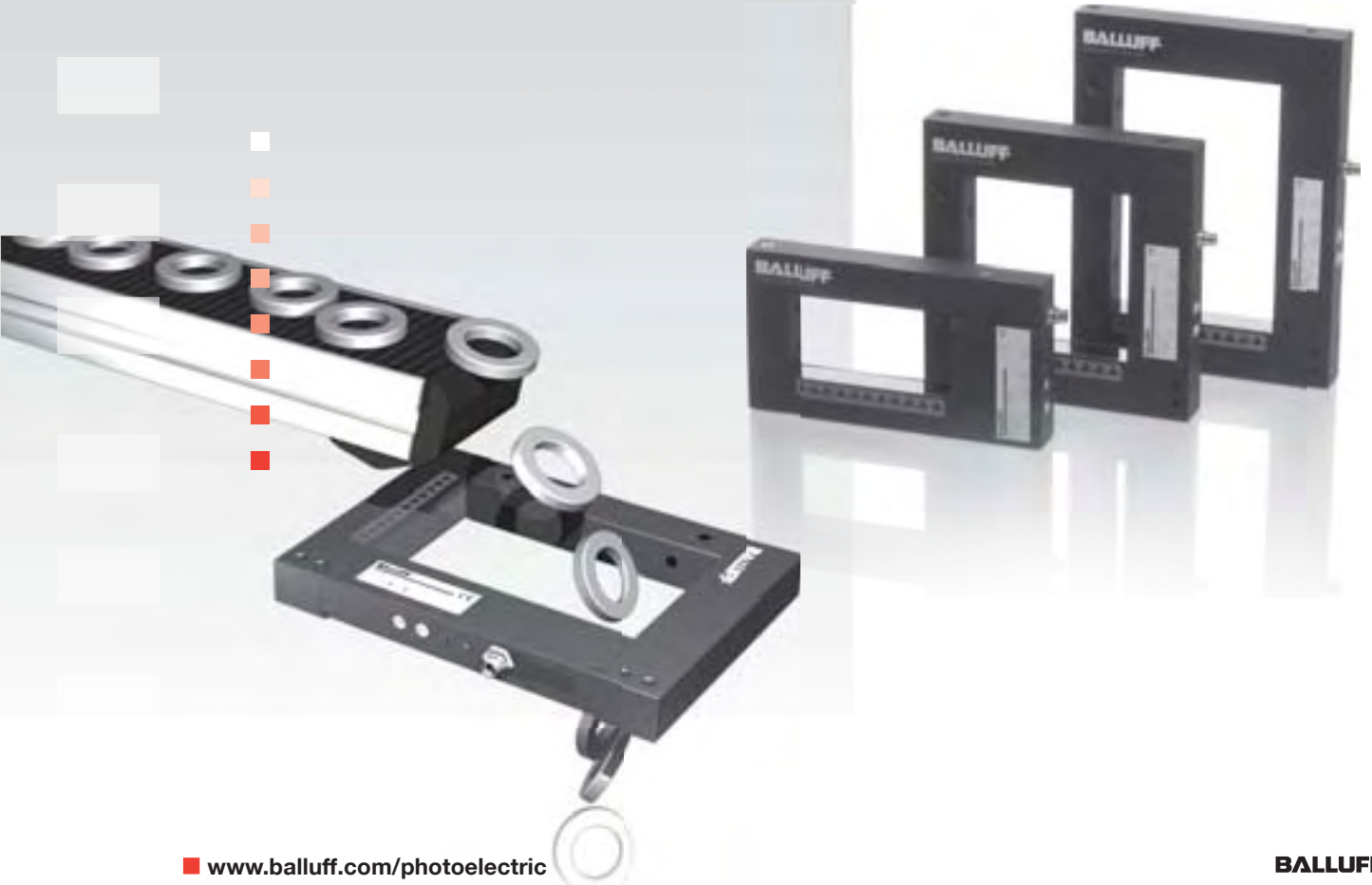
Wiring Diagrams





Optical Windows

Balluff's dynamic optical windows provide a unique solution for counting parts ejecting from a machine in a random orientation, such as parts coming out of stamping presses, air feeders, and vibratory or manual feeders. Typical photoelectric sensors are not able to detect parts which vary in orientation and distance from the sensor, but dynamic optical windows are immune from these limitations. The rugged metal design features an array of emitters and receivers arranged in a thru-beam configuration to detect any part that breaks the beams of light.



