

Mechanical Pressure Products



- ▶ Electronic Products
- ▶ Pressure Transducers
- ▶ **Mechanical Pressure Products**
- ▶ Valves & Regulators
- ▶ Temperature Products
- ▶ Level Products
- ▶ Air Suspension Valves

Barksdale®
CONTROL PRODUCTS

Barksdale - the total control solutions partner

At Barksdale, our goal is to help our customers “Control Every Move”. For us, this isn’t simply a motto, but rather a vision that guides the way we do business with our valued customers. At every stage in the process from needs assessment, design and manufacturing to customer support, we provide peace of mind by delivering a total controls solution tailored to meet the specific needs of each customer. We accomplish this by leveraging the following:

A **Highly Experienced Team** of engineers that work closely with customers to meet, exceed and even anticipate their every control need.

A **Diverse Product Portfolio** of quality standard and custom-tailored product solutions that help control Pressure, Temperature, Level and Flow in the most demanding applications in the industry.

Our **Global Reach and Support** via our:

Worldwide direct sales force of experts

Manufacturing facilities in North America and Europe

Team of highly capable and friendly customer support staff that make it easy to do business with Barksdale anywhere in the world

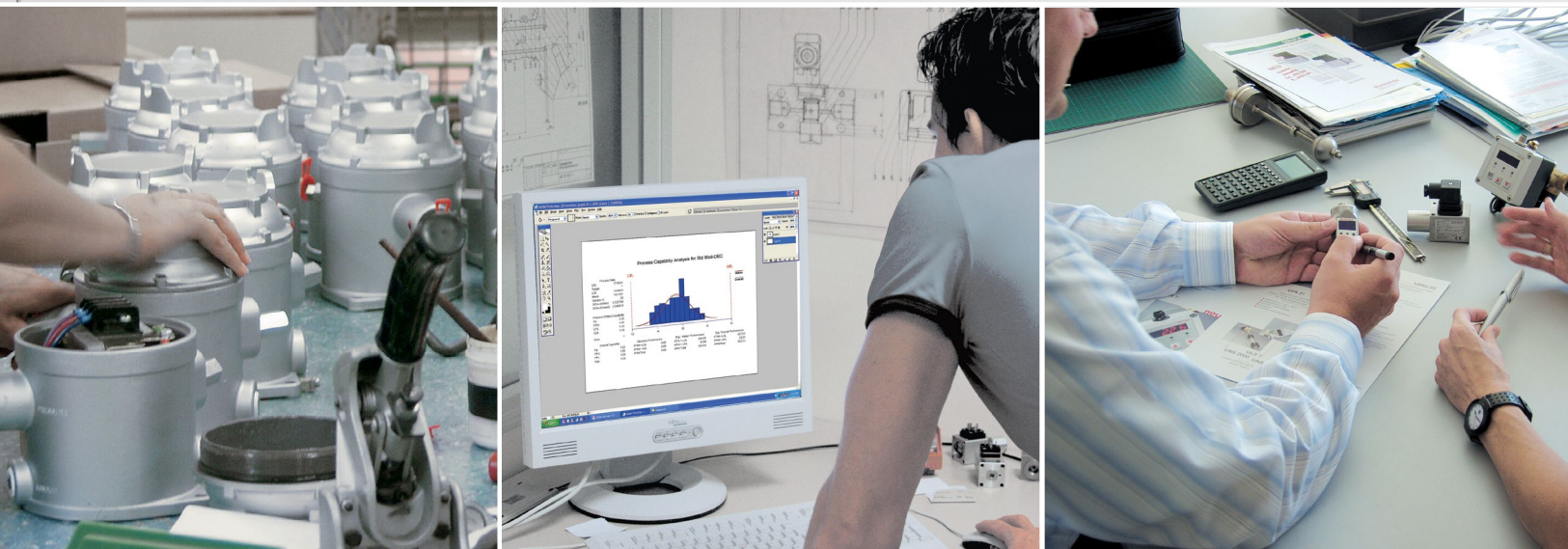
Dedicated Tools & Processes

Production Part Approval Process (PPAP) to satisfy the most stringent quality control requirements

Compliance with ISO 9001:2000 standards

ATEX / IECx compliant facilities

6 Sigma culture / Process Capability



Barksdale®

CONTROL PRODUCTS

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How to Select a Pressure Switch for your Application

STEP 1 - SERVICE LIFE OF THE SWITCH

Expected service life is the first consideration to be made in selecting a pressure switch, regardless of the pressure or sensitivity desired. If the service life (the number of cycles the switch is expected to operate) is one million or less, use of either a bourdon tube or diaphragm switch is indicated. If a service life of more than one million cycles is desired, a piston switch should be used. An exception to this rule may be made when pressure change in a system is very slight (20% or less, of the adjustable range). Under such conditions a bourdon tube or diaphragm switch can be used up to 2.5 million cycles before metal fatigue.

A second consideration in choosing a pressure switch is the speed of cycling, regardless of the service life. If a switch is expected to cycle more than once every three seconds, a piston type switch should be specified. The metal of any bourdon tube or diaphragm acts as a spring which will heat and fatigue in extremely fast cycling operations, thus shortening the life of the switch.

The media to be controlled must always be considered when selecting a pressure switch and, to simplify selection, wetted materials for each type of switch are noted on applicable catalog pages.

STEP 2 - PROOF PRESSURES

Choice of the type of pressure switch to be used - diaphragm, bourdon tube or piston - also must be governed by the proof pressure to which it will be subjected. (Proof pressure is the highest surge pressure that will ever be experienced in a system.) It must be remembered that, although a pressure gauge may register a constant operating pressure, there may be surges going through a system that are dampened out by the orifice in the gauge. Diaphragm and bourdon tube pressure switches are extremely sensitive and would be affected by those surges. Barksdale diaphragm switches are available in an adjustable range from vacuum to 150 psi with proof pressures to 300 psi. Barksdale bourdon tube switches are adjustable to 18,000 psi with proof pressures of 24,000 psi. Barksdale piston switches have an adjustable range to 12,000 psi with a proof pressure of 20,000 psi.

STEP 3 - FUNCTION OF THE SWITCH

The function of the switch is another determining factor in making a selection. Three types of Barksdale pressure switches, based on function, are described below:

(1) Single setting pressure switches sense a single pressure source and open or close a single electrical circuit by means of one snap action electrical switch.

(2) Pressure difference switches sense a change in relationship between two variable contained pressures and open or close a single electrical circuit by means of one snap action electrical switch.

(3) Dual control pressure switches sense two pressure limits from a single pressure source and open or close two independent electrical circuits by means of two snap action electrical switches.

STEP 4 - TYPES OF HOUSING AVAILABLE

Stripped pressure switches are basic Barksdale pressure switch units without housings. They may be used wherever electrical enclosures are already available and are favored by original equipment manufacturers for use in common cabinets. Naturally, stripped switches may be purchased at a lower cost.

Housed pressure switches are completely enclosed to avoid possible hazard from loose wires in exposed locations.

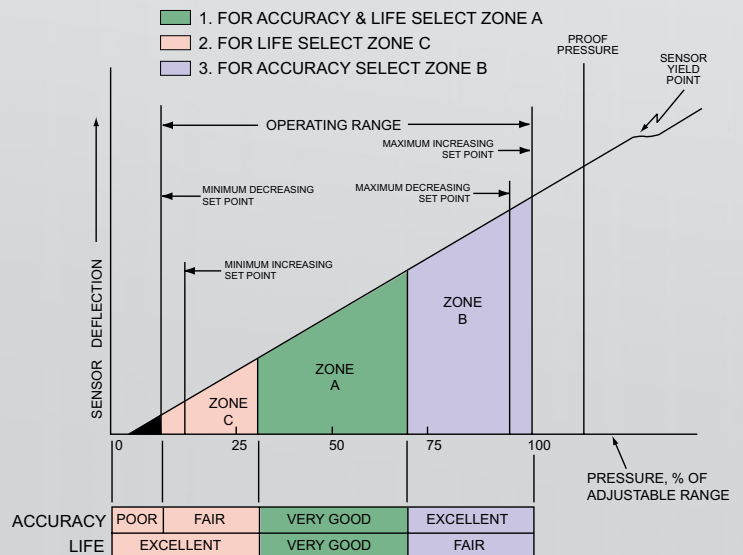
Terminal block pressure switches are housed and, in addition, are equipped with enclosed terminal blocks, thus eliminating the expense of buying and installing external junction boxes.

Explosion proof pressure switches are designed with heavy housings built to conform to accepted electrical standards in isolating the units from explosive atmosphere. All explosion proof models are equipped with terminal blocks for convenience in wiring.

STEP 5 - SELECTION OF ADJUSTABLE RANGE

The term "working range" defines the pressure range a switch may see under normal working conditions. This is normally the adjustable range.

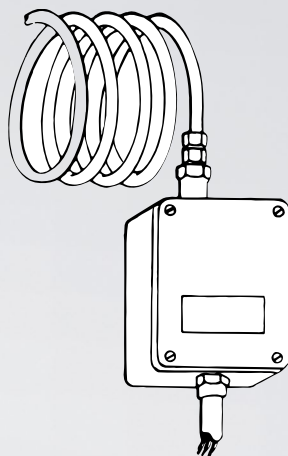
For greatest accuracy, the set point should fall in the upper 65% of the adjustable range. For the most favorable life factor, the set point should be in the lower 65% of the adjustable range. Therefore, the most favorable combination of accuracy and life factor lies in the middle 30% of the adjustable range (see diagram). This general rule applies both to diaphragm and bourdon tube pressure switches.



General Operating, Engineering & Service Data

Steam Service

Only diaphragm and bourdon tube switches are suitable for steam service. Install pressure switch with pressure fitting up; preferably with two or three 4" to 8" coiling loops in the pressure line to serve as heat exchangers and to form a static water head as buffer to the steam temperature. Dia-Seal type switches may be used if fittings are stainless steel, polysulfone or nickel-plated.



Chemical Protectors

Many Barksdale pressure switches can be used in conjunction with liquid filled chemical protectors: Contact factory.

1. The DIT, D2T, DIH, D2H, DIX, D2X-H18 or -H18SS switches will have an increase in actuation value (differential) of approximately 50%.
 2. If a capillary system is used, a lag time will be introduced unless the pressure change is very gradual.
 3. Only capillary-type connections can be furnished on pressure difference type switches.
 4. Piston type switches, models 9048, T9048, C9612, 9672, C9622, TC9622, 9653, 9673 and diaphragm switches with proof pressure ratings of 3 psi and 10 psi (-2 and -3 models) CANNOT be used with chemical protectors. Econ-O-Trols must have impregnated or polysulfone fittings.
 5. Vacuum service greater than 20" hg. (gauge) is not recommended. For greater vacuum, consult factory with all details of the application given.
-

Life Expectancy

The same factors governing the life of gauges and other instruments, using bourdon tube or diaphragm sensing elements, apply to pressure switches.

If with each operating cycle the sensing element must flex over the entire operating range for which it was designed, or whether it flexes only over a small portion of that range considerably affects the life expectancy of the unit.

The second factor to speed up metal fatigue of the tube or diaphragm is the speed with which it must repeat the flexing cycles. At normal flexing rate (less than 25 cycles per minute) you may therefore find the following variance in the same type of sensing element:

At full range flexing up to 1,000,000 cycles depending on thickness of diaphragm. The thinner the material, the longer the life. At 50% of its flexing range up to 3,500,000 cycles (see above). At 10 to 20% of its flexing range up to 5,000,000 cycles (see above).

Corrosive Environments

Barksdale housed and explosion proof pressure switches intended for use in hostile and/or corrosive environments can be painted with green epoxy paint (color per Federal Standard 595A #24300). The complete switch is painted after assembly and test at Barksdale. For best results, exposed metal surfaces must be touched up with epoxy paint after installation.

Supplemental Guide

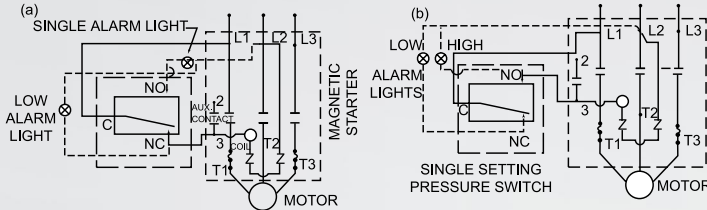
Pressure Switch Products

Typical Wiring Diagrams

Single Pressure Control

1. Low-Voltage Release

Starter drops out when voltage fails but will pull in when voltage is restored.



Motoraction

(1) Stop at high pressure start when pressure falls by amount of actuation value

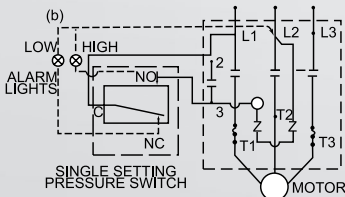
(2) Start at low pressure stop when pressure value.

(1) Start at high pressure stop when pressure falls by amount of actuation value

(2) Stop at low pressure start when pressure rises by amount of actuation value

2. Low-Voltage Protection

Starter drops out when voltage fails but does not start when voltage is restored because relay will open. Manual start switch will close relay again.

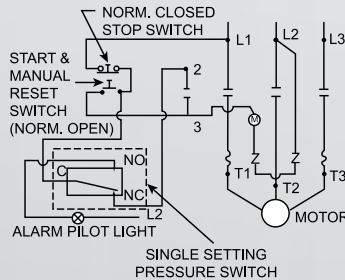


Connect pressure switch same as (a) or (b) for desired motor response to Press. change (a) as shown above

3. High or Low Level Shut-down Electrical Manual Reset with Alarm-Low Voltage Protection

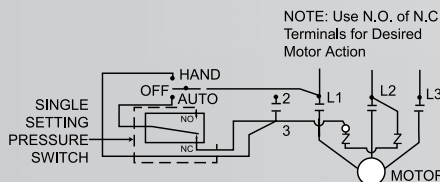
Motor started by normally open (manual reset switch) as long as pressure remains within high limit. Motor runs until stop switch is actuated. Low voltage protection is obtained as starter will drop out if voltage fails and will not start again until start switch is closed.

When pressure exceeds high limit, pressure switch actuates, motor stops, and an alarm is sounded or light lights. (Note: Reverse NO and NC connections to pressure switch for same action on low pressure limit.)



4. Hand-Off Automatic Selection

Provides ability to operate starter manually for emergency control.



NOTE: Use N.O. of N.C. Terminals for Desired Motor Action

"Auto" position pressure switch controls motor.

