9012G and 9016G industrial pressure and vacuum switches

9012G pressure switches

The 9012G pressure switches are UL Listed and CSA certified as industrial control equipment. They are used to interface pneumatic or hydraulic systems with electrical control systems by opening or closing electrical contacts in response to pressure changes in the system. They have outstanding repeatability and drift performance. Their efficient design uses durable, low mass components for excellent performance under heavy duty vibration and shock conditions.

The 9012G pressure switches line offers devices with either diaphragm or piston actuators—for optimum life, versatility, and speed of operation. Features include the following:

- High shock resistance
- High set-point stability
- Internal or external range adjustment
- No drain line required
- Dual numerical range scale (psi and kPa)
- One or two SPDT double-break contacts
- Adjustable or fixed (nonadjustable) differential
- Single-stage, dual-stage, or differential-pressure operation

A variety of modifications is available (see also page 69):

The 9012G diaphragm switches range from 0.2-675 psi falling pressure. Nitrile diaphragms and zinc-plated steel flanges are standard. Diaphragms of Viton® fluorocarbon or ethylene propylene are available as well as stainless steel flanges.

The 9012G piston-actuated switches range from 20-9,000 psi falling pressure. They have sealed pistons and can be used on air, water, oil, or any media compatible with the actuator material. The switches come standard with stainless steel pistons and housings, Viton diaphragms and O-ring seals, and Teflon® retaining rings. Ethylene propylene diaphragms and O-ring seals are also available.

The 9012G industrial pressure switches are available as open type or in NEMA 1 enclosures. The backplate is steel with a plastic cover. Open devices in pressure ranges up to 250 psi are available with internal- or external-threaded pressure connectors, ideally suiting them for panel mounting.

The 9012G machine tool pressure switches with NEMA 4, 4X, or 13 (IP66) cast aluminum enclosures are UL Listed and CSA certified as industrial control equipment. They are also UL Marine Listed for use on vessels greater than 65 ft long where ignition protection is not required.

The 9012G machine tool switches are also available in NEMA 7 & 9 cast aluminum enclosures. These are UL Listed for use in Class I, Divisions 1 and 2, Groups C and D, and Class II, Divisions 1 and 2, Groups E, F, G hazardous locations.

Application and general information

9012 pressure switches can generally be used in any application where electrical contacts must open or close in response to a system pressure change, within the electrical and pressure ratings of the switch. Pressure switches are used in a wide variety of applications such as the following:

- compressed air systems
- HVAC equipment
- chillers
- pumping systems
- machine tools
- stamping presses
- automatic grinders
- welders
- process equipment
- molding machines

Pressure switches typically perform one of the following two functions:

Monitoring the pressure in the system. The switch can be used either as an interlock that sequences operations in an automatic system, or to give an audio or visual signal, typically an alarm of an undesired condition, at predetermined pressures.

A switch with a **fixed** differential is generally used in these applications.

Controlling the pressure in the system by starting and stopping a pump or a compressor at predetermined pressures. A switch with an **adjustable** differential is usually needed in these applications.

9012G and 9016G industrial pressure and vacuum switches

9012G pressure switches

Diaphragm life

The elastomer diaphragms used on 9012G switches can withstand high speed cycling and wide pressure changes. They can tolerate operating speeds up to 200 cycles per minute with no negative impact on the life of the diaphragm.

Diaphragm life is affected by pressure medium compatibility. Standard diaphragms on 9012G devices are nitrile in zinc-plated steel flanges. Also available are Viton fluorocarbon and ethylene propylene diaphragms, as well as Type 316 stainless steel flanges.

The diaphragm can withstand wide pressure changes on each operating cycle. However, the pressure applied to the diaphragm during the normal operating cycle should never exceed the maximum value listed in the Range column in the catalog listing. Regularly cycling the pressure above this value reduces life considerably. If significant surges are common, or if pressures are higher than those listed in the Range column, consider using a piston device.

Piston life

For long piston life, the pressure medium should be filtered to keep foreign matter such as dirt and chips out of the piston assembly. 9012G sealed piston devices are not recommended for use on dry gas media, since this usage could cause some leakage past the seal. Depending on the gas, the media pressure, and the rate of operation, the amount of leakage could render the switch inoperable. (Note, however, that some weepage of the media is necessary to lubricate the seals. This small amount of weepage does not indicate a problem.)

Surges

One of the most destructive conditions for a pressure switch is hydraulic surge. A surge is a high rate of rise in pressure, normally of short duration, caused by starting a pump or by opening and closing a valve. Extremely high rates of rise in pressure can be damaging even if they are within the limits of the maximum allowable pressure.

To limit the effect of surges, the switch should be mounted as close to an accumulator and as far from the pump or quick acting valve as possible. The 9012G piston-actuated switches have a 0.020 in. pressure orifice to help reduce the effects of minor surges. 9012G diaphragm-actuated switches have a 0.060 in. pressure orifice. A restrictor with a small orifice placed in the line between the switch and the pump or valve will further help to protect the switch.

Vibration

Among other things, excessive vibration can cause contact bounce, chatter, or premature contact transfer, especially when system pressure is near the operating point of the switch. Remote mounting of the switch is the best way to avoid problems.

Use on steam

Switches should not be applied directly on steam exceeding 15 psig. However, with steam capillary tubing installed between the pressure connection and the switch, steam pressure up to 250 psig can be applied—provided this does not exceed the maximum allowable pressure rating of the switch or the maximum temperature rating at the actuator. Refer to the instruction bulletin supplied with the device.

Dual-stage operation

The 9012G dual-stage pressure switches provide two distinct levels of control from one device. These switches are most commonly used where dual functions are required, or in sequencing applications such as alarm-shutdowns.

Differential-pressure operation

The 9012G pressure switches for differential-pressure sensing can monitor changes in the difference between two pressures. These unidirectional devices signal that a predetermined pressure difference was reached, resulting from a widening or narrowing of the difference between two pressures.

9012G and 9016G industrial pressure and vacuum switches
9012G pressure switches

Piston- vs. diaphragm-actuated devices

Whether to select a piston or diaphragm device depends on several criteria:

- maximum allowable pressure
- range and differential
- surges
- medium (whether hydraulic or pneumatic)

Maximum allowable pressures for piston devices are much higher than for diaphragm devices. Most diaphragm devices have a maximum allowable pressure of 850 psi or less, whereas all piston devices have a maximum allowable pressure of 10,000 psi or more.

Range and differential for diaphragm devices are lower than for piston devices. Many applications call for a low differential, such as 20 psi. This may exclude piston devices, which have a minimum differential of 60 psi or more.

Surges are a part of every hydraulic system. While many are small and have only a small effect on the switch, some are significant and can potentially destroy a pressure switch. Diaphragm devices are the most sensitive to surges and are most easily damaged. Piston devices are more tolerant of surges and last longer in the same application.

Hydraulic systems, which typically use oil-based media, are more demanding applications than pneumatic systems. Pressure switches used in hydraulic applications typically experience higher pressures, have wider pressure variations, and produce more surges, since the medium does not compress. Pneumatic systems, which typically use air, place fewer demands on a system, since these applications typically experience lower pressures and the medium can compress, cushioning the effects of surges. Table 1 offers basic guidelines for determining the selection of a piston- versus a diaphragm-operated pressure switch.

Piston vs. diaphragm

Maximum allowable pressures	High	Piston
	Lower	Diaphragm
Pressures	High pressures	Piston
	Low differentials or pressures	Diaphragm
Surges	Constant	Piston
	Minimal	Diaphragm or piston
Media	Hydraulic systems	Piston
	Pneumatic systems	Diaphragm

Operating points (set points)

Pressure switches have two operating points:

- Increasing pressure (rising pressure)
- Decreasing pressure (falling pressure)

These operating points are also called the set points of the switch.

