

Pressure, Vacuum, and Float Switches



Electronic Pressure Sensors
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Application	Electronic	Electromechanical Control
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Product Family	XMLG	XMLK	XMLF	XMLA, B, C, D	9012G	9016G
Type of Installation/ Application	Control circuits	Control circuits Pumping applications	Control circuits	Control circuits	Control circuits	Control/power circuits
Fluids Controlled	Air, water, hydraulic oils, corrosive fluids	Air, fresh water, 0 to + 80 °C (32 to 176 °F)	Air, water, hydraulic oils, corrosive fluids			
Type of Operation and Features	Pressure/vacuum switches and transmitters Analog output 4–20 mA or 0–10 V	Pressure transmitters Analog output, 4–20 mA or 0–10 V	Pressure/vacuum switches and transmitters Configurable units with digital display Analog output 4–20 mA Regulation between 2 trip points (adjustable differential)	Pressure/vacuum switches Detection of single trip point (nonadjustable differential) Regulation between 2 trip points (adjustable differential)	Pressure switches Detection of single trip point (nonadjustable differential) Regulation between 2 trip points (adjustable differential) 2-stage	Vacuum switches Regulation between 2 trip points (adjustable differential)
Size/Range	–14.5 to 5800 psi	0 to 25 bar or 0 to 300 psi, depending on the model	–14.5 to 8700 psi	–14.5 to 7250 psi	0.2 to 9000 psi	0 to 29 in. of Hg
Type of Output	Analog, 4–20 mA or 0–10 V Digital, PNP or NPN normally closed (N.C.) output	Analog, 4–20 mA or 0–10 V	Analog, 4–20 mA Digital, PNP or NPN, 200 mA, relay output 2 A	Snap action contacts SPDT or DPDT 10 A continuous	Snap action contacts SPDT or DPDT 10 A continuous	Snap action contacts SPDT 10 A continuous DPST horsepower rated
Electrical Connection	M12 connector or Integrated quick connection	M12, DIN 43650 A or Metri-Pack connector ▲	M12 connector, Snap-C compatible SAE 7/8-16 UN2A	Cable entry for Pg 13 (DIN PG13.5) cable gland, ISO M20, 1/2" NPT, and 1/2" PF	1/2" -14 NPT Cable entry 20 mm	9016G: 1/2" -14 NPT Cable entry 20 mm 9016GVG: NEMA Type 1 and 3R: 3 knockouts for 1/2 in. conduit NEMA Type 7 and 9: 2 conduit entries, 3/4"-14 NPT
Fluid Connection	G 1/4" BSP internal, 1/4" NPT internal SAE 7/16"-20 UNF female	G 1/4 A (male) conforming to ISO7 or 1/4"-18 NPT male ▲	G 1/4" BSP internal, 1/4" NPT internal SAE 7/16"-20 UNF female	G 1/4" BSP internal, 1/4" NPT internal 1/4"-18 NPT external	1/4" - 18 NPTF internal 7/16"-20 UNF-2B internal G 1/4" BSP internal G 1/4"-19 BSP internal	G 1/4" BSP internal, 1/4" NPT internal 1/4"-18 NPT external
Fluid Characteristics	Hydraulic oils, air, fresh water, sea water, corrosive fluids from –15 to +125 °C (5 to +257 °F)	Air, fresh water, 0 to + 80 °C (32.0 to 176.0 °F)	Hydraulic oils, air, fresh water, sea water, corrosive fluids from –15 to +80 °C (5 to +176 °F)	Hydraulic oils, air, fresh water, sea water, steam, corrosive fluids, viscous products, 32 to 320 °F (0 to 160 °C) depending on the model	Hydraulic oils, air, fresh water, sea water, corrosive fluids from –26 to +120 °C (–15 to +250 °F) depending on the model	Hydraulic oils, air, fresh water, sea water, from –26 to +120 °C (–15 to +250 °F) depending on the model
Enclosure Rating	IP66, IP67 conforming to IEC/EN 60529, NEMA 4	IP65 conforming to IEC/EN60529, NEMA 4	IP67 conforming to IEC/EN 60529, NEMA 4/6/12/13	Screw terminal models: IP66 conforming to IEC 529, NEMA 4	NEMA Type 4, 4X, 7, 9, 13	9016G: NEMA Type 4, 4X, 7, 9, 13 9016GVG: NEMA Type 1
Dimensions of Case, in. (mm) width x height x depth	dia. 0.90 x 2.76 (dia. 22.8 x 70.1 mm)	dia. 1.40 x 3.10 (dia. 36 x 79.5)	1.81 x 4.45 x 2.28 in. (46 x 113 x 58 mm)	4.45 x 1.38 x 2.95 in. (113 x 35 x 75 mm) NEMA 4: 3.50 x 3.60 x 2.63 in. (89 x 91 x 67 mm)	NEMA 1: 2.06 x 5.03 x 2.75 in. (52 x 128 x 70 mm) NEMA 4: 3.50 x 3.60 x 2.63 in. (89 x 91 x 67 mm)	Control circuit: same as 9012G Power circuit: same as 9013G
Conforming to Standards	CE, IEC/EN 60947-1, IEC/EN 60947-5-1, EN 50081-1, EN 50082-2, EN 61000-6-2	CE, IEC/EN 60947-1, IEC/EN 60947-5-1 EN 50081-1, EN 50082-2, EN 61000-6-2	CE, IEC/EN 60947-1, IEC/EN 60947-5-1, EN 50081, EN 50082, EN 61000-6-2, EN 61000-4-2/3/4/5/6/8/11	CE, IEC/EN 60947-5-1, VDE 0660-200, UL 508, CSA C22-2 No. 14	NEMA A600 UL508	NEMA A600 UL508
Certifications	UL Listed, CSA Certified	UL: File E97729, CCN NKPZ CSA: File 240515, Class 3211-03	UL Listed, CSA Certified	UL B300 - R300 Listed. CSA B300 - R300, (BV, GL, RiNA, LROS pending)	UL Listed, CSA Certified	UL Listed, CSA Certified
Catalog Number	XMLG	XMLK	XMLF	XMLA, XMLB, XMLC, XMLD	9012GA, 9012GC, 9012GG, 9012GH, 9012GK, 9012GM, 9012GR, 9012GS, 9012GT, 9012GN, 9012GP, 9012GQ	9016GA, 9016GV

▲ For other connections, consult the Sensor Competency Center.

Application	Electromechanical Pressure Switches	Electromechanical Float Switches
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Product Family	9013F	9013G	9036D, 9036F	9036G	9037	9038
Type of Installation/ Application	Power circuits	Power circuits	Power circuits	Power circuits	Power circuits	Power circuits
Fluids Controlled	Fresh water, air		Fresh or sea water, hydraulic oils; suitable for corrosive fluids except for cast iron bushing (shown above)			
Type of Operation and Features	Pressure switches Detection of single trip point (fixed differential) Regulation between 2 trip points (adjustable differential)	Pressure switches Regulation between 2 trip points (adjustable differential)	Liquid level control in Open tanks— either pumping in or pumping out of tank	Liquid level control in Open tanks— either pumping in or pumping out of tank	Liquid level control in Closed tanks for condensate, return heating water, fuel oil, etc.	Liquid level control in Open or Closed tanks— two pumps alternate, and both pumps run in peak demand Non-alternating option also available
Size/Range (psi)	6 to 200 psi	10 to 250 psi	Light duty	Medium duty	—	—
Type of Output	2-pole, snap action contacts HP rated	2-pole, snap action contacts HP rated	2-pole, snap action contacts HP rated	2-pole, snap action contacts HP rated	2-pole, snap action contacts HP rated	2 sets of 2-pole, snap action contacts HP rated
Electrical Connection	2 open side entries, 0.88 in. diameter, with two flats	NEMA Type 1 and 3R: 3 knockouts for 1/2 in. conduit NEMA Type 7 and 9: 2 conduit entries, 3/4"-14 NPT	4 screw terminals NEMA Type 1: 2 open side entries, 0.88 in. diameter, with two flats NEMA Type 4, 7, 9: 2 cable entries, 3/4-14 conduit entry 9036FG: 2 cable entries, 0.88 in. (22.4 mm) with 0.84 in. (21.3 mm) across flat	4 screw terminals NEMA Type 1: 3 knockouts for 1/2 in. conduit entry NEMA Type 4, 7, 9: 2 cable entries, 3/4-14 conduit entry	4 screw terminals NEMA Type 1: 2 open side entries, 0.88 in. diameter, with two flats NEMA Type 4, 7, 9: 2 cable entries, 3/4-14 conduit entry	8 screw terminals NEMA Type 1: 4 knockouts for 1/2 in. (9038 AG) or 3/4 in. conduit entry NEMA Type 4, 7, 9: 2 cable entries, 3/4-14 conduit entry
Fluid Connection	1/4" NPSF internal, 1/4" NPT external, plus other options	1/4" NPSF internal, 1/4" NPT external	Open tank	Open tank	Closed tank	Open tank (9038A) Closed tank (9038C, D)
Fluid Characteristics	Fresh water, air		Fresh water, sea water, hydraulic oils (and corrosive fluids, depending on the model) with a density ≥ 0.8			
Enclosure Rating	NEMA Type 1 NEMA Type 3R IP20	NEMA Type 1, 3R, 7, 9 IP20	NEMA Type 1, 4, 7, 9	NEMA Type 1, 4, 7, 9	NEMA Type 1, 4, 7, 9	NEMA Type 1, 4, 7, 9
Dimensions of Case width x height x depth in. (mm)	3.76 x 2.8 x 2.78 in. (95.5 x 71.12 x 70.6 mm)	3.68 x 3.85 x 3.44 in. (93.47 x 97.79 x 87.37 mm)	See page 22-23	See page 22-23	See pages 22-24, 22-25	See page 22-26
Conforming to Standards	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508
Certifications	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified
Catalog Number	9013FS, 9013FR, 9013FH, 9013FT, 9013FY	9013GS, 9013GH, 9013GM	9036DG, 9036DW, 9036DR, 9036FG	9036GG, 9036GW, 9036GR	9037EG, 9037EW, 9037ER, 9037HG, 9037HW, 9037HR	9038AG, 9038AW, 9038AR, 9038CG, 9038CW, 9038CR, 9038DG, 9038DW, 9038DR

XMLG pressure transmitters and pressure switches are characterized by their ceramic pressure-measuring cell. The deformation caused by the pressure is transmitted to the resistors of a Wheatstone bridge silk-screened on the ceramic. The change in resistance is then processed by the integrated electronics, providing either a digital or analog output signal.

Table 22.1: Specifications

Enclosure Rating	IP66, IP67 conforming to IEC/EN 60529, NEMA 4
Ambient Temperature (Operation)	-15 to +85 °C (+5 to +185 °F)
Media Temperature	-15 to +125 °C (+5 to +257 °F)
Precision (Linearity, Repeat Accuracy, Hysteresis)	Transmitters: <0.3%; pressure/vacuum switches: <1%
Repeat Accuracy (PNP/NPN output)	0.1% of the measuring range
Current Consumption	Transmitters: < 20 mA Pressure/vacuum switches: < 4 mA
Maximum Load Current	Transmitters: < 20mA Pressure/vacuum switches: 150 mA switching capacity
Rated Voltage	12/24 V for transmitters and pressure/vacuum switches
Voltage Limits	24 V for transmitters and pressure/vacuum switches
Fluids Controlled	Hydraulic oils, air, fresh/sea water, corrosive fluids from -15 to +125 °C (+5 to +257 °F)
Materials in Contact with Fluid	Ceramic Al ₂ O ₃ , stainless steel type AISI 303, Vitor® FPM, PPS (leakage protection for P> 40 bar)
Output Response Time	< 2 ms

Table 22.2: Interpretation of the Catalog Number (example: XMLG100D23TQ)

XMLG	100			D	2	3	TQ
Units without Display, 22.8 mm diameter	Rated Pressure Range			Electrical Connection	Output	Fluid Connection	Bulk Pack
	Code	psi	bar				
	M01	−14.5 to 0	−1 to 0	D: M12 Q: Integrated quick connect	1: DC Analog, 4–20 mA, shunt calibration 2: Analog, 4–20 mA 3: Solid state, NPN 4: Solid state, PNP 7: Analog, 0–10 V (bulk packs only) 11: DC Analog, 0–10 V shunt calibration	1: G 1/4 A (BSP male) 3: 1/4" NPT male 7: 7/16-20 UNF male	
	001	0 to 14.5	0 to 1				
	006	0 to 87.0	0 to 6				
	010	0 to 145	0 to 10				
	016	0 to 232.1	0 to 16				
	025	0 to 362.5	0 to 25				
	100	0 to 1450	0 to 100				
	160	0 to 2329.6	0 to 160				
	250	0 to 3625	0 to 250				
	400	0 to 5800	0 to 400				

NOTE: Use this table only to interpret the catalog number. Some combinations are not available.

Table 22.3: Selection

Rated Pressure Range		Fluid Connection	Electrical Connection	Catalog Number ▲ ■	
				Analog Output, 4–20 mA	Analog Output, 0–10 Vdc
-14.5 to 0 psi	-1 to 0 bar	1/4" NPT Male	M12	XMLGM01D23	XMLGM01D73
0 to 14.5 psi	0 to 1 bar			XMLG001D23	XMLG001D73
0 to 87 psi	0 to 6 bar			XMLG006D23	XMLG006D73
0 to 145 psi	0 to 10 bar			XMLG010D23	XMLG010D73
0 to 232 psi	0 to 16 bar			XMLG016D23	XMLG016D73
0 to 362.5 psi	0 to 25 bar			XMLG025D23	XMLG025D73
0 to 1450 psi	0 to 100 bar			XMLG100D23	XMLG100D73
0 to 2320 psi	0 to 160 bar			XMLG160D23	XMLG160D73
0 to 3625 psi	0 to 250 bar			XMLG250D23	XMLG250D73
0 to 5800 psi	0 to 400 bar			XMLG400D23	XMLG400D73

▲ For devices with a switch output or 0–10 Vdc analog output, contact the Sensor Competency Center at 1-800-435-2121.

■ For a bulk package (25 units), add TQ to the end of the catalog number. The minimum order quantity is 50 units (two bulk packs). When ordering, specify the individual number of units, NOT the number of bulk packs. Minimum order quantity for factory ordered individual items (non-stock) is 50 pieces.

NOTE: For units with a solid-state output, the settings must be specified for each order.

Table 22.4: Wiring Configurations (M12)

Output	Pin 1	Pin 3	Pin 4
Analog, 4–20 mA	+ Power supply	Output	—
Analog, 0–10 Vdc	+ Power supply	Output	Ground
Solid State, NPN	+ Power supply	Ground	Output
Solid State, PNP	+ Power supply	Ground	Output

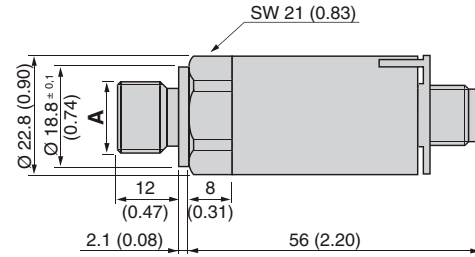
UL E164865
CCN NKPZLR 44087
Class 3211-03

For wiring diagrams, refer to Table 22.5 on page 22-5.

For connectors and cables, see Table 22.15 on page 22-9.

Figure 22.1: Dimensions, in. (mm)

XMLG***D***, M12 x 1 Connection



Dimension A	
XMLG***D2**1	G 1/4 A (BSAP Male)
XMLG***D2**3	1/4" NPT Male
XMLG***D2**7	7/16-20 UNF Male

XMLG***Q**, Integrated Quick Connection

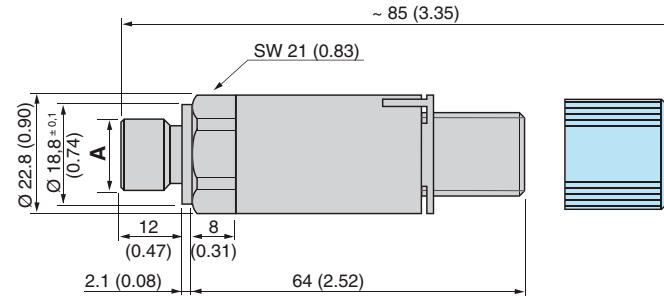
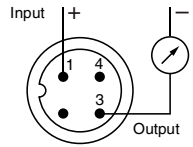
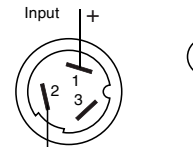
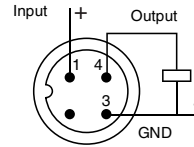
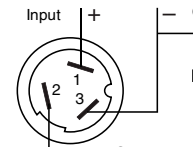
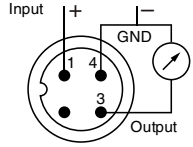
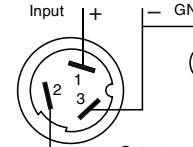
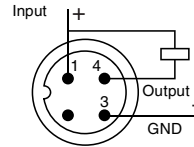
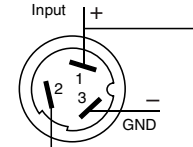


Table 22.5: Connector Wiring

Pressure Transmitters		Electronic Pressure Switches	
M12	Integrated Quick Connection	M12	Integrated Quick Connection
2-wire (4–20 mA) 	2-wire (4–20 mA) 	3-wire (PNP) 	3-wire (PNP) 
3-wire (0–10 V) 	3-wire (0–10 V) 	3-wire (NPN) 	3-wire (NPN) 

For wiring configurations, refer to Table 22.4 on page 22-4.

New!