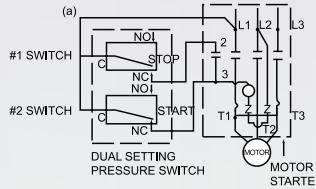
"Hand" position bypasses pressure switch and motor runs continuously.

"Off" position motor cannot run.

High/Low Pressure Control

5. Low Voltage Release

(Starter drops out when voltage fails; will pull in when voltage is restored)



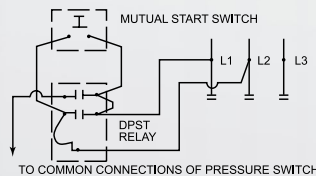
Motoraction

(1) Stop motor at high Press.
(2) Start motor at low Press.

(1) Start motor at high Press.
(2) Stop motor at low Press.

6. Low Voltage Protection

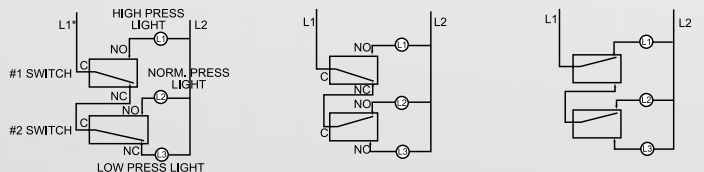
Starter drops out when voltage fails but does not start when voltage is restored because relay will open. Manual start switch will close relay again.



Insert relay as shown in line between L1 and common connections of pressure switch. Connect as in Diagram 5 for motor action.

7. Pressure Condition Indication

To show remotely the Press. condition in system



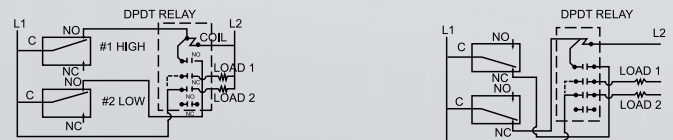
Condition: Pressure level at or below low; Pressure low; Pressure light on, others off

Condition: Pressure normal, normal; Pressure light on, others off

Condition: Pressure at or above high; Pressure high; Pressure light on, others off

8. Achieving Adjustable Differential by relay Control (High/Low Level)

Solenoid valves-pilot lights-pilot circuits



(a) At high pressure relay is energized Load 1 is de-energized Load 2 is energized

(b) At low pressure relay is de-energized Load 1 is energized Load 2 is de-energized

(a) At low pressure relay is energized Load 1 is de-energized Load 2 is energized

(b) At high pressure relay is de-energized Load 1 is energized Load 2 is de-energized

NOTE: The wiring diagrams shown are typical and do not constitute a recommendation. Suitability must be determined by end user or specifying engineer

Conversion Tables

The most frequently needed conversions are tabulated for low range values. They are rounded off to the nearest practical decimal. For more precise conversions, use the following factors:

Kp/cm² X 14.22 = psi
Kg/cm² X 14.22 = psi 14.503 = psi
Bar X 14.503 = psi
Kg/cm² X X 14.233 = psi
Inches of Water (In./H₂O) X 0.07353 = In./Hg

Inches of Mercury (In./Hg) X 13.6 = In./H₂O
Inches of Water (In./H₂O) X .036 = psi
Feet of Water (Ft./H₂O) X .433 = psi
Inches of Mercury (In./Hg) X .490 = psi
Centimeters of Mercury (Cm/Hg) X .193 = psi
Kilopascals (KPa) x .145 = psi

in/H ₂ O	psi	in/Hg	mm/Hg	psi	in/Hg	in/H ₂ O	mm/Hg	psi	in/Hg	in/H ₂ O	mm/Hg
1	.04	.07	2.	.01	.02	.3	.5	1.1	2.25	30.5	57.
2	.07	.15	4.	.02	.04	.6	1.	1.2	2.45	33.3	62.
3	.11	.22	5.5	.03	.06	.8	1.6	1.3	2.65	36.1	67.
4	.15	.29	7.5	.04	.08	1.1	2.1	1.4	2.86	38.9	72.5
5	.18	.37	9.5	.05	.10	1.4	2.6	1.5	3.06	41.6	77.5
6	.22	.44	11.5	.06	.12	1.7	3.1	1.6	3.27	44.4	83.
7	.25	.51	13.	.07	.14	1.9	3.6	1.7	3.47	47.2	88.
8	.29	.59	15.	.08	.16	2.2	4.1	1.8	3.67	50.0	93.
9	.32	.66	16.5	.09	.18	2.5	4.7	1.9	3.88	52.7	98.5
10	.36	.74	18.5	.10	.20	2.8	5.2	2.0	4.08	55.5	103.5
11	.40	.81	20.5	.11	.22	3.0	5.7	2.1	4.29	58.3	108.5
12	.43	.89	22.5	.12	.24	3.3	6.2	2.2	4.49	61.1	114.
13	.47	.96	24.5	.13	.26	3.6	6.8	2.3	4.69	63.8	119.
14	.50	1.03	26.	.14	.28	3.9	7.3	2.4	4.90	66.6	124.
15	.54	1.10	28.	.15	.31	4.2	7.8	2.5	5.10	69.4	129.5
16	.58	1.17	30.	.16	.33	4.4	8.3	2.6	5.31	72.2	134.5
17	.61	1.25	31.5	.17	.35	4.7	8.8	2.7	5.51	74.9	139.5
18	.65	1.32	33.5	.18	.37	5.0	9.3	2.8	5.71	77.7	145.
19	.68	1.40	35.5	.19	.39	5.3	9.9	2.9	5.92	80.5	150.
20	.72	1.47	37.	.20	.41	5.6	10.4	3.0	6.12	83.3	155.
21	.76	1.54	39.	.21	.43	5.8	10.9	3.1	6.33	86.0	160.5
22	.79	1.62	41.	.22	.45	6.1	11.4	3.2	6.53	88.8	165.5
23	.83	1.69	43.	.23	.47	6.4	12.0	3.3	6.73	91.6	171.
24	.87	1.76	44.5	.24	.49	6.7	12.5	3.4	6.94	94.4	176.
25	.90	1.84	46.5	.25	.51	7.0	13.0	3.5	7.14	97.1	181.
26	.94	1.91	48.5	.26	.53	7.2	13.5	3.6	7.35	99.9	186.5
27	.97	1.98	50.	.27	.55	7.5	14.0	3.7	7.55	102.7	191.5
28	1.01	2.06	52.	.28	.57	7.8	14.5	3.8	7.76	105.5	196.5
29	1.05	2.13	54.	.29	.59	8.0	15.0	3.9	7.96	108.2	202.
30	1.08	2.21	56.	.30	.61	8.3	15.5	4.0	8.16	111.0	207.
31	1.12	2.28	57.5	.31	.63	8.6	16.0	4.1	8.37	113.8	212.
32	1.15	2.35	59.5	.32	.65	8.9	16.5	4.2	8.57	116.6	217.5
33	1.19	2.43	61.5	.33	.67	9.2	17.1	4.3	8.78	119.3	222.5
34	1.23	2.50	63.	.34	.69	9.4	17.5	4.4	8.98	122.1	227.5
35	1.26	2.57	65.	.35	.71	9.7	18.1	4.5	9.18	124.9	233.
36	1.30	2.65	67.	.36	.73	10.0	18.6	4.6	9.39	127.7	238.
37	1.33	2.72	68.5	.37	.76	10.3	19.1	4.7	9.59	130.4	243.
38	1.37	2.79	70.5	.38	.78	10.5	19.6	4.8	9.80	132.2	248.5
39	1.41	2.87	72.5	.39	.80	10.8	20.2	4.9	10.00	136.0	253.5
40	1.44	2.94	74.5	.40	.82	11.1	20.7	5.0	10.21	138.8	259.
41	1.48	3.01	76.5	.41	.84	11.4	21.2	5.1	10.41	141.6	264.
42	1.50	3.09	78.	.42	.86	11.7	21.7	5.2	10.61	144.3	269.
43	1.55	3.16	80.	.43	.88	12.0	22.3	5.3	10.82	147.1	274.5
44	1.59	3.23	82.	.44	.90	12.2	22.8	5.4	11.02	149.9	279.5
45	1.62	3.31	84.	.45	.92	12.5	23.3	5.5	11.23	152.7	284.5
46	1.66	3.38	85.5	.46	.94	12.8	23.8	5.6	11.43	155.4	290.
47	1.69	3.45	87.5	.47	.96	13.0	24.3	5.7	11.63	158.2	295.
48	1.72	3.53	89.5	.48	.98	13.3	24.8	5.8	11.84	161.0	300.
49	1.76	3.60	91.	.49	1.00	13.6	25.4	5.9	12.04	163.8	305.5
50	1.80	3.68	93.	.50	1.02	13.9	25.9	6.0	12.25	166.5	310.5
51	1.84	3.75	95.	.51	1.04	14.2	26.4	6.1	12.45	169.3	315.5
52	1.87	3.82	97.	.52	1.06	14.4	26.9	6.2	12.65	172.1	321.
53	1.91	3.90	98.5	.53	1.08	14.7	27.5	6.3	12.86	174.9	326.
54	1.95	3.97	100.5	.54	1.10	15.0	28.0	6.4	13.06	177.6	331.
55	1.98	4.04	102.5	.55	1.12	15.3	28.5	6.5	13.27	180.4	336.5
56	2.02	4.12	104.	.56	1.14	15.5	29.0	6.6	13.47	183.2	341.5
57	2.05	4.19	106.	.57	1.16	15.8	29.5	6.7	13.67	186.0	347.
58	2.09	4.26	108.	.58	1.18	16.1	30.0	6.8	13.88	188.7	352.
59	2.13	4.34	109.5	.59	1.20	16.4	30.6	6.9	14.08	191.5	357.
60	2.16	4.41	111.5	.60	1.22	16.7	31.1	7.0	14.29	194.3	362.5
61	2.20	4.48	113.5	.61	1.25	17.0	31.6	7.1	14.49	197.1	367.5
62	2.23	4.56	115.5	.62	1.27	17.2	32.1	7.2	14.70	199.8	372.5
63	2.27	4.63	117.5	.63	1.29	17.5	32.6	7.3	14.90	202.6	378.
64	2.31	4.70	119.	.64	1.31	17.8	33.2	7.4	15.10	205.4	383.
65	2.34	4.78	121.	.65	1.33	18.0	33.7	7.5	15.31	208.2	388.
66	2.38	4.85	123.	.66	1.35	18.3	34.2	7.6	15.51	210.9	393.5
67	2.41	4.92	124.5	.67	1.37	18.6	34.7	7.7	15.72	213.7	398.5
68	2.44	5.00	126.5	.68	1.39	18.9	35.2	7.8	15.92	216.5	403.5
69	2.48	5.07	128.5	.69	1.41	19.2	35.8	7.9	16.12	219.3	409.
70	2.52	5.15	130.5	.70	1.43	19.4	36.2	8.0		222.0	414.
71	2.55	5.22	132	.71	1.45	19.7	36.7	8.1	16.33	224.8	419.
72	2.59	5.29	134.	.72	1.47	20.0	37.2	8.2		227.6	424.5
73	2.63	5.37	136.	.73	1.49	20.3	37.8	8.3	16.53	230.4	429.5
74	2.66	5.44	137.5	.74	1.51	20.5	38.3	8.4	16.74	233.1	435.
75	2.70	5.51	139.5	.75	1.53	20.8	38.8	8.5	16.94	235.9	440.
76	2.73	5.59	141.5	.76	1.55	21.1	39.3	8.6	17.14	238.7	445.
77	2.77	5.66	143.	.77	1.57	21.4	39.8	8.7	17.35	241.5	450.5
78	2.80	5.73	145.	.78	1.59	21.6	40.3	8.8	17.55	244.2	455.5
79	2.84	5.81	147.	.79	1.61	21.9	40.9	8.9	17.76	247.0	460.5
80	2.88	5.88	149.	.80	1.63	22.2	41.4	9.0	17.96	249.8	466.
81	2.91	5.95	151.	.81	1.65	22.5	41.9	9.1	18.16	252.6	471.
82	2.95	6.03	152.5	.82	1.67	22.8	42.4	9.2	18.37	255.3	476.
83	2.98	6.10	154.5	.83	1.69	23.0	43.0	9.3	18.57	258.1	481.5
84	3.02	6.17	156.5	.84	1.71	23.3	43.5	9.4	18.78	260.9	486.5
85	3.06	6.25	158.5	.85	1.73	23.6	44.0	9.5	18.98	263.7	491.5
86	3.09	6.32	160	.86	1.76	23.9	44.5	9.6	19.19	266.4	497.
87	3.13	6.39	162	.87	1.78	24.1	45.0	9.7	19.39	269.2	502.
88	3.16	6.47	164	.88	1.80	24.4	45.5	9.8	19.59	272.0	507.
89	3.20	6.55	165.5	.89	1.82	24.7	46.1	9.9	19.80	274.8	512.5
90	3.24	6.62	167.5	.90	1.84	25.0	46.6	10.0	20.00	277.6	517.5
91	3.27	6.69	169.5	.91	1.86	25.3	47.1	14.7	20.21	408.	760.
92	3.31	6.77	171.5	.92	1.88	25.5	47.6		20.41		
93	3.34	6.84	173.	.93	1.90	25.8	48.2		30.		
94	3.38	6.92	175.	.94	1.92	26.1	48.7				
95	3.42	6.99	177.	.95	1.94	26.4	49.2				
96	3.45	7.06	179.	.96	1.96	26.6	49.7				
97	3.49	7.13	180.5	.97	1.98	26.9	50.2				
98	3.52	7.21	182.5	.98	2.00	27.2	50.7				
99	3.56	7.28	184.5	.99	2.02	27.5	51.3				
100	3.60	7.35	186.5	1.00	2.04	27.8	51.8				

Supplemental Guide

Pressure Switch Products

Actuation Value

(Differential, Dead Band, Hysteresis) By Class of Electrical Switch Used

DIAPHRAGM PRESSURE SWITCHES - Values given in psi (Gauge)

Diaphragm Pressure Sensing Capsule	Proof Pressure psi	Approximate Actuation Value (Differential, Dead Band, Hysteresis) by Class of Electrical Switch									
		A	B	C	E	H	M	GH			
— 2SS	3.00	—	—	—	—	0.02 to 0.05	0.03 to 0.09	.02 to .05			
— 3SS	10.00	0.07 to 0.15	0.12 to 0.39	0.32 to 0.59	0.39 to 1.30	0.04 to 0.07	0.07 to 0.15	.04 to .07			
— 18SS	60.00	0.32 to 0.58	0.42 to 1.61	1.24 to 2.43	1.61 to 5.90	0.12 to 0.26	0.32 to 0.58	.12 to .26			
— 80SS	160.00	1.60 to 3.40	1.90 to 8.80	5.90 to 13.20	7.90 to 33.0	0.59 to 1.54	1.60 to 3.40	.59 to 1.54			
— 150SS	300.00	2.30 to 6.0	3.30 to 15.20	9.90 to 22.80	13.20 to 56.80	0.99 to 2.70	2.30 to 6.0	0.99 to 2.70			
DIAPHRAGM VACUUM SWITCHES - Values given in inches of Mercury (Gauge)											
— 3SS	6.00	0.14 to 0.28	0.20 to 0.72	0.57 to 1.09	0.69 to 2.56	0.07 to 0.12	0.14 to 0.28	0.07 to 1.20			
— 18SS	30.00	0.84 to 1.63	1.26 to 4.20	3.43 to 6.30	4.20 to 14.30	0.40 to 0.80	0.84 to 1.63	0.40 to 0.80			

SS represents Stainless Steel diaphragm.