Differential

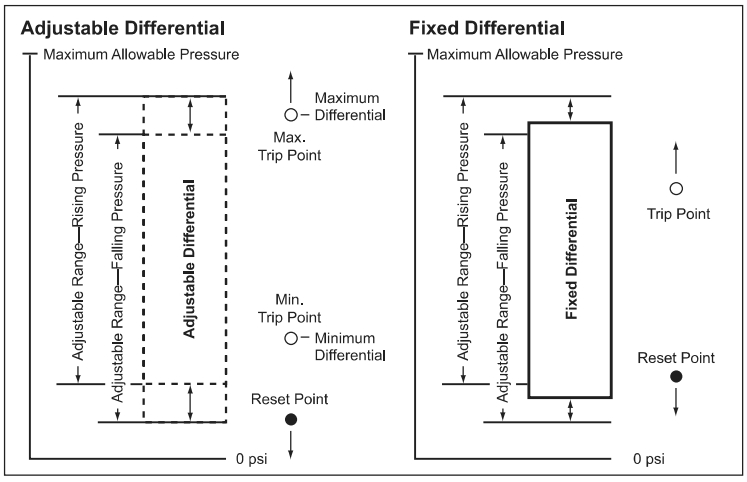
The *differential* is the difference in pressure between the rising and falling pressure points. It can be adjustable or fixed.

Range

The *range* refers to the pressure limits within which the operating points (settings) can be adjusted. The range of the 9012G pressure switch is tied to the decreasing pressure operating point. Adding the differential to the decreasing pressure operating point determines the increasing pressure operating point.

9012G and 9016G industrial pressure and vacuum switches
9012G pressure switches

Differential



Fixed differential

To determine the operating range on rising pressure for a fixed differential switch, add the differential to the decreasing pressure operating point. For example, to determine the range on **increasing** pressure for a 9012GDW5 switch:

- Range on decreasing pressure = 3 to 150 psi
- Fixed differential = 6.0 ± 0.8 psi
- Range on increasing pressure = 9 ± 0.8 to 156 ± 0.8 psi

Adjustable differential

For adjustable differential switches, add the minimum differential to the low end of the range and the maximum differential to the high end of the range. For example, to determine the range on **increasing** pressure for a 9012GAW5:

- Range on decreasing pressure = 3 to 150 psi
- Adjustable differential = 6.0 to 30 psi
- Range on increasing pressure = 9 to 180 psi

During the normal operating cycle, system pressure should never exceed the upper limit of the range when using a diaphragm-actuated switch. This greatly reduces the life of the diaphragm. For optimum life, operate the switch in the middle 80% of the range.

Maximum allowable pressure

Maximum allowable pressure is the pressure to which a switch can be subjected without causing a change in operating characteristics, shift in settings, or damage to the device.

System pressure surges may occur during machine startup or from valve operation. Surges are not normally detrimental to the life of a switch if the surge is within the maximum allowable pressure rating of the switch. Diaphragm-actuated switches should not be subjected to more than 10 surges per day. More frequent surges greatly reduce the life of the diaphragm.

9012G and 9016G Industrial pressure and vacuum switches

9012G pressure and 9016G vacuum switches

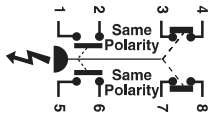
Environment

Environmental specifications

Conformity to standards	CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14
Product certifications	UL Listed and CSA certified as industrial control equipment
Protective treatment	Marine use: HT (does not apply to 9016GVG)
Fluids controlled	Air, water, hydraulic oils, gases, steam (depending on the model)
Materials	Cast aluminum enclosures (9012 NEMA 1 and 9016 GVG are stamped metal enclosure and molded cover)
Operating position	Operates in all positions
Shock resistance	50 g
Degree of protection	Depends on the model
Operating rate (operating cycles/minute)	120 operations/minute max. 9016GVG: 60 operations/minute max.
Repeat accuracy	±2.0% (does not apply to 9016GVG)
Drift	±1.0% of the adjustable range over 1 million operations
Pressure connection	G1/4 (BSP) female, 1/4"-18 NPTF, or 1/2"-14 NPT
Electrical connection	1/2"-14 NPTF, Pg13.5, or ISO M20 (also, 3/4"-14 NPTF available only on NEMA 7 and 9). NEMA 1 is 1/2" conduit entry, unthreaded.

Contact arrangement

9012G and 9016G machine tool and vacuum switches (except GVG)

Type	Contact arrangement	Contact symbol
Single Pole Double Throw (SPDT)	1 N.O., 1 N.C.	
Snap switch contains two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.		
Double Pole Double Throw (DPDT)	2 N.O., 2 N.C.	
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.		

Circuit ratings

Contacts	Continuous carrying amperes	AC—50 or 60 Hz						DC		
		Voltage (V)	Inductive 35% power factor				Resistive, 75% power factor	Voltage (V)	Inductive and resistive	
			Make		Break		Make and break amperes		Make and break amperes	
			A	VA	A	VA			Single throw	Double throw
SPDT	10	120	60	7200	6	720	6	125	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	301-600 *(1)*	0.10	–
	–	600	12	7200	1.2	720	1.2			
DPDT	10	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	–	–
	–	600	12	7200	1.2	720	1.2	–	–	–

(1) Continuous carrying ampere rating does not apply.
Acceptable wire sizes: 12-22 AWG. **Recommended terminal clamp torque**: 7 lb-in
Not recommended for use on circuits below 24 V, 20 mA.

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	–	–	0.5 hp

Note: Control Circuit Rating: A600

9012G and 9016G industrial pressure and vacuum switches
9012G pressure switches

Interpreting the commercial reference (excluding 9016GVG)

Use this table for interpretation only. Some combinations are not available.

Designation				9012G	A	R		2	2	
				Commercial reference						
Classification	Pressure Switch			9012G						
	Vacuum Switch			9016G						
Actuator Type—Differential Type	Single-Stage Machine Tool	Diaphragm, Low Pressure—Adjustable			A					
		Diaphragm, High Pressure—Adjustable			B					
		Piston—Adjustable			C					
		Diaphragm, Low Pressure—Fixed			D					
		Diaphragm, High Pressure—Fixed			E					
		Piston—Fixed			F					
	Differential-Pressure	Diaphragm, Low Pressure—Adjustable			G					
		Diaphragm, High Pressure—Adjustable			H					
		Piston— Adjustable			J					
	Dual-Stage	Diaphragm, Low Pressure—Adjustable			K					
		Diaphragm, High Pressure—Adjustable			L					
		Piston—Adjustable			M					
	Single-Stage Industrial	Diaphragm, Low Pressure—Adjustable			N					
		Diaphragm, High Pressure—Adjustable			P					
		Piston—Adjustable			Q					
		Diaphragm, Low Pressure—Fixed			R					
		Diaphragm, High Pressure—Fixed			S					
		Piston—Fixed			T					
Enclosure, NEMA Type	1					G				
	Open					O				
	7, 9					R				
	4, 4X, 13					W				
Threads	1/4"-18 NPTF						blank			
	Metric						M			
Contacts	Single-pole, double-throw							blank		
	Double-pole, double-throw							2		
Pressure Range (psi)	Diaphragm	Single or Dual Stage, Low Pressure	0.2-10						1	
			1-40						2	
			1.5-75						4	
			3-150						5	
			5-250						6	
		Single or Dual Stage, High Pressure	13-425						1	
			20-675						2	
		Differential-Pressure, Low Pressure	0-75						1	
			0-175						4	
		Differential-Pressure, High Pressure	0-500						1	
	Piston	Single or Dual Stage	20-1000						1	
			90-2900						2	
			170-5600						3	
			270-9000						4	
		Differential-Pressure	0-5000						1	
Vacuum (inHg)	Diaphragm	Single Stage, Low Pressure	0-28						1	
			0-25						2	
Options	Factory modifications and accessories									See tables on pages 75, 77 and 83

9012G machine tool pressure switches for single-stage operation
Pressure range (psi)—Contacts change on decreasing pressure

Actuator	Switch style	Range (psi)	Fixed differential	Adjustable differential	Pressure code
Diaphragm	Single or Dual Stage, Low Pressure	0.2-10	0.6±0.1	0.6-2	1
		1-40	1.6±0.4	1.6-8	2
		1.5-75	3.0±0.5	3.5-15	4
		3-150	6.0±0.8	6.0-30.0	5
		5-250	10.0±1.5	10.0-49	6
	Single or Dual Stage, High Pressure	13-425	16±3.5	16-90	1
		20-675	27±5	27-130	2
	Differential-Pressure, Low Pressure	0-75	0.25±10	0.25-10	1
		0-175	—	0.5-36	4
	Differential-Pressure, High Pressure	0-500	—	3-175	1
Piston	Single or Dual Stage	20-1000	89±18	89-200	1
		90-2900	255±30	255-560	2
		170-5600	578±110	578-1260	3
		270-9000	788±140	788-1900	4
	Differential-Pressure	0-5000	—	15-825	1

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

9012G and 9016G industrial pressure and vacuum switches

9012G machine tool pressure switches

9012GDW1

Single-Stage Operation

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 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.
- NEMA 4, 4X, and 13 devices are suitable for use in Class I, Division 2, Groups A, B, C, and D hazardous locations or nonhazardous locations only.
- 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.