Type XMLK pressure transmitters are characterized by their ceramic pressure-measuring cell. The deformation caused by the pressure is transmitted to the resistors of a Wheatstone bridge silk-screened on the ceramic. The change in resistance is then processed by the integrated electronics to provide an analog output signal.

Table 22.6: Environmental Specifications

Enclosure Rating	IP65 conforming to IEC/EN 60529, NEMA 4	
Ambient Air Temperature	For Operation	0 to + 80 °C (32 to 176 °F)
	For Storage	-25 to + 85 °C (13 to 185 °F)
Precision (Resolution)	Combined sum of linearity, hysteresis, and repeat accuracy $\leq \pm 0.5\%$ of the measuring range Setting tolerance of zero point and measuring range limit $< \pm 1\%$ of the measuring range	
Repeat Accuracy	$\pm 0.3\%$ of the measuring range	
Current Consumption	4–20 mA: < 20 mA 0–10 V: < 6 mA	
Rated Supply Voltage	24 Vdc	
Voltage Limits	4–20 mA: 8–33 V \cdots 0–10 V: 16.2–33 V \cdots	
Fluids or Products Controlled	Air, fresh water (0 to + 80 °C / 32 to 176 °F)	
Materials in Contact with Fluid	Steel, type AISI 303 (stainless steel) nitrile (NBR)	
Output Response Time	< 2 ms	

XMLK****C
DIN 43650A Connector

Table 22.7: Interpretation of the Catalog Number

XMLK	100	P	2	D	2	3	TQ		
Units Without Display	Rated Pressure			Unit of Pressure	O-Ring	Electrical Connection	Output	Fluid Connection	Bulk Pack
	Code	psi	bar						
36 mm (1.42 in.) diameter	006		0–6	B: bar P: psi	2: NBR (Nitrile)	C: DIN 43650A D: M12 P: Metri-Pack	2: Analog, 4–20 mA 7: Analog, 0-10 V	1: G 1/4 A (male) 3: 1/4"-18 NPT (male)	
	010		0–10						
	016		0–16						
	025		0–25						
	100	0–100							
	150	0–150							
	200	0–200							
	300	0–300							

NOTE: Use this table only to interpret the catalog number. Some combinations are not available.

Table 22.8: Selection

Rated Pressure Range	Catalog Number ▲					
	4–20 mA Analog Output			0–10 Vdc Analog Output		
	DIN	M12	Metri-Pack	DIN	M12	Metri-Pack
Bar Version, G 1/4 A Male Fluid Connector						
0–6 bar (0–87 psi)	XMLK006B2C21	XMLK006B2D21	—	XMLK006B2C71	XMLK006B2D71	—
0–10 bar (0–145 psi)	XMLK010B2C21	XMLK010B2D21	—	XMLK010B2C71	XMLK010B2D71	—
0–16 bar (0–232 psi)	XMLK016B2C21	XMLK016B2D21	—	XMLK016B2C71	XMLK016B2D71	—
0–25 bar (0–362.5 psi)	XMLK025B2C21	XMLK025B2D21	—	XMLK025B2C71	XMLK025B2D71	—
PSI Version, 1/4"-18 NPT Male Fluid Connector						
0–100 psi (0–6.9 bar)	XMLK100P2C23	XMLK100P2D23	XMLK100P2P23	XMLK100P2C73	XMLK100P2D73	XMLK100P2P73
0–150 psi (0–10.3 bar)	XMLK150P2C23	XMLK150P2D23	XMLK150P2P23	XMLK150P2C73	XMLK150P2D73	XMLK150P2P73
0–200 psi (0–13.8 bar)	XMLK200P2C23	XMLK200P2D23	XMLK200P2P23	XMLK200P2C73	XMLK200P2D73	XMLK200P2P73
0–300 psi (0–20.7 bar)	XMLK300P2C23	XMLK300P2D23	XMLK300P2P23	XMLK300P2C73	XMLK300P2D73	XMLK300P2P73

▲ For a bulk package (25 units), add TQ to the end of the catalog number. The minimum order quantity is 50 units (two bulk packs). When ordering, specify the individual number of units, **not** the number of bulk packs. Minimum order quantity for factory ordered individual items (non-stock) is 50 pieces.

Table 22.9: Wiring Configurations (M12)

Output	Pin 1	Pin 3	Pin 4
Analog, 4–20 mA	+ Power supply	Output	—
Analog, 0–10 Vdc	+ Power supply	Output	Ground
Solid State, NPN	+ Power supply	Ground	Output
Solid State, PNP	+ Power supply	Ground	Output

UL E164865
CCN NKPZLR 44087
Class 3211-03

For wiring diagrams, refer to Table 22.5 on page 22-5.

For connectors and cables, see Table 22.15 on page 22-9.

Table 22.10: Dimensions

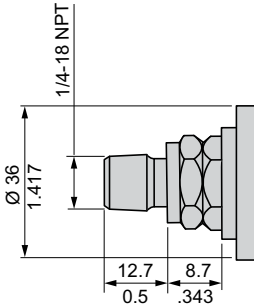
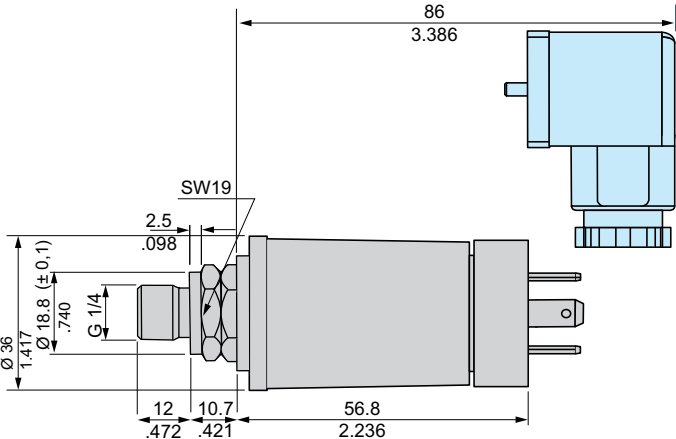
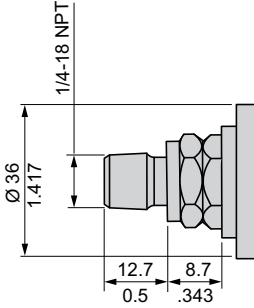
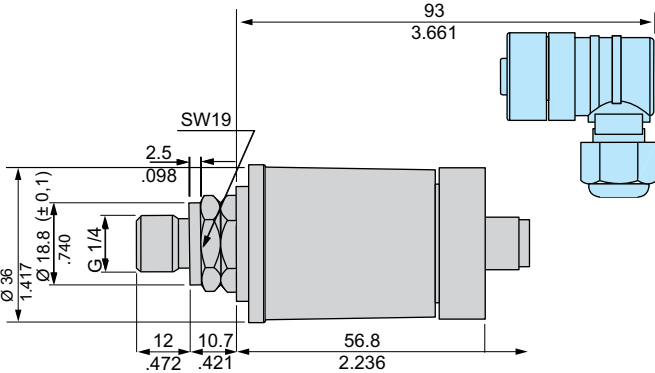
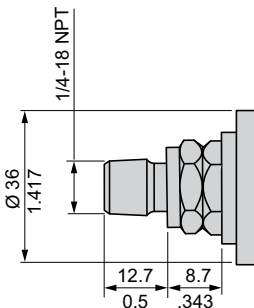
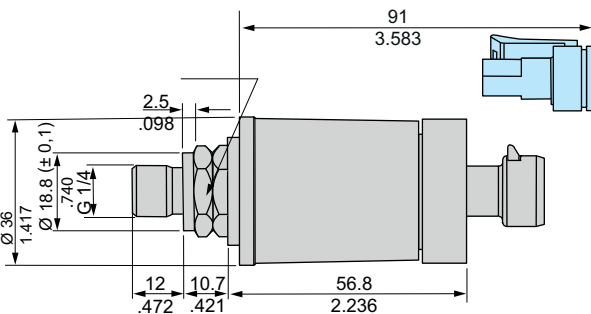
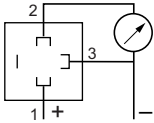
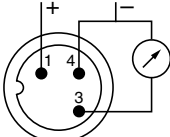
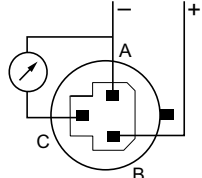
XMLK, DIN connector	
NPT	G 1/4 A (male)
	
Dimensions = mm / in.	
XMLK, M12 connector	
NPT	G 1/4 A (male)
	
XMLK, Metri-Pack connector	
NPT	G 1/4 A (male)
	

Table 22.11: Connector Wiring

DIN 43650A	M12	Metri-Pack
		

XMLF is a user-friendly electronic pressure switch with an easy-to-read four digit display and finger-operated adjustment buttons for scrolling up and down through the menu functions. Burst pressure is six times the nominal pressure (up to 1,800 bar or 26,100 psi).

- DC versions are protected against reverse polarity, short circuit, and overvoltage.
- DC versions are double insulated.
- Response time display: 3 levels (slow-normal-fast).

Available in four versions:

- Universal sensor with 1 analog output (4–20 mA) and 1 digital output
- Universal sensor with 1 analog output (1–10 V) and 1 digital output
- Dual stage sensor, 2 digital outputs, 24 Vdc (17–33 Vdc)
- Electronic pressure switch with relay output, 120 Vac (102–132 Vac)

The XMLF electronic pressure switch can be set without any tools once connected to a 24 Vdc power supply. It is ergonomically designed to be easy to hold and to set. The pressure connection is on the bottom of the switch and the electrical connector on the top, giving the switch a slim, straight-through profile. It has built-in water hammer resistance. It is available in AC and DC versions, each of which feature a 4-digit LED display. It is programmable to display either bar or psi. Digital solid state outputs are programmable as NPN or PNP, and N.O. or N.C.

Window mode (FEN) allows the switch to operate between selected minimum and maximum settings. Outputs change state when the pressure ranges outside the window settings.

Table 22.12: Specifications

Enclosure Rating		IP67 NEMA 4, 6, 12, 13
Ambient Air Temperature for Operation		DC Models: -25 to +80 °C (-13 to + 176 °F) AC Models: -25 to +80 °C (-13 to + 176 °F)
Media Temperature		-15 to +80 °C (+5 to + 176 °F)
Precision	Analog Output	±0.6% of the measurement range, output offset < 200 mV
	Digital Output	±0.6% of the measurement range
Repeat Accuracy (PNP/NPN output)		±0.5% of the measurement range
Maximum Load Current		DC: 200 mA for 17–33 Vdc; AC: 2.5A AC15 C300

Table 22.13: Interpretation of the Catalog Number (example: XMLF100D206)

XMLF	100			D	2	02	6
Configurable	Rated pressure			Electrical Connection	With Viewing Window	Output	Fluid Connection
	Code	psi	bar				
	M01	-14.5 to 0	-1 to 0	D: M12 DC only		01: DC Analog 4–20 mA, shunt calibration	5: 1/4" BSP female
	002	0 to 36.25	0 to 2.5	E: 7/8-16 UN2A AC only		6: 1/4" NPTF female	
	010	0 to 145	0 to 10			9: SAE 7/16-20 UNF female	
	016	0 to 232	0 to 16				
	025	0 to 362.5	0 to 25				
	040	0 to 580	0 to 40				
	070	0 to 1015	0 to 70				
	100	0 to 1450	0 to 100				
	160	0 to 2320	0 to 160				
	250	0 to 3625	0 to 250				
	400	0 to 5800	0 to 400				
	600	0 to 8700	0 to 600				

NOTE: Use this table only to interpret the catalog number. Some combinations are not available.

Table 22.14: Selection

Catalog Number	Range	Output	Pressure Connection	Electrical Connection
AC Versions				
XMLF010E2046	0 to 145 psi	Relay (2.5 A)	1/4" NPT Female	SAE7/8-16UNF
XMLF070E2046	0 to 1015 psi	Relay (2.5 A)	1/4" NPT Female	SAE7/8-16UNF
DC Versions				
XMLFM01D2026	-14.5 to 0 psi	Analog with single stage	1/4" NPT Female	M12
XMLF010D2026	0 to 145 psi		1/4" NPT Female	M12
XMLF070D2029	0 to 1015 psi		SAE7/16-20 Female	M12
XMLF400D2029	0 to 5800 psi		SAE7/16-20 Female	M12
XMLF010D2039	0 to 145 psi	Dual stage Relay (2.5 A)	SAE7/16-20 Female	M12
XMLF070D2039	0 to 1015 psi		SAE7/16-20 Female	M12
XMLF400D2039	0 to 5800 psi		SAE7/16-20 Female	M12
XMLF010D2036	0 to 145 psi		1/4" NPT Female	M12
XMLF070D2036	0 to 1015 psi		1/4" NPT Female	M12



File E164865
CCN NKPZ



File LR44087
Class 3211-03



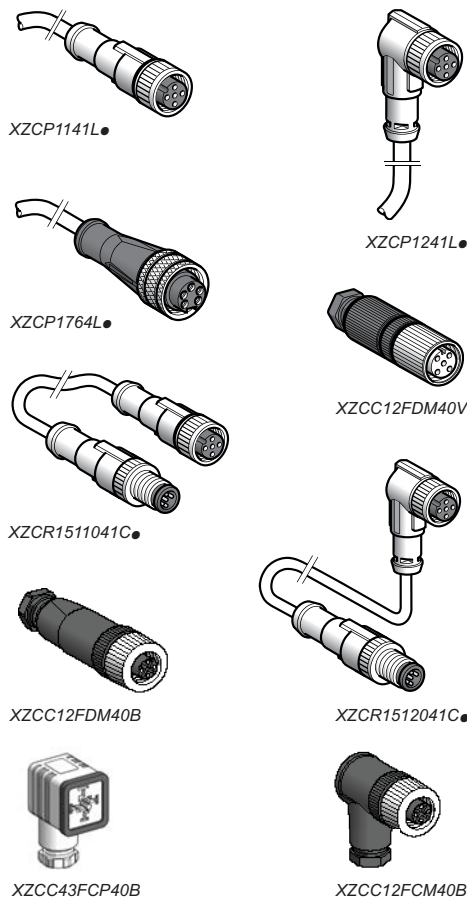


Table 22.15: Connectors and Cables

Description	Cable Length m (ft)	Weight g (oz)	Catalog Number
Phoenix Contact QUICKON connector ▲	—	—	XMLGZ001
Pre-wired M12 female connector with cable	Straight black PUR	2 (6.6)	115 (4.06)
		5 (16.4)	270 (9.52)
		10 (32.8)	520 (18.34)
	Straight yellow PVC	2 (6.6)	90 (3.17)
		5 (16.4)	190 (6.70)
		10 (32.8)	370 (13.05)
Pre-wired 7/8" 16UN, female connector with cable	90°	2 (6.6)	115 (4.06)
		5 (16.4)	270 (9.52)
		10 (32.8)	520 (18.34)
	Straight	2 (6.6)	185 (6.53)
		5 (16.4)	460 (16.23)
		10 (32.8)	900 (31.75)
M12-M12 jumper cables with straight male connector, for splitter box	Straight female connector	1 (3.3)	65 (2.29)
		2 (6.6)	95 (3.35)
	90° female connector	1 (3.3)	65 (2.29)
		2 (6.6)	95 (3.35)
		1 (3.3)	65 (2.29)
		2 (6.6)	95 (3.35)

▲ Connector incorporating IDCs (insulation displacement connectors) for quick, direct, in-line connection to cable without a screwdriver or soldering iron.

Table 22.16: Accessories

Description	Weight g (oz)	Catalog Number
M12 female connector, metal clamping ring, with screw terminal connections	Straight	20 (0.71)
	Elbowed	20 (0.71)
DIN 43650A female connector, with screw terminal connections	35 (1.23)	XZCC43FCP40B
Sealing gasket	15 (0.48)	XMLZL010
Mounting bracket	37 (1.19)	XMLZL008
Cooler for versions with 1/4" BSP fluid connection	370 (11.90)	XMLZL009

Table 22.17: Wiring Configurations

Version	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
AC (5-pin E)	Power supply	Power supply	Ground	+ Relay	– Relay
DC (4-pin D), analog or single stage	+ Power supply	4–20 mA	– Power supply	Single stage	
DC (4-pin D), dual stage	+ Power supply	Second stage	– Power supply	First stage	

Table 22.18: Electrical Connections

	AC Connector	DC Connector
Wiring		Analog 1. + Power Supply 2. 4–20 mA 3. – Power Supply 4. Solid State, PNP or NPN
		Dual Stage 1. + Power Supply 2. 2nd Stage Solid-State Output 3. – Power Supply 4. 1st Stage Solid-State Output
Rated Supply Voltage	120 Vac (102–132 Vac), N.O. – N.C. Relays, Output 2.5 A, 5 Wire	24 Vdc (17–33 Vdc), Analog PNP–NPN, N.O. Outputs, 4 Wire 24 Vdc (17–33 Vdc), Analog + Shunt Calibration, 4 Wire 24 Vdc (17–33 Vdc), Dual Stage N.O. – N.C., PNP–NPN Outputs, 4 Wire
Display	The display shows the pressure in the circuit up to a value of twice the maximum pressure size of the device (for example, XMLF6000... displays values up to 1200 bar). If the pressure is higher than 130% of the pressure range, the display blinks. The display shows two digits after the decimal point from –1 to 2.5 bar (–14.5 to 36.25); one digit after the decimal from 10 to 70 bar (145 to 1015); and no digits after the decimal from 100 to 600 bar (1450 to 8700). In all cases, the display shows no values below 2% at the beginning of the scale.	

Figure 22.2: XMLF...D2...