DIAPHRAGM PRESSURE DIFFERENCE SWITCHES - Values given in psi (Gauge)

Diaphragm Pressure Sensing Capsule	Proof Pressure psi (proof)	Approximate Actuation Value (Differential, Change to Reset) by Class of Electrical Switch									
		A	B	C	D	E	H	J	K	M	GH
— 3SS	10.00	0.09 to .24	0.15 to 0.61	0.42 to 0.93	0.38 to 1.29	0.51 to 2.07	0.06 to 0.12	0.04 to 0.18	0.15 to 0.76	0.09 to 0.24	0.06 to 0.12
— 18SS	60.00	0.33 to 0.75	0.45 to 2.07	1.31 to 4.21	0.95 to 4.21	1.70 to 7.61	0.18 to 0.32	0.13 to 0.57	0.45 to 2.59	0.33 to 0.75	0.18 to 0.32
— 80SS	160.00	2.20 to 4.70	2.70 to 13.40	8.20 to 20.1	5.40 to 26.90	10.90 to 50.40	1.0 to 2.00	0.80 to 3.70	2.70 to 16.80	2.20 to 4.70	1.00 to 2.00
— 150SS	300.00	3.50 to 8.70	4.40 to 24.80	13.20 to 37.30	8.80 to 49.70	17.60 to 93.20	1.70 to 3.70	1.30 to 6.20	4.40 to 31.10	3.50 to 8.70	1.70 to 3.70
Diaphragm Vacuum Switches - Values given in inches of Mercury (Gauge)											
— 3SS	6.00	0.17 to 0.51	0.24 to 1.37	0.69 to 2.05	0.55 to 2.80	0.87 to 4.83	0.09 to 0.24	0.07 to 0.39	0.24 to 1.69	0.17 to 0.51	0.09 to 0.24
— 18SS	30.00	7.80 to 2.09	1.19 to 5.39	3.25 to 8.18	2.88 to 11.27	3.90 to 18.42	0.44 to 1.00	3.50 to 1.56	1.19 to 6.71	0.78 to 2.09	0.44 to 1.00

SS represents Stainless Steel diaphragm.

- Class GH switches are SPDT with gold contacts.
- Class K switches are SPDT with fine silver contacts and an Elastomer Boot around pin actuators to prevent moisture and foreign matter from affecting contacts.
- All other switch classes are SPDT with fine silver contacts and fixed differentials.
- Class A, H, and M switches meet humidity requirements of MIL-S-6743.

Actuation Value

(Differential, Dead Band, Hysteresis) By Class of Electrical Switch Used

BOURDON TUBE PRESSURE SWITCHES - Values given in psi (Gauge)

Bourdon Tube Pressure Sensing Element	Proof Pressure for Stripped Models	Proof Pressure for Household Models	Approximate Actuation Value (Differential, Dead Band, Hysteresis) by Class of Electrical Switch							
			A	B	C	E	H	M	S**	GH
— 12SS	1500	1800	11 to 27•	20 to 65	51 to 100	58 to 202	7 to 14	11 to 27	95 to 190	7 to 14
— 20SOUL	4800	4800	19 to 79	51 to 171	132 to 260	154 to 547	16 to 39	19 to 79	243 to 508	
— 32SS	4000	4800	19 to 79	51 to 171	132 to 260	154 to 547	16 to 39	19 to 79	243 to 508	16 to 39
— 32SS-UL	7200	7200	40 to 85•	59 to 226	163 to 341	204 to 787	22 to 40	40 to 85	300 to 695	
— 48SS	6000	7200	40 to 85•	59 to 226	163 to 341	204 to 787	22 to 40	40 to 85	300 to 695	22 to 40
— 65SS	8125	9750	54 to 115	76 to 301	215 to 454	272 to 1064	29 to 52	54 to 115	396 to 930	29 to 52
— 72SS-UL	18000	18000	275 to 550•	366 to 1520	1061 to 2289	1375 to 5532	144 to 246	275 to 550	1950 to 4750	
— 120SS	15000	18000	275 to 550•	366 to 1520	1061 to 2289	1375 to 5532	144 to 246	275 to 550	1950 to 4750	144 to 246
— 180SS	20000	24000	275 to 550•	366 to 1520	1061 to 2289	1375 to 5532	144 to 246	275 to 550	1950 to 4750	144 to 246

SS represents Stainless Steel.

**Not available on dual or UL listed switches.

HI-P (DIA-SEAL PISTON) PRESSURE SWITCHES

Pressure Sensing Element	Approx. Actuation Value (Differential, Dead Band, Hysteresis) by Class of Electrical Switch		
	B	H/GH	M
— 30	.4 to 2.0•	.1 to 1.0x	1.0 - 1.5
— 30SS	.4 to 2.0•	.1 to 1.0	1.0 - 1.5
— 85	.8 to 7.0•	.25 to 2.5	1.0 - 5.0
— 85SS	.8 to 7.0•	.25 to 2.5	1.0 - 5.0
— 340	2.0 to 22.0•	1.0 to 6.0	2.0 - 10.0
— 340SS	2.0 to 22.0•	1.0 to 6.0	2.0 - 10.0
— 600	6.0 to 30.0	2.0 to 17.0•	3.6 - 23.0
— 600SS	6.0 to 30.0	2.0 to 17.0•	3.6 - 23.0
— 1600	25 to 100	20 to 70	20 - 95
— 1600SS	25 to 100	20 to 70	20 - 95

ECON-O-TROL (DIA-SEAL PISTON) PRESSURE SWITCHES

Pressure Sensing Element	Approx. Actuation Value (Differential, Dead Band, Hysteresis) by Class of Electrical Switch					
	B	H	M	R	GH	
— 15	.2 to 2.3	.1 to .3•	.2 to 1.2		.1 to .8	
— 90	1.0 to 10.5	.5 to 8.0•	1.0 to 10.0	SEE	.5 to 8.0	
— 250	2.0 to 27.0	1.0 to 20.0•	2.0 to 21.0	CHARTS	1.0 to 20.0	
— 500	6.0 to 50.0	4.0 to 28.0•	6.0 to 40.0	PG. 8	4.0 to 28.0	

***Plain numbers represent untreated aluminum fitting.

† Represents polysulfone fitting.

• 'Standard' for Regular Housed and Stripped (check with your Barksdale Controls representative for prices and delivery). All others are 'Special' (check with factory for prices and delivery).

- Class GH switches are SPDT with gold contacts.
- Class K switches are SPDT with fine silver contacts and an Elastomer Boot around pin actuators to prevent moisture and foreign matter from affecting contacts.
- Class R & S switches are SPDT with fine silver contacts and adjustable differentials.
- All other switch classes are SPDT with fine silver contacts and fixed differentials.
- Class A, H, & M switches meet humidity requirements of MIL-S-6743.

Supplemental Guide

Pressure Switch Products

Electrical Ratings

(Current Given in Ampere)

A.C. RATINGS (60 Cycles)

All altitudes to 45,000 feet

30° C Maximum temperature rise.

CLASS OF SWITCH	VOLTS	INRUSH		MOTOR		LAMP		INDUCTIVE*	RESISTIVE
		N.C.	N.O.	N.C.	N.O.	N.C.	N.O.		
A,H	125	30.0	15.0			3.0	1.5	10.0	10.0
	250	30.0	15.0			3.0	1.5	10.0	10.0
	480	15.0	7.5			3.0	1.5	3.0	3.0
	600								
B,K	125	30.0	15.0			3.0	1.5	10.0	10.0
	250	30.0	15.0			3.0	1.5	10.0	10.0
	480	30.0	15.0			3.0	1.5	10.0	10.0
	600	30.0	15.0					2.0	2.0
C	125	30.0	15.0			3.0	1.5	10.0	10.0
	250	30.0	15.0			3.0	1.5	10.0	10.0
	480	30.0	15.0			3.0	1.5	10.0	10.0
	600	30.0	15.0					2.0	2.0
E	125	75.0	75.0	12.5	12.5	7.5	7.5	15.0	15.0
	250	75.0	75.0	12.5	12.5	7.5	7.5	15.0	15.0
	480	75.0	75.0	12.5	12.5	7.5	7.5	15.0	15.0
	600	75.0	75.0					2.0	2.0
L	125	44.0	22.0	5.8	5.8	3.0	1.5	15.0	15.0
	250	44.0	22.0	4.9	4.9	3.0	1.5	15.0	15.0
	480	44.0	22.0			3.0	1.5	15.0	15.0
	600								
M	125	30.0	15.0			3.0	1.5	10.0	10.0
	250	30.0	15.0			3.0	1.5	10.0	10.0
	480	15.0	7.5			3.0	1.5	3.0	3.0
	600								
R,S	125	75.0	75.0	12.5	12.5	7.5	7.5	15.0	15.0
	250	75.0	75.0	12.5	12.5	7.5	7.5	15.0	15.0
	480	75.0	75.0	12.5	12.5	7.5	7.5	15.0	15.0
	600								
GH	125	2.0	1.0	.7	.35	.2	.1	1.0	1.0
	250								
	480								
	600								
AA	125							4.0	4.0
	250								
HH	125							5.0	5.0
	250								
BB	125							5.0	5.0
	250								
CC	125							10.0	10.0
	250								

*50% Power Factor

D.C. RATINGS

All altitudes to 45,000 feet

CLASS OF SWITCH	VOLTS***	INRUSH		MOTOR		LAMP		INDUCTIVE**	RESISTIVE
		N.C.	N.O.	N.C.	N.O.	N.C.	N.O.		
A,H	6	.5	.5			.5	.5	.5	.5
	12	.5	.5			.5	.5	.5	.5
	24	.5	.5			.5	.5	.5	.5
B,K	6	30.0	15.0			3.0	1.5	15.0	15.0
	12	30.0	15.0			3.0	1.5	10.0	15.0
	24	30.0	15.0			3.0	1.5	5.0	6.0
	125	4.0	4.0			.4	.4	.05	.4
	250	2.0	2.0			.2	.2	.03	.2
C	6	30.0	15.0			3.0	1.5	15.0	15.0
	12	30.0	15.0			3.0	1.5	15.0	15.0
	24	30.0	15.0			3.0	1.5	10.0	10.0
	125	6.0	6.0			.6	.6	.1	.6
	250	3.0	3.0			.3	.3	.05	.3
E,R,S	6	30.0	15.0	5.0	2.5	3.0	1.5	15.0	15.0
	12	30.0	15.0	5.0	2.5	3.0	1.5	15.0	15.0
	24	30.0	15.0	5.0	2.5	3.0	1.5	5.0	6.0
	125	4.0	4.0	.8	.8	.4	.4	.05	.4
	250	2.0	2.0	.4	.4	.2	.2	.03	.2
L	6	44.0	22.0	5.0	2.5	3.0	1.5	8.0	22.0
	12	44.0	22.0	5.0	2.5	3.0	1.5	5.0	22.0
	24	44.0	22.0	5.0	2.5	3.0	1.5	1.0	2.0
	125	4.0	4.0	.8	.8	.4	.4	.03	.4
	250	2.0	2.0	.4	.4	.2	.2	.02	.2
M	6	30.0	15.0			3.0	1.5	8.0	15.0
	12	30.0	15.0			3.0	1.5	5.0	15.0
	24	30.0	15.0			3.0	1.5	1.0	2.0
	125	4.0	4.0			.4	.4	.5	.75
	250	2.0	2.0			.2	.2	.25	.4
GH	6	2.0	1.0	.7	.35	.2	.1	1.0	1.0
	12	2.0	1.0	.7	.35	.2	.1	1.0	1.0
	24	2.0	1.0	.7	.35	.2	.1	1.0	1.0

**L/R = .026. L/R is the ratio of inductance to resistance. It is the time required for the current to rise to 63% of the maximum value.

***6, 12 and 24 VDC electrical ratings are for engineering reference only. These ratings are not recognized by the UL and CSA. Standard nameplate marking does not include these ratings.

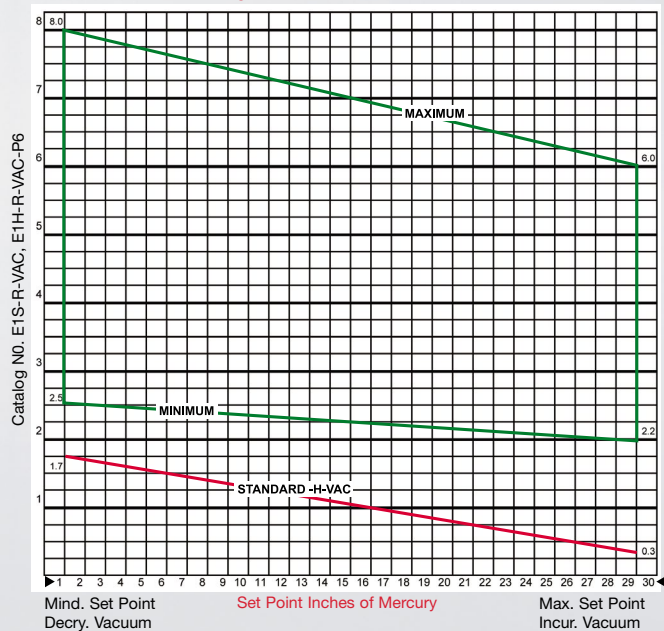
- Class GH switches are SPDT with gold contacts.
- Class R & S switches are SPDT with fine silver contacts and adjustable differentials.
- All other switch classes are SPDT with fine silver contacts and fixed differentials.
- Class A, H & M switches meet humidity requirements of MIL-S-6743.