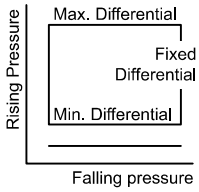
Fixed differential
NEMA 4, 4X, 13 Enclosure
UL Listed and CSA Certified as Industrial Control Equipment

Range on decreasing pressure psig	Approximate differential at mid-range, psig *(1)*	Maximum allowable pressure, psig	Class 9012 Type SPDT	DPDT
Diaphragm actuated—Nitrile diaphragm, zinc plated steel housing				
0.2-10	0.6 ± 0.1	100	**9012GDW1**	–
1-40	1.6 ± 0.4	100	**9012GDW2**	**9012GDW22**
1.5-75	3.0 ± 0.5	240	**9012GDW4**	–
3-150	6.0 ± 0.8	475	**9012GDW5**	**9012GDW25**
5-250	10.0 ± 1.5	750	**9012GDW6**	–
13-425	16 ± 3.5	850	**9012GEW1**	–
20-675	27 ± 5	2000	**9012GEW2**	–
Piston actuated—#440 stainless steel piston #303 stainless steel housing, Viton® fluorocarbon diaphragm and O-ring, Teflon® retaining ring				
20-1000	59 ± 9	10,000	**9012GFW1**	–
90-2900	170 ± 15	15,000	**9012GFW2**	**9012GFW22**
170-5600	289± 55	20,000	**9012GFW3**	–

Specifications

Fluids controlled		Air, water, hydraulic oils, gases, steam (depending on the model)	
Pressure connection		1/4"-18 NPTF is standard. For metric threads, add M after the W on all types *(2)*. Other options are available (see page 75).	
Weight (approximate)		3 lb (1.36 kg)	
Voltage limits		600 V	
Continuous current		10 A	
Electrical connections		1/2"-14 NPTF (standard), For Pg 13.5, or ISO M20, see footnote *(2)*.	
Standards/Ratings		CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14. UL Marine Listed for use on ships/vessels greater than 65 ft long where ignition protection is not required.	
Temperature ratings		**Minimum**	**Maximum**
Ambient		-23 °C (-10 °F)	+85 °C (+185 °F)
Media	Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)
	Piston	-26 °C (-15 °F)	
	All with Form Q4	-26 °C (-15 °F)	

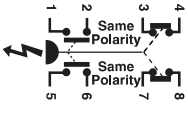
Operating curves



Contact blocks

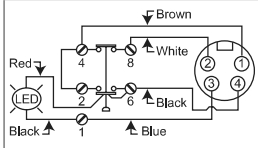
1 N.O., 1 N.C.

2 N.O., 2 N.C.

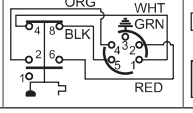


Connection

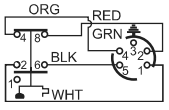
Form H17



Form H10



Form H11



SPDT snap switches contain two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.
DPDT snap switches contain two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.

Acceptable wire sizes:	12-22 AWG	**Recommended terminal clamp torque:**	7 lb-in

(1) The differential adds to the range setting and determines the operating point on rising pressure.
(2) To order a Pg13.5 electrical conduit entry and a 1/4"-19 BSP pressure connection, add M12 to the end of the commercial reference, 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 and 1/4"-19 BSP pressure connection
9012GAWM1M12 = Pg13.5 electrical conduit entry and 1/4"-19 BSP pressure connection

9012G and 9016G industrial pressure and vacuum switches

9012G machine tool pressure switches

9012GAW1

9012GAW5G18

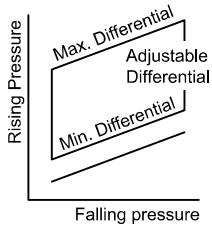
Adjustable Differential NEMA 4, 4X, 13 Enclosure UL Listed and CSA Certified as Industrial Control Equipment				
Range on Decreasing Pressure, psig	**Adjustable Differential *(1)* Approximate at Mid Range**	**Maximum Allowable Pressure, psig**	**Class 9012 Type SPDT**	**DPDT**
Diaphragm Actuated—Nitrile Diaphragm, Zinc Plated Steel Housing				
0.2-10	0.7-2	100	**9012GAW1**	**9012GAW21**
1-40	2.4-8	100	**9012GAW2**	**9012GAW22**
1.5-75	3.9-15	240	**9012GAW4**	**9012GAW24**
3-150	6.6-30	475	**9012GAW5**	**9012GAW25**
5-250	11-49	750	**9012GAW6**	**9012GAW26**
13-425	20-82	850	**9012GBW1**	**9012GBW21**
20-675	35-130	2000	**9012GBW2**	**9012GBW22**
Piston Actuated—#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring				
20-1000	65-200	10,000	**9012GCW1**	**9012GCW21**
90-2900	187-560	15,000	**9012GCW2**	**9012GCW22**
170-5600	425-1050	20,000	**9012GCW3**	**9012GCW23**
270-9000	580-1500	25,000	–	**9012GCW24**

Specifications

Fluids Controlled	Air, water, hydraulic oils, gases, steam (depending on the model)
Pressure Connection	1/4"-18 NPTF is standard. For metric threads (G1/4 BSP female pressure connection and M20 electrical connection), add M after the W in the commercial reference. For additional pressure connections, see page 75 *(1)*.
Weight (approximate)	3 lb (1.36 kg)
Voltage Limits	600 V
Continuous Current	10 A
Electrical Connections	1/2"-14 NPTF is standard. For metric threads (G1/4 BSP female pressure connection and M20 electrical connection), add M after the W in the commercial reference *(2)*.
Standards/Ratings	CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14. UL Marine Listed for use on ships/vessels greater than 65 ft long where ignition protection is not required.

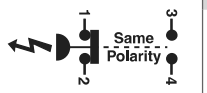
Temperature Ratings		**Minimum**	**Maximum**
Ambient		-23 °C (-10 °F)	+85 °C (+185 °F)
Media	Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)
	Piston	-26 °C (-15 °F)	
	All with Form Q4	-26 °C (-15 °F)	

Operating Curves

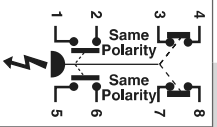


Contact Blocks

1 N.O., 1 N.C.

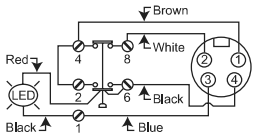


2 N.O., 2 N.C.

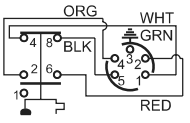


Connection

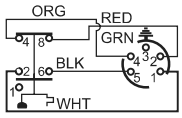
Form H17



Form H10



Form H11



SPDT snap switches contain two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.
DPDT snap switches contain two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.