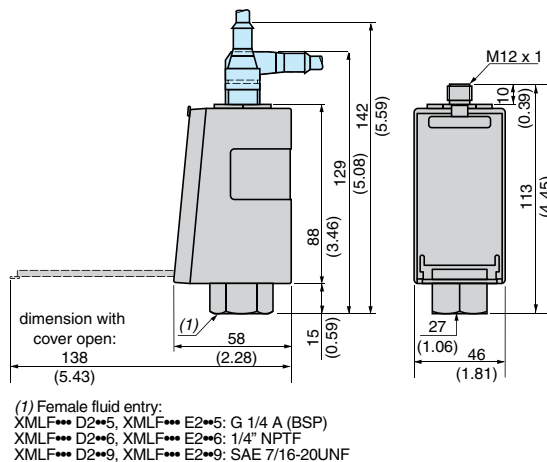
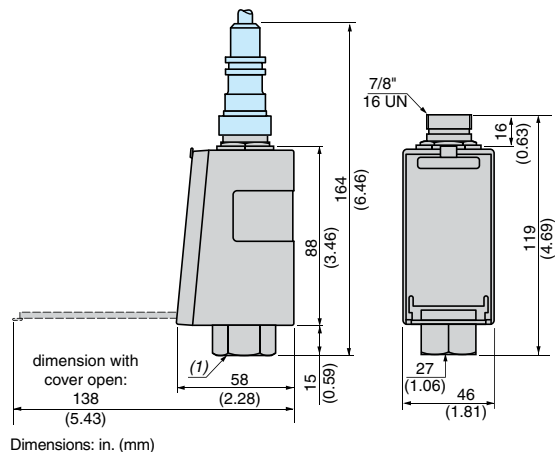


Figure 22.3: XMLF...E2...



XML international pressure switches meet IEC, Cenelec, UL, and CSA standards. They are CE marked.

- Fixed differential (XMLA), adjustable differential single-pole (XMLB) or double-pole (XMLC), and dual stage (XMLD)
- Range listed is on increasing pressure (psi, bar, kPa)
- External pressure setting window available
- 1 N.O.–1 N.C. snap acting contacts standard
- Temperature range: –13 to +158 °F (–25 to +70 °C)
- Enclosure rating: IP65 with plug-in connector, IP66 with terminal connections
- Operating rate: up to 120 operations per minute for diaphragm and 60 per minute for piston
- Media connection: 1/4" NPT
- Conduit connection: 1/2" NPT

Table 22.19: Specifications

Enclosure Rating	Screw terminal models: IP66 conforming to IEC/EN 60529 Connector models: IP65 conforming to IEC/EN 60529
Ambient Temperature	Operation –25 to +70 °C (–13 to +158 °F) Storage –40 to +70 °C (–40 to 158 °F)
Repeat Accuracy	< 2%
Fluids Controlled	Hydraulic oils, air, fresh water, sea water, 32 to 320 °F (0 to +160 °C), depending on the model Steam, corrosive fluids, viscous products, 32 to 320 °F (0 to +160 °C), depending on the model
Operating Rate (operating cycles/minute)	Piston version switches: up to 60 cycles/minute for temperatures above 32 °F (0 °C) Diaphragm version switches: up to 120 cycles/minute for temperatures above 32 °F (0 °C)
Operational Characteristics	~ AC-15; B300 (Ue = 240 V, Ie = 1.5 A; Ue = 120 V, Ie = 3 A) --- DC-13; R300 (Ue = 250 V, Ie = 0.1) conforming to IEC 947-5-1 Appendix A, EN 60 947-5-1
Type of Contacts	Silver tipped contacts XMLA & XMLB: 1 C/O single-pole contact (4 terminal), snap action XMLC: 2 C/O single-pole contacts (8 terminals), simultaneous snap action XMLD: 2 C/O single-pole contacts (8 terminals), staggered snap action
Resistance Across Terminals	< 25 mΩ conforming to NF C 93-050 method A or IEC 255-7 category 3
Terminal Referencing	Conforming to CENELEC EN 50013
Short-Circuit Protections	10 A cartridge fuse type gG (gl) recommended
Connection	Screw clamp terminals Clamping capacity, min: 1 x 0.2 mm ² , max: 2 x 2.5 mm ²

Table 22.20: Component Materials in Contact with Fluid

Pressure Switch Catalog Number	Zinc Alloy	Stainless Steel	Brass	Steel	Nitrile	PTFE	FPM, FKM	Aluminum
XMLAM01V**** / XMLM02V****	X	X ▲	—	—	X	—	—	—
XMLBM03S****	—	X ▲	—	—	—	X	—	—
XMLM05A****	X	X ▲	—	—	X	—	—	—
XMLBL05S****	—	X ■	—	—	—	X	—	—
XMLL35R****	—	X ■	—	X	—	—	X	—
XMLL35S****	—	X ■	—	—	—	X	—	—
XML001****	—	X ■	—	—	—	X	—	—
XML002A****	X	—	—	—	X	—	—	—
XML002B****	—	—	—	X	—	—	X	—
XMLA004A****	X	—	—	—	X	—	—	—
XMLB004A****	X	—	—	—	X	—	—	—
XML004B****	—	—	—	X	—	—	X	—
XML010A****	X	—	—	—	X	—	—	—
XML010B****	—	—	X	—	—	—	X	—
XML020A**** / XML035A****	X	—	—	—	X	—	—	X
XML020B**** / XML035B****	—	—	X	—	—	—	X	—
XML070D**** / XML160D****	—	—	X	X	—	X	X	—
XML300D****	—	—	X	X	—	X	X	—
XML500D****	—	—	X1	X	—	X	X	—

▲ X2GNI Mo 17-12-2 (AISI 316L)

■ X8GNI S 18-09 (AISI 303)

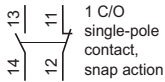
Table 22.21: Interpretation of the Catalog Number (example: XMLD070D1S13)

XML D	070	D	1	S	1	3
Contacts	Rated Pressure	Actuator	Scale	Electrical Connection	Output	Fluid Connection
A Fixed differential, single-pole contact	Code L05 0 to 0.725 0 to 0.05 L35 0 to 5.075 0 to 0.35 M01 -14.5 to -4.06 -1 to -0.28 M02 -14.5 to -2.03 -1 to -0.14 M03 -2.9 to -0.029 -0.2 to -0.02 M05 -7.25 to 72.5 -0.5 to 5	Diaphragm A Hydraulic oil, air, fresh water, sea water (0 to 70 °C) B Hydraulic oil, air, fresh water, sea water (0 to 160 °C) C Corrosive fluids P Viscous fluids R Hydraulic oil, air (0 to 160 °C) S Fresh/sea water, corrosive fluids (0 to 160 °C) Vacuum V Hydraulic oil, air, fresh water, sea water (0 to 70 °C) T Hydraulic oil, air, fresh water, sea water (0 to 160 °C)	1 Without 2 With	S Without connector (not available on solid-state devices) C Square / DIN 43650 D M12 Micro connector	1 Contacts	Fluid Electrical
B Adjustable differential, single-pole contact						1 1/4 Gas Type 13 (PG 13,5)
C 2 adjustable differential, single-pole contacts, simultaneous						2 1/4 Gas ISO M20
D 2 fixed differential, single-pole contacts, staggered	001 0 to 14.5 0 to 1 002 0 to 36.25 0 to 2.5 004 0 to 58 0 to 4 010 0 to 145 0 to 10 020 0 to 290 0 to 20 035 0 to 507.5 0 to 35 040 0 to 580 0 to 40 070 0 to 1015 0 to 70 160 0 to 2320 0 to 160 300 0 to 4350 0 to 300 500 0 to 7250 0 to 500	Piston D Hydraulic oil E Fresh / sea water				3 1/4 in. NPTF 1/2 in. NPT 4 PT 1/4 (JIS B0203) 1/2 in. PF (JIS B0202)

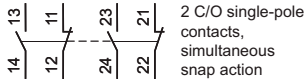
NOTE: Use this table only to interpret the catalog number. Some combinations are not available.

Terminal Diagrams

XMLA, XMLB



XMLC



XMLD

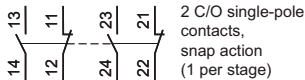


Table 22.22: Fixed Differential Catalog Numbers

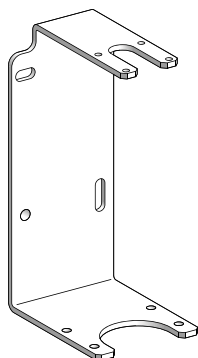
Range on Increasing Pressure (psi)	Approximate Differential Across Range	Maximum Allowable Pressure	Catalog Number
Fixed, 1 Single-Pole Contact (XMLA)			
-4.06 to -14.5	3.5	130.5	XMLAM01V2S13
0.435 to 14.5	0.29 low / 0.58 high	32.62	XMLA001S2S13
2.17 to 36.25	1.88	130.5	XMLA002A2S13
5.8 to 58	5.07	130.5	XMLA004A2S13
8.7 to 145	7.25	326.25	XMLA010A2S13
10.2 to 290	5.8 low / 14.5 high	652.5	XMLA020A2S13
21.75 to 507.5	18.12	1160	XMLA035A2S13
72.5 to 1015	43.5 low / 108.75 high	2320	XMLA070D2S13
145 to 2320	79.75 low / 261 high	5220	XMLA160D2S13
290 to 4350	239.25 low / 507.5 high	9787.5	XMLA300D2S13
435 to 7250	290 low / 652.5 high	16312.5	XMLA500D2S13
Fixed, 2 Single-Pole Contacts, Staggered (XMLD)			
0.84 to 5.07	0.44	32.62	XMLDL35S1S13
-1.74 to -14.5	1.45	130.5	XMLDM02V1S13
1.74 to 14.5	0.44 low / 1.02 high	32.62	XMLD001S1S13
4.93 to 36.25	2.03 low / 2.76 high	130.5	XMLD002B1S13
5.8 to 58	2.18 low / 2.76 high	130.5	XMLD004B1S13
17.4 to 145	6.53 low / 8.7 high	326.25	XMLD010B1S13
2.14 to 20	10.15 low / 18.85 high	652.5	XMLD020B1S13
63.8 to 507.5	21.75 low / 37.7 high	1160	XMLD035B1S13
136.3 to 1015	72.5 low / 137.75 high	2320	XMLD070D1S13
239.25 to 2320	127.6 low / 290 high	5220	XMLD160D1S13
522 to 4350	246.5 low / 609 high	9787.5	XMLD300D1S13
594.5 to 7250	304.5 low / 942.5 high	16312.5	XMLD500D1S13

Table 22.23: Adjustable Differential Catalog Numbers

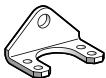
Range on Increasing Pressure (psi)	Approximate Differential Across Range	Maximum Allowable Pressure	Catalog Number
Adjustable, 1 Single-Pole Contact (XMLB)			
0.038 to 0.72	0.02 low / 0.06 high	1.63	XMLBL05S2S13
0.65 to 5.07	0.6 low / 0.72 high	32.62	XMLBL35R2S13
-2 to -14.5	1.9	130.5	XMLBM02V2S13
-0.29 to -2.9	0.26	29	XMLBM03S2S13
-7.25 to 72.5	7.25	163.12	XMLBM05A2S13
0.72 to 14.5	0.58 low / 0.87 high	32.62	XMLB001S2S13
4.35 to 36.25	2.32 low / 3.04 high	130.5	XMLB002A2S13
3.62 to 58	2.9 low / 3.62 high	130.5	XMLB004A2S13
10.15 to 145	8.26 low / 12.32 high	326.25	XMLB010A2S13
18.9 to 290	14.5 low / 23.2 high	652.5	XMLB020A2S13
50.75 to 507.5	24.65 low / 36.97 high	1160	XMLB035A2S13
101.5 to 1015	68.15 low / 127.6 high	2320	XMLB070D2S13
145 to 2320	134.85 low / 301.6 high	5220	XMLB160D2S13
319 to 4350	281.3 low / 536.5	9787.5	XMLB300D2S13
435 to 7250	333.5 low / 762.7 high	16312.5	XMLB500D2S13
Adjustable, 2 Single-Pole Contacts, Simultaneous (XMLC)			
0.65 to 5.07	0.29 low / 0.51 high	32.62	XMLCL35S2S13
-2 to -14.5	1.89 low / 2.03 high	130.5	XMLCM02V2S13
-7.97 to 72.5	6.52	163.12	XMLCM05S2S13
0.725 to 14.5	0.43 low / 0.58 high	32.62	XMLC001S2S13
4.35 to 36.25	1.89 low / 2.47 high	130.5	XMLC002B2S13
4.35 to 58	2.18 low / 2.47 high	130.5	XMLC004B2S13
10.15 to 145	6.53 low / 10.15 high	326.25	XMLC010B2S13
18.85 to 290	10.15 low / 14.5 high	652.5	XMLC020B2S13
50.75 to 507.5	14.5 low / 21.75 high	1160	XMLC035B2S13
101.5 to 1015	65.25 low / 129.05 high	2320	XMLC070D2S13
174 to 2320	130.5 low / 304.5 high	5220	XMLC160D2S13
319 to 4350	232 low / 507.5 high	9787.5	XMLC300D2S13
435 to 7250	275.5 low / 754 high	16312.5	XMLC500D2S13

Table 22.24: Accessories for XML Pressure and Vacuum Switches

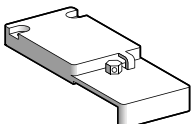
Description	For Use with Switches	Catalog Number
Rear mounting bracket For vibrations > 2 gn	XML•L35 XML•001	XMLZL006
Additional top support bracket For vibrations > 4 gn	XMLAM01 XML•M05 XMLA004 XML•010 ... XML•500	XMLZL002
Lead sealable protective cover To prevent unauthorized access to the adjustment screws and the switch cover mounting screw	XMLA XMLB	XMLZL001
Lead sealable protective cover To prevent unauthorized access to adjustment screws	All models	XMLZL011



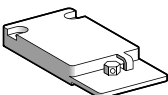
XMLZL006



XMLZL002



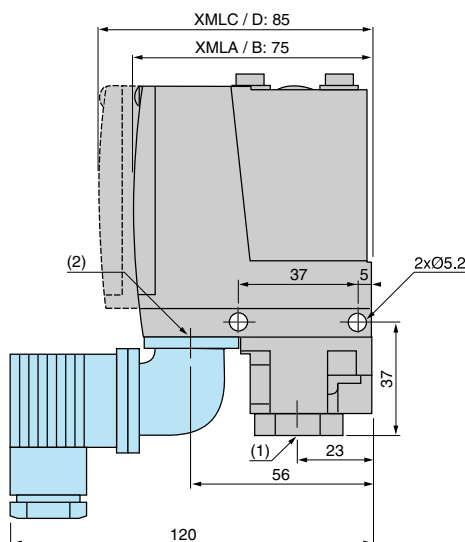
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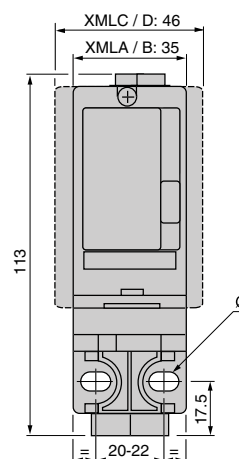
XMLZL011

Figure 22.4: Dimensions

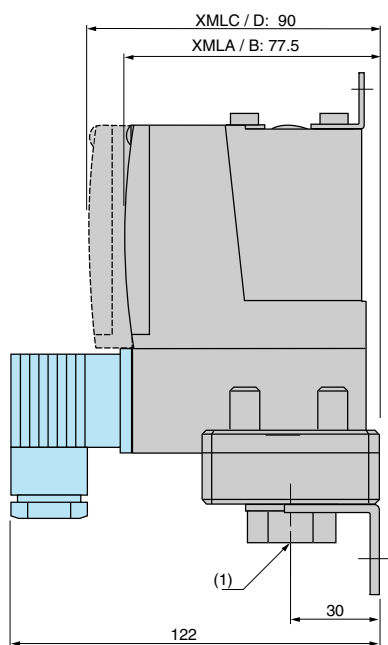
XMLAM01, XMLBM05, XMLCM05, XMLA004, X•ML010...500



(1) 1 fluid entry, tapped G 1/4 (BSP female) or 1/4" NPT
 (2) 1 electrical connections entry, tapped M20 x 1.5 or Pg 13.5, or 1/2" NPT
 Ø: 2 elongated holes Ø 5.2 x 6.7



XML-M02, XML-002, XMLB004, XMLC004, XMLD004



(1) 1 fluid entry, tapped G 1/4 (BSP female) or 1/4" NPT
 (2) 1 electrical connections entry, tapped M20 x 1.5 or Pg 13.5, or 1/2" NPT
 Ø: 2 elongated holes Ø 10.2 x 5.2

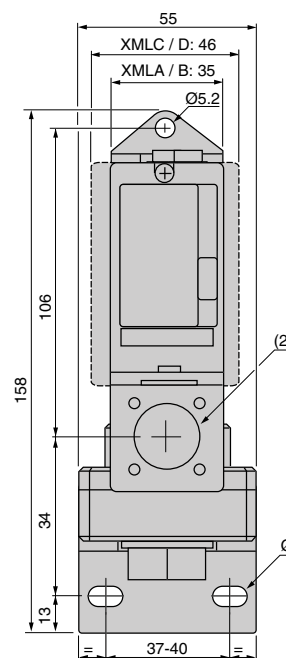


Table 22.25: Fixed Differential, Open Type or NEMA 1 Enclosure

UL Listed and CSA Certified As Industrial Control Equipment

Range On Decreasing Pressure psig	Approximate Differential at Mid-Range psig▲	Maximum Allowable Pressure psig	Open Type Type	NEMA 1 Type
Diaphragm Actuated—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing				
0.2–10	0.4 ±0.1	100	GRO1	GRG1
1–40	1.2 ±0.3	100	GRO3	GRG3
1.5–75	2.2 ±0.4	240	GRO4	GRG4
3–150	4.2 ±1	475	GRO5	GRG5
5–250	7.4 ±2	750	GRO6	GRG6
13–425	13 ±3	850	GSO1	GSG1
20–675	19 ±5	2000	GSO2	GSG2
Piston Actuated—#440 Stainless Steel Piston, #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-Ring, Teflon® Retaining Ring				
20–1000	49 ±10	10000	GTO1	GTG1
90–2900	141 ±15	15000	GTO2	GTG2
170–5600	200 ±40	20000	GTO3	GTG3
270–9000	350 ±45	25000	GTO4	GTG4



NEMA 1

Table 22.26: Adjustable Differential, Open Type or NEMA 1 Enclosure

UL Listed and CSA Certified As Industrial Control Equipment

Range On Decreasing Pressure psig	Approximate Mid-Range Differential Adds to Decreasing Set Point▲	Maximum Allowable Pressure psig	Open Type Type	NEMA 1 Type
Diaphragm Actuated—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing				
0.2–10	0.4–0.9	100	GNO1	GNG1
1–40	1.2–3.6	100	GNO3	GNG3
1.5–75	2.2–6.6	240	GNO4	GNG4
3–150	4.2–13.2	475	GNO5	GNG5
5–250	7.4–33.6	750	GNO6	GNG6
13–425	13–37.2	850	GPO1	GPG1
20–675	19–58.8	2000	GPO2	GPG2
Piston Actuated—#440 Stainless Steel Piston, #303 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-Ring, Teflon Retaining Ring				
20–1000	49–150	10000	GQO1	GQG1
90–2900	141–455	15000	GQO2	GQG2
170–5600	200–950	20000	GQO3	GQG3
270–9000	350–1400	25000	GQO4	GQG4

▲ Determines operating point on rising pressure.