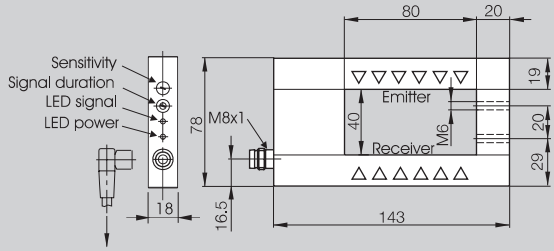
Features

- Three fixed sizes to save you time and money
- Detect targets as small as 0.76 mm
- Dynamic outputs detect only moving targets
- Sensitivity adjustment to distinguish between small and large targets
- Duration adjustment for non-symmetrical targets and/or large targets
- Rugged metal housing withstands abuse
- M8 connection for error-free wiring

Applications

- Part counting
- Part ejection detection
- Unwinding/winding detection
- Air bubbles in clear tubing

Series	Optical Windows Dynamic Output Only
Active Area	**40 x 80 mm**



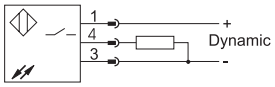
PNP 40 mm x 80 mm Min target size: 0.8 mm	BOWA 0408-PS-C-S49
NPN 40 mm x 80 mm Min target size: 0.8 mm	BOWA 0408-NS-C-S49
PNP 80 mm x 80 mm Min target size: 1 mm	
NPN 80 mm x 80 mm Min target size: 1 mm	
PNP 120 mm x 80 mm Min target size: 1.5 mm	
NPN 120 mm x 80 mm Min target size:1.5 mm	

Supply Voltage	10...30 Vdc
Voltage Drop U_d at I_e	2.0 V (NPN), 2.5 V (PNP)
Current Consumption I_O (no Load)	100 mA
Output Type	PNP or NPN
Output Function	Dark operate, dynamic
Rated Output Current	200 mA
Response Time	200 µs 3...100 Hz
Pulse Stretching	10 ms to 300 ms (adjustable)
Protections	Short-circuit, polarity reversal
Sensitivity Adjustment	Single-turn potentiometer
LED Indicators	Red output, Green power
Emitter Light Source	Infrared 880 nm
Operating Temperature Range	-10° C to +55° C
Storage Temperature	-30° C to +70° C
Degree of Protection per IEC 529	IP 65
Housing Material	Anodized aluminum
Sensing Face Material	PMMA
Connection	M8 3-pin connector
Recommended Connector	C49 ANE-00-VY-050M

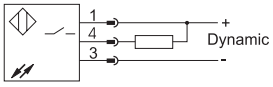
Warning! These optical windows must NOT be used for personal safety applications.

Wiring Diagrams

PNP



NPN

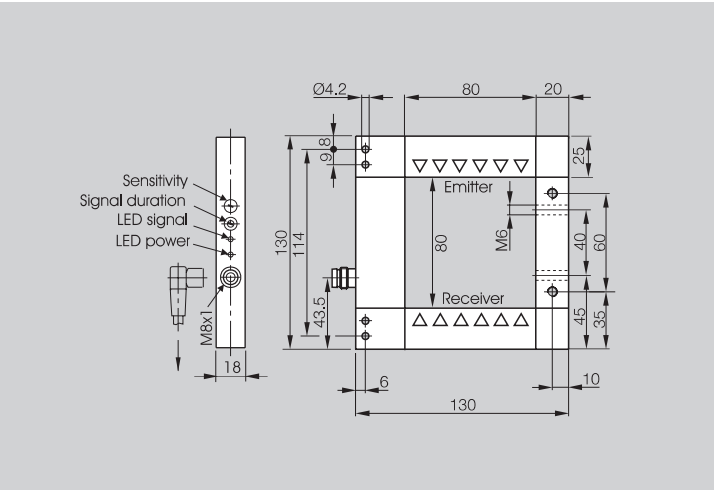
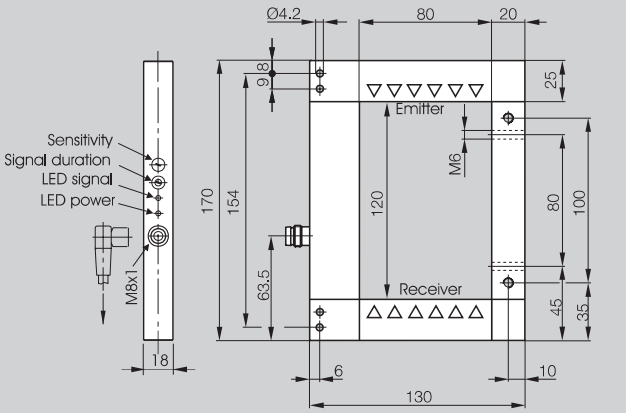