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

(1) The differential adds to the range setting and determines the operating point on rising pressure.
(2) To order a Pg13.5 electrical conduit entry and a 1/4"-19 BSP pressure connection, add M12 to the end of the commercial reference, 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 and 1/4"-19 BSP pressure connection
9012GAWM1M12 = Pg13.5 electrical conduit entry and 1/4"-19 BSP pressure connection

Photo-electric sensors

XUM, general purpose, single mode function
Miniature design, plastic
Three-wire DC, solid-state output
Potentiometer setting for NO/NC, sensitivity

9012GAR4

Adjustable Differential
NEMA 7 & 9 Enclosure, Class I & II, Division 1 & 2, Groups C, D, E, F, G
UL Listed as Industrial Control Equipment

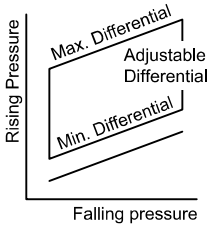
Range on Decreasing Pressure, psig	Adjustable Differential *(1)* Approximate at Mid Range	Maximum Allowable Pressure, psig	Class 9012 Type SPDT	DPDT
Diaphragm Actuated—Nitrile Diaphragm, Zinc Plated Steel Housing				
1.5-75	8-15	240	**9012GAR4**	**9012GAR24**
3-150	16-30	475	**9012GAR5**	**9012GAR25**
5-250	23-49	750	**9012GAR6**	–
13-425	36-82	850	**9012GBR1**	–
Piston Actuated—#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring				
90-2900	281-560	15,000	**9012GCR2**	–
170-5600	638-1050	20,000	**9012GCR3**	–

Specifications

Fluids Controlled	Air, water, hydraulic oils, gases, steam (depending on the model)
Pressure Connection	1/4"-18 NPTF (standard) or 1/2"-14 NPT. See page 75.
Weight (approximate)	10 lb (4.54 kg)
Voltage Limits	600 V
Continuous Current	10 A
Electrical Connections	1/2"-14 NPTF, 3/4"-14 NPTF
Standards/Ratings	CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14. UL Marine Listed for use on vessels longer than 65 ft where ignition protection is required.

Temperature Ratings		**Minimum**	**Maximum**
Ambient		-23 °C (-10 °F)	+85 °C (+185 °F)
Media	Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)
	Piston	-26 °C (-15 °F)	
	All with Form Q4	-26 °C (-15 °F)	

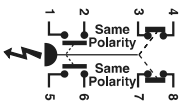
Operating Curves



Contact Blocks

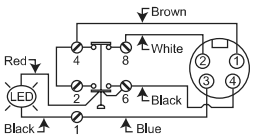
1 N.O.,1 N.C.

2 N.O., 2 N.C.

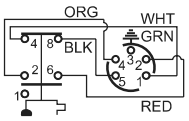


Connection

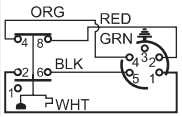
Form H17



Form H10



Form H11



SPDT snap switches contain two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.
DPDT snap switches contain two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.

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

(1) The differential adds to the range setting and determines the operating point on rising pressure.

UL LISTED
Listed G•W, G•O, G•G
Listed Haz. Loc., G•R
Listed Marine Use, G•W

CSA CERTIFIED
Certified Class 3211-03 G•W, G•O, G•G
Certified Class 3218-02 G•R

CE

UKCA

9012G and 9016G industrial pressure and vacuum switches

9012G pressure switches for differential-pressure operation

9012GJW1

Differential-Pressure Operation

Pressure switches for differential-pressure operation are used to monitor the change in the difference between two pressures. The 9012G differential-pressure switches are unidirectional devices and 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 be used in applications to signal that a predetermined pressure difference has been reached as a result of a narrowing or decreasing difference between the two pressures.

NEMA 4, 4X, and 13 devices are suitable for use in Class I, Division 2, Groups A, B, C, and D hazardous locations or nonhazardous locations only.

Adjustable differential
NEMA 4, 4X, 13 Enclosures
UL Listed and CSA Certified as Industrial Control Equipment

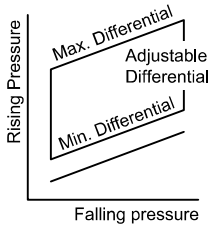
Working Pressure Range on decreasing X (upper) actuator	Adjustable Difference on Decreasing Pressure (Adds to working pressure) Y (lower) actuator	Adjustable Differential Actuates on increasing pressure (adds to adjustable difference)	Maximum Allowable Pressure	Class 9012 Type	
				SPDT	DPDT
Diaphragm Actuated—Nitrile Diaphragm, Zinc Plated Steel Housing					
0-75	0.25-10	1-2	100	**9012GGW1**	**9012GGW21**
0-175	0.5-36	5.6-15	240	**9012GGW4**	**9012GGW24**
0-500	3-175	26-90	850	**9012GHW1**	**9012GHW21**

Specifications

Fluids Controlled	Air, water, hydraulic oils, gases, steam (depending on the model)
Pressure Connection	1/4"-18 NPTF is standard. For metric threads (G1/4 BSP female pressure connection and M20 electrical connection), add M after the W in the commercial reference. For other options, see page 75 *(1)*.
Weight (approximate)	3 lb (1.36 kg)
Voltage Limits	600 V
Continuous Current	10 A
Electrical Connections	1/2"-14 NPTF (standard), For Pg 13.5, or ISO M20, see footnote *(2)* on page 72.
Standards/Ratings	CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14. UL Marine Listed for use on vessels greater than 65 ft long where ignition protection is not required.

Temperature Ratings		Minimum	Maximum
Ambient		-23 °C (-10 °F)	+85 °C (+185 °F)
Media	Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)
	Piston	-26 °C (-15 °F)	
	All with Form Q4	-26 °C (-15 °F)	

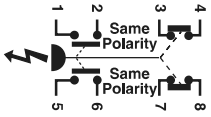
Operating Curves



Contact Blocks

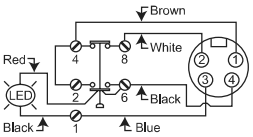
1 N.O., 1 N.C.

2 N.O., 2 N.C.

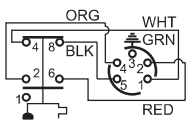


Connection

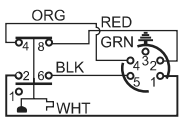
Form H17



Form H10



Form H11



SPDT snap switches contain two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.
DPDT snap switches contain two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.

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

UL LISTED — Listed Marine Use

CSA CERTIFIED — Certified Class 3211-03

CE

UKCA

9012G and 9016G industrial pressure and vacuum switches

9012G dual-stage pressure switches

9012GKW2

Dual-Stage Operation

The 9012G 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 shutdowns. The spread between the two stages is adjustable, but the differential between the high (rising) and low (falling) operating points of each stage is fixed.

NEMA 4, 4X, and 13 devices are suitable for use in Class I, Division 2, Groups A, B, C, and D hazardous locations or nonhazardous locations only.

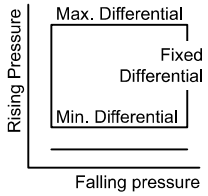
Fixed Differential
NEMA 4, 4X, 13 Enclosure
UL Listed and CSA Certified as Industrial Control Equipment

Range Setting Pressure limits between which Stage 1 can be adjusted to operate on decreasing pressure	Adjustable Spread Add to the range setting to obtain the decreasing operating point of Stage 2	Fixed Differential Add to the low operating point to obtain the approximate high operating point for each stage		Maximum Allowable Pressure	SPDT Each Stage Type
		Stage 1	Stage 2		
Diaphragm Actuated—Nitrile Diaphragm, Zinc Plated Steel Housing					
1-40	4.4-20	4.0 ± 1.0	6.0 ± 1.5	100	**9012GKW2**
1.5-75	6.6-30	6.0 ± 1.5	8.0 ± 2.0	240	**9012GKW4**
3-150	13.2-75	8.0 ± 2.0	12 ± 3	475	**9012GKW5**
5-250	24.2-110	14 ± 3	21 ± 5	750	**9012GKW6**
Piston Actuated—#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring					
90-2900	176-800	140 ± 30	210 ± 52	15,000	**9012GMW2**
170-5600	360-1700	275 ± 60	400 ± 100	20,000	**9012GMW3**

Specifications

Fluids Controlled		Air, water, hydraulic oils, gases, steam (depending on the model)	
Pressure Connection		1/4"-18 NPTF is standard. For metric threads, add M after the W on all types. Other options are available (see page 75). *(1)*	
Weight (approximate)		3 lb (1.36 kg)	
Voltage Limits		600 V	
Continuous Current		10 A	
Electrical Connections		1/2"-14 NPTF (standard), For Pg 13.5, or ISO M20, see footnote *(2)* on page 7.	
Standards/Ratings		CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14. UL Marine Listed for use on vessels greater than 65 ft long where ignition protection is not required.	
Temperature Ratings		**Minimum**	**Maximum**
Ambient		-23 °C (-10 °F)	+85 °C (+185 °F)
Media	Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)
	Piston	-26 °C (-15 °F)	
	All with Form Q4	-26 °C (-15 °F)	

Operating Curves



Contact Blocks

1 N.O., 1 N.C.

Acceptable Wire Sizes:
12-22 AWG

Recommended Terminal Clamp Torque:
7 lb-in

UL LISTED — Listed Marine Use

CSA CERTIFIED — Certified Class 3211-03

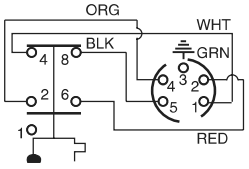
CE

UKCA

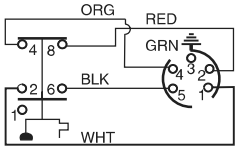
Wiring Diagrams for Receptacles and Connectors. Factory Modifications (Forms).