How to Select Adjustable Differential from Charts

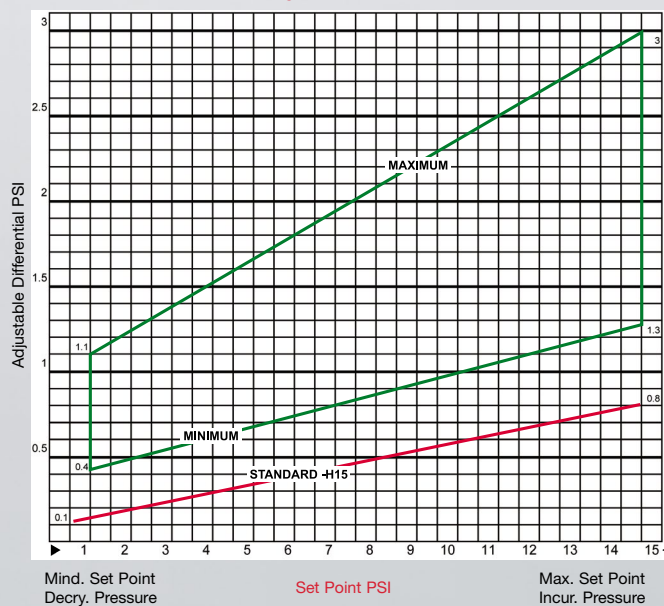
Econ-O-Trol Models

1. Establish Set Point required.
2. Establish Adjustable Differential required.
3. Select chart within maximum adjustable range.
4. Project Set Point vertically until it crosses horizontal projection of desired Adjustable Differential. To obtain the desired differential, lines must cross between heavy horizontal lines labeled "Minimum" and/or "Maximum."
5. For comparison, the heavy horizontal line labeled "Standard" shows how differential varies from lowest to highest setting on fixed differential models.

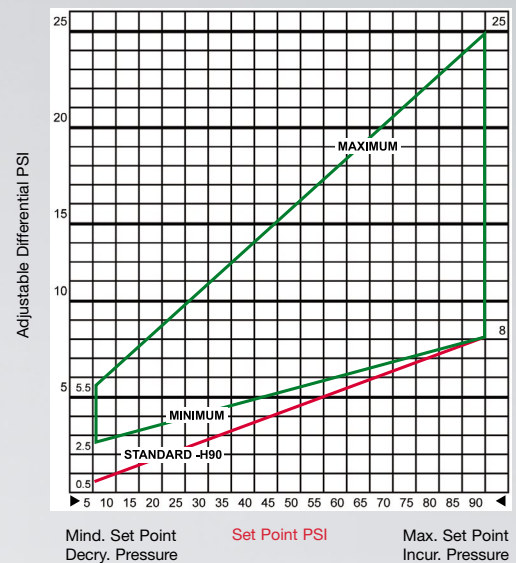
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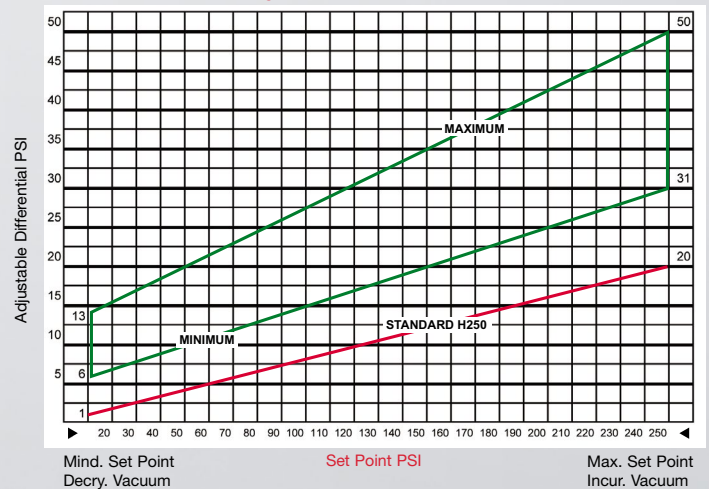
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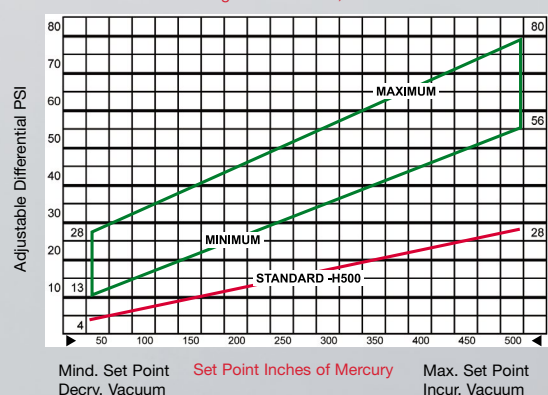
Catalog No. E1S-R90, E1H-R90



Catalog No. E1S-R250, E1H-R250



Catalog No. E1S-R500, E1H-R500



Supplemental Guide

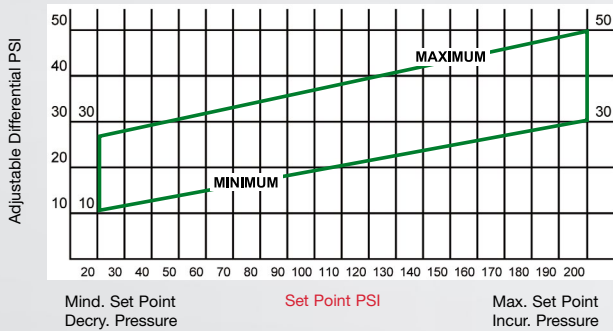
Pressure Switch Products

How to Select Adjustable Differential from Charts

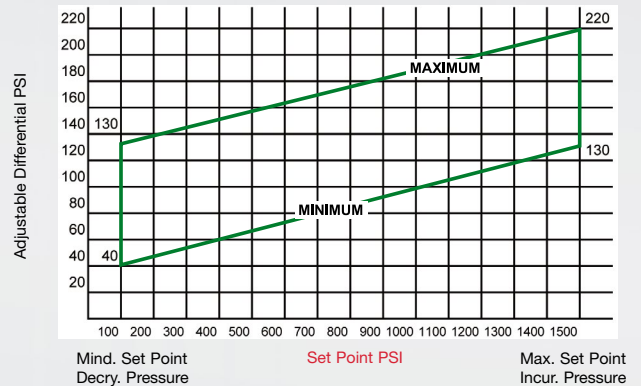
A9675-AA Models

1. Establish Set Point required.
2. Establish Adjustable Differential required.
3. Select chart within maximum adjustable range.
4. Project Set Point vertically until it crosses horizontal projection of desired Adjustable Differential. To obtain the desired differential, lines must cross between heavy horizontal lines labeled "Minimum" and/or "Maximum".

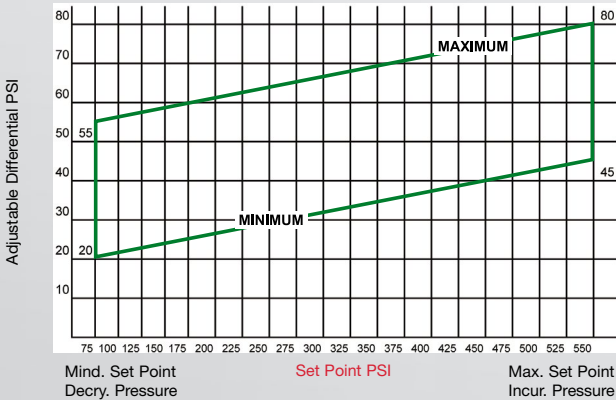
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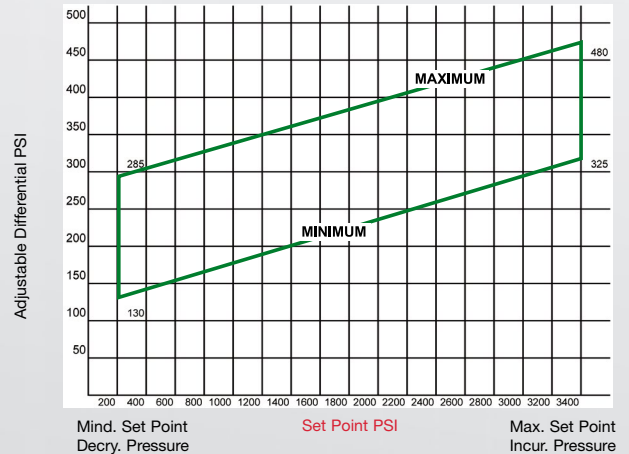
Catalog No. A9675-1-AA



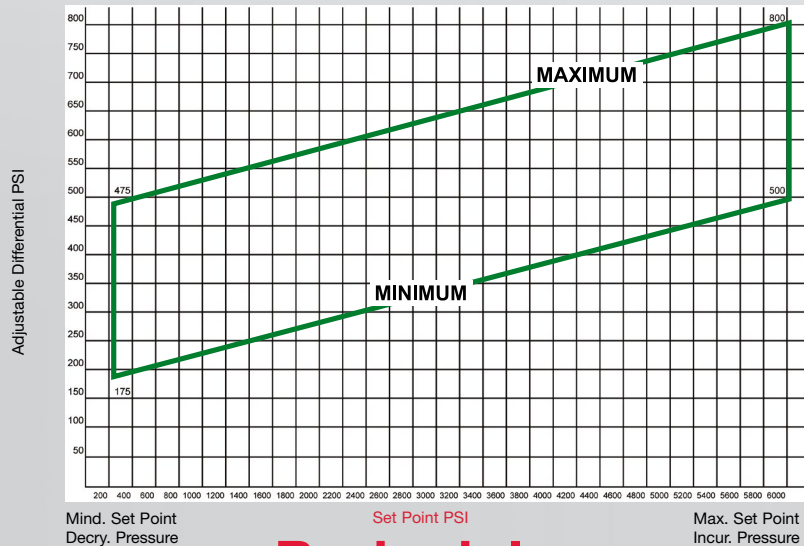
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Catalog No. A9675-3-AA



Catalog No. A9675-4-AA



Trouble-Shooting Pointers

Barksdale Diaphragm and Bourdon Tube Pressure Switches

Suspected Pressure Switch Trouble	Check	Possible Causes	Remedy
A. Will not actuate at desired pressure.	<ol style="list-style-type: none"> 1. Check catalog for range of switch. 2. Disconnect switch electrically. 3. Apply pressure to switch and check actuation point with accurate gauge. 4. Maximum surge pressure in system. 5. Maximum current and voltage through switch with ammeter and voltmeter. 	<ol style="list-style-type: none"> 1. Desired setting out of switch range. 2. Switch not set at proper pressure. 3. Pressure gauge defective. 4. Defective switch element. 5. Over stressed or fatigued pressure sensing element. 6. Loose adjusting screw or bracket. 7. Surplus electrical leads interfering with switch action. 8. Current or voltage beyond switch capacity. 9. Surge pressures in system exceed proof pressure of switch. 	<ol style="list-style-type: none"> 1. Replace pressure capsule or bourdon tube with proper range. 2. Readjust switch. 3. Replace pressure gauge. 4. Replace switch element. 5. Replace pressure capsule (check cycling rate for possible piston switch application). 6. Replace or tighten. 7. Remove surplus from area around switch element. 8. Install relay or switch element with higher rating. 9. Replace pressure capsule, bourdon tube or switch with proper proof pressure.
B. Will not reactuate at desired pressure.	<ol style="list-style-type: none"> 1. Check catalog for actuation value range. 2. Check 2, 4 and 5 under A above. 3. Apply pressure to switch and check actuation value with accurate gauge. 	<ol style="list-style-type: none"> 1. Specification does not match switch. 2. See 3 thru 9 Trouble A. 	<ol style="list-style-type: none"> 1. Change specification or get proper pressure switch. 2. See 3 thru 9 Trouble A
C. Rapidly actuates and reactuates or chatters or unwanted actuations.	<ol style="list-style-type: none"> 1. Check for instantaneous rapid pressure fluctuation in system. 2. Mechanical vibration of switch. 	<ol style="list-style-type: none"> 1. Peaks and valleys of surges are in excess of actuation value of switch. 2. Vibration causes unwanted actuation when switch is near set point. 	<ol style="list-style-type: none"> 1. (a) Put surge damper on switch. (b) Replace with pressure switch of larger actuation value 2. Change position of switch or shock mount.
D. Actuation point changes with temperature.	<ol style="list-style-type: none"> 1. Check maximum and minimum temperatures. 2. Check for loose adjustment screw or bracket. 	<ol style="list-style-type: none"> 1. Temperature changes drastic (i.e. over plus or minus 50°F). 	<ol style="list-style-type: none"> 1. (a) Readjust for changes. (b) Set switch at highest possible temperature to minimize effect of changes. 2. Tighten or replace screws.
E. Actuation point of switch changes over period of time.	<ol style="list-style-type: none"> 1. Maximum current through switch. 2. Number of pressure cycles on switch. 3. Moisture in switch. 	<ol style="list-style-type: none"> 1. Overloading of switch contacts. 2. Service life of switch exceeded (consult data). 3. Corrosion of parts. 	<ol style="list-style-type: none"> 1. Replace with pressure switch with higher current rating. 2. Replace pressure switch. 3. Seal conduit.
F. Cannot get current through switch when actuates or reactuates.	<ol style="list-style-type: none"> 1. Check for power at switch. 2. Check maximum current through switch. 3. Poor electrical connections. 4. Desired electrical circuit. 	<ol style="list-style-type: none"> 1. Line not "hot." 2. Corroded or loose connections. 3. Connected to wrong leads on switch. 4. Contacts fused. 	<ol style="list-style-type: none"> 1. Get power to switch. 2. Make new or tight connection. 3. Make proper connection (consult wiring diagram or color code). 4. Replace pressure switch.