Ordering Code

BOWA XX YY - PS - C - S49

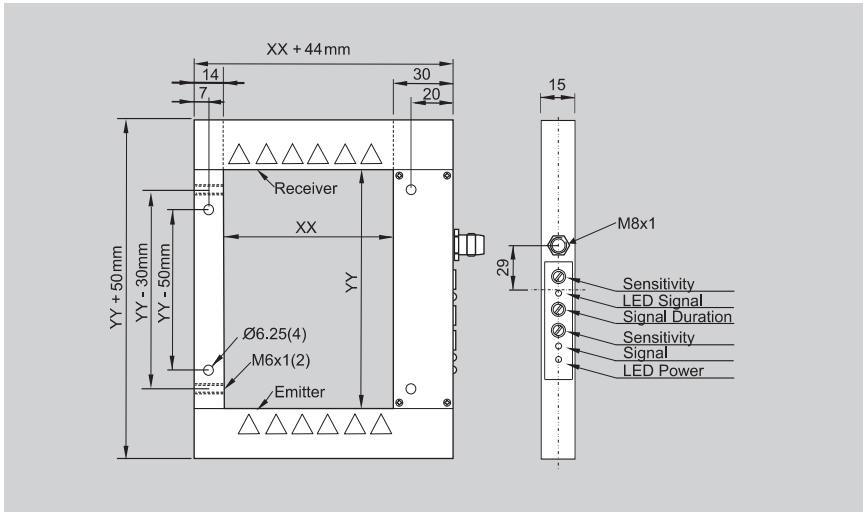
Height in cm	Width in cm
04, 08, 12	08

XX = Sensing Area
YY = Sensing Face (Emitter/Receiver)

Dynamic Optical Windows Dynamic Output Only **80 x 80 mm**	Dynamic Optical Windows Dynamic Output Only **120 x 80 mm**
	
BOWA 0808-PS-C-S49 BOWA 0808-NS-C-S49	BOWA 1208-PS-C-S49 BOWA 1208-NS-C-S49
10...30 Vdc	10...30 Vdc
2.0 V (NPN), 2.5 V (PNP)	2.0 V (NPN), 2.5 V (PNP)
100 mA	100 mA
PNP or NPN	PNP or NPN
Dark operate, dynamic	Dark operate, dynamic
200 mA	200 mA
200 µs 3...100 Hz	200 µs 3...100 Hz
10 ms to 300 ms (adjustable)	10 ms to 300 ms (adjustable)
Short circuit, polarity reversal	Short circuit, polarity reversal
Single-turn potentiometer	Single-turn potentiometer
Red output, Green power	Red output, Green power
Infrared 880 nm	Infrared 880 nm
-10° C to +55° C	-10° C to +55° C
-30° C to +70° C	-30° C to +70° C
IP 65	IP 65
Anodized aluminum	Anodized aluminum
PMMA	PMMA
M8 3-pin connector	M8 3-pin connector
C49 ANE-00-VY-050M	C49 ANE-00-VY-050M

Warning! These optical windows must NOT be used for personal safety applications.