Prewired 5-pin male receptacle

Form H10

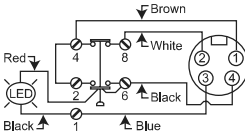


Form H11



Micro connector, 4-pin, for 24 Vdc pilot light

Form H17



Modifications, Renewal Parts, and Accessories

9012G Machine Tool Factory Modifications (Forms)

Modification		Applies to		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 and GAWM-GFWM	clear lens	G17
			red lens	G18
24 Vdc only LED		For pilot light conversion kits: See 9998PC306-308	clear lens	G21
			red lens	G22
24 Vdc LED pilot light with green lens		Class 9012 GAW-GMW and GAWM-GFWM, or Class 9016 GAW		G23
SPDT snap switch rated 1.1 A at 125 Vdc (minimum differential doubles)		Available on GAR-GFR, GAW-GJW, and GAWM-GFWM		H3
Prewired 5-pin male receptacle: Brad Harrison #41310 or interchangeable Crouse-Hinds receptacle at our convenience. For use with Brad Harrison female portable plug #41306, 41307, 41308 or equal		Available on GAW-GJW single pole devices only. **See wiring diagrams on page** 80**.**		H10 or H11
Micro connector, 4-pin, for 24 Vdc pilot light (see diagram on page 80)		G•W (single pole only), except GAW2 and Form B2.		H17
External range adjustment with range scale window	With knob	GAW-GFW, GAWM-GFWM, and GKW-GMW		K
	Slotted for screwdriver	GAW-GFW, GAWM-GFWM, and GKW-GMW		K1
Pg 13.5 conduit thread and 1/4"-19 BSP pressure connection		GAW-GFW and GKW-GMW		M12
#316 stainless steel flange	Standard nitrile diaphragm	GAR, GBR, GDR, GER, GAW, GBW, GDW, GEW, GGW, GHW, GAWM, GBWM, GDWM, GEWM, GKW, GLW, except Types 1 and 21		Q1
	Ethylene propylene diaphragm	Available on all GGW, GHW except GGW-1, 21. Available on all GAR, GBR, GDR, GER, GAW, GBW, GDW, GEW, GAWM, GBWM, GDWM, GEWM, GKW, GLW, except Types 1 and 21		Q3
	Viton® fluorocarbon diaphragm	GAR, GAW, GBR, GBW, GDR, GDW, GER, GEW, GGW, GHW, GAWM, GBWM, GDWM, GEWM, GKW, GLW, except Types 1 and 21		Q4
Range scale window (standard with Forms K and K1)		GAW-GMW, GAWM-GFWM		V1
Special factory setting specified (If indicating only one special setting, specify whether this setting is on increasing or decreasing pressure.)		All 9012G		Y1
Pressure connection	1/4"-18 NPT external thread	GAR, GAW, GDR, GDW, GGW, GKW		Z
Not available in combination with Forms Q1, Q3, Q4	1/2"-14 NPT external thread, 1/4"-18 NPTF internal thread	GAR, GAW, GDR, GDW, GGW, GKW		Z16
	7/16"-20 UNF-2B internal thread	GAR-GFR; GAW-GMW		Z18

9012G Pressure Switches, Factory Modifications (Forms) for Renewal Parts Kits, Class 9998

For suffixes for renewal parts kits, see the table below.

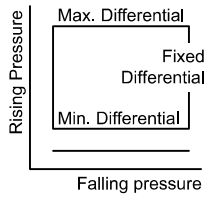
Modification		Applies to Parts Kit Type	Form
SPDT snap switch rated 1.1 A at 125 Vdc (minimum differential doubles)		PC313	H3
#316 stainless steel flange	Standard nitrile diaphragm	PC177-179, PC268, 269	Q1
		PC265-267	
	Ethylene propylene diaphragm	PC177-178, PC268, 269	Q3
		PC266, 267	
	Viton® fluorocarbon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

9012G and 9016G industrial pressure and vacuum switches

9012G industrial pressure switches

9012GRG5

Fixed Differential Open Type or NEMA 1 Enclosure UL Listed and CSA Certified as Industrial Control Equipment				
Range on Decreasing Pressure, psig	**Approximate Differential** *(1)* **At Mid Range, psig**	**Maximum Allowable Pressure, psig**	**Class 9012 Type**	
			Open Type	**NEMA 1**
Diaphragm Actuated—Nitrile Diaphragm, Zinc Plated Steel Housing				
1.5-75	2.2 ± 0.4	240	**9012GRO4**	**9012GRG4**
3-150	4.2 ± 1	475	–	**9012GRG5**
Piston Actuated—#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-Ring, Teflon® Retaining Ring				
20-1000	49 ± 10	10,000	–	**9012GTG1**

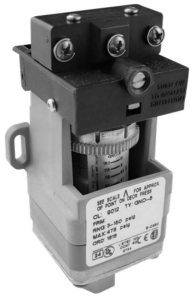
Specifications			
Fluids Controlled	Air, water, hydraulic oils, gases, steam (depending on the model)		
Pressure Connection	1/4"-18 NPTF (standard), 1/2"-14 NPT, or 7/16"-20 UNF-2B. See Forms table on page 77.		
Weight (approximate)	**Type 1**: 2 lb (0.91 kg); **Open**: 1.7 lb (0.77)		
Voltage Limits	600 V		
Continuous Current	10 A		
Electrical Connections	1/2" conduit entry, unthreaded		
Standards/Ratings	CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14		
Temperature Ratings	**Minimum**	**Maximum**	
Ambient	-23 °C (-10 °F)	+85 °C (+185 °F)	
Media Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)	
Piston	-26 °C (-15 °F)		
All with Form Q4	-26 °C (-15 °F)		
Operating Curves	**Contact Blocks**		
	**SPDT** **Form C contacts** 	**Acceptable Wire Sizes:** 12-22 AWG **Recommended Terminal Clamp Torque:** 7 lb-in	

(1) Determines the operating point on rising pressure.

Certified Class 3211-03

9012G and 9016G industrial pressure and vacuum switches

9012G industrial pressure switches



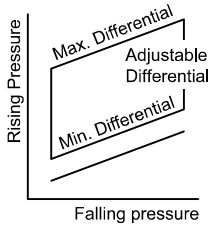
9012GNO5

9012GNG1

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 *(1)* Differential** (adds to the decreasing set point)	**Maximum Allowable Pressure psig**	**Class 9012 Type**	
			Open Type	**NEMA 1**
Diaphragm Actuated—Nitrile Diaphragm, Zinc Plated Steel Housing				
0.2-10	0.6-1.0	100	–	**9012GNG1**
1-40	1.6-5.0	100	–	**9012GNG3**
1.5-75	2.5-6.5	240	**9012GNO4**	**9012GNG4**
3-150	4.8-13	475	**9012GNO5**	**9012GNG5**
5-250	8.5-20.5	750	**9012GNO6**	**9012GNG6**
13-425	20-41	850	–	**9012GPG1**
20-675	35-66	2000	–	**9012GPG2**
Piston Actuated—#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-Ring, Teflon® Retaining Ring				
20-1000	56-98	10,000	–	**9012GQG1**
90-2900	162-308	15,000	–	**9012GQG2**
170-5600	355-563	20,000	–	**9012GQG3**

Specifications		
Fluids Controlled	Air, water, hydraulic oils, gases, steam (depending on the model)	
Pressure Connection	1/4"-18 NPTF (standard), G1/4 (BSP) female, or 1/2"-14 NPT. See Forms in the table below.	
Weight (approximate)	**Type 1**: 2 lb (0.91 kg); **Open**: 1.7 lb (0.77)	
Voltage Limits	600 V	
Continuous Current	10 A	
Electrical Connections	1/2" conduit entry, unthreaded	
Standards/Ratings	CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14	
Temperature Ratings	**Minimum**	**Maximum**
Ambient	-23 °C (-10 °F)	+85 °C (+185 °F)
Media Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)
Media Piston	-26 °C (-15 °F)	
Media All with Form Q4	-26 °C (-15 °F)	

Operating Curves



Contact Blocks

SPDT Form C contacts

Acceptable Wire Sizes:
12-22 AWG

Recommended Terminal Clamp Torque:
7 lb-in

(1) Determines the operating point on rising pressure.