Supplemental Guide

Pressure Switch Products

Trouble-Shooting Pointers

Barksdale Econ-O-Trol & HI-P Pressure Switches

Suspected Pressure Switch Trouble	Check	Possible Causes	Remedy
A. Will not actuate or reactuate at desired pressure.	<ol style="list-style-type: none"> 1. Catalog or nameplate for range of switch. 2. Actuation point with accurate gauge. 3. Maximum surge pressure in system. 4. Maximum current and voltage through switch. 5. Switch element. 6. Loose parts. 7. Switch element position. 	<ol style="list-style-type: none"> 1 a. Setting out of switch range. 1 b. Switch not set at proper pressure. 2. Pressure gauge defective. 3. Surge pressures in system exceed proof pressure of switch. 4. Current or voltage beyond switch capacity. 5. Defective switch element. 6. Vibration or poor assembly. 7. Switch element not properly positioned on mounting. 	<ol style="list-style-type: none"> 1 a. Replace pressure plates and spacer with proper range. 1 b. Readjust switch. 2. Replace pressure gauge. 3. Replace with piston or bourdon tube switch. 4. Install relay or switch element with higher rating. 5. Replace switch element. 6. Replace or tighten. 7. Follow procedure below: <ol style="list-style-type: none"> (a) Loosen limit switch screws. (b) Pressurize switch to a minimum of 10% above the top of adjustable range. (c) With a bug lite or continuity meter adjust limit switch position until it is actuated and then move slightly (.005") toward plunger to insure safety factor. (d) Tighten limit switch screws firmly (10-15" / # torque). <p>NOTE: On HI-P only, there should be .013 ± .003 clearance between Hex nut on plunger and face of fitting when maximum pressure applied. Adjust if necessary.</p>
B. Rapidly actuates and reactuates (chatters); or unwanted actuations.	<ol style="list-style-type: none"> 1. Rapid pressure fluctuations in system. 2. Mechanical vibration of switch. 	<ol style="list-style-type: none"> 1. Surges are in excess of actuation value of switch. 2. Vibration causes unwanted actuation when switch is near set point. 	<ol style="list-style-type: none"> 1 a. Put surge damper on switch. 1 b. Replace with switch element or pressure switch of larger actuation value. 2. Change position of switch or shock mount.
C. Actuation point changes with ambient temperature change.	<ol style="list-style-type: none"> 1. Maximum and minimum temperatures. 	<ol style="list-style-type: none"> 1. Temperature changes drastic (i.e. over plus or minus 50°F). 	<ol style="list-style-type: none"> 1 a. Readjust for changes. 1 b. Set switch at nominal temperature to minimize effect of changes. 1 c. Relocate switch.
D. Actuation point of switch changes over period of time.	<ol style="list-style-type: none"> 1. Maximum current through switch. 2. Number of pressure cycles on switch. 3. Moisture in switch. 	<ol style="list-style-type: none"> 1. Overloading of switch contacts. 2. Service life of switch exceeded (consult data). 3. Corrosion of parts. 	<ol style="list-style-type: none"> 1. Replace with pressure switch with higher current rating or relay. 2. Replace pressure switch. 3. Seal conduit.
E. Cannot get current through switch when actuates or reactuates.	<ol style="list-style-type: none"> 1. Power at switch. 2. Poor electrical connections. 3. Desired electrical circuit. 4. Maximum current through switch. 	<ol style="list-style-type: none"> 1. Line not "hot." 2. Corroded or loose connections. 3. Connected to wrong leads on switch. 4. Contacts fused. 	<ol style="list-style-type: none"> 1. Get power to switch. 2. Make new or tight connection. 3. Make proper connection (consult wiring diagram or color code). 4. Replace switch element.

Trouble-Shooting Pointers

Barksdale Diaphragm and Bourdon Tube Pressure Switches

Suspected Pressure Switch Trouble	Possible Causes	Remedy
A. Erratic operation	<ol style="list-style-type: none"> 1. Faulty switching element 2. Too high current (burned points) 3. Galling on piston and fitting 4. O-ring swell 5. Foreign matter in service media 6. Excessive shock 7. Setting under Mind. rated pressure 	<ol style="list-style-type: none"> 1. Replace switching element. 2. Replace switching element with one of correct electrical characteristics. 3. Remove and clean up. Replace piston and fitting if badly scored. 4. Consult factory for correct O-ring for service media. 5. Disassemble and clean fitting assembly. 6. Isolate switch from source of shock. 7. Replace with correct switch.
B. Short circuiting	<ol style="list-style-type: none"> 1. Faulty switching element 2. Loose connections 3. Damaged insulator 	<ol style="list-style-type: none"> 1. Replace switching element. 2. Tighten connections. 3. Replace insulator.
C. Leakage	<ol style="list-style-type: none"> 1. Damaged O-ring (Surges) 2. Damaged O-ring (Galling) 3. Worn O-ring 4. O-ring shrinkage 	<ol style="list-style-type: none"> 1. Replace O-ring and damp surges. 2. Remove and clean up or replace fitting and piston. Replace O-ring. 3. Replace O-ring. 4. Consult factory for correct O-ring for service media.

MAINTENANCE

1. Remove cover and visually inspect for evidence of shorting or leakage every million cycles or 6 months, whichever is less.
2. When switch used as safety device, setting should be tested periodically.
3. Disassemble and inspect fitting assembly and replace O-Ring once per year or every 2,000,000 cycles, whichever occurs first.

WARNING: Field repair of UL, CSA and other listed units may void the UL or CSA listing of the repaired unit.

Compact Pressure Switch

Series CSP

Features

- ▶ Compact size
- ▶ Multiple electrical connections
- ▶ SPDT or SPST
- ▶ Factory preset or field adjustable
- ▶ 3-7 psi to 25-150 psi

Applications

- ▶ Hydraulic power units
- ▶ General industrial applications
- ▶ Machine tools
- ▶ Pneumatic systems



General Specifications*

Accuracy:	+/- 3% of full set point range
Switch:	SPDT or SPST
Wetted Parts:	Nitrile (Optional Viton & EPDM) Diaphragm; Brass fitting
Electrical Connection:	Free Leads – 18" DIN #43650A 1/4 Spades Deutsch 2 pins DT04-2P Deutsch 2 pins DT04-3P Weatherpak 2 Pins WPT-2 Weatherpak 3 Pins WPT-3
Enclosure Ratings:	DIN 43650A-IP65, Terminals – IP00
Approvals:	cURus UL recognized components evaluated to industrial control equipment standards UL508 & Canadian standard CSA C22.2, No. 14

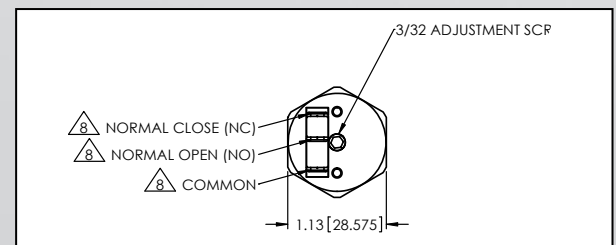
Process Connection:	1/4" NPT 1/8" NPT 7/16-20 SAE G 1/4 9/16-18 SAE
Temperature Range:	-20°F to 176°F (-29°C to 80°C) UL max. ambient temperature 131°F (55°C)
Adjustment Instructions: Pressure Setpoint:	Turn 3/32" allen wrench adjustment screw clockwise to increase pressure; counterclockwise to decrease pressure
Shipping Weight:	0.26 lbs (0.12 Kg.)

* See product configurator for additional options.

Wiring Code

CONTACTS	FREE LEADS	DIN CONNECTION	1/4 SPADE TERMINALS	DEUTSCH (PLUG)	WEATHER PACK (FEMALE)*
COMMON	BLACK	PIN 1		PIN A	PIN A
NORMALLY OPEN	RED	PIN 3		PIN B	PIN B
NORMALLY CLOSED	BLUE	PIN 2		PIN C	PIN C

* Not UL rated



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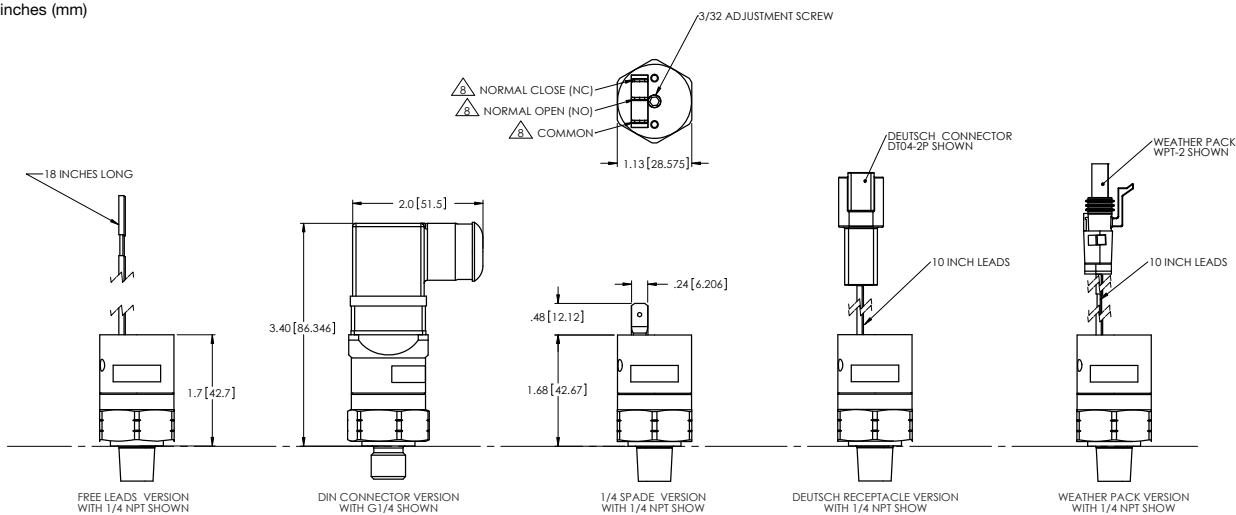
CRANE Barksdale, Inc./Barksdale GmbH
A Subsidiary of Crane Co.

Compact Pressure Switch

Series CSP

Technical Drawing

Dimensions in inches (mm)



Product Configurator

Example	CSP1	1	-2	1	-2	1	B
---------	------	---	----	---	----	---	---

Base Model/Basic Configuration

CSP1	Field Adjustable
CSP2	Factory Set

Pressure Range

Range	Adjustable Range	Approx. Deadband (Actuation Value)	Max. Proof Pressure
	psi (bar)	psi (bar)	psi (bar)
1	3 – 7 (.21 – .48)	.5 – 1.2 (.03 – .08)	350 (24)
2	5 – 30 (.32 – 2.07)	1 – 2.5 (.07 – .17)	350 (24)
3	25 – 150 (1.72 – 10.3)	2 – 10 (.14 – .69)	350 (24)
Blank	Factory Set Only (CSP2)		

Limit Switch

-1	SPST, N.O.
-2	SPST, N.C.
-3	SPDT

Current Rating

1	5A @ 125 VAC
2	10A @ 125 VAC, 6A @ 250VAC
3*	20 mA @ 12 VDC

Process Fitting Size

-1	1/4" NPT
-2	1/8" NPT
-3	7/16-20 SAE
-4	G 1/4 (No O-ring)
-5	9/16-18 SAE

Set Point

-XXX	Set point (not required for field adjustable)
R	Rising Pressure (PSIG)
F	Falling Pressure (PSIG)

Diaphragm Material

B	Buna-N
V	Viton
E	EPDM

Electrical Connection

1	Free Leads – 18"
2 ²	DIN #43650A
3	1/4 Spades
4 ¹	Leads w/ Deutsch 2 pins DT04-2P
5 ²	Leads w/ Deutsch 3 pins DT04-3P
6 ^{1*}	Leads w/ Weatherpak 2 pins WPT-2
7 ^{2*}	Leads w/ Weatherpak 3 pins WPT-3

Notes:

¹ SPST Models only

² SPDT Models only

* Not UL rated

NOTE: Depending on the rate of change in pressure for certain applications, an intermittent condition may occur across the set point.

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Compact Pressure Switch

Series CSM

Features

- ▶ Compact size
- ▶ Multiple electrical connections
- ▶ SPDT or SPST
- ▶ Factory preset or field adjustable
- ▶ 30-120 psi to 2000-5000 psi

Applications

- ▶ Hydraulic power units
- ▶ General industrial applications
- ▶ Lubrication systems



General Specifications*

Accuracy:	+/- 3% of full set point range
Switch:	SPDT or SPST
Wetted Parts:	Nitrile (Optional Viton & EPDM) Diaphragm; Zinc plated steel fitting
Electrical Connection:	Free Leads – 18" DIN #43650A 1/4 Spades Deutsch 2 pins DT04-2P Deutsch 2 pins DT04-3P Weatherpak 2 pins WPT-2 Weatherpak 3 pins WPT-3
Enclosure Ratings:	DIN 43650A-IP65, Terminals – IP00
Approvals:	cURus UL recognized components evaluated to industrial control equipment standards UL508 & Canadian standard CSA C22.2, No. 14

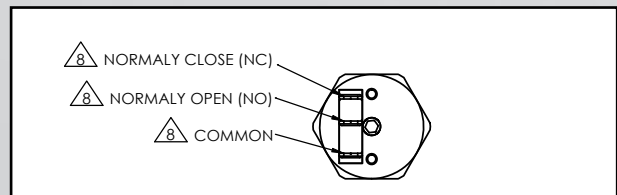
Process Connection:	1/4" NPT 1/8" NPT 7/16-20 SAE G 1/4 9/16-18 SAE
Temperature Range:	-20°F to 176°F (-29°C to 80°C) UL max. ambient temperature 131°F (55°C)
Adjustment Instructions: Pressure Setpoint:	Turn 3/32" allen wrench adjustment screw clockwise to increase pressure; counterclockwise to decrease pressure
Shipping Weight:	0.41 lbs (0.19 Kg.)

* See product configurator for additional options.