Table 22.27: Available Modifications

Modification	Applies to	Form
Standard Nitrile (Buna-N) diaphragm in #316 stainless steel housing	GNG1, GNO1, GRG1, GRO1 only All other GNG, GNO, GPG, GPO, GRG, GRO, GSG, GSO	Q1
Ethylene propylene diaphragm in #316 stainless steel housing	Not available on GNG1, GNO1, GRG1, GRO1. Available on all other GNG, GNO, GPG, GPO, GRG, GRO, GSG, GSO	Q3
Viton fluorocarbon diaphragm in #316 stainless steel housing	GNG1, GNO1, GRG1, GRO1 only All other GNG, GNO, GPG, GPO, GRG, GRO, GSG, GSO	Q4
1/4–18 NPT external thread pressure connection	GNG, GNO, GRG, GRO	Z
1/2–14 NPT external thread, 1/4–18 NPTF internal thread pressure connection. Standard actuator only.	GNG, GNO, GRG, GRO	Z16
7/16–20 UNF-2B internal thread pressure connection	GNG, GNO, GPG, GPO, GQG, GQO, GRG, GRO, GSG, GSO, GTG, GTO	Z18

Table 22.28: Class 9049 Accessories for Class 9012 Pressure Switches

Description	Applies to	Type
Stainless steel surge reducer for use on oils, coolants, and hydraulic fluids (not recommended for air or water)	9012G	A26S

Acceptable Wire Sizes 12-22 AWG
Recommended Terminal Clamp Torque 7 lb-in

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Renewal Parts Kits page 22-28



File E12158
CCN NKPZ



File LR25490
Class 3211-03




 9012GAW5
 NEMA 4, 4X, 13

Class 9012 single stage pressure switches are control circuit rated devices used in pneumatic or hydraulic systems on a wide variety of machine and process applications to protect the equipment and control or monitor the system pressure.

- Type G machine tool switches are available with NEMA Type 4, 4X, and 13 (IEC IP66) enclosure ratings.
- The NEMA 7 and 9 devices are UL listed for use in the following hazardous locations: Class I, Divisions 1 and 2, Groups C and D; and Class II, Divisions 1 and 2, Groups E, F, and G.
- Enclosure materials are cast aluminum.
- To ensure repeatability and minimize setting drift, pressure settings should fall within the middle 80 percent of the pressure range.

Table 22.29: Fixed Differential ▲
NEMA 4, 4X, 13 Enclosure

UL Listed and CSA Certified As Industrial Control Equipment

Range on Decreasing Pressure psig	■ Approximate Differential at Mid-Range psig	Maximum Allowable Pressure psig	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing				
2–10	0.6 ±0.1	100	GDW1	GDW21
1–40	1.6 ±0.4	100	GDW2	GDW22
1.5–75	3.0 ±0.5	240	GDW4	GDW24
3–150	6.0 ±0.8	475	GDW5	GDW25
5–250	10.0 ±1.5	750	GDW6	GDW26
13–425	16 ±3.5	850	GEW1	GEW21
20–675	27 ±5	2000	GEW2	GEW22
Piston Actuated—#440 Stainless Steel Piston, #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring				
20–1000	59 ±9	10000	GFW1	GFW21
90–2900	170 ±15	15000	GFW2	GFW22
170–5600	289 ±55	20000	GFW3	GFW23
270–9000	495 ±70	25000	GFW4	GFW24

Table 22.31: Adjustable Differential ▲
NEMA 4, 4X, 13 Enclosure

UL Listed and CSA Certified As Industrial Control Equipment

Range on Decreasing Pressure psig	■ Adjustable Differential Approximate at Mid-Range	Maximum Allowable Pressure psig	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing				
2–10	0.6–2	100	GAW1	GAW21
1–40	1.6–8	100	GAW2	GAW22
1.5–75	3.5–15	240	GAW4	GAW24
3–150	6.0–30	475	GAW5	GAW25
5–250	10.0–49	750	GAW6	GAW26
13–425	16–90	850	GBW1	GBW21
20–675	27–130	2000	GBW2	GBW22
Piston Actuated—#440 Stainless Steel Piston, #303 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring				
20–1000	59–200	10000	GCW1	GCW21
90–2900	170–560	15000	GCW2	GCW22
170–5600	289–1260	20000	GCW3	GCW23
270–9000	495–1900	25000	GCW4	GCW24

Table 22.30: Fixed Differential
NEMA 7 & 9 Enclosure
Class I & II, Division 1 & 2, Groups C, D, E, F, G

UL Listed As Industrial Control Equipment.

UL Marine Listed for use on vessels greater than 65 feet long where ignition protection is required.

Range on Decreasing Pressure psig	■ Approximate Differential at Mid-Range psig	Maximum Allowable Pressure psig	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing				
0.2–10	1.0 ±0.1	100	GDR1	GDR21
1–40	2.4 ±0.8	100	GDR2	GDR22
1.5–75	4.5 ±1	240	GDR4	GDR24
3–150	9 ±1.5	475	GDR5	GDR25
5–250	15 ±3	750	GDR6	GDR26
13–425	25 ±7	850	GER1	GER21
20–675	41 ±10	2000	GER2	GER22
Piston Actuated—#440 Stainless Steel Piston, #303 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring				
20–1000	89 ±18	10000	GFR1	GFR21
90–2900	255 ±30	15000	GFR2	GFR22
170–5600	578 ±110	20000	GFR3	GFR23
270–9000	788 ±140	25000	GFR4	GFR24

Table 22.32: Adjustable Differential
NEMA 7 & 9 Enclosure
Class I & II, Division 1 & 2, Groups C, D, E, F, G

UL Listed As Industrial Control Equipment.

UL Marine Listed for use on vessels greater than 65 feet long where ignition protection is required.

Range on Decreasing Pressure psig	■ Adjustable Differential Approximate at Mid-Range	Maximum Allowable Pressure psig	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing				
0.2–10	1.0–2	100	GAR1	GAR21
1–40	2.4–8	100	GAR2	GAR22
1.5–75	4.5–15	240	GAR4	GAR24
3–150	9–35	475	GAR5	GAR25
5–250	15–49	750	GAR6	GAR26
13–425	25–90	850	GBR1	GBR21
20–675	41–130	2000	GBR2	GBR22
Piston Actuated—#440 Stainless Steel Piston, #303 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring				
20–1000	89–200	10000	GCR1	GCR21
90–2900	255–560	15000	GCR2	GCR22
170–5600	578–1260	20000	GCR3	GCR23
270–9000	788–1900	25000	GCR4	GCR24

- ▲ For metric threads, add **M** after the **W** on all types (offered at an additional cost). To order a Pg13.5 electrical conduit entry and a 1/4"-19 BSP pressure connection, add M12 to the end of the catalog number, as well as adding "M" after "W" for metric threads. For example:
 9012GAW1 = 1/2" NPT electrical conduit entry
 9012GAWM1 = 20 x 1.5 mm electrical conduit entry
 9012GAWM1M12 = Pg13.5 electrical conduit entry and 1/4-19 BSP pressure connection.
- The differential adds to the range setting and determines the operating point on rising pressure.

 Acceptable Wire Sizes: 12–22 AWG
 Recommended Terminal Clamp Torque: 7 lb-in

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Temperature Rating	page 22-16
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Accessories	page 22-18
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Dimensions	page 22-17


 File E12443 Haz. Loc. CCN NOWT G•R
 File E12158 CCN NKPZ G•O, G•G, G•W
 File E12158 CCN NTHT Marine Use, G•W

 File LR25490 Class 3211-03 G•W, G•O, G•G
 File LR26817 Class 3218-02 G•R

 Complies with IEC 60957.5.1,
 5C8.3.4 when protected with a
 Bussmann CCKTK-R-10 fuse.



9012GGW1

Differential-Pressure Operation

Pressure switches for differential-pressure operation monitor the change in the difference between two pressures. Type G differential-pressure switches are used in applications to signal that a predetermined pressure difference has been reached as a result of a widening or increasing difference between the two pressures. They can also signal that a predetermined pressure difference has been reached as a result of a narrowing or decreasing difference between the two pressures.

**Table 22.33: Differential-Pressure Switches
NEMA 4, 4X, 13 Enclosures**

UL Listed and CSA Certified As Industrial Control Equipment ▲

Working Pressure Range on Decreasing X (upper) Actuator	Adjustable Difference on Decreasing Pressure (adds to working pressure) Y (lower) Actuator	Adjustable Differential Actuates on Increasing Pressure (adds to adjustable difference)	Maximum Allowable Pressure psi	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing					
0–75	0.25–10	0.8–2	100	GGW1	GGW21
0–175	0.5–36	5–15	240	GGW4	GGW24
0–500	3–175	22–90	850	GHW1	GHW21
Piston Actuated—#440 Stainless Steel Piston, #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring					
0–5000	15–825	80–200	7500	GJW1	GJW21

Dual-Stage Operation

Type G dual stage pressure switches are designed for use in applications where two separate pressure operations must be controlled by a single pressure monitoring device. These controls are most commonly used where dual functions are required or in sequencing applications such as alarm, followed by shutdown.

**Table 22.34: Dual-Stage Pressure Switch
NEMA 4, 4X, 13 Enclosure**

UL Listed and CSA Certified As Industrial Control Equipment ▲

Range Setting Limits of Pressure Between Which Stage 1 Can Be Adjusted to Operate on Decreasing Pressure	Add Adjustable Spread to Range Setting to Obtain Decreasing Operating Point of Stage 2	Fixed Differential—Add to Low (Decreasing) Operating Point to Obtain Approximate High (Rising) Operating Point of Each Stage		Maximum Allowable Pressure psi	SPDT Each Stage Type
		Stage 1	Stage 2		
Diaphragm Actuated—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing					
2–10	1–5	1.0 ±0.2	1.5 ±0.4	100	GKW1
1–40	4–20	4.0 ±1.0	6.0 ±1.5	100	GKW2
1.5–75	6–30	5.0 ±1.5	8.0 ±2.0	240	GKW4
3–150	12–75	8.0 ±2.0	12 ±3	475	GKW5
5–250	22–110	14 ±3	21 ±5	750	GKW6
13–425	40–180	20 ±4	30 ±7.5	850	GLW1
20–675	45–250	30 ±6	45 ±11	2000	GLW2
Piston Actuated—#400 Stainless Steel Piston, #300 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring					
20–1000	50–300	50 ±10	75 ±19	10000	GMW1
90–2900	140–800	140 ±30	210 ±52	15000	GMW2
170–5600	300–1700	275 ±60	400 ±100	20000	GMW3
270–9000	500–2500	400 ±80	800 ±150	25000	GMW4

▲ UL Marine Listed for use on vessels greater than 65 feet long where ignition protection is not required.

Ordering Dual-Stage Pressure Switches

- Specify Class 9012 Type..., and indicate the high or low operating point for each stage within the limits shown in the above table.

Example:

Class 9012 Type GKW4
Set: Stage 1 at 30 psi decreasing pressure
Stage 2 at 50 psi decreasing pressure
(20 psi spread)

Differential of each stage will be approximately as shown in the table above.

- For available modifications see page 22-18. If one or more of these modifications are desired, add the appropriate Form to the Class and Type. Arrange form letters in alphabetical order when ordering more than one modification.

Acceptable Wire Sizes 12-22 AWG
Recommended Terminal Clamp Torque 7 lb-in

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Dimensions page 22-17



File E12158 CCN NKPZ
File E12158 CCN NTHT - Marine Use



File LR25490 Class 3211-03



Table 22.35: Control Duty Circuit Ratings

Contacts	AC—50 or 60 Hz						DC			AC or DC
	V	Inductive, 35% Power Factor				Resistive 75% Power Factor Make and Break Amperes	V	Inductive and Resistive		Continuous Carrying Amperes
		Make		Break				Make and Break Amperes		
		A	VA	A	VA			Single Throw	Double Throw	
SPDT	120	60	7200	6	720	6	120	0.55	0.22	10
	240	30	7200	3	720	3	250	0.27	0.11	10
	480	15	7200	1.5	720	1.5	600	0.10	—	10
	600	12	7200	1.2	720	1.2	—	—	—	—
DPDT	120	60	7200	6	720	6	125	0.22	0.22	10
	240	30	7200	3	720	3	250	0.11	0.11	10
	480	15	7200	1.5	720	1.5	600	—	—	10
	600	12	7200	1.2	720	1.2	—	—	—	—

Table 22.36: Type G Industrial

Contact Arrangement	Contact Symbol
1 N.O. – 1 N.C. (600 Vdc rating does not apply)	

Note: Contacts are single pole, double throw—one circuit normally open and one circuit normally closed. These circuits are not electrically separate and can not be used on opposite polarities.

Table 22.37: Temperature Ratings

	Actuator	Minimum	Maximum
Ambient	All	-23 °C (-10 °F)	+85 °C (+185 °F)
	Diaphragm	-40 °C (-40 °F)	
	Piston	-26 °C (-15 °F)	+120 °C (+250 °F)
Media	All with Forms Q4 and Q14	-26 °C (-15 °F)	

Figure 22.5: Types GAW, GBW, GCW, GDW, GEW, GFW, GKW, GLW, and GMW Machine Tool Switches (except 1, 21)

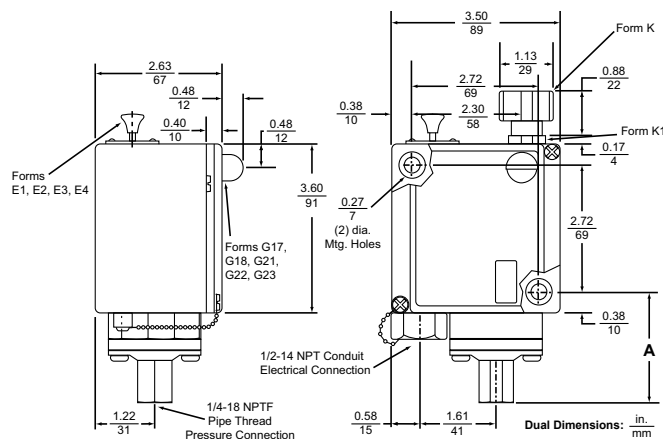


Table 22.38: Dimension A for G•W Switches

Type	Dimension A, in. (mm)
GAW, GDW, GKW 2, 4, 5, 6, 22, 24, 25, 26, 52, 54, 55, 56	2.33 (59)
GBW, GEW, GLW 1, 2, 21, 22, 51, 52	2.23 (57)
GCW, GFW, GMW 1, 2, 3, 4, 21, 22, 23, 24, 51, 52, 53, 54	3.15 (80)

Table 22.39: Dimension A for G•R, Switches

Type / Tipo / Type	Dimension A, in. (mm)
GAR1, 2, 21, 22	2.02 (51.3)
GAR4, 5, 6, 24, 25, 26	1.42 (36.1)
GBR1, 2, 21, 22; GCR1, 21	1.32 (33.5)
GCR2, 3, 4, 22, 23, 24	2.24 (56.9)
GDR1, 2, 21, 22	2.02 (51.3)
GDR4, 5, 6, 24, 25, 26	1.42 (36.1)
GER1, 2, 21, 22; GFR1, 21	1.32 (33.5)
GFR2, 3, 4, 22, 23, 24	2.24 (56.9)

Table 22.40: Type G Machine Tool and Vacuum (except GVG)

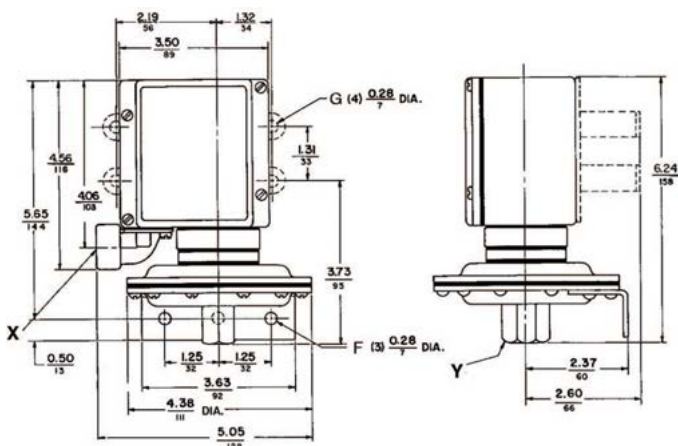
Type	Contact Arrangement	Contact Symbol
Single Pole Double Throw	1 N.O.–1 N.C.	