Factory Modifications (Forms) for 9012G Pressure Switches, Open Type or NEMA 1 UL Listed and CSA Certified as Industrial Control Equipment			
Modification		**Applies to**	**Form**
Diaphragm	Standard Nitrile in #316 stainless steel housing	GNG, GNO, GPG, GPO, GRG, GRO, GSG, GSO	Q1
	Ethylene propylene in #316 stainless steel housing	Not available on GNG, GNO, GRG, GRO1. Available on all other GNG, GNO, GPG, GPO, GRG, GRO, GSG, GSO	Q3
	Viton® fluorocarbon in #316 stainless steel housing	GNG, GNO, GPG, GPO, GRG, GRO, GSG, GSO	Q4
Pressure connection	1/4"-18 NPT external thread	GNG, GNO, GRG, GRO	Z
	1/2"-14 NPT external thread, 1/4"-18 NPTF internal thread. Standard actuator only.	GNG, GNO, GRG, GRO	Z16
	7/16"-20 UNF-2B internal thread	GNG, GNO, GPG, GPO, GQG, GQO, GRG, GRO, GSG, GSO, GTG, GTO	Z18

9012G and 9016G industrial pressure and vacuum switches

9016G vacuum switches

Control applications

9016GAW2

9016GAW Switches for Sensitive Control Applications

9016GAW vacuum switches have double throw contacts. Normally open and normally closed circuits allow the use of these controls for standard or reverse action applications.

Standard controls can be mounted from the front using the bracket provided. Two mounting screws are required for firm attachment to any smooth, flat surface. Allowance must be made for flange projection.

Controls with the Form F modification include two mounting feet with 9/32" mounting holes on 3-3/4 in. centers. The Range and Differential adjustments are accessed by removing the front cover.

- Maximum allowable positive pressure: 100 psig.
- Diaphragms are oil resisting, nitrile butadiene rubber (Buna-N).
- For electrical ratings and temperature limitations, see table on page 68.
- For dimensions and modifications, see page 80.

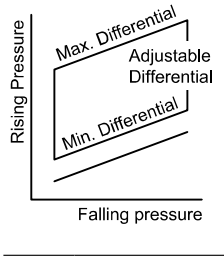
9016GAW Vacuum Switch for Control Applications, Diaphragm Actuated

Range on Decreasing Vacuum (inHg)	Adjustable Differential (inHg) Adds to Range *(1)*		Contact Arrangement	Pipe Tap (NPTF)	Class 9016 Type NEMA Enclosure Type 4, 4X & 13
	@ Minimum Range	@ Mid-Range			
0-28.7	0.8-9	1.3-7.4	1 N.O.-1 N.C.	1/4"-18	**9016GAW1**
0-25	5-20	5-20	1 N.O.-1 N.C.	1/4"-18	**9016GAW2**
0-28.3	1-9	1.7-7.4	2 N.O.-2 N.C.	1/4"-18	**9016GAW21**
0-25	5-20	5-20	2 N.O.-2 N.C.	1/4"-18	**9016GAW22**

Specifications

Fluids Controlled	Air, water, hydraulic oils, gases, steam (depending on the model)		
Pressure Connection	**NEMA 4, 4X & 13**: 1/4"-18 NPTF (standard), G1/4 (BSP) female, or 1/2"-14 NPT. See Forms table on page 80. **NEMA 7 & 9**: 1/4" NPTF		
Weight (approximate)	Type 4, 4X, and 13: 3 lb (1.36 kg); Type 7 & 9: 10 lb (4.54 kg)		
Voltage Limits	600 V		
Continuous Current	10 A		
Electrical Connections	**NEMA 4, 4X & 13**: 1/2"-14 NPTF **NEMA 7 & 9**: 3/4"-14 NPTF		
Standards/Ratings	CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14		
Temperature Ratings	**Minimum**		**Maximum**
Ambient	-23 °C (-10 °F)		+85 °C (+185 °F)
Media Diaphragm	-40 °C (-40 °F)		+120 °C (+250 °F)
Media Piston	-26 °C (-15 °F)		
Media All with Form Q4	-26 °C (-15 °F)		

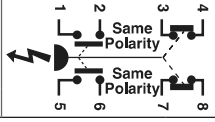
Operating Curves



Contact Blocks

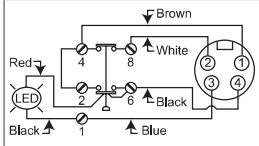
1 N.O., 1 N.C.

2 N.O., 2 N.C.

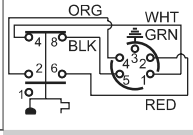


Connection

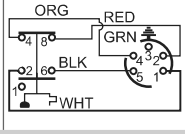
Form H17



Form H10



Form H11



SPDT snap switches contain two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.
DPDT snap switches contain two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double-break contact elements (1 N.O., 1 N.C.) that must be used on circuits of the same polarity.

Acceptable Wire Sizes:	12-22 AWG	**Recommended Terminal Clamp Torque:**

(1) Add the Differential to the Range to obtain the operating point on increasing vacuum (within vacuum limitations). The differential increases linearly over the range. The minimum differential doubles with NEMA 7 & 9 enclosures.

UL LISTED — Listed Marine Use

CSA CERTIFIED — Certified Class 3211-06

CE

UKCA

9012G and 9016G industrial pressure and vacuum switches

9016G vacuum switches
Power applications

9016GVG1J09E

9016GVG1J10F

9016GVG Power Switches

The 9016GVG1 is designed as a companion to the 9036GG float switches in common use on vacuum heating pumps. Electrical ratings of float and vacuum switch types are equal.

For dimensions and modifications, see page 80.

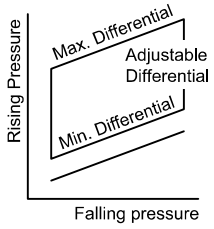
9016GVG Vacuum Switch for Power Applications
NEMA 1 Enclosure
Contacts Open on Increasing Vacuum

Cut-Out Range, inHg	Approximate Adjustable Differential, inHg	Cut-In Range, inHg	Poles	Pressure Connection	Vacuum Setting, inHg	NEMA 1 Enclosure Class 9016 Type *(1)*
5-25	5-10 inHg	0-20	2	1/4"-18 NPSF	3-8	**9016GVG1J09●**
					16.5-25	**9016GVG1J10●**
					17-22	**9016GVG1J11●**
					18-23	**9016GVG1J12●**
					20-25	**9016GVG1J13●**
					Specify other vacuum (minimum order quantity: 4 pieces)	**9016GVG1J99●**

Specifications

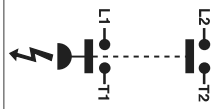
Fluids Controlled		Air, water, hydraulic oils, gases, steam (depending on the model)	
Pressure Connection		1/4"-18 NPTF (standard), G1/4 (BSP) female, or 1/2"-14 NPT. See Forms table, page 83.	
Max. Allowable Positive Pressure		100 psig	
Weight (approximate)		2 lb (0.91)	
Voltage Limits		600 V	
Continuous Current		10 A	
Electrical Connections		3 knockouts for 1/2" conduit	
Standards/Ratings		CE, UKCA, IEC 60947.4.1, UL 508, CSA C22-2 n°14	
Temperature Ratings		**Minimum**	**Maximum**
Ambient		-23 °C (-10 °F)	+85 °C (+185 °F)
Media	Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)
	Piston	-26 °C (-15 °F)	
	All with Form Q4	-26 °C (-15 °F)	