Wiring Code

CONTACTS	FREE LEADS	DIN CONNECTION (PIN #)	1/4 SPADES	DEUTSCH (RECEPTACLE)	WEATHER PACK (FEMALE)*
COMMON	BLACK	1	△ 8	PIN A	PIN A
NORMALLY CLOSED	BLUE	2	△ 8	PIN C	PIN C
NORMALLY OPEN	RED	3	△ 8	PIN B	PIN B

* Not UL rated

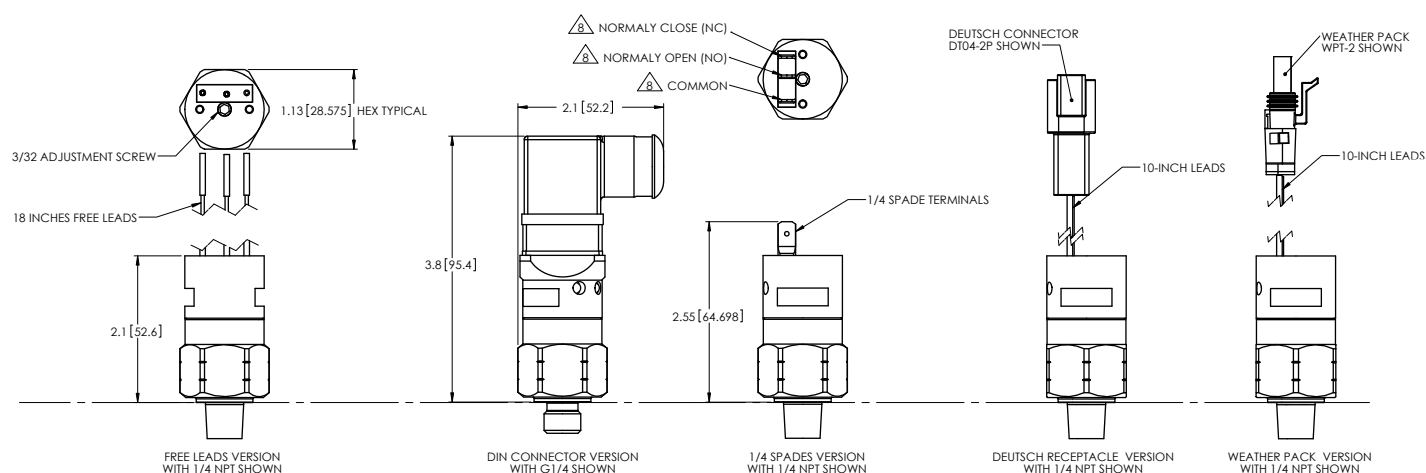


Compact Pressure Switch

Series CSM

Technical Drawing

Dimensions in inches (mm)



Product Configurator

Example CSM1 4 -2 1 -2 1 B

Base Model/Basic Configuration

CSM1	Field Adjustable
CSM2	Factory Set

Pressure Range

Range	Adjustable Range	Approx. Deadband (Actuation Value)	Max. Proof Pressure
	psi (bar)	psi (bar)	psi (bar)
4	30 - 120 (2 - 8)	9 - 20 (.6 - 1.4)	9000 (620)
5	75 - 300 (5 - 21)	12 - 36 (.8 - 2.5)	9000 (620)
6	300 - 1200 (21 - 83)	69 - 180 (4.7 - 12.4)	9000 (620)
7	1000 - 3000 (69 - 207)	180 - 360 (12.4 - 24.8)	9000 (620)
8	2000 - 5000 (138 - 345)	200 - 400 (13.6 - 27.6)	9000 (620)
Blank	Factory Set Only (CSM2)		

Limit Switch

-1	SPST, N.O.
-2	SPST, N.C.
-3	SPDT

Current Rating

1	5A @ 125 VAC
2	10A @ 125 VAC, 6A @ 250 VAC
3*	20 mA @ 12 VDC

Set Point

-XXX	Set point (not required for field adjustable)
R	Rising Pressure (PSIG)
F	Falling Pressure (PSIG)

Diaphragm Material

B	Buna-N
V	Viton
E	EPDM

Electrical Connection

1	Free Leads - 18"
2 ²	DIN #43650A
3	1/4 Spades
4 ¹	Leads w/ Deutsch 2 pins DT04-2P
5 ²	Leads w/ Deutsch 3 pins DT04-3P
6 ^{1*}	Leads w/ Weatherpak 2 pins WPT-2
7 ^{2*}	Leads w/ Weatherpak 3 pins WPT-3

Process Fitting Size

-1	1/4" NPT
-2	1/8" NPT
-3	7/16-20 SAE
-4	G 1/4 (No O-ring)
-5	9/16-18 SAE

Notes:

¹ SPST Models only

² SPDT Models only

* Not UL rated

Depending on the rate of change in pressure for certain applications, an intermittent condition may occur across the set point.

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Compact Pressure Switch

Series CSK

Features

- ▶ Compact size
- ▶ Multiple electrical connections
- ▶ Single pole single throw, floating contact
- ▶ Factory preset or field adjustable
- ▶ 20-120 psi to 1000-3000 psi

Applications

- ▶ Hydraulic power units
- ▶ General industrial applications
- ▶ Pneumatic systems
- ▶ Machine tools
- ▶ Factory automation



General Specifications*

Accuracy:	+/- 4% of full set point range
Switch:	SPST; Creep action (floating contact)
Wetted Parts:	Nitrile (Optional Viton & EPDM) Diaphragm; Zinc plated steel fitting
Electrical Connection:	Free Leads – 18" 1/4 inch spade Leads with Deutsch 2 pins
Enclosure Ratings:	Switch sealed IP65 except exposed terminals

* See product configurator for additional options.

Process Connection:	1/4" NPT 1/8" NPT 7/16-20 SAE G 1/4 9/16-18 SAE
Temperature Range:	-20°F to 180°F (-29°C to 82°C)
Adjustment Instructions: Pressure Setpoint:	Turn 1/8" allen wrench adjustment screw clockwise to increase pressure; counterclockwise to decrease pressure
Shipping Weight:	0.15 lbs (0.07 Kg.)

Wiring Code

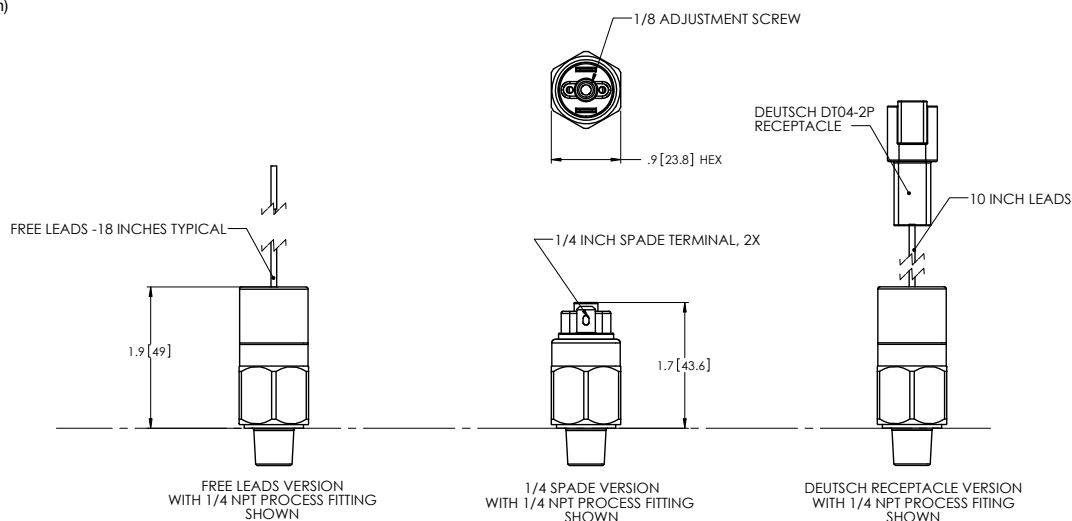
CONTACTS	FREE LEADS	1/4 SPADE	DEUTSCH RECEPTACLE
Normally Open	Black	2	PIN B
Common	Black	1	PIN A
Normally Closed	Black	2	PIN B

Compact Pressure Switch

Series CSK

Technical Drawing

Dimensions in inches (mm)



Product Configurator

Example	CSK1	2	-1	3	-1	2	B	
---------	------	---	----	---	----	---	---	--

Base Model/Basic Configuration

CSK1	Field Adjustable
CSK2	Factory Set

Pressure Range

Range	Adjustable Range	Max. Proof Pressure
	psi (bar)	psi (bar)
2	20 – 120 (1.4 – 8)	9000 (620)
3	90 – 250 (6.2 – 17.2)	9000 (620)
4	250 – 950 (17.2 – 65.5)	9000 (620)
5	700 – 1900 (48.3 – 131)	9000 (620)
6	1000 – 3000 (68.9 – 206.8)	9000 (620)
Blank	Factory Set Only (CSK2)	

Limit Switch

-1	SPST, N.O.
-2	SPST, N.C.

Current Rating

1	8A/4A/2A @ 12 VDC/24 VDC/42 VDC
2	33 mA/16 mA/13 mA@12 VDC/24 VDC/30 VDC

Set Point

-XXX	Set point (not required for field adjustable)
R	Rising Pressure (PSIG)
F	Falling Pressure (PSIG)

Diaphragm Material

B	Buna-N
V	Viton
E	EPDM

Electrical Connection

1	Free Leads – 18"
2	1/4 Spades
3	Leads w/ Deutsch 2 pins DT04-2P

Process Fitting Size

-1	1/4" NPT
-2	1/8" NPT
-3	7/16-20 SAE
-4	G 1/4 (No O-ring)
-5	9/16-18 SAE

NOTE: Depending on the rate of change in pressure for certain applications, an intermittent condition may occur across the set point.

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Compact Pressure Switch

Series 7000

Features

- ▶ Compact size
- ▶ Multiple electrical connections
- ▶ SPDT snap action micro-switch
- ▶ NEMA 1 or 4 (depending on electrical connection)
- ▶ Factory preset or field adjustable
- ▶ Available in stainless steel or brass

Applications

- ▶ Air proving in HVAC systems
- ▶ Engine monitoring
- ▶ Hydraulic power units
- ▶ Mobile hydraulics
- ▶ Pump or compressor control
- ▶ Hydraulic and pneumatic braking systems



General Specifications*

Electrical Characteristics:	All models incorporate Underwriters' Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements.
Accuracy:	±8% typical for ranges "2" to "7"
Switch:	SPDT snap action; single circuit
Wetted Parts:	
Diaphragm type: (range 2, 3)	300 series stainless steel fitting or brass fitting and Buna-N diaphragm.
Piston type: (ranges 4, 5, 6, 7)	300 series stainless steel or brass fitting.
Electrical Connection:	See product configurator for electrical connection options.
Enclosure Ratings:	NEMA 1; NEMA 4
Pressure Connection:	1/4" NPT (standard)

* See product configurator for additional options.

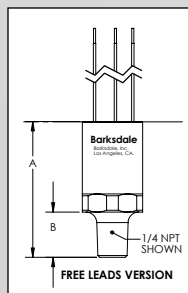
Approvals:	
UL:	Recognized components per UL 508 standard, industrial control equipment.
CSA:	Listed per CSA Guide 380-W1.16 class 3231
PED (European):	Compliant to PED 97/23/EC standard
Temperature Range:	
Operating:	-40° to +180°F - piston type 0° to 180°F - diaphragm type
Storage:	-40° to +200°F
EMI/RFI:	
Vibration:	10 g's per MIL-STD 202, method 204, condition A
Shock:	50 g's per MIL-STD 202, method 213, condition A
Adjustment Instructions:	
Pressure Setpoint:	Turn adjustment screw clockwise to increase pressure; counterclockwise to decrease pressure.
Shipping Weight:	Stainless steel: approximate .25 lbs.

SS Fitting Dimension

FITTING	DIMENSION 'A'	DIMENSION 'B'
1/4 NPT	2.25 [57.15]	.75 [19.05]
1/8 NPT	2.62 [66.55]	1.10 [27.94]
* 7/16 NPT	2.25 [57.15]	.75 [19.05]
* G 1/4	2.25 [57.15]	.75 [19.05]

FOR (-6 AND -7) PRESSURE RANGE BRASS FITTINGS, ADD .51 INCH LENGTH TO ABOVE DIMENSIONS 'A' AND 'B'

* Available in stainless steel only



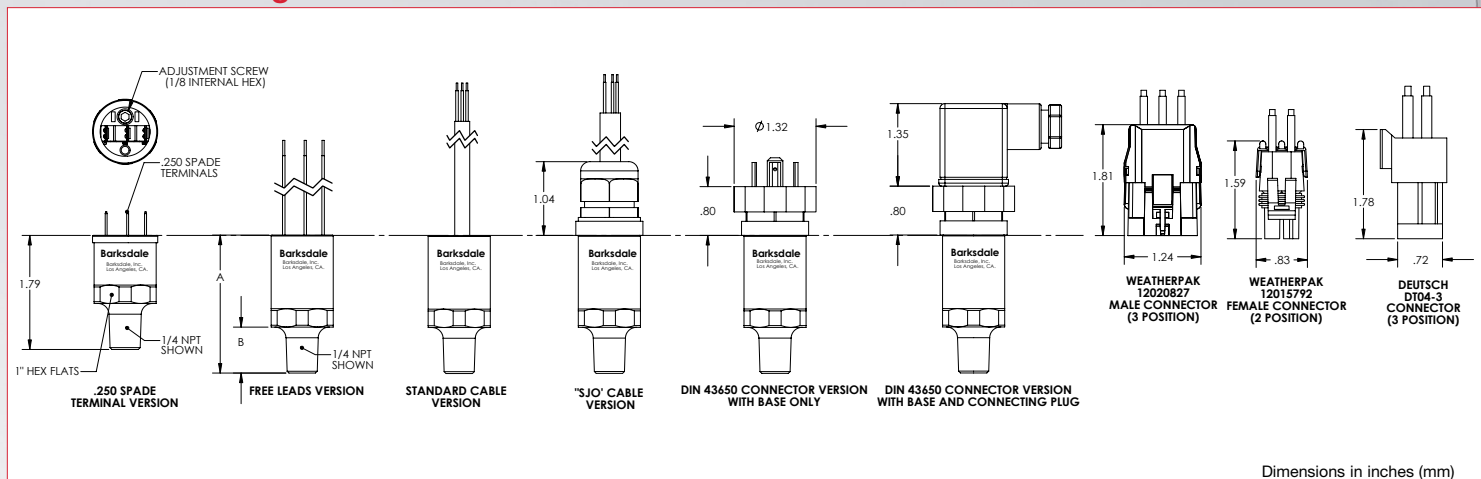
Wiring Code

CONTACT	FREE LEADS	PVC GRAY CABLE	TYPE 'SJO' CABLE	DIN 43650 TYPE CONNECTOR
COMMON	PURPLE	WHITE	WHITE	POSITION 1
NORMALLY OPEN	RED	RED	GREEN	POSITION 3
NORMALLY CLOSED	BLUE	BLACK	BLACK	POSITION 2

Compact Pressure Switch

Series 7000

Technical Drawing



Product Configurator

Example 72 4 S -2 4 -1 B

Basic Configuration

71	Factory set & permanently locked
72	Field adjustable
73	Field adjustable with factory pre-set

Pressure Range

Range	Adjustable Range				Approx. Deadband (Actuation Value)	*Operating Pressure (Max)	Max. Proof Pressure
	Decreasing - psi		Increasing - psi				
	Min	Max	Min	Max	psi	psi	psi
2	6	35	8	50	2 - 15	80	100
3	30	90	40	120	5 - 30	130	140
4 ²	150	700	250	1000	30 - 300	4000	6000
5 ²	500	2300	600	3000	100 - 800	4000	6000
6 ³	20	150	30	200	10 - 100	700	2000
7 ³	80	400	150	500	20 - 150	700	2000

* Operating pressure is defined as the maximum pressure at which the pressure switch can maintain set point accuracy.