Series	Optical Windows Static and Dynamic Outputs
Active Area	40 x 40 mm to 400 x 400 mm, See chart below



Ordering code

PNP	BOWA _ _ _ _-PU-C-S75
NPN	BOWA _ _ _ _-NU-C-S75

Supply Voltage	15...30 Vdc
Voltage Drop U_d at I_e	3.0 V
Current Consumption I_O (no Load)	Depends on size, 750 mA maximum
Output Type	PNP or NPN
Output Function	Dynamic and static, Lt./Dk. selectable (power supply wiring)
Rated Output Current	200 mA
Response time (static output)	1 s
Response time (dynamic output)	200 µs
Pulse Stretching (dynamic output)	10 ms to 300 ms (adjustable)
Protections	Short circuit, polarity reversal
Sensitivity Adjustment	Single-turn potentiometer
LED Indicators	Red dynamic output, Red static output, Green power
Emitter Light Source	Infrared 880 nm
Operating Temperature Range	-10° C to +55° C
Storage Temperature	-30° C to +70° C
Degree of Protection per IEC 529	IP 65
Housing Material	Anodized aluminum
Sensing Face Material	PMMA
Connection	M8 4-pin connector
Recommended Connector	C75 ANL-00-VY-050M

Warning! These optical windows must NOT be used for personal safety applications.

Example ordering code

BOWA 2016-PU-C-S75
Optical window with 200mm x 160mm opening, PNP output, minimum object size of 2.4mm

BOWA 1620-NU-C-S75
Optical window with 160mm x 200mm opening, NPN output, minimum object size of 2.8mm

Excluded sizes:
BOWA - 0420
BOWA - 0440

Ordering Code:

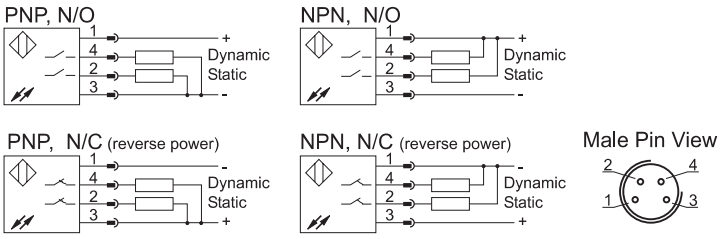
BOWA X X Y Y-PU-C-S75

Width in cm.
04, 08, 12, 16
20, 24, 28, 32
36, 40

XX=Sensing Face (Emitter/Receiver)
YY=Sensing Area

Height in cm.	Min. target size (mm) Dynamic	Static
04	2.0	2.0
08	2.0	3.0
12	2.0	3.5
16	2.0	4.0
20	2.0	4.0
24	2.4	5.0
28	2.8	7.0
32	3.2	10.0
36	4.0	15.0
40	5.0	20.0

Wiring Diagrams



Dynamic Output Operation

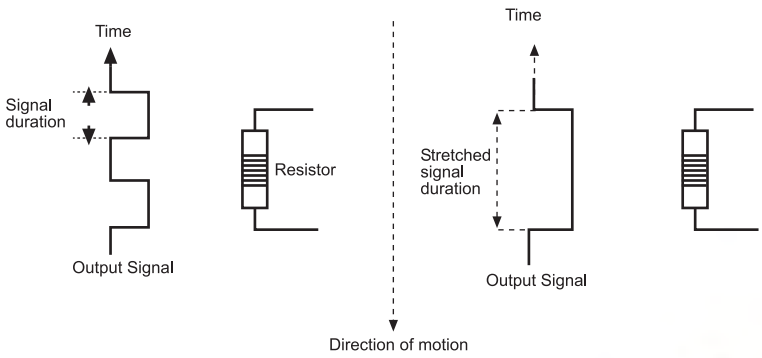
The Dynamic output of a BOWA window sensor will „turn-on“ with detection of movement of an object into the sensing area, based on the setting of the Sensitivity potentiometer. This output will remain on for a user-selected period of time set by the Signal Duration potentiometer. The output will then “turn-off” until the next transition of an object entering the sensing area is seen.