Operating Curves



Contact Blocks

DPST



Acceptable Wire Sizes:
8-14 AWG
Recommended Terminal Clamp Torque:
22-27 lb-in

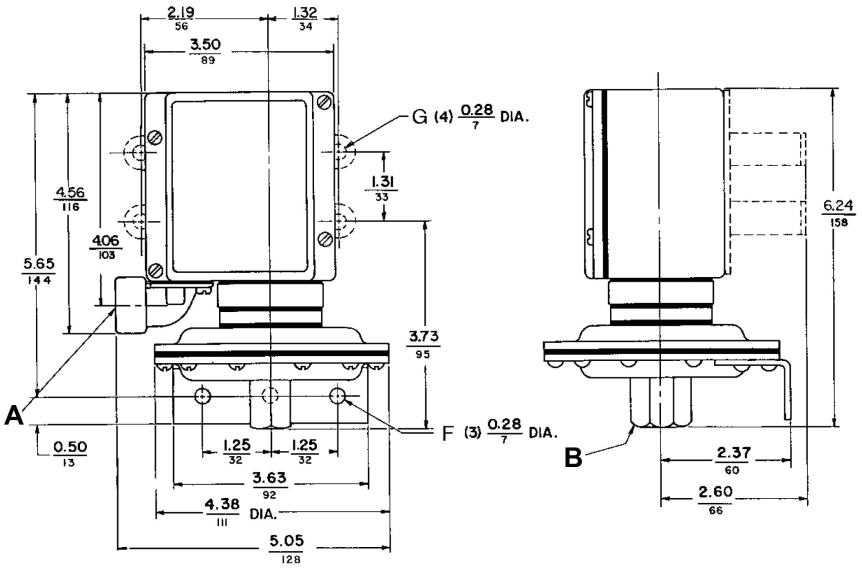
For other ratings and specifications, see page 68.

(1) Available Modifications for 9016GVG Vacuum Switches

Description	Form
3-way lever plus nameplate with marking: *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 in. male pipe connection (1/4"-18 NPT, external thread) (for retrofit, use 1/4" pipe nipple)	Z

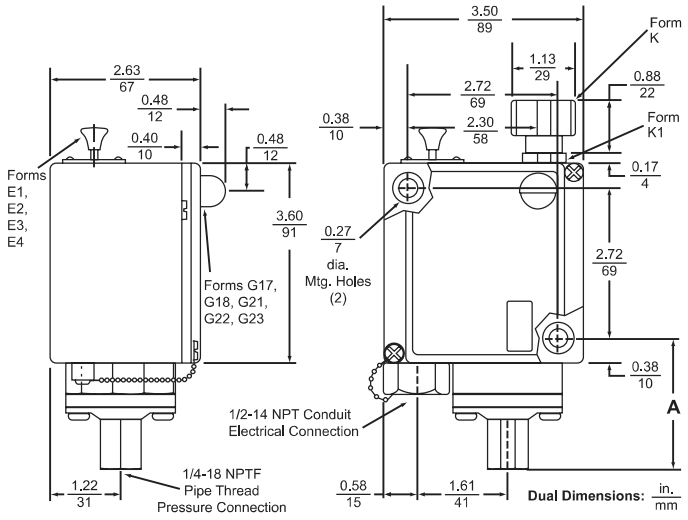
Machine Tool Pressure Switch Dimensions

9012GAW, GDW, GKW 1, 21



A: Conduit connection: G•W = 1/2-14 NPT; G•WM = 20mm BS4568, Form M12 = Pg13.5; DIN40430.
B: 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.

9012GAW, GBW, GCW, GDW, GEW, GFW, GKW, GLW, and GMW (except GAW, GDW, GKW 1, 21)

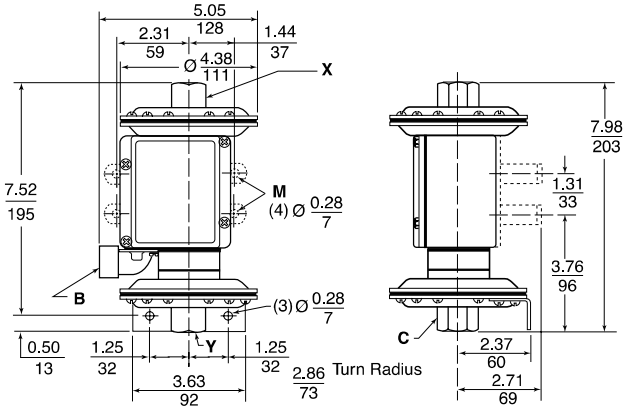


Type	Dimension A, in. (mm)
GAW, GDW, GKW 2, 4, 5, 6, 22, 24, 25, 26	2.33 (59)
GBW, GEW, GLW 1, 2, 21	2.23 (57)
GCW, GFW, GMW 1, 2, 3, 4, 21,. 22, 23, 24	3.15 (80)

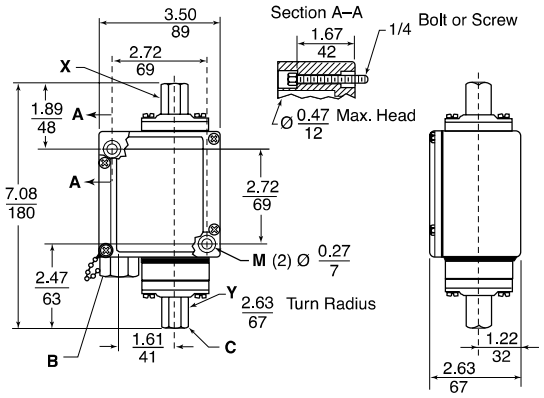
NOTE: Dimensions change with metric thread.
For flange and mounting bracket dimensions for low pressure device, see figure on page 83.

9012GGW, GHW, GJW (Differential-Pressure)