Note: Snap switch contains two double-break contact elements (1 N.O. and 1 N.C.) that must be used on circuits of same polarity.

Type	Contact Arrangement	Contact Symbol
Double Pole Double Throw	2 N.O.–2 N.C.	

Note: Snap switch contains two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double break contact elements (1 N.O. and 1 N.C.) that must be used on circuits of the same polarity.

Figure 22.6: Types GAW, GDW, GKW 1, 21



X: Conduit connection: G•W = 1/2-14 NPT; G•WM = 20MMBGS4568, Form M12 = Pg13.5; DIN40430.
Y: Pressure connection: G•W = 1/4-18 NPTF; G•WM = 8; Form M14 = G 1/4 BS 2779; RP1/4 ISO 711; R 1/4 DIN 2999; GJ 1/4 UN1339.

Figure 22.7: Types GAR, GBR, GCR, GDR, GER, and GFR

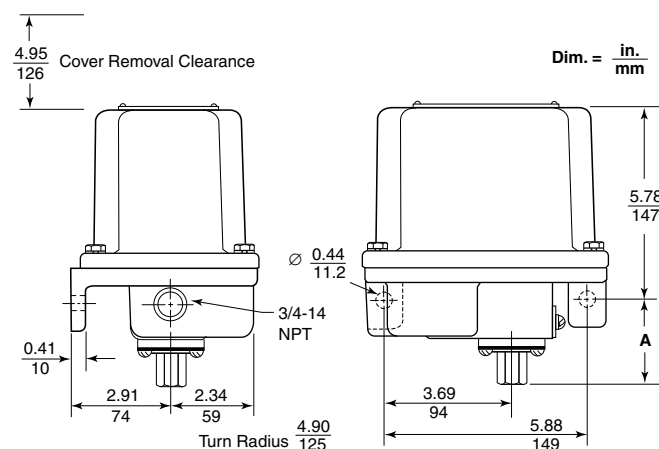


Figure 22.8: 9012G Dimensions, in. (mm)

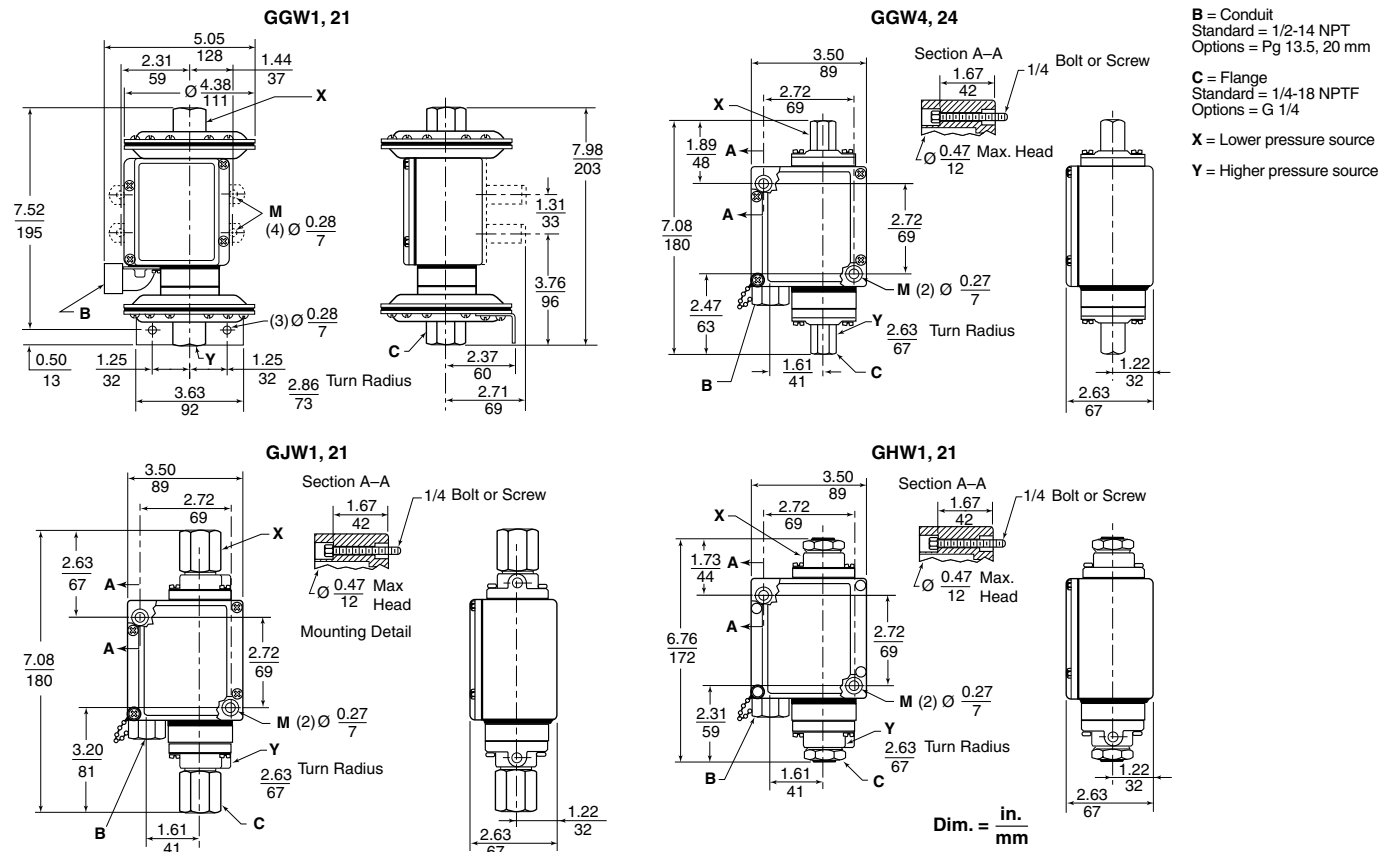


Figure 22.9: 9012GNO1, GRO1

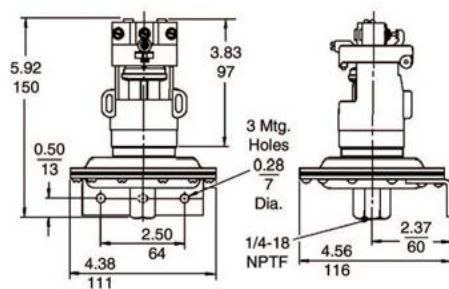


Figure 22.10: 9012GNG1, GRG1

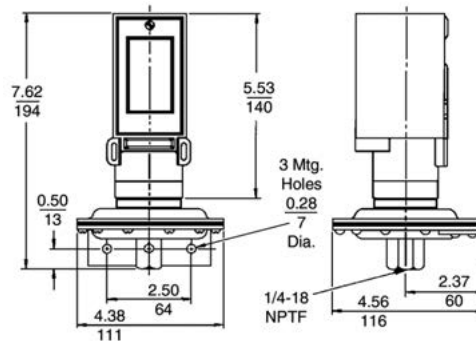


Figure 22.11: 9012GNO, GRO

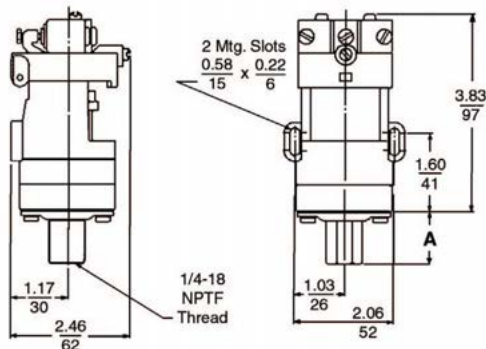
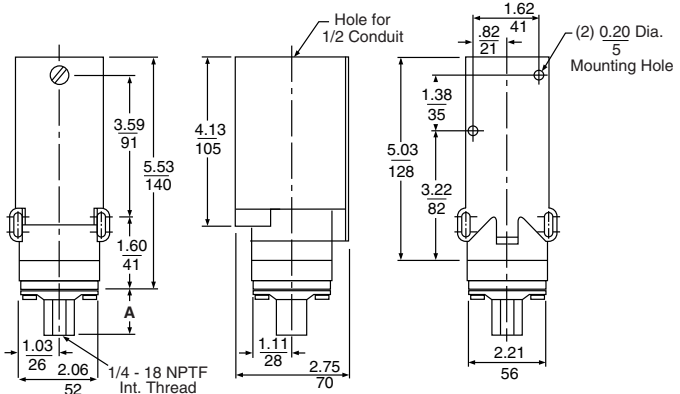


Figure 22.12: 9012GNG, GRG



Type	Dimension A, in. (mm)
GNO, GRO 3, 4, 5, 6	1.41 (35.8)
GPO, GSO 1, 2, 3	1.31 (33.3)
GQO, GTO 1, 2, 3, 4	2.24 (56.9)

Type	Dimension A, in. (mm)
GNG, GRG 3, 4, 5, 6	1.41 (35.8)
GPG, GSG 1, 2, 3	1.31 (33.3)
GQG, GTG 1, 2, 3, 4	2.24 (56.9)

Table 22.41: Factory Modifications for Class 9012 Pressure Switches

Modification	Applies to Pressure Switch Type	Form
Lock on rising pressure, manual reset only	Available on GDW, GDWM, GEW, GEWM, GFW, GFWM only	E3
120 Vac or Vdc neon pilot light	Available on all GAW–GMW, GAWM–GFWM	with clear lens G17 with red lens G18
24 Vdc only LED	For pilot light conversion kits: See 9998 PC-306–308. Complete Class and Type information required	with clear lens G21 with red lens G22
24 Vdc LED pilot light with green lens	Class 9012 GAW–GMW and GAWM–GFWM, or Class 9016 GAW and Class 9025G	G23
SPDT snap switch rated 1.1 A at 125 Vdc (minimum differential doubles)	Available on GAR–GFR, GAW–GJW, GAWM–GFWM	H3
Prewired 5-pin Brad Harrison male receptacle #41310 or interchangeable Crouse-Hinds receptacle. For use with Brad Harrison female portable plug #41306, 41307, 41308, or equivalent.	Available on GAW–GJW single pole devices only	H10 or H11
Micro connector, 4-pin, for 24 Vdc pilot light	G•W (single pole only), except GAW2 and Form B2.	H17
External range adjustment (includes knob and range scale window)	GAW–GFW, GAWM–GFWM, GKW–GMW	K
External range adjustment slotted for screwdriver (includes range scale window)	GAW–GFW, GAWM–GFWM, GKW–GMW	K1
Pg 13.5 conduit thread and 1/4–19 BSP pressure connection	G•WM only	M12
Standard Nitrile (Buna-N) diaphragm in #316 stainless steel flange	GGW1, GGW 21 only	Q1
	All other GGW, GHW only	Q1
	GAR, GAW, GDR, GDW, GAWM, GDWM, GKW1, 21 only	Q1
	All other GAR, GBR, GDR, GER, GAW, GBW, GDW, GEW, GAWM, GBWM, GDWM, GEWM, GKW, GLW	Q1
Ethylene propylene diaphragm in #316 stainless steel flange	Available on all GGW, GHW except GGW1, 21	Q3
	Available on all GAR, GBR, GDR, GER, GAW, GBW, GDW, GEW, GAWM, GBWM, GDWM, GEWM, GKW, and GLW, except Types 1 and 21	Q3
Viton® fluorocarbon diaphragm in #316 stainless steel flange	GGW1, 21 only	Q4
	All other GGW, GHW	Q4
	GAR, GAW, GBR, GBW, GDR, GDW, GER, GEW, GAWM, GBWM, GDWM, GEWM, GKW1, 21 only	Q4
	All other GAR, GAW, GBR, GBW, GDR, GDW, GER, GEW, GAWM, GBWM, GDWM, GEWM, GKW, GLW	Q4
Range scale window (standard with Forms K and K1)	GAW–GMW, GAWM–GFWM	V1
Special setting specified (If indicating only a fixed differential setting, specify whether this setting is on increasing or decreasing pressure.)	All 9012G	Y1
1/4"-18 NPT external thread pressure connection	GAR, GAW, GDR, GDW, GGW, GKW Not available in combination with Forms Q1, Q3, Q4.	Z
1/2"-14 NPT external thread, 1/4"-18 NPTF internal thread pressure connection	GAR, GAW, GDR, GDW, GGW, GKW Not available in combination with Forms Q1, Q3, Q4.	Z16
7/16"-20 UNF-2B internal thread pressure connection	GAR–GFR; GAW–GMW Not available in combination with Forms Q1, Q3, Q4.	Z18

Table 22.42: Factory Modifications for Renewal Parts Kits for Class 9012 Pressure Switches

Suffixes for renewal parts kits, see page 22-28.

Modification	Applies to Parts Kit Type	Form
SPDT snap switch rated 1.1 A at 125 Vdc (minimum differential doubles)	PC313	H3
Standard Nitrile (Buna-N) diaphragm in #316 stainless steel flange	PC177–179, PC268, 269	Q1
	PC265–267	
Ethylene propylene diaphragm in #316 stainless steel flange	PC177–178, PC268, 269	Q3
	PC266, 267	
Viton® fluorocarbon diaphragm in #316 stainless steel flange	PC177–178, PC268, 269	Q4
	PC265–267	
1/4"-18 NPT external thread pressure connection	PC265–269	Z
1/2"-14 NPT external thread, 1/4"-18 NPTF internal thread pressure connection	PC265–269	Z16
7/16"-20 UNF-2B internal thread pressure connection	PC177, 178, PC265–273	Z18

Table 22.43: Class 9049 Accessories for Class 9012 Pressure Switches

Description	Applies to Class	Type
Stainless steel surge reducer for use on oils, coolants, and hydraulic fluids (not recommended for air or water)	9012G	A26S



Type GAW—Sensitive Control Applications

9016GAW vacuum switches are provided with double throw contacts; normally open and normally closed circuits allow these controls to be used for standard or reverse action applications.

Standard devices can be mounted from the front with the bracket provided. Two mounting screws are required for a firm attachment to any smooth, flat surface. Allowance must be made for flange projection. Controls with Form F modification include two mounting feet with 9/32" mounting holes on 3-3/4" centers. Range and Differential adjustments are internal and exposed by removal of the front cover.

Maximum allowable positive pressure: 100 psig.

Diaphragms are oil resistant, nitrile butadiene (Buna N) rubber.

Electrical Ratings and Temperature Limitations—See page 22-14 for Type G machine tool.

Dimensions—See page 22-17.

Table 22.44: Class 9016, Diaphragm Actuated

Range on Decreasing Vacuum (In. of Hg)	Adjustable Differential Adds to Range▲ (In. of Hg)	Contact Arrangement	Pipe Tap (NPTF)	Enclosure	
				NEMA 4, 4X & 13	NEMA 7 & 9 ■
				Type	Type
0-28.7	At Minimum Range: 0.8-9 At Mid-Range: 1.3-7.4	1 N.O., 1 N.C.	1/4"-18	GAW1	GAR1
0-25	5-20	1 N.O., 1 N.C.	1/4"-18	GAW2	N/A
0-28.3	At Minimum Range: 1-9 At Mid-Range: 1.7-7.4	2 N.O., 2 N.C.	1/4"-18	GAW21	GAR21
0-25	5-20	2 N.O., 2 N.C.	1/4"-18	GAW22	N/A

▲ Add Differential to Range to obtain the operating point on increasing vacuum (within vacuum limitations). The differential increases linearly over its range.

■ The minimum differential doubles with NEMA 7 & 9 enclosures.

Table 22.45: Available Modifications

Description	Form
Mounting feet (GAW1 and GAW21 only)	F
Range scale window	V1
1/4"-18 NPT external thread pressure connection	Z
1/2"-14 NPT external thread, 1/4"-18 NPTF internal thread pressure connection (standard actuator only)	Z16



File E12443 Haz Loc CCN NOWT G*R
File E12158 CCN NKPZ G*W
File E12158 CCN NTHT Marine Use, G*W



File LR25490 Type GAW only
File LR26817 Type GAR only
(NEMA 7 and 9 Haz Loc)



Type GVG—Power Circuit Applications

The 9016GVG1 vacuum switch is a companion to the 9036GG and 9037GG float switches commonly used on vacuum heating pumps. Electrical ratings of float and vacuum switch types are equal.

Table 22.46: Class 9016, Contacts Open on Increasing Vacuum

Cut-out Range (In. of Hg)	Approximate Adjustable Differential (In. of Hg)	Cut-in Range (In. of Hg)	Poles	Pressure Connection	NEMA 1 Enclosure Type
5-25	5-10	0-20	2	1/4"-18 NPSF	GVG1

Note: Maximum allowable positive pressure: 150 psig. In. of Hg = inches of mercury.