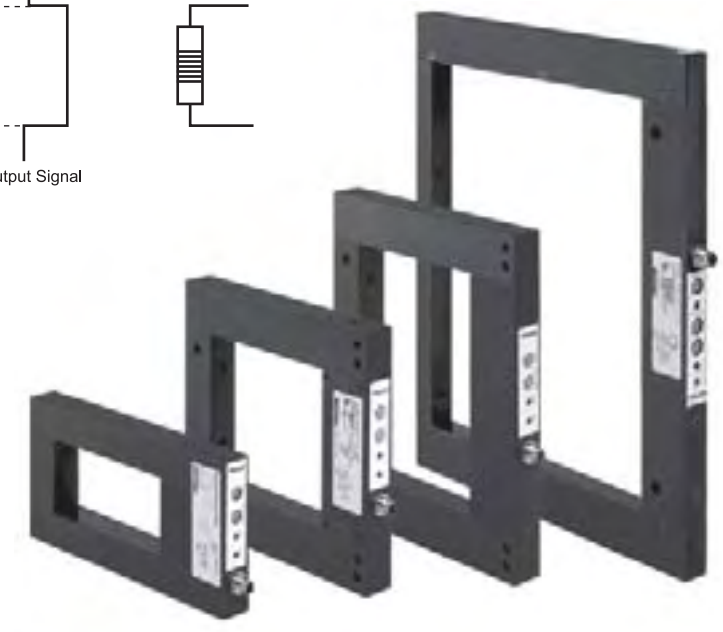
Static Output Operation

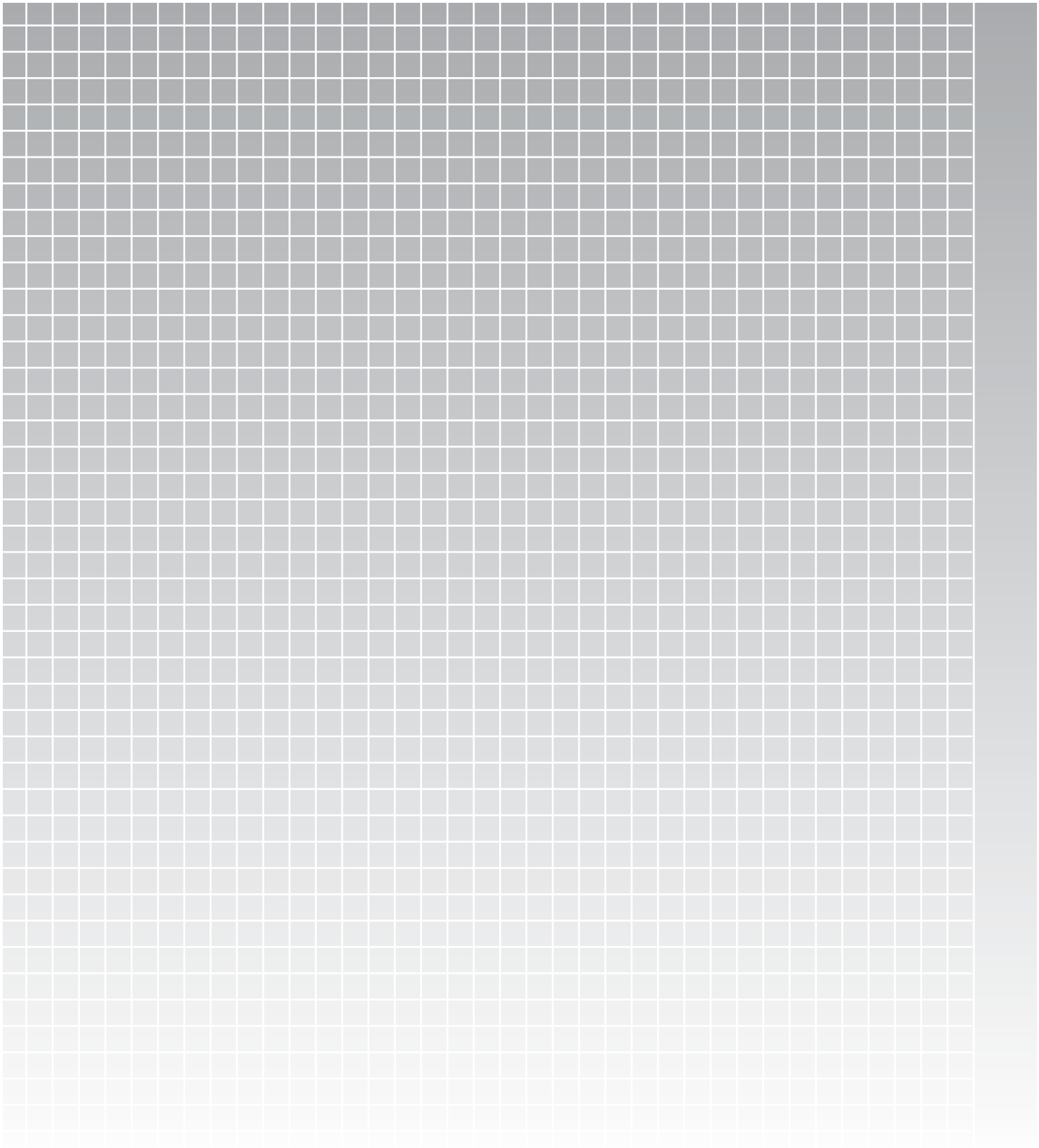
The Static output of a BOWA window sensor turns on with the detection of an object in the sensing area. This output will remain on for as long as the object remains in the sensing area and 1 second after the object is removed.