Fitting Material

S	300 series stainless steel
B ⁶	Brass (only available with pressure ranges 6 and 7, and 1/8" NPT process connection)

Limit Switch

-1	SPDT, snap-action switch, 5 Amps @ 125/250 VAC (silver contacts)
-2	SPDT, snap-action switch, 0.1 Amps @ 125/250 VAC (gold contacts)
-4	SPST, N.O., snap-action switch, 5 Amps @ 125/250 VAC (silver contacts)
-5	SPST, N.C., snap-action switch, 5 Amps @ 125/250 VAC (silver contacts)
-6	SPST, N.O., snap-action switch, 0.1 Amps @ 125/250 VAC (gold contacts)
-7	SPST, N.C., snap-action switch, 0.1 Amps @ 125/250 VAC (gold contacts)

Options

-Wxxx Extra wire length (XXX = inches)

Set Point

-XXX	Set point (not required for field adjustable)
R	Rising pressure
F	Falling pressure

Wetted Material

B	Buna-N
N	Neoprene (all except -4 and -5 pressure range codes)
V	Viton® Diaphragm
D	Disogrin O-ring (available in stainless steel & piston models only)

Process Connection⁵

-1	1/8" NPTM
-2	1/4" NPTM
-3	7/16-20 with O-ring seal (available only with stainless steel models)
-4	G1/4 (available only with stainless steel models)

Electrical Connection

1	.250 x .032 male spade quick disconnects (NEMA 1), not available with brass
2	.110 x .020 male spade quick disconnects (NEMA 1), not available with brass, only SPDT
3	Free leads. 18 gauge, 18" long (NEMA 1)
4	Unshielded PVC jacketed cable, 18 AWG, 18" long (NEMA 4)
5 ⁴	DIN 43650-type connector - base only (available only with stainless steel & factory set models - NEMA 4)
6 ⁴	DIN 43650-type connector - with base & plug (available with factory set models - NEMA 4)
7 ⁴	SJO type cable, 3 wire, 18 AWG, 18" long (available only with factory set models - NEMA 4)
8 ^{1,5}	Weatherpak connector, female, 2-position, two 18" free wires, for normally closed circuits
9 ^{1,5}	Weatherpak connector, female, 2-position, two 18" free wires, for normally open circuits
10 ^{1,5}	Weatherpak, connector, male, 3-position, three 18" free wires, used only with SPDT limit switches
11 ^{1,5}	Deutsch connector, female, 3-position, three 18" free wires, used only with SPDT limit switches

NOTES:

- ¹ Not UL/CSA certified
- ² Piston models - only available in stainless steel
- ³ Available only in brass fittings (use Viton diaphragms as standard - no price adder)
- ⁴ Available only with stainless steel or brass, factory set & locked models
- ⁵ Minimum quantities may be required.
- ⁶ Brass fitting only available in 1/8" NPT, pressure ranges 6 or 7, electrical connections 3 or 4.

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Compact Switch

Series 96201, 96211, 96221

Features

- ▶ Compact size
- ▶ Low & high pressures including vacuum
- ▶ Extremely versatile
- ▶ Optional DIN and conduit connectors
- ▶ NEMA 1 & 4; IP65
- ▶ Single pole double throw snap action switching
- ▶ Factory preset or field adjustable

Applications

- ▶ Pump & compressor monitoring
- ▶ Air proving in HVAC systems
- ▶ Engine monitoring
- ▶ Machine tools
- ▶ Hydraulic power units
- ▶ Mobile hydraulics
- ▶ Medical equipment
- ▶ Irrigation systems
- ▶ General industrial applications



General Specifications*

Accuracy:	± 2% of full range
Switch: Type:	SPDT snap action; single circuit
Rating:	5 Amp @ 125/250 VAC (Class BB microswitch - standard) 10 Amp @ 125/250 VAC (Class CC microswitch) 5 Amp @ 30 VDC (Class BB and CC microswitches) (No agency)
Wetted Parts: Process Fitting:	Brass (standard); 416 stainless steel (optional)
O-Ring Seals & Diaphragms:	Buna-N (standard)
Piston (96201 models):	Stainless steel; Teflon back-up ring
Electrical Connection:	12" free leads, #18 AWG (Standard)
Enclosure Ratings:	NEMA 1 (plastic - standard) NEMA 4 (when ordered with -T4 or -T5 options) IP65 (when ordered with T2 DIN connection option)
Pressure Connection:	1/4" NPT male (standard)
Approvals: UL:	UL recognized component (UR); With optional conduit connector (-T4 or -T5 option) becomes UL listed. UL File No. E42816.
CSA:	CSA #LR22355

Temperature Range: Series 96201: Series 96211: Series 96221:	-40° to +165°F (-40° to +74°C) -20° to +165°F (-29° to +74°C) 0° to +165°F (-18° to +74°C)
Adjustment Capability:	Models L96201, L96211 and L96221 are factory set and permanently locked. Models 96201, 96211, and 96221 are field adjustable via an external adjustment sleeve.
Pressure Setpoint Adjustment:	Secure hex body with open-end wrench; hand turn adjustment sleeve: Clockwise (counterclockwise for vacuum models) to increase. Counterclockwise (clockwise for vacuum models) to decrease set point.
Shipping Weight:	Approximate 0.95 lbs.

Wiring Code

LEAD	PRESSURE		VACUUM	
	COLOR	PIN	COLOR	PIN
NORMALLY CLOSED	BLUE	2	RED	3
COMMON	PURPLE	1	PURPLE	1
NORMALLY OPEN	RED	3	BLUE	2

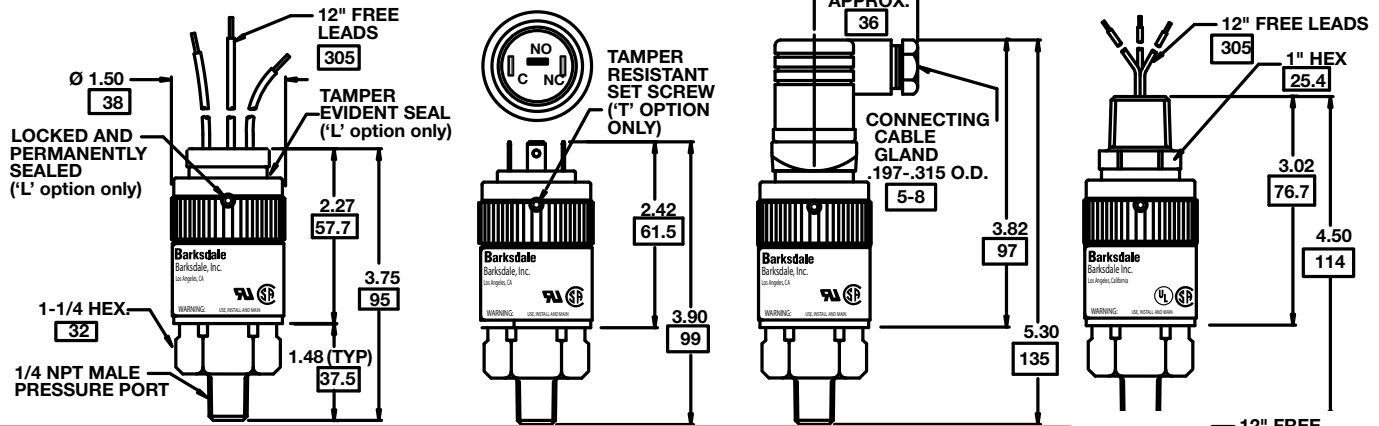
* See product configurator for additional options.

Compact Switch

Series 96201, 96211, 96221

Technical Drawings

Dimensions in inches (mm)



Product Configurator

Example: **96211-BB3 SS -T5 -V**

Prefix

L ⁵	Factory set and permanently locked (optional)
T	Tamper resistant setscrew (optional)

Base Model

	Adjustable Range				Approx. Deadband (Actuation Value)	Proof Pressure	
	Decreasing - psi (bar)		Increasing - psi (bar)				
	Min.	Max.	Min.	Max.	psi (bar)	psi (bar)	
96221-BB1	1" Hg	28" Hg	6" Hg	30" Hg	.5 - 8" Hg	30 (2)" Hg	Vacuum
96211-BB1	2.5 (.2)	12.8 (.9)	3 (.2)	15 (1)	.3 - 3 (.02 - .21)	1000 (68)	Low Pressure Diaphragms
96211-BB2	5 (.3)	31 (2)	6 (.4)	35 (2.4)	.5 - 6 (.03 - .41)	1000 (68)	
96211-BB3	8.5 (.6)	44 (3)	10 (.6)	50 (3.4)	.5 - 8 (.03 - .55)	1000 (68)	
96211-BB4	22.5 (1.5)	112 (8)	25 (1.8)	125 (8.5)	1 - 15 (.07 - 1.03)	1000 (68)	
96211-BB5	70 (5)	220 (15)	80 (5.5)	250 (17)	5 - 40 (.34 - 2.76)	1000 (68)	
96211-BB6	110 (7)	440 (30)	130 (9)	500 (34)	10 - 75 (.69 - 5.17)	1000 (68)	
96201-BB1	190 (13)	450 (31)	250 (17)	600 (41)	30-150 (2.07 - 10.35)	7000 (476)	High Pressure Piston
96201-BB2	360 (24)	1450 (105)	430 (29)	1700 (116)	40-400 (2.76 - 27.59)	7000 (476)	
96201-BB3	1450 (105)	3900 (265)	1650 (112)	4400 (300)	100-750 (6.90 - 51.72)	7000 (476)	
96201-BB4	3650 (248)	6700 (456)	4000 (272)	7500 (510)	200-1000 (13.79-68.96)	12000 (816)	
96201-BB5	300 (20)	2500 (170)	380 (26)	3000 (200)	80-500 (5.52-34.48)	7000 (476)	
-CC	10A @ 125/250VAC Limit Switch (replace -BB with -CC)						

Fitting Option

Blank	Brass (Standard)
SS ¹	Stainless steel (Not available with vacuum or 96201-BB4 models)

Electrical Connectors

Blank	12" free leads (standard)
-T1	1/4" male spade terminals
-T2	DIN Connector, 43650A
-T4	1/2" NPT male conduit connector with free leads
-T5	1/2" NPT female conduit connector with free leads

NOTES:

- 1 Not available with 96221-BB1 or 96201-BB4 base models
- 2 Minimum quantities may apply
- 3 Only available with -T5 electrical connection
- 4 Not available with DIN connector (-T2 option)
- 5 Requires selection of factory preset -SXXX option.

Options

-Z1	Cleaned for oxygen service
-Z12	Gold contact limit switch, 1 A, 125 VAC
-Z17	DIN 43650 base only (no mating plug)
-Z24	Unshielded cable, #18 AWG PVC (No agency)
-P1	7/16-20 SAE pressure Fitting with O-ring
-JXXX ³	SJO cable, #18 AWG (XXX = inches) (available only with T5 connector)
-WXXX ⁴	Extra wire length (XXX = inches)
-SXXX	Factory preset (consult factory)

Diaphragm/O-ring Material²

Blank	Buna-N (standard)
-E	Ethylene propylene (EPR)
-N	Neoprene (No agency)
-V	Viton®

Compact Pressure Switch

Series 8000

Features

- ▶ Proven design in stationary and mobile hydraulic applications
- ▶ Wide setpoint pressure range
- ▶ Available in wide range of configurations
- ▶ Precise setpoint adjustment
- ▶ Factory preset or field adjustable
- ▶ UL Type 4
- ▶ Modular concept
- ▶ Manifold mount
- ▶ Additional process connections

Applications

- ▶ Hydraulic power packs
- ▶ Machine tools
- ▶ Overload controls
- ▶ Railways
- ▶ Factory automation
- ▶ Balers and compactors



General Specifications*

Repeatability:	±2% typical, diaphragm models ±1% typical, piston models
Microswitch:	SPDT contact
Rating:	Silver contacts: 3A @ 250 VAC 5A @ 125 VAC 3A @ 30 VDC Gold contacts: 0.1A @ 125 VAC 0.1A @ 30 VDC
Switching Frequency:	Max. 60 /min piston switch Max. 30/ min diaphragm switch
Wetted Parts:	
Process Fitting:	300 series stainless steel
Housing:	Aluminum die-cast 230
Seals & Diaphragms:	Buna-N (NBR) standard; FKM, EPDM (EPR) optional
Adjustment Screw:	300 stainless steel (HEX 5 mm)
Electrical Connection/ Rating:	For IP rating and electrical connections see page 2
Enclosure Ratings*:	NEMA 4

Pressure Connection:	Standard manifold (Additional options available; see product configurator)
Approvals:	
Standard:	UL / cULus (CSA)
Ambient Temperature Range:	
Piston Switch:	-40°F to +167°F (-40°C to +75°C)
Diaphragm Switch:	-4°F to +167°F (-20°C to +75°C)
Adjustment Instructions:	
Setpoint Adjustment:	Turn adjustment screw clockwise to increase pressure setpoint; counterclockwise to decrease pressure setpoint.
Shipping Weight:	
Manifold Version:	0.77 lbs. (350 g)
Adaptor Version Straight:	1.36 lbs. (620 g)
Adaptor Version 90° Angle:	1.48 lbs. (675 g)

* See product configurator for additional options.