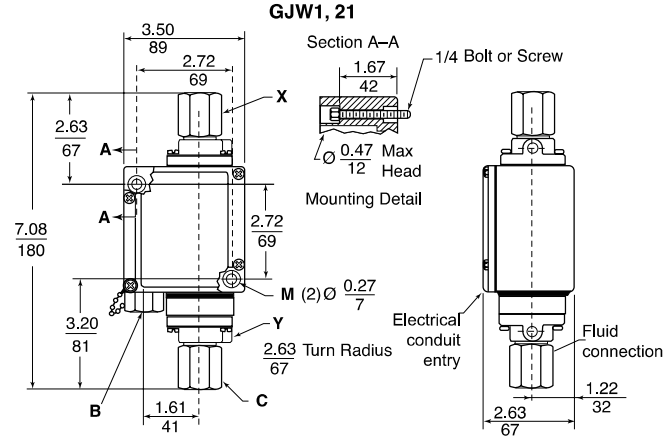
GGW1, 21



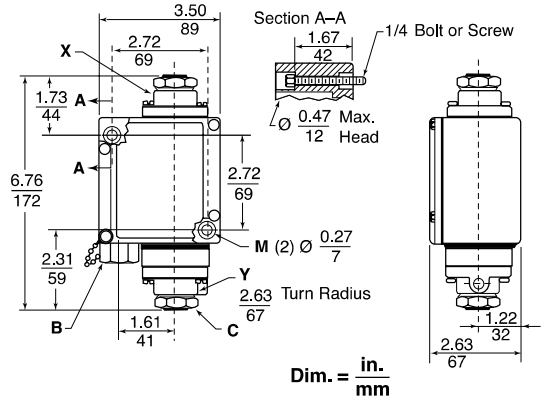
GGW4, 24



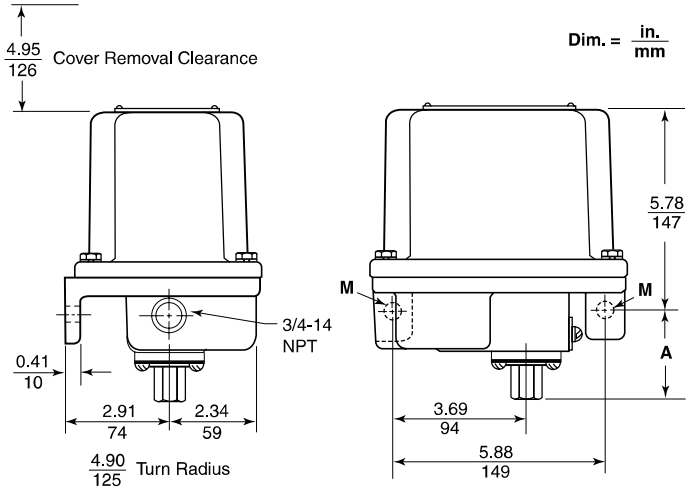
GJW1, 21



GHW1, 21



9012GAR, GBR, GCR, GDR, GER, and GFR

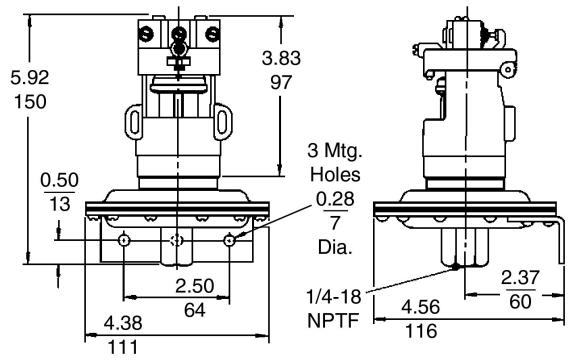


Dimension A for 9016G•R Switches	
Type	**Dimension A, in. (mm)**
GAR4, 5, 6, 24, 25, 26	1.42 (36)
GBR1, 2, 21, 22; GCR1, 21	1.32 (34)
GCR2, 3, 4, 22, 23, 24	2.24 (57)
GDR1, 2, 21, 22	2.02 (56)
GDR4, 5, 6, 24, 25, 26	1.42 (36)
GER1, 2, 21, 22; GFR1, 21	1.32 (34)
GFR2, 3, 4, 22, 23, 24	2.24 (57)

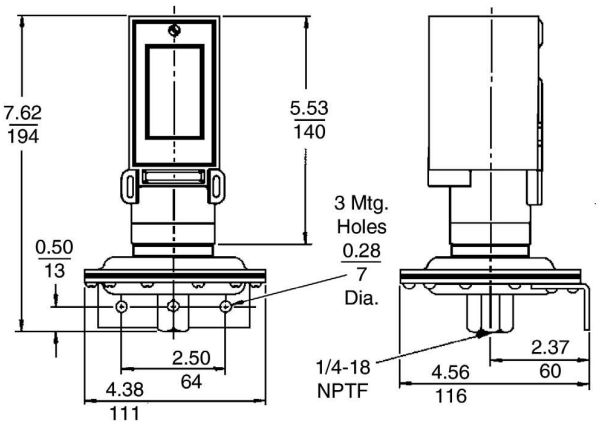
9012G and 9016G industrial pressure and vacuum switches

9012G pressure switches

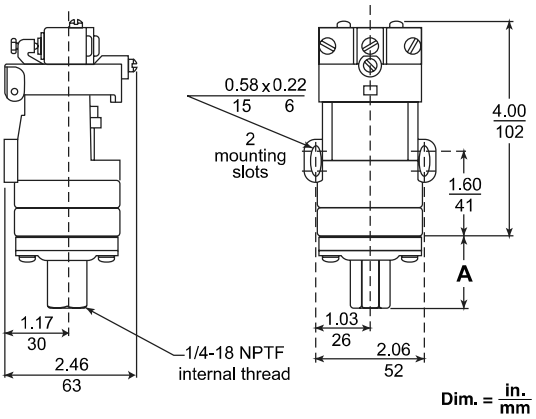
9012GNO1, GRO1



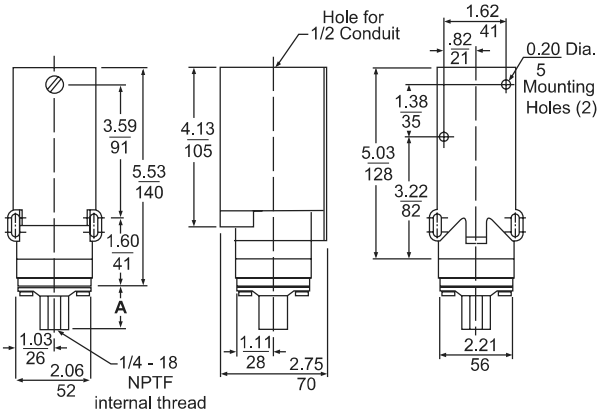
9012GNG1, GRG1



9012GNO, GRO



9012GNG, GPG, GQG, GRG, GSG, and GTG



Dimension A for 9012G●O Switches

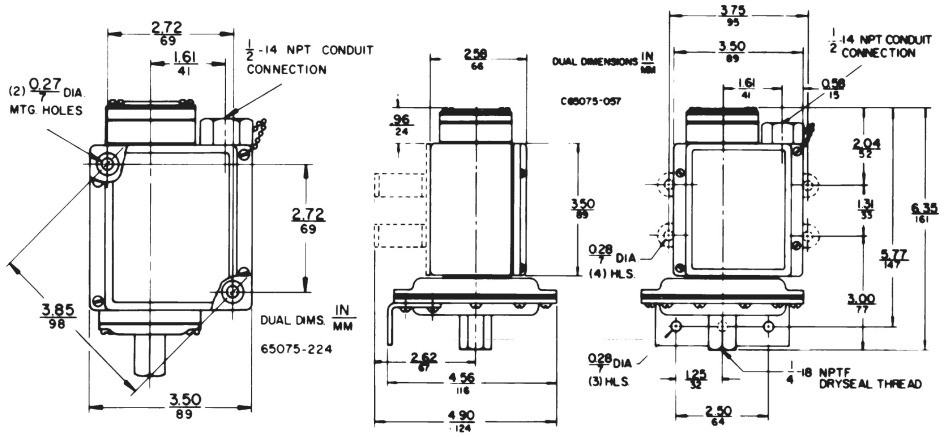
9012	Dimension A, in. (mm)
GNO, GRO 3, 4, 5, 6	1.41 (36)
GPO, GSO 1, 2, 3	1.31 (33)
GQO, GTO 1, 2, 3, 4	2.24 (57)

Dimension A for 9012G•G Switches

9012	Dimension A, in. (mm)
GNG, GRG 3, 4, 5, 6	1.41 (36)
GPG, GSG 1, 2, 3	1.31 (33)
GQG, GTG 1, 2, 3, 4	2.24 (57)

Vacuum Switch Dimensions and Modifications

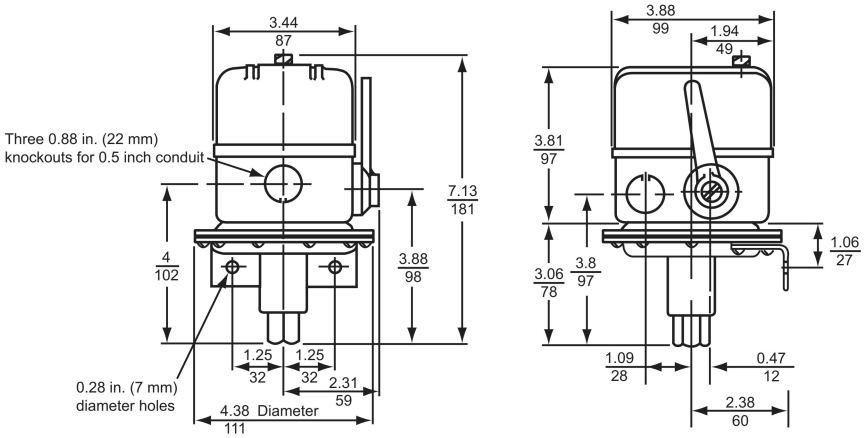
9016GAW Control Vacuum Switches—Dimensions



9016GAW Vacuum Switches—Available Modifications

Description	Form
Mounting feet (GAW 1, 21 only)	F
Viton® diaphragm with #316 stainless steel flange	Q4
Range scale window (standard with Forms K and K1)	V1
Special setting specified (If indicating only one special setting, specify whether this setting is on increasing or decreasing pressure.)	Y1
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

9016GVG Power Vacuum Switches-Dimensions



9016GVG Vacuum Switches-Available Modifications

Description	Form
3-way lever plus nameplate with marking: 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 in. male pipe connection (1/4"-18 NPT, external thread) (for retrofit, use 1/4" pipe nipple)	Z