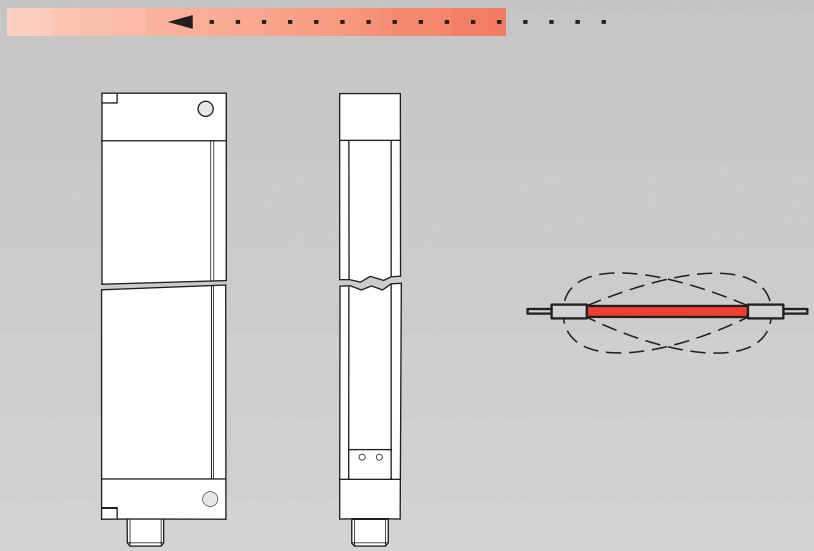
Differentiation using pulse stretching

If non-symmetrical objects such as the resistor shown in the diagram below need to be counted, then suitable selection of pulse stretching ensures counting of that object only once, regardless of its orientation. The following examples of a resistor illustrates this point. In the example, on the right the signal duration is too short, the second end of the wire triggers a double (count) impulse.









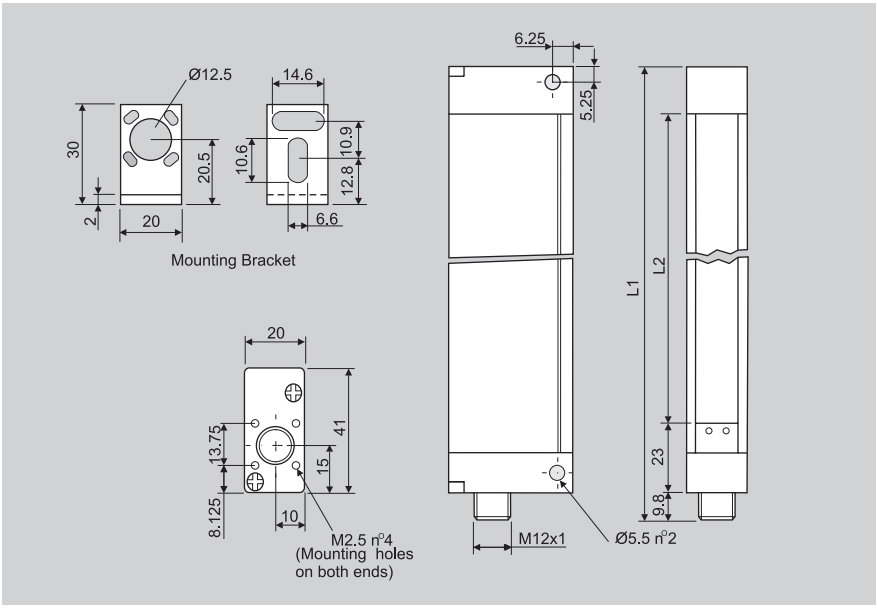
Dimensional Light Grids

Dimensional light grids offer an economical solution to larger part detection or sizing. Completely self-contained with no separate controller, dimensional light grids are available with 0…10 V DC analog out and a PNP switching output. Set-up consists of simple mounting and alignment, with no pushbuttons, dip switches, or potentiometers to adjust.