Table 22.47: Available Modifications

Description	Form
3-way lever—nameplate marked: Float only—Vacuum and Float—Continuous (factory modification only)	E
Mounting bracket (for retrofit, order 9049A53 bracket kit)	F
Reverse action—normally open contacts	R
1/4" male pipe connection (1/4"-18 NPT, external thread) (for retrofit, use 1/4" pipe nipple)	Z

Table 22.48: Electrical Ratings—9016GVG

Voltage	AC		DC
	Single Phase	Polyphase	
110 V	2 hp	3 hp	1 hp
220 V	3 hp	5 hp	1 hp
440-550 V	5 hp	5 hp	—
32 V	—	—	1/2 hp

Note: Control Circuit Rating: A600

Table 22.49: Vacuum Codes

Settings (In. of Hg)	Code
3-8	J09
16.5-25	J10
17-22	J11
18-23	J12
20-25	J13
Specify other setting (minimum order quantity is 4 pieces)	J99

Ordering Information: Specify Class 9016 Type G. Give vacuum settings within the limits of the listings above.

For Setting Codes, see Table 22.49. If special features are desired, add the appropriate Form letter to the Class and Type. Arrange the Form letters in alphabetical order when ordering more than one special feature.



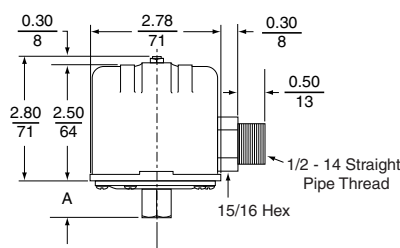
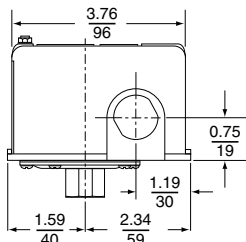
File E12158
CCN NKPZ



File LR25490



PUMPTROL™
Pressure Switch



Shown with Form T

Table 22.52: Type F—Net Weight, 1-1/8 lb

Switch Type	A	
	in.	mm
FHG2, 12, 22, 32, 42, 52 FRG2, FSG2, FYG2	2-29/32	23
FHG3, 13, 33 FRG3, FSG3, FYG3	1-9/32	33
FHG9, 19, 29, 39, 49, 59 FRG9, FSG9, FYG9	1-3/32	28

Table 22.53: Pressure Code (fixed differential)

Off at...	Code
80 psi	J43
100 psi	J27
110 psi	J37
115 psi	J38
120 psi	J69
125 psi	J52
135 psi	J39
140 psi	J68
155 psi	J40
150 psi	J55
175 psi	J59
Specify other pressure (minimum order quantity is 4 pieces)	J99

Note: The existence of a code does not imply that the code is available for any or all devices.



File E12158
CCN NKPZ



File
LR25490

Note: UL Listed control equipment. Type 4 must have Form T; otherwise these Types are component recognized. If conduit or pressure line is rigid, UL; if both are flexible, UR.

Class 9013 Type FHG pressure switches are designed for the control of small electrically driven air compressors.

- Contacts open on pressure rise.
- Diaphragm actuated.
- For application data, see page 22-16.
- For repair parts kits, see page 22-28.

Table 22.50: Selection Table

Adjustable Cut-out Range Increasing Pressure (psig)	Approximate Differential Fixed (psig)	Poles	Pressure Connection	NEMA 1 Enclosure	
				Lower hp	Higher hp
				Type	Type
40-100	20	2	1/4" NPSF internal	FHG2	FHG22
			3/8" NPSF internal	FHG3	—
			1/4" four way	FHG4	FHG24
			1/4" NPT external	FHG9	FHG29
70-150	30	2	1/4" NPSF internal	FHG12	FHG32
			3/8" NPSF internal	FHG13	FHG33
			1/4" four way	FHG14	FHG34
			1/4" NPT external	FHG19	FHG39
100-200	40	2	1/4" NPSF internal	FHG42	FHG52
			1/4" four way	FHG44	FHG54
			1/4" NPT external	FHG49	FHG59

Table 22.51: Special Features and Modifications for Type FHG

Description	Form
Bulk pack	▲
Addition of a second ground screw	G4■
Maintained manual cut-out lever (Auto-Off)	M1
Pulsation plug—factory order only (available only on 1/4-inch fittings, not to include 4-way)	P
1/2" conduit bushing—1/2" long thread—on left	T
Slip-on connectors (load side terminals only)	U
Slip-on connectors (line and load terminals)	U2
Factory sealed range stud	W
Two-way pressure release valve	X
Quick connect two-way pressure release valve (for use with Polyflow® tubing)	X1
Black cover	Z22

- ▲ For bulk package quantities and Form numbers, see Table 22.61 on page 22-21. If a Form is not specified, devices will be shipped individually packaged.
- Can be field installed. Nameplate should then be marked with the Form letter and maintenance and ordering records corrected.

Table 22.54: Electrical Ratings For All 9013 Switches

Switch Type	Voltage	Single Phase AC	Polyphase AC ▼	DC	Control Circuit Rating
FHG2, 9, 12, 13, 14, 19, 42, 43, 44, 49 FSG, FSW	115	1-1/2 hp	2 hp	1/4 hp◆	A600
	230	2 hp	3 hp	1/4 hp◆	
	460/575	—	1 hp	—	
FHG22, 29, 32, 33, 34, 39, 52, 54, 59 FYG, FYW	115	2 hp	3 hp	1/2 hp★	A600
	230	3 hp	5 hp	1/2 hp★	
	460/575	—	1 hp	—	
FRG One Pole All Form H	32	—	—	—	A300
	115	1 hp	—	1/4 hp	
	230	1 hp	—	1/4 hp	
FRG Two Pole	32	—	—	1/4 hp	A300
	115	1 hp	1 hp	1/4 hp	
	230	1 hp	1 hp	1/4 hp	
All 9013G Form H	115	1 hp	—	1/2 hp	A600
	230	2 hp	—	1/2 hp	
	460/575	2 hp	—	—	
All 9013G, except Form H	115	2 hp	3 hp	1 hp	A600
	230	3 hp	5 hp	1 hp	
	460/575	5 hp	5 hp	—	

- ◆ DC rating does not apply to Form M4.
- ★ 1/4 hp with Form M1.
- ▼ See 1993 NEC Article 430-84

Ordering Information

1. Specify Class 9013 Type FHG.
2. Select pressure code from Table 22.53, and add the code designation to end of the Type number. Ensure that the pressure rating of the code falls within the limits of the device as shown in Table 22.50.
3. To order special features, add the appropriate Form designation to the Class and Type. Arrange Forms in alphabetical order when specifying more than one feature or modification.

Accessories page 22-22

- Designed for the control of electrically driven water pumps. Diaphragm actuated.
- Type FSG is the standard water pump switch, suitable for all types of pumps: jets, submersible, reciprocating, etc.
- Type FYG is designed to meet higher horsepower and pressure requirements.
- Type FRG is reverse acting: contacts open on falling pressure.



PUMPTROL™
Pressure Switch

Table 22.55: Pressure Codes▲

Standard Action Devices		Reverse Action Devices	
Settings	Code	Settings	Code
5–21 psi	J15	8.5–5.5 psi	J17
8–20 psi	J16	10–5 psi	J36
20–40 psi	J20	22–12 psi	J22
20–50 psi	J18	22–16 psi	J19
30–50 psi	J21	35–20 psi	J70
40–60 psi	J24	40–20 psi	J23
50–70 psi	J33	50–30 psi	J35
55–85 psi	J34■	80–60 psi	J32■
60–80 psi	J25	100–80 psi	J51■
Specify other pressure	J99■	150–120 psi	J64■
		Specify other pressure	J99■

Table 22.56: Maximum Allowable Pressure for All 9013 Switches

Type	Pressure
FHG, FSG, FYG, FSW, FYW, FRG	220 psig
GHB, GHG, GSB, GSG	300 psig
GMG, GSR, GSW	100 psig
GHR, GHW	250 psig

Table 22.57: Temperature Limitations for All 9013 Switches

Operation (Media)	Storage
Min. -36 °C (-33 °F)	Min. -36 °C (-33 °F)
Max. +125 °C (+257 °F)	Max. +125 °C (+257 °F)

Ordering Information

- Specify Class 9013 Type F.
- Select the pressure code from Table 22.55, and add the code designation to the end of the Type number. Ensure that the pressure rating of the code falls within the limits of the device as shown in Tables 22.58 and 22.59.
- To order special features, add the appropriate Form letter to the Class and Type. Arrange the Form letters in alphabetical order when ordering more than one special feature.

Electrical Ratings:page 22-20
Dimensions:page 22-20
Renewal Parts Kits:page 22-28



File E12158 CCN NKPZ



File LR25490

Note: Products on this page are UL Listed, however type numbers ending in 8, 10 or 20 (non rigid pressure lines) must have Form T or TI—otherwise these are UL component recognized.

- ▲ Existence of a code does not imply that the code is available for any or all devices.
- Minimum order quantity is 4 pieces.
- ◆ Must be mounted in vertical position to maintain enclosure rating.
- ★ For bulk package quantities and Form numbers, see Table 22.61. If Form C** is not specified, devices will be shipped individually packaged.
- ▼ Nylon pulsation plug can be field installed on types having 1/4" NPSF internal connector. Part number 1530S6G1 is one bag of 50 plugs.

Table 22.58: Standard Action: Contacts Open On Rising Pressure

Cut-out Range (psig)	Approximate Adjustable Differential (psig)	Cut-in Range (psig)	Pressure Connection	2 Pole	
				NEMA 1 Type	NEMA 3R◆ Type
20–65	15–30	5–45	1/4" NPSF internal	FSG2	FSW2
			1/4" NPT external	FSG9	FSW9
			1/4" bayonet (barbed)	FSG10	FSW10
			90° elbow 1/4" bayonet	FSG20	FSW20
20–50	10–30	10–30	1/4" NPSF internal	FSG22	FSW22
20–60	10–30	10–45	1/4" NPT external	FSG29	FSW29
9–30	6–20	3–10	1/4" NPSF internal	FSG42	FSW42
9–30	6–20	3–10	1/4" NPT external	FSG49	FSW49
25–80	20–30	5–60	1/4" NPSF internal	FSG52	—
			1/4" NPT external	FSG59	—
34–65	15–30	19–45	(FSG1 through 20 with Form M4 is only available in this range)		
25–80	20–30	5–60	1/4" NPSF internal	FYG2	FYW2
			1/4" NPT external	FYG9	FYW9
			1/4" bayonet (barbed)	FYG10	FYW10
			90° elbow 1/4" bayonet	FYG20	FYW20
39–80	20–30	19–60	(FYG1 through 20 with Form M4 is only available in this range)		
20–50	10–30	10–30	1/4" NPSF internal	FYG22	FYW22
20–60	10–30	10–45	1/4" NPT external	FYG29	FYW29
9–40	6–30	3–10	1/4" NPSF internal	FYG42	FYW42
9–40	6–30	3–10	1/4" NPT external	FYG49	FYW49

Table 22.59: Reverse Action: Contacts Open On Falling Pressure

Cut-in Range (psig)	Approximate Adjustable Differential (psig)	Cut-out Range (psig)	Pressure Connection	1-Pole	2-Pole
				Type	Type
23–65	15–30	8–45	1/4" NPSF internal	FRG12	FRG2
			3/8" NPSF internal	FRG13	FRG3
			1/4" NPT external	FRG19	FRG9
10–45	6–20	4–25	1/4" NPSF internal	FRG32	FRG22
			3/8" NPSF internal	FRG33	FRG23
			1/4" NPT external	FRG39	FRG29
6–14	5 Fixed	1–9	1/4" NPSF internal	FRG52	FRG42
			3/8" NPSF internal	FRG53	FRG43
			1/4" NPT external	FRG59	FRG49
40–100	20–30	20–80	1/4" NPSF internal	FRG72	FRG62
			3/8" NPSF internal	FRG73	FRG63
65–150	30–45	35–120	1/4" NPSF internal	FRG92	FRG82
			3/8" NPSF internal	FRG93	FRG83
			1/4" NPT external	FRG99	FRG89

Table 22.60: Special Features and Modifications for Type FSG, FYG & FRG Devices

Description	Applies to Types	Form
Bulk package	All Type F	★
One normally open—one normally closed contact	FRG 2-Pole only	H
Maintained manual cut-out lever (Auto-Off)	FSG, FYG	M1
Momentary manual cut-in lever (Auto-Start)	FRG2-59 only	M3
Low pressure cut-off (Auto-Start-Off)	FSG, FYG	M4
Operates at approximately 10 psig below cut-in and will turn off the pump		
Maintained manual cut-in lever (Auto-On)	FRG2-59 only	M5
Pulsation plug (Type 2 & 9 only)	FRG, FSG, FYG	P▼
Plastic flange (max. temp. 120 °F) (max. pressure 80 psi)	FSG*, FYG*, FRG*	Q8
Available only on Types FSG2, FYG2, FRG2, FSG*2, FYG*2, FRG*2	1/4" NPSF internal only	
1/2" conduit bushing, 1/2" long thread—on left	All Type F	T
Slip-on connectors (load side terminals only)	FSG, FYG	U
Slip-on connectors (line and load terminals)	FSG, FYG	U2
Black cover	FSG, FYG	Z22

Table 22.61: Bulk Package Form Numbers for 9013F Pressure Switches

Description	Bulk Package Quantity					
	16	20	40	50	400	500
Product without Forms M1, M3, M4, M5, T, X1	9013FHG (without 1/4" four-way)	—	C20	—	C50	—
	9013FHG4, 14, 24, 34, 44, 54 (with 1/4" four-way)	—	C20	—	C50	C400
	9013FRG	—	C20	—	C50	—
	9013FYG	—	C20	—	C50	—
Product with Forms M1, M3, M4, M5	9013FHG (without 1/4" four-way)	—	C20	C40	—	—
	9013FHG4, 14, 24, 34, 44, 54 (with 1/4" four-way)	—	C20	C40	—	—
	9013FRG	—	C20	C40	—	—
	9013FSG	—	C20	C40	—	—
Product with Forms T, X1	9013FYG	—	C20	C40	—	—
	9013FHG (without 1/4" four-way)	C16	—	C40	—	—
	9013FHG4, 14, 24, 34, 44, 54 (with 1/4" four-way)	C16	—	C40	—	—
	9013FRG	C16	—	C40	—	—
9013FHG9 Special with Extended Flange	9013FSG	C16	—	C40	—	—
	9013FYG	C16	—	C40	—	—



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Pressure Switch

Shown with Form X

Table 22.62: Pressure Codes

Code	Pressure Setting (Close-Open), psi
J20	20–40
J21	30–50
J23	40–20 (reverse action)
J24	40–60
J25	60–80
J26	70–90
J28	70–100
J29	75–100
J30	80–100
J31	90–120
J50	135–175
J51	100–80 (reverse action)
J53	100–125
J54	110–125
J56	110–150
J57	120–150
J58	125–150
J60	125–175
J61	130–175
J62	140–175
J63	145–175
J64	150–120 (reverse action)
J65	215–250
J99	Specify the required setting

Ordering Information

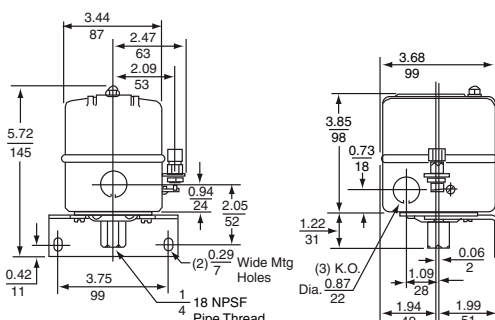
- Specify Class 9013 Type G.
- Select the pressure code from Table 22.62, and add the code to the end of the Type number. Ensure that the pressure rating of the code falls within the limits of the device. See Table 22.63.
- To order special features, add the appropriate Form letter to the Class and Type. Arrange Form letters in alphabetical order when ordering more than one special feature.

Electrical Ratings page 22-20

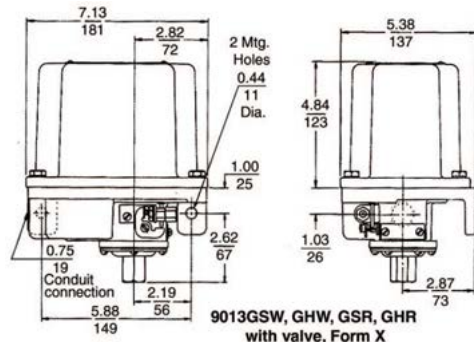
Table 22.63: Selection Tables

Cut-out Range (psig)	Approximate Adjustable Differential (psig)	Cut-in Range (psig)	Enclosure	Poles	NPSF Internal Pressure Connection	Type
10–35	4–8	5.5–30.5	NEMA 1 (General Purpose)	2	1/4	GMG2
20–80	15–30	5–60	NEMA 3R ▲ (Rainproof)	2	1/4	GSB2
					1/8	GSG1
20–80	15–30	5–60	NEMA 1 (General Purpose)	2	1/4	GSG2
					3/8	GSG3
			NEMA 7 & 9 (Hazardous Locations)		1/8	GSR1
					1/4	GSR2
					3/8	GSR3
			NEMA 4 (Watertight)		1/8	GSW1
					1/4	GSW2
					3/8	GSW3
65–200	20–40	40–170	NEMA 3R ▲ (Rainproof)	2	1/4	GHB2
					1/8	GHG1
65–200	20–40	40–170	NEMA 1 (General Purpose)	2	1/4	GHG2
					3/8	GHG3
			NEMA 7 & 9 (Hazardous Locations)		1/8	GHR1
					1/4	GHR2
					3/8	GHR3
			NEMA 4 (Watertight)		1/8	GHW1
					1/4	GHW2
					3/8	GHW3
80–250	25–45	32–215	NEMA 3R ▲ (Rainproof)	2	1/4	GHB5
					1/8	GHG4
80–250	24–45	32–215	NEMA 1 (General Purpose)	2	1/4	GHG5
					3/8	GHG6
			NEMA 7 & 9 (Hazardous Locations)		1/8	GHR4
					1/4	GHR5
					3/8	GHR6
			NEMA 4 (Watertight)		1/8	GHW4
					1/4	GHW5
					3/8	GHW6

▲ Must be mounted in vertical position to maintain enclosure rating.