Wiring Code

(contact status at atmospheric pressure)

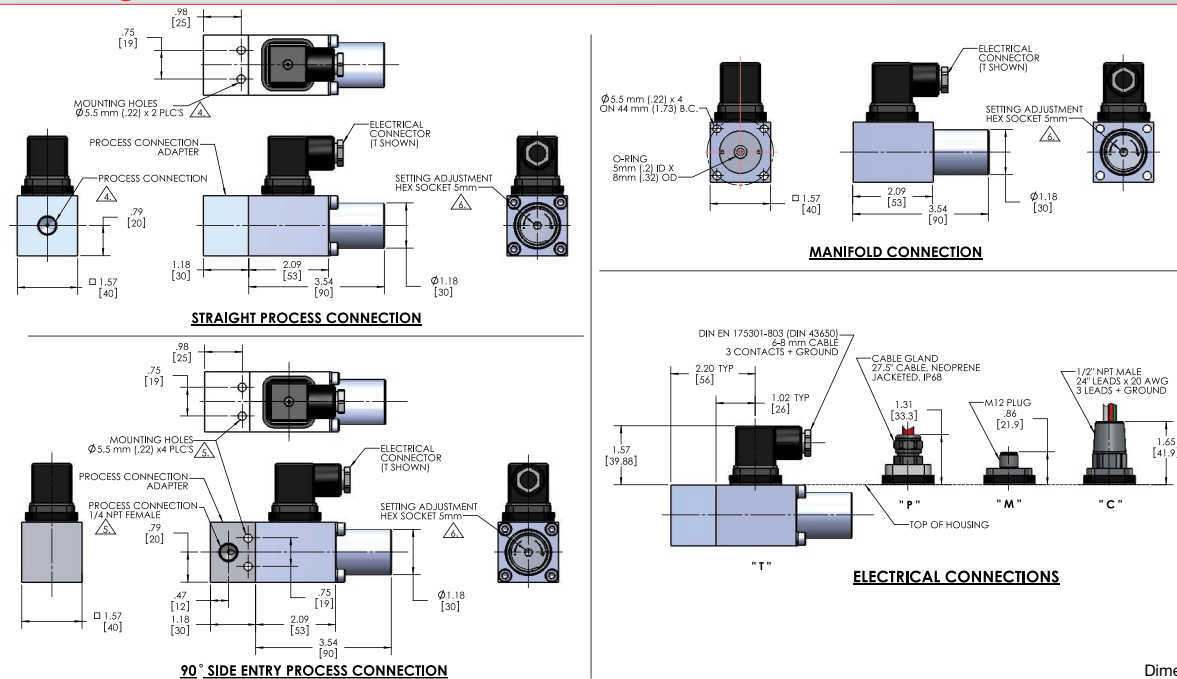


	DIN 43650 Plug (T/B)	M12 Plug (M)	Cable Gland (P)	1/2" NPT Conduit w/ Free Leads (C)
Common	1	1	White	Violet
Normally Closed	2	2	Black	Blue
Normally Open	3	4	Red	Red
Ground	GRD	3	Green	Green

Compact Pressure Switch

Series 8000

Technical Drawings



Dimensions in mm (inch)

Product Configurator

Example: **8 A A 1 T B**

Series

8 Series 8000

Process Connections¹

1²	Manifold connection flange 40 x 40
2	G1/4" female
A	1/4" NPT female
C	1/8" NPT female
D	1/4" NPT female, 90° side entry
E	7/16-20 UNF SAE-4 female
F	9/16-18 UNF SAE-6 female

SPDT Contacts

1	Silver
2	Gold-plated

*Electrical Connectors

T	Plug DIN 43650 A, IP65 (UR only) (formerly PL1)
B	DIN 43650 A, without mating plug, IP65
M	Plug M12, 4-pol. without female plug, IP67 (UR only) (formerly PL2)
P	Cable gland, 27.5" (0.7 m) cable, neoprene jacketed, IP68 (formerly CA3)
C	1/2" NPTM AWG 20 with 24" (60 cm) leads (3 leads + ground) (formerly CD1)

*Electrical connectors listed meet NEMA 4 rating

Pressure Range

	Adjustable Ranges				Max. Hysteresis ³ (Dead-band)	Max. Operating Pressure		Proof Pressure	
	(decreasing pressure) psi	(increasing pressure) bar	(increasing pressure) psi	(increasing pressure) bar		psi	bar	psi	bar
Diaphragm									
A	5.8- 82	0.4 - 5.7	8.7 - 87	0.6 - 6	≤15% of max adjustable range	725	50	1200	80 ^(†)
B	29 - 246	2.0 - 17	45 - 290	3.1 - 20		725	50	1200	80 ^(†)
C	43 - 600	3.0 - 41	60 - 650	4.1 - 45		725	50	1200	80 ^(†)
Piston									
D ⁸	43 - 2320	3.0 - 160	75 - 2610	5.0 - 180	≤15% of max adjustable range	3600	250	8700	600
E ⁸	430 - 4300	30 - 300	750 - 5000	50 - 350		6500	450	8700	600
F ⁸	800 - 7550	55 - 520	1200 - 8700	80 - 600		8700	600	13050	900

^(†) Proof pressure 2900 psi (200 bar) on request (May shorten the lifetime of the switch).

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Pressure

Intrinsically Safe Compact Pressure Switch

Series 8000-EXI

Features

- ▶ Proven design in stationary and mobile hydraulic applications
- ▶ Wide setpoint pressure range
- ▶ Available in wide range of configurations
- ▶ Precise setpoint adjustment
- ▶ Factory preset or field adjustable
- ▶ IP65, IP68
- ▶ ATEX
- ▶ Modular concept

Applications

- ▶ Hydraulic power packs
- ▶ Oil and gas
- ▶ Flour mills
- ▶ Paint spraying
- ▶ Factory automation
- ▶ Mining
- ▶ Marine applications



General Specifications*

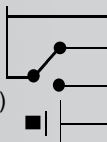
Repeatability:	±1% typical, piston models ±2% typical, diaphragm models
Microswitch: Type:	SPDT contact
Rating:	Silver/Gold contacts: Voltage = 28 V max Current = 50 mA max
Switching Frequency:	max. 60 /min piston switch max. 30/ min diaphragm switch
Wetted Parts: Process Fitting:	300 series stainless steel
Housing:	Aluminum die-cast 2014 or 2007 Stainless steel - optional AISI 303
Seals & Diaphragms:	Buna-N (NBR), FKM, EPDM
Adjustment Screw:	300 stainless steel (HEX 5mm)
Electrical Connection:	For IP rating and electrical connections see page 2

Pressure Connection:	Multiple pressure connections available
Approvals: ATEX: <div> <div>Ex</div> II1GD Ex ia IIC T6 Ga Ex ia IIIC T100°C Da <div>Ex</div> II1GD Ex ia IIB T6 Ga Ex ia IIIC T100°C Da </div>	DIN plug version Cable version GOST R
Ambient Temperature Range: Piston Switch: Diaphragm Switch:	-40°F to +167°F (-40°C to +75°C) -4°F to +167°F (-20°C to +75°C)
Adjustment Instructions: Setpoint Adjustment:	Turn adjustment screw clockwise to increase pressure; counterclockwise to decrease pressure.
Shipping Weight: CETOP Flange Model: Adaptor Version Straight: Adaptor Version 90° Angle:	0.77 lbs. (350 g) 1.36 lbs. (620 g) 1.48 lbs. (675 g)

* See product configurator for additional options.

Wiring Code

(contact status at atmospheric pressure)



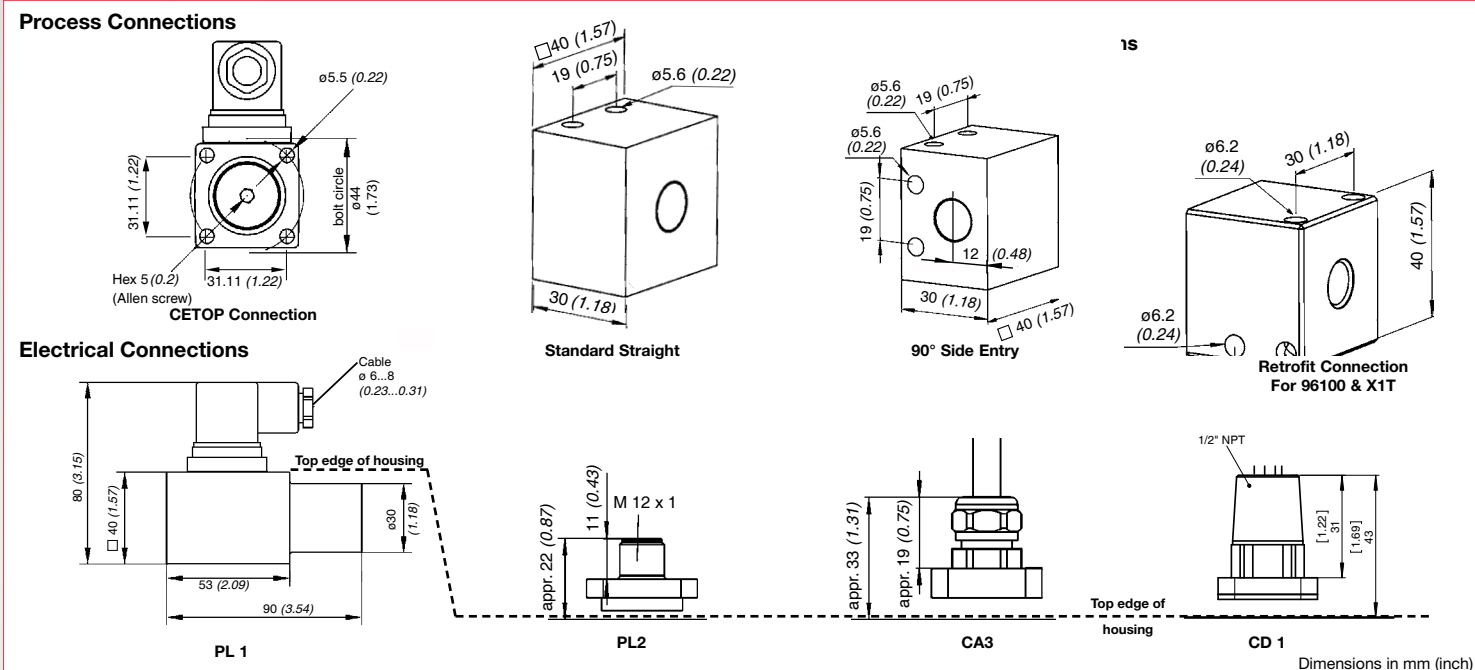
	DIN 43650 Plug (PL1)	M12 Plug (PL2)	Cable Gland (CA)	1/2" NPT Conduit w/ Free Leads (CD1)
Common	1	1	Brown	Violet
Normally Closed	2	2	Black	Blue
Normally Open	3	4	Gray	Red
Ground	GRD	3*	Green/Yellow	Green

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Intrinsically Safe Compact Pressure Switch

Series 8000-EXI

Technical Drawings



Product Configurator

Example: 8 A A 1 - PL1 - B -VA -EXI - EX⁶ Intrinsically safe EXia

Series 8000

Process Connections¹

1 ²	Manifold cetop connection flange 40 x 40
2	G1/4" female
A	1/4" NPT female
C	1/8" NPT female
D	1/4" NPT female, 90° side entry
E	7/16 SAE-4 20 UNF

SPDT Contacts

1	Silver
2	Gold-plated

Electrical Connectors

- PL1	Plug DIN 43650 A, IP65
- PL2	Plug M12, 4-pol. without female plug, IP67
- CA3	Cable gland, 27.5" (0.7 m) cable, neoprene jacketed, IP68
- CD1	1/2" NPTM AWG 20 with 24" (60 cm) leads (3 leads + ground)

Options⁴

Blank	Aluminum die-cast 230 (Standard)
-VA	300 series stainless steel (Optional)
-LH ⁵	Low hysteresis
-D ⁵	Surge protection

Seals

- B	Buna -N (NBR)
- V	FKM
- E	EPDM

Pressure Range

	Adjustable Ranges				Max. Hysteresis ³ (Dead-band)	Max. Operating Pressure psi (bar)	Proof Pressure psi (bar)	
	(decreasing pressure) psi	(increasing pressure) (bar)	(increasing pressure) psi	(increasing pressure) (bar)				
Diaphragm								
A	10 - 80	(0.7 - 5.5)	10 - 85	(0.7 - 5.9)	≤15% of max adjustable range	725	50	1200 (80) ⁽⁷⁾
B	30 - 245	(2.0 - 17)	45 - 290	(3.1 - 20)		725	50	1200 (80) ⁽⁷⁾
C	45 - 600	(3.1 - 41)	60 - 650	(4.1 - 45)		725	50	1200 (80) ⁽⁷⁾
Piston								
D ⁷	45 - 2320	(3.1 - 160)	75 - 2610	(5.2 - 180)	≤15% of max adjustable range	3600	250	8700 (600)
E ⁷	430 - 4300	(3.1 - 300)	750 - 5000	(52 - 345)		6500	450	8700 (600)
F ⁷	800 - 7550	(55 - 520)	1200 - 8700	(83 - 600)		8700	600	15000 (900)

⁽⁷⁾ Proof pressure 2900 psi (200 bar) on request (May shorten the lifetime of the switch).

Notes:

¹ Consult factory for other process connections. Minimum quantities may apply.

² Model 81XX- at pressure ranges is (A to E) delivered with 2 spring clips and 2 mounting screws 5 x 60 mm, steel 10.9, galvanized (hex 4). Pressure range (F) is delivered with 4 mounting screws.

³ Consult sales drawing for dead-band chart

⁴ Consult factory for additional options.

⁵ Only for piston version (D, E, F pressure range)

⁶ Intrinsically safe model can be ordered with or without stainless steel feature (-VA).

⁷ For water applications or pressure over 3,000 psi, -D option, surge protection, is recommended.

Compact Pressure Switch

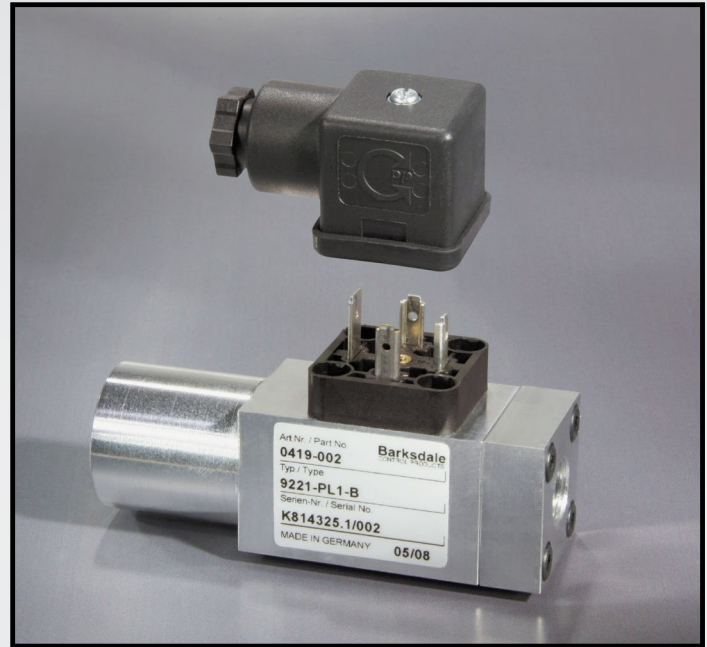
Series 9000

Features

- ▶ Compact design as compared to Series 8000
- ▶ Long pressure spring (enhanced adjustment)
- ▶ Captive set screw
- ▶ Standard DIN 43650 electrical connector
- ▶ NEMA 4 / IP65

Applications

- ▶ OEM applications
- ▶ Hydraulic power units
- ▶ Test equipment
- ▶ Heavy industry
- ▶ Mobile and stationary hydraulics
- ▶ Press Equipment