- Emitter-Receiver separation
  - 150 mm to 2.1 m
- Sensing height
  - 100 mm
  - 150 mm
  - 300 mm
- Output
  - 0 to 10 Vdc analog output
  - PNP discrete output
- No set-up required

2.176 BLG Light Grids

Series		BLG	BLG	BLG
Sensing Height		100 mm	150 mm	300 mm



150 mm to 2.1 m Sensing Distance

PNP, Dark-on, NO + 0…10 Vdc Analog	Standard Res. 7 mm	BLG 1-010-210-070-PV01-SX	BLG 1-015-210-070-PV01-SX	BLG 1-030-210-070-PV01-SX
PNP, Dark-on, NO + 0…10 Vdc Analog	High Res. 5 mm	BLG 1-010-210-050-PV01-SX	BLG 1-015-210-050-PV01-SX	
Supply Voltage		24 Vdc ±15%	24 Vdc ±15%	24 Vdc ±15%
Voltage Drop U_d at I_e		≤ 1.5 V	≤ 1.5 V	≤ 1.5 V
Analog Output		0…10 Vdc	0…10 Vdc	0…10 Vdc
Discrete Rated Output Current I_e		100 mA	100 mA	100 mA
Current Consumption I_O (No Load)		≤ 150 mA	≤ 150 mA	≤ 150 mA
		≤ 50 mA	≤ 50 mA	≤ 50 mA
Utilization Category (IEC 60-947-4-1) Output Duty Cycle		DC 13	DC 13	DC 13
Emitter Light Source		Infrared 880 nm	Infrared 880 nm	Infrared 880nm
Ambient Light Immunity (EN 60947-5-2)		10000 Lux	10000 Lux	10000 Lux
Display/LED	Output	Orange LED	Orange LED	Orange LED
	Power	Green LED	Green LED	Green LED
Response Time (On/Off Delay)		See Table	See Table	See Table
Operating Temperature Range		0° C to +55° C	0° C to +55° C	0° C to +55° C
Electrical Shock Protection		Class 2	Class 2	Class 2
Degree of Protection per IEC 60529		IP 65	IP 65	IP 65
Short Circuit Protection		Yes	Yes	Yes
Housing Material		Aluminum	Aluminum	Aluminum
Sensing Face Material		PMMA	PMMA	PMMA
Emitter Life		Average 100,000 hr with Ta=+25° C	Average 100,000 hr with Ta=+25° C	Average 100,000 hr with Ta=+25° C
Connection		M12 4- and 5-pin connector	M12 4- and 5-pin connector	M12 4- and 5-pin connector
Recommended Connectors	Emitter	C04 ANL-00-PB-050MS	C04 ANL-00-PB-050MS	C04 ANL-00-PB-050MS
	Receiver	C04 ANQ-00-VB-050MS	C04 ANQ-00-VB-050MS	C04 ANQ-00-VB-050MS
Weight (Pair)	100 mm	300 g		
	150 mm		340 g	
	300 mm			510 g

Warning! These light grids must NOT be used for personal safety applications.