Note: The mounting bracket shown is available as kit 9049A52.
9013GHG, GSG - with or without Form X



9013GSW, GHW, GSR, GHR with valve, Form X

Table 22.64: Special Features and Modifications for Type G Devices

Description	Applies to	Form
Standard pack of 10 switches ■	All Type G	C10
3-way lever (On-Auto-Off) (not compatible with Form X)	GHG, GMG, GSG	E
1 N.O., 1 N.C. contact	All Type G	H
Pulsation plug (not field replaceable.)	All Type G	P
Reverse action (Select pressure code from reverse action table on page 22-21)	All Type G	R
Slip-on connectors (load side terminals only)	All Type G	U
Slip-on connectors (line and load terminals)	All Type G	U2
Two-way pressure release valve (Not compatible with Form E)	GHB, GMG, GSB, GHG, GSG	X
	GHR, GHW, GSR, GSW	X
1/4" male pipe thread on pressure connection	All Type G	Z
1/2"-14 NPT external	All Type G	Z16
1/4"-18 NPT internal ♦	All Type G	

- Available on GHB, GHG, GSB, and GSG. If Form C10 is not specified, devices will be shipped individually packaged
- ♦ UL Listed industrial control equipment.

Table 22.65: Class 9049 Accessories for Class 9013 Pressure Switches

Type	Description	Applies to Class
A12	Two-way pressure release valve, replacement only. Cannot be added to switch that originally had no valve.	9013GHG, GSG, Form X only
A52	Mtg. bracket—replacing obsolete 9013A with 9013G	9013GHG, GSG
A53	Mtg. bracket—replacing obsolete 9013A with 9013G, or for current 9016GVG	9013GMG, 9016GVG
A56	Two-way pressure release valve. Replacement only. Cannot be added to switch that originally had no valve.	9013FHG, Form X only



Type DG2



Type GG



File No. E12158
File No. E12443
Haz Loc



File LR25490
File LR26817
Haz Loc

Open Tank or Sump Applications

Ambient temperature ratings: Min. -30 °C (-22 °F); Max. +105 °C (+220 °F).

For accessories, refer to page 22-28.

Table 22.66: Class 9036, 2-Pole, Single Lever Operated

Contact Operation	NEMA 1 Type	NEMA 4 Type	NEMA 7, 9 Type
Close on liquid rise	DG2	DW31	DR31
Open on liquid rise	DG2R	DW31R	DR31R
Close on liquid rise	GG2	GW1	GR1
Open on liquid rise	GG2R	GW1R	GR1R

Order the universal mounting bracket and float accessory kits separately from the Class 9049 Accessories section on page 22-28. Types GW and GR use a center-hole float. Devices with Form C use a center-hole float. All others use a tapped-at-top float.

Table 22.67: Modifications

Description	Factory Installed Form	Field Installed Class 9049 Kit
Types DG, DW, DR		
Reverse action (Type DG)	R	A58
Compensating spring (Type DG)	C	A19
Compensating spring (Type DR, DW)	C	A20
Compensating spring and reverse action	CR	Not available
Types GG, GW, GR		
Compensating spring for Type GG2	C	9049A13
Combination of compensating spring and reverse action (Type GG2)	CR	9049A13
1 N.O., 1 N.C. contact configuration	H	Not available
Combination of comp. spring & 1 N.O., 1 N.C. contact for Type GG2	CH	Not available
Reverse action (Type GR, GW)	R	Not available

Table 22.68: Class 9049 Float Accessory Specifications (oz)

Item	Type A6	Type A6S	Type A6C	Type A6CS	Type A6A	Type A6CA
Net buoyancy ■ (in water) 7" float	60▲	60▲	70▲	70▲	60▲	70▲
Weight of 5 ft rod	18.5	16.9	18.5	16.9	6	6
Weight of extra ft of rod (per ft)	3.7	3.4	3.7	3.4	1.2	1.2
Total weight of stops	3 (2 stops)	3 (2 stops)	6 (4 stops)	6 (4 stops)	3 (2 stops)	6 (4 stops)

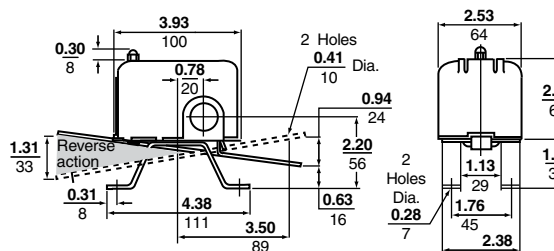
- ▲ Net buoyancy of float has been calculated with float 80% submerged, thus allowing 20% factor of safety.
 - Buoyancy data is calculated for use in water. Consult factory for buoyancy data in media with a different specific gravity than water.
- When ordering float accessories**, first specify the desired float accessory package, such as 9049A6 or 9049A6CS, then as a second item give the number of additional rod kits required. For example, for a 9049A6 with 15 ft of rod, order as follows:
Item A = 9049A6, quantity = 1; Item B = 9049T1, quantity = 4.

Table 22.69: Maximum Forces at Which Switches Are Tested (oz)

Type	Force Up To Trip	Force Down To Trip	Weight Supported with Compensating Spring	Type (with or without Form H)	Lever Length Position	Force Up to Trip	Force Down to Trip	Weight Supported with Compensating Spring at Max. Adjustment (oz)
DG2	9	8	60	GG2	Short	33	39	◆
DG2 Form R	8	8	60	GG2	Long	21	27	100
DW31	8	8	66	GG2 Form R	Short	30	24	◆
DW31 Form R	8	8	66	GG2 Form R	Long	22	16	150
DR31	8	8	66	GR1, GW1	Short	24	31	80
DR31 Form R	8	8	66	GR1, GW1	Medium	22	29	72
				GR1, GW1	Long	20	27	64

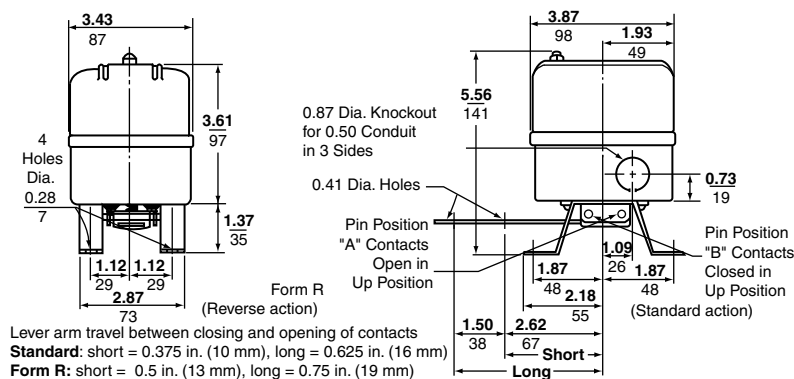
◆ Compensating spring not effective in combination with Short lever length position.

Figure 22.13: Type DG Dimensions



Float lever travel between closing and opening of contacts: short = 1 in. (25 mm), medium = 1.12 (28 mm), long = 1.25 in. (31.8)

Figure 22.14: Type GG Dimensions



Lever arm travel between closing and opening of contacts

Standard: short = 0.375 in. (10 mm), long = 0.625 in. (16 mm)

Form R: short = 0.5 in. (13 mm), long = 0.75 in. (19 mm)

For Type GR/GW dimensions, see catalog 9034CT9701.

For Type DR/DW dimensions, see catalog 9034CT9701.

Table 22.70: Electrical Ratings for All Float Switches

Applies to Class and Type	Control Circuit	Single Phase AC			Polyphase AC ★			DC		
		115 V	230 V	460/ 575 V	115 V	230 V	460/ 575 V	32 V	115 V	230 V
9036DG, DR, DW (2-pole), FG	A600	2 hp	3 hp	—	3 hp	5 hp	1 hp	1/4 hp	1/2 hp	1/2 hp
9036GG, GR, GW (2-pole)	A600	2 hp	3 hp	5 hp	3 hp	5 hp	5 hp	1/2 hp	1 hp	1 hp
9036G Form H (1 N.O., 1 N.C.)	A300	1 hp	2 hp	2 hp	—	—	—	—	1/2 hp	1/2 hp
9037EG, ER, EW; HG, HR, HW (2-pole)	A600	2 hp	3 hp	—	3 hp	5 hp	1 hp	1/4 hp	1/2 hp	1/2 hp
9038 All Devices (2-pole)	A600	2 hp	3 hp	—	3 hp	5 hp	1 hp	1/4 hp	1/2 hp	1/2 hp

★ See 1993 NEC Article 430-84

Open Tank or Sump Applications, Float Switch, Class 9036 Type FG

The Class 9036 Type FG30 pedestal style float switch is designed for liquid level control with electric motor operated pumps either directly or through a magnetic starter. It can also be used to activate alarms in liquid level control systems. The upward or downward movement of the lever arm of the Class 9036 Type FG30 float switch controls the On and Off positions corresponding to the water level changes required to turn the pump or alarm on and off.

Ambient temperature ratings: Min. -30 °C (-22 °F); Max. +105 °C (+220 °F)

Table 22.71: Type FG Float Switch and Accessories

Description	Class	Type
2-pole, NEMA 1, contacts close on liquid rise	9036	FG30
Plastic center hole float (1 required)	9049	A60
33.75 inch aluminum rod, 2 float stop assemblies and attaching hardware (1 required)	9049	A61

Closed Tank, Class 9037 Type E

Type E switches are flange mounted and float movement is transmitted through a Quad-Ring[®] seal.

Build up the switch to meet your exact requirements from the **basic switch**, **float rod**, and **float** groups below. Switch may be assembled in the field to give contacts that open on liquid rise or close on liquid rise. Consult Schneider Electric for use in media with a different specific gravity than water.

Ambient temperature ratings: Min. -30 °C (-22 °F); Max. +105 °C (+220 °F)

Table 22.72: Class 9037 Type E

Application	Post Length L (in.)	NEMA 1	NEMA 4	NEMA 7 & 9
		Type	Type	Type
For minimum water level change	2-5/8	EG8	EW8	ER8
	4-11/16	EG10	—	—
For maximum water level change	2-5/8	EG9	EW9	ER9
	4-11/16	EG13	EW13	—

Table 22.73: Class 9049 Floats for Type E Switches

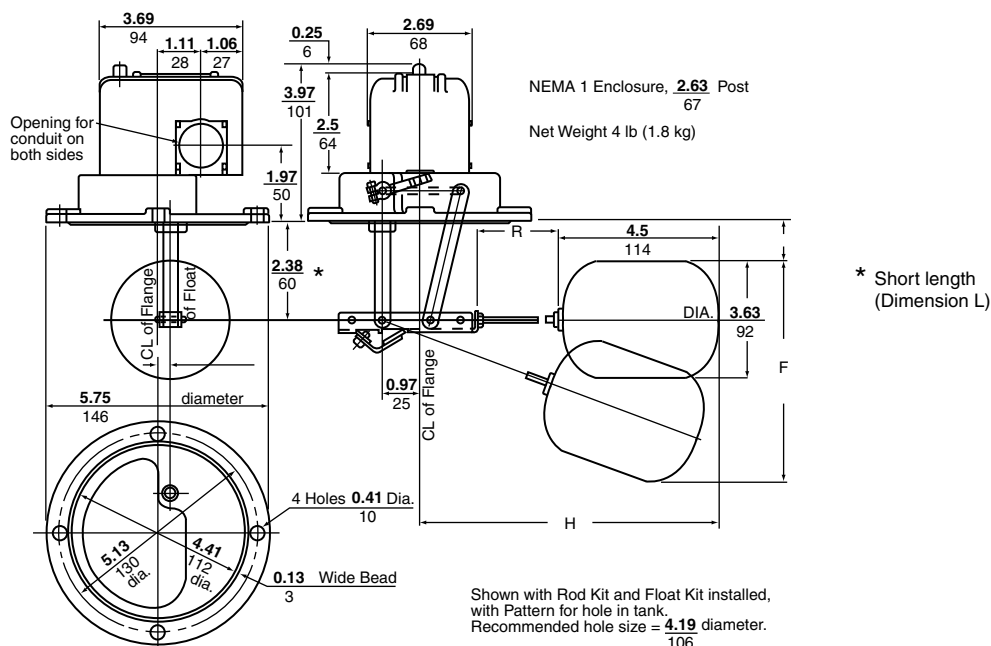
Description	Type
#304 stainless steel	EF1
#316 stainless steel	EF2

Table 22.74: Class 9049 Float Rod Kits

Type	A (in.)	F (in.)	R (in.)	H (in.)
ER1	1.00	4.75	1.75	8.25
ER2	1.00	4.75	2.5	9.00
ER3	1.00	4.75	3.50	9.50
ER5	1.00	4.75	5.25	11.75
ER7	1.00	5.00	7.25	13.75
ER12	1.00	5.75	12.25	18.75

Figure 22.15: Type EG Dimensions, in. (mm)

For 9037ER/EW dimensions and rod positions, see catalog 9034CT9701



Type H switches are attached to the tank by means of a 2-1/2 in. screw-in bushing. An external pointer indicates the float position within the tank when the unit is mounted. Switches come complete with stainless steel float and rod. A Buna N Quad-Ring® seal is used between the float rod and sealing connector. Normal application is at atmospheric pressure, but where higher pressures are encountered, the switch will withstand tank pressures up to 50 psi at temperatures up to +220 °F. Occasional replacement of the Quad-Ring seal may be necessary. Ambient temperature ratings: Min. -30 °C (-22 °F); Max. +105 °C (+220 °F)

Table 22.75: Class 9037 Type H Contacts Close On Liquid Rise

Float Position (viewed from front of switch, facing indicator scale)	Float Rod Angle	Approximate Water Level Change (Field Adjustable)		NEMA 1	NEMA 4	NEMA 7 & 9
		Min. (in.)	Max. (in.)	Type	Type	Type
Right	45°	2	5	HG33	HW33	HR33
	90° Offset	2	5	HG35	HW35	HR35
			7	HG37	HW37	HR37
			8-1/4	HG39	HW39	HR39
			11-1/2	HG31	HW31	HR31
Left	45°	2	5	HG34	HW34	HR34
	90° Offset	2	5	HG36	HW36	HR36
			7	HG38	HW38	HR38
			8-1/4	HG30	HW30	HR30
			11-1/2	HG32	HW32	HR32

Note: For replacement floats, see Class 9049 Type H on page 22-28. Types shaded in gray are available with Form Z19; see Table 22.77.

Table 22.76: Type H Float Travel Distances

Float Rod Angle	R in. (mm)	H in. (mm)	f1 in. (mm)		f2 in. (mm)		F in. (mm)	
			Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
45°	—	6.22 (158)	2.25 (57)	4.50 (114)	2.00 (52)	4.50 (110)	4.25 (108)	9.00 (229)
90° offset	3.00 (76)	4.25 (108)	2.75 (70)	4.25 (108)	2.25 (57)	4.25 (108)	5.00 (127)	7.50 (191)
	4.25 (108)	5.50 (140)	3.50 (89)	5.50 (140)	2.75 (70)	4.00 (102)	6.25 (159)	9.50 (241)
	5.00 (127)	6.25 (159)	3.75 (95)	6.25 (159)	3.00 (76)	4.50 (110)	6.75 (171)	10.75 (273)
	7.00 (178)	8.25 (210)	4.75 (121)	8.25 (210)	3.75 (95)	5.75 (146)	8.50 (216)	14.00 (356)

▲ Clearance from the centerline of the hub to the side of the tank.

Table 22.77: Available Modifications For Class 9037 Type H

Description	Form
Omit 2-1/2" tank connecting bushing	F3
Omit float	L
Reverse action, contacts open on rise	R
Viton® packing: 5 oz. float (diesel fuel) for Types shaded in gray in Table 22.75 above.	Z19
Viton packing (suitable for applications up to +250 °F)	Z20
#316 stainless steel float and Viton packing	Z21

Figure 22.16: Type HG—45° Angle Dimensions

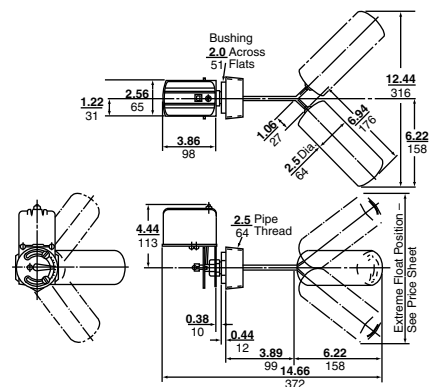


Figure 22.18: Type HR/HW—45° Angle Dimensions

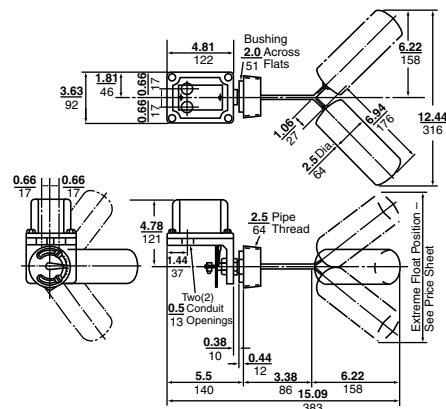


Figure 22.17: Type HG—90° Offset Dimensions

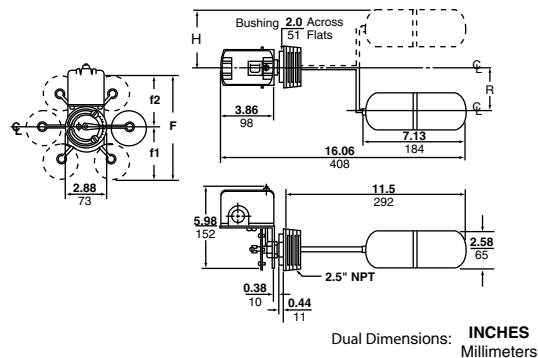
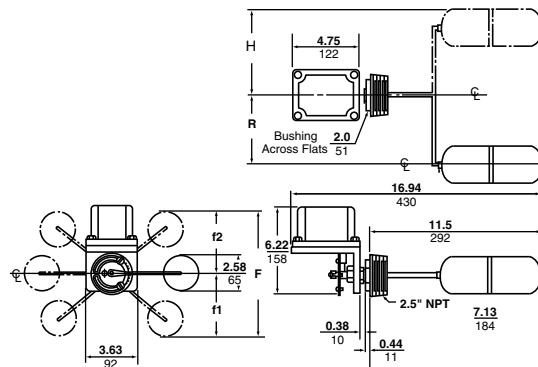
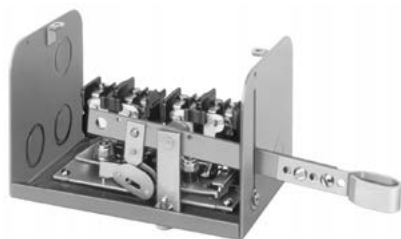


Figure 22.19: Type HR/HW—90° Offset Dimensions



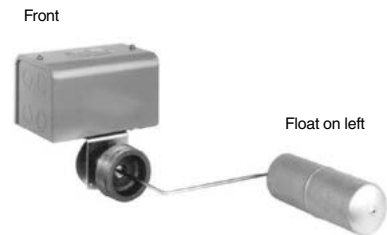
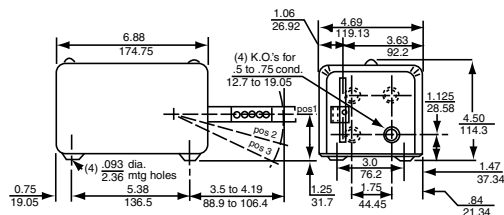
Type A, Open Tank

Alternators are designed to provide motor alternation in the operation of two motors.



Type A1
Mechanical Alternator, Float Operated

Figure 22.20: Type A Dimensions, in. (mm)



Type CG36

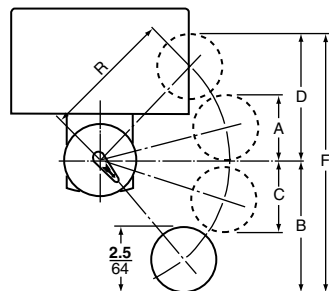


File No. E12158
excludes NEMA 7 & 9 products
(9038AR, CR, and DR)



File LR25490
excludes NEMA 7 & 9 products
(9038AR, CR, and DR)

Figure 22.21: Travel Dimensions



Replacement Float:
9049HF page 22-28

Table 22.78: Class 9038 Type A

Application	Description	NEMA 1 Type	NEMA 4 Type	NEMA 7 and 9 Type
For open tank or sump systems using duplex pumps	Mechanical alternator float operated	AG1	AW1	AR1

Note: For use with Class 9049 float accessories listed on page 22-28.

Type AW and AR alternators **must** use center hole floats.

Table 22.79: Operating Forces—Types AG, AR and AW

Type	Without Compensating Spring (No Form C)		With Compensating Spring (Form C)			
	Force Up	Force Down	Maximum Weight of Rod and Stops Supported	Length of Rod Supported at the Maximum Adjustment		
			Note: AW1 and AR1 have compensating spring standard.	Brass	Stainless Steel	Aluminum
AG1 (min. lever ext.)	18 oz	20 oz	47 oz.	10 ft	12 ft	25 ft
AG1 (max. lever ext.)	16	17	41	8	10	21
AG1 Form R (min. lever ext.)	14	16	33	7	8	17
AG1 Form R (max. lever ext.)	11	12	30	6	7	15
AR1, AW1 (standard lever)	—	—	74	16	20	41
AR1, Form R, AW1 Form R (std. lever)	—	—	85	19	23	47

▲ Rod length has been determined using the weight of the rod material furnished on Class 9049 accessories (3/8" O.D. tubing).

Other types of rod should be weighed and compared to the Maximum Weight of Rod column in Table 22.79.

■ Add 2 oz for Form N5 High Water alarm.

Type C, Closed Tank, with Bushing

Flange mounted with bushing for control of liquid level within a closed tank. Build up the switch to meet your requirements from the basic switch, rod kit, and float kit groups below.

Type C switches are attached to the tank by means of a 2-1/2 in. screw-in bushing. An external pointer indicates the float position within the tank when the unit is mounted. Switches come complete with screw-in connector, stainless steel float and rod.

Table 22.80: Class 9038 Type C

Float Position Viewed from Front of Switch Facing Indicator Scale	R in. (mm)	Approx. Water Level Change		NEMA Type 1	NEMA Type 4	NEMA Type 7, 9
		Min. (in.)	Max. (in.)	Type	Type	Type
Right	7 (178)	6.5 (165)	13 (330)	CG31	CW31	CR31
Left	7 (178)	6.5 (165)	13 (330)	CG32	CW32	CR32
Right	4.25 (108)	4 (102)	7.75 (197)	CG33	CW33	CR33
Left	4.25 (108)	4 (102)	7.75 (197)	CG34	—	CR34
Right	5 (127)	4.75 (121)	9.25 (235)	CG35	—	—
Left	5 (127)	4.75 (121)	9.25 (235)	CG36	CW36	CR36

Table 22.81: Type C Float Travel Adjustments

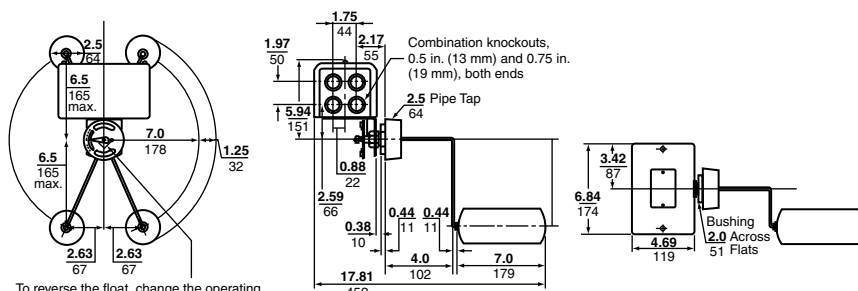
R in. (mm)	A in. (mm)		B in. (mm)		C in. (mm)		D in. (mm)		F in. (mm)	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
7 (178) ◆	2.5 (64)	5 (127)	5 (127)	7 (178)	2 (51)	4 (102)	5 (152)	7 (178)	10 (254)	14 (495)
5 (127) ■	2.25 (57)	3.75 (95)	4 (102)	5.25 (133)	2.75 (70)	3 (76)	4 (102)	5.25 (133)	8 (203)	10.5 (267)
4.25 (108) ▲	2 (51)	3.5 (89)	3.5 (89)	4.75 (121)	2.5 (64)	3.75 (95)	3.5 (89)	4.75 (121)	7 (178)	9.5 (241)

▲ CG33, CG34, CW33, CW34, CR33, CR34

■ CG35, CG36, CW35, CW36, CR35, CR36

◆ CG31, CG32, CW31, CW32, CR31, CR32

Figure 22.22: Type CG Dimensions



To reverse the float, change the operating link in the holes of the adjusting plate.



Type DG Shown with Rod Kit 9049ER5 and Float Kit 9049HF3 Installed.



File No. E12158
excludes NEMA 7 & 9 products
(9038AR, CR, and DR)



File LR25490
excludes NEMA 7 & 9 products
(9038AR, CR, and DR)

Type D, Closed Tank, Top Mounted

Designed for applications where mounting is to be made at the top of a closed tank.

Table 22.82: Class 9038 Type D Contacts Close On Liquid Rise

Water Level Change	Hinge Post Dimension "V" (in.)	NEMA 1 Type	NEMA 4 Type	NEMA 7 and 9 Type
Min.	2-5/8	DG7	DW7	—
Max.		DG8	DW8	DR8
Min.	4-11/16	DG9	—	—
Max.		DG10	—	—

Table 22.83: Float Kits, For Use with Type D Switches

Size and Material Diameter x Length (in.)	Class and Type
3.625 x 4.50, #304 stainless steel	9049EF1
3.625 x 4.50, #316 stainless steel	9049EF2
2.50 x 7, #304 stainless steel	9049HF3
2.50 x 7, #316 stainless steel	9049HF4

Table 22.84: Float Rod Kit, Class 9049

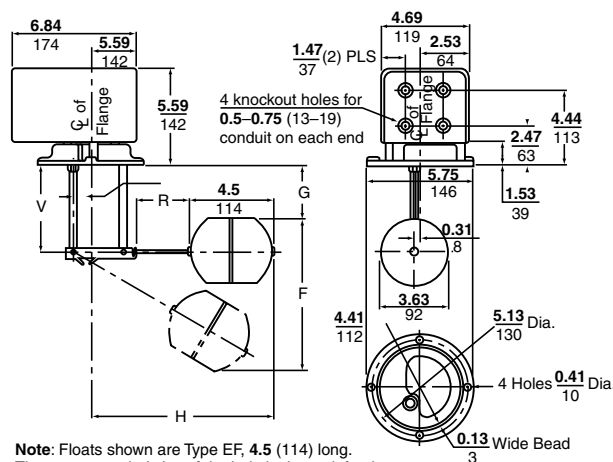
Type	R (in.)	H (in.)	G (in.)	F (in.)
ER1	1.75	8.25	3.25	8.75
ER2	2.50	9.00	3.50	10.50
ER3	3.25	9.50	3.50	11.00
ER5	5.25	11.75	3.75	12.75
ER7	7.25	13.75	4.00	14.50
ER12	12.25	18.75	4.75	19.00

Table 22.85: Available Modifications for All Mechanical Alternators

Consult Schneider Electric for use in media with a different specific gravity than water.

Description	Form
Compensating spring (Type AG)	C
Omit 2-1/2 in. connecting bushing (Type CG, CR, CW)	F3
Omit float (Type CG, CR, CW)	L
Two-level non-alternating unit	N4
Addition of a third, high-water alarm circuit (Type AG, AR, AW, CG, DG only)	N5
High-water alarm circuit, 2-pole (Type CG only)	N25
Reverse action (contacts open on Rise)	R
Viton® packing, 5 oz. float (diesel fuel) (Type CG)	Z19
Viton packing (Type CG, CR, CW)	Z20
#316 stainless steel float and Viton packing (Type CG, CR, CW)	Z21

Figure 22.23: Type DG Dimensions, in. (mm)



Note: Floats shown are Type EF, 4.5 (114) long.
The recommended size of the hole in the tank for the entry of the float and the mounting of the control is 4.19 (106).
Add 2.5 (64) to "H" if using Type HF Floats, which are 7.0 (178) long.

Table 22.86: Temperature Ratings for Class 9038

Description	Rating
Ambient Temperature	-22 to 200 °F (-30 to 93 °C)
Media	Buna-N Seal Up to 215 °F (102 °C)
	Viton® Seal Up to 250 °F (121 °C)

Accessories for Float Switches

To order, specify the Class and Type number of the kit.

Table 22.87: Class 9049 Accessories for Float Switches

Description			Applies to Class	Type
Compensating Spring			9036GG	A13
			9038AG	A15
			9036DR, DW	A20
Float	Dia. 3.62 in. (92 mm), length 4.5 in. (114 mm)	#304 stainless steel	9037E, 9038D	EF1
		#316 stainless steel	9037E, 9038D	EF2
	Dia. 2.5 in. (64 mm), length 7 in. (178 mm)	#304 stainless steel	9037H, 9038C	HF3
		#316 stainless steel	9037H, 9038C	HF4
Float Kit	7 in. tapped-at-top #304 stainless steel float, 5 ft rod, 2 stops	Brass rod	All 9036, 9038A	A6
		Aluminum rod	All 9036, 9038A	A6A
	7 in. center-hole #304 stainless steel float, 5 ft rod, 4 stops	Brass rod	All 9036, 9038A	A6C
		Aluminum rod	All 9036, 9038A	A6CA
	7 in. center-hole #316 stainless steel float, 5 ft stainless steel rod, 4 stainless steel stops		All 9036, 9038A	A6CS
	7 in. tapped-at-top #316 stainless steel float, 5 ft stainless steel rod, 2 stainless steel stops		All 9036, 9038A	A6S
	Replacement float—7 in. round center-hole #304 stainless steel		9049A6C, A6CA	AF1
Lever	Form R		9036DG	A58
	Replacing obsolete 9036A with 9036G		9036GG	A54
Mounting Bracket	Replacing 9036A (S or F1) with 9036G		9036GG	A55
	Universal		All 9036, 9038AG, AR, AW	UMS1
Rod	Stainless steel	1-3/4 in. long	9037E, 9038D	ER1
		2-1/2 in. long	9037E, 9038D	ER2
		3-1/4 in. long	9037E, 9038D	ER3
		5-1/4 in. long	9037E, 9038D	ER5
		7-1/4 in. long	9037E, 9038D	ER7
		12-1/4 in. long	9037E, 9038D	ER12
Rod Kit	Additional 2-1/2 ft section with connector	Brass rod	9049A6, A6C	T1
		Aluminum rod	9049A6A, A6CA	T1A
		Stainless steel rod	9049A6S, A6CS	T1S

Renewal Parts for Class 9012–9038 Devices

Renewal parts are generally available for Pump Control Products with a numerical date code—for example, 172 (first quarter, 1972)—or a current date code. Parts are no longer available for devices manufactured before 1965.

To order, specify the Class and Type number of the kit.

Table 22.88: Class 9998 Renewal Parts Kits for Class 9012–9038 Devices

Description / Equipment To Be Serviced ^{9thl}			Parts Kit Type
Actuator Assembly	9012GA, GD, GG, GK, GN, GR 5, 25, 55 Series C only		PC268▲
	9012GA, GD, GG, GK, GN, GR 6, 26, 36, 46, 56 Series C only		PC269▲
	9012GB, GE, GH1, 21, 31, 41, 51; GL, GP, GS1		PC177▲
	9012GB, GE, GH2, 22, 32, 42, 52; GL, GP, GS2		PC178▲
Contact Kit (2-Pole Contacts)	9013FHG22, 29, 32, 39, 52, 59; 9013 FYG; 9036DG, DR, DW; 9037EG, ER, EW, HG, HR, HW30–39; 9038 All Types (2 Kits Required); obsolete 9013HHGY, HSGY; HSWY; 9037HEG, HSG3, 4; 9035DG10, DW10 (This kit also contains a replacement diaphragm for pressure switches. The diaphragm fits pressure switch only.)		PC242
	9013GHG, GSG, GHR, GSR, GMG; 9036GG, GR, GW; 9037GG Series C All except Forms H & R; 9016GVG, Form R		PC205
	9013GHG, GSG, GSR, GMG; 9036GG, GR, GW; 9037GG, GR, GW Series C Form H only; 9016GVG, Form H		PC206
	9013GHG, GSG, GHR, GSR, GMG; 9036GR, GW: Series C Form R only; 9016GVG		PC207
Contact Replacement Kit	9013FHG2 thru 19, 42 thru 49, all FSG Complete contact replacement kit—includes new diaphragm		PC241
Diaphragm Assembly	9012GA, GD, GN, GR1, 21 Series C only		PC265▲
	9012GA, GD, GG, GK, GN, GR 2, 3, 22, 52 Series C only		PC266▲
	9012GA, GD, GG, GK, GN, GR4, 24, 54 Series C only		PC267▲
	Convolute diaphragm assembly for 9013GHG, GSG: Series C		PC208
	9013GHW, GSW; and GSW, GHR: Series C		PC211
Gasket Kit	9016 GAW-1, 21		PC233
	Contains all replaceable gaskets for all 9012 open, NEMA 1, 4, 4X, 13 devices		PC184
Pilot Light, 24 Vdc	9012, 9016G Forms G7, G8, G9, G10, G21, G22		PC305
Piston Assembly	9012GC, GF, GJ, GQ, GT1, 21, 31, 41, 51 Series C only		PC270▲
	9012GC, GF, GJ, GQ, GT2, 22, 32, 42, 52 Series C only		PC271▲
	9012GC, GF, GQ, GT4, 24, 34, 44, 54 Series C only		PC273▲
Seal Kit	Buna N, for Series A devices: 9037HG/HW/HR30–39; 9038CG/CW/CR31–36		PC337
	Viton [®] , for Series A devices with Form Z19 or Z20: 9037HG/HW/HR30–39; 9038CG/CW/CR31–36		PC338
Seal Tube Kit	Buna N Quad-Ring [®] , for Series C devices: 9037HG/HW/HR3–12; 9038CG/CW/CR1–6		PC282
	Viton Quad-Ring, for Series C devices: 9 037HG/HW/HR3–12; 9038CG/CW/CR1–6		PC333
Snap Switch	SPDT, for 9012GA, GB, GC, GD, GE, GF, GG, GH, GJ single pole; except Forms E2, E3, E4, H3: Series C only		PC313▲
	DPDT, for 9012GA, GB, GC, GD, GE, GF, GG, GH, GJ double pole; except Forms E2, E3, H6, H7: Series C only		PC314▲
Switch Mechanism	9036DR1, DW1 Series B		PC285

▲ If one of these **Form** designations appears on the pressure switch nameplate, complete the 9998 PC number by adding that same **Form suffix** from page 22-18, and add the Form price to the kit price.