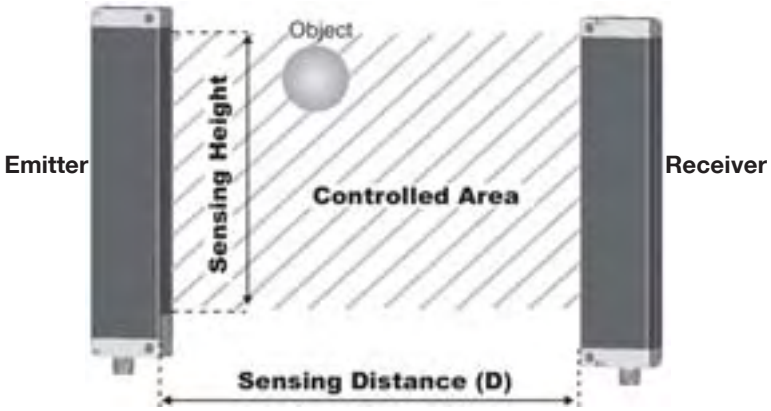
BLG Length Chart

	L1 (mm)	L2 (mm)
BLG 010A	149.8	107
BLG 015A	199.8	157
BLG 030A	349.8	307

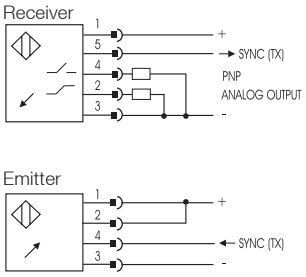
Technical Characteristics

Part #	Sensing Distance (Sn)	Sensing Height (SH)	Number of Beams	Minimum Resolution	Analog Output Sensitivity	Response Time
BLG 1-010-210-070-PV01-SX	150 mm to 2.1 m	100 mm	16	7 mm	0.63 V	1 ms
BLG 1-010-210-050-PV01-SX	150 mm to 2.1 m	100 mm	32	5 mm	0.31 V	2 ms
BLG 1-015-210-070-PV01-SX	150 mm to 2.1 m	150 mm	24	7 mm	0.42 V	1.5 ms
BLG 1-015-210-050-PV01-SX	150 mm to 2.1 m	150 mm	48	5 mm	0.21 V	2.75 ms
BLG 1-030-210-070-PV01-SX	150 mm to 2.1 m	300 mm	48	7 mm	0.21 V	2.75 ms

Functioning and Performances



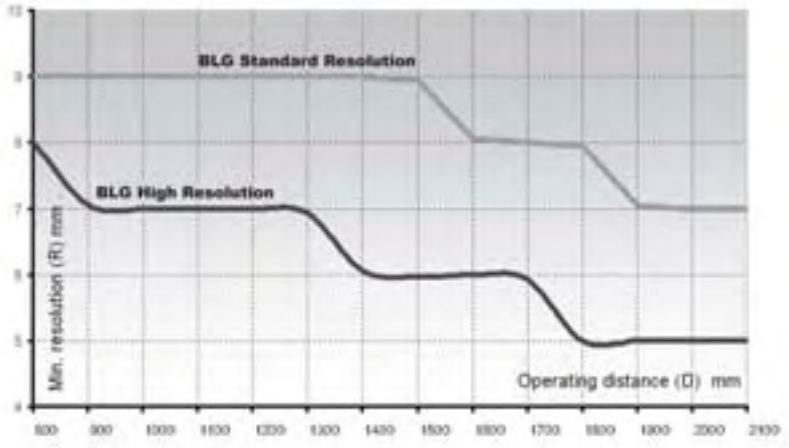
Wiring Diagrams



Note: The sync wire of the receiver (Pin 5) must be connected to the sync wire of the emitter (Pin 4) for proper operation.

Detection Diagram

150...2.1 m



Diagnostics

Receiver Unit:

Signal	State	Cause	Action
 **OUT LED**	**ON**	Switching output. Presence of the object into the controlled area.	Normal operation
	OFF	Switching output. Controlled area free of objects.	Normal operation
 **POWER ON LED**	**ON**	Optimal functioning	
	Fast Blinking	Critical alignment of the unit and/or functioning close to maximum operating distance.	
	Slow Blinking	Wrong connections and/or malfunctioning.	- Verify the output connections and any short-circuits - Switch ON and switch OFF the device - If condition persists, consult factory
	OFF	Device is not powered.	- Verify the connections - If conditions persist, consult factory

Emitter Unit:

Signal	State	Cause	Action
 **POWER ON LED**	**ON**	Normal functioning of emitter.	
	Blinking	Unit malfunctioning.	- Switch ON and switch OFF the device - If conditions persist, consult factory
	OFF	Absence of power and/or synchronism with receiver.	- Verify the connections and power supply - If conditions persist, consult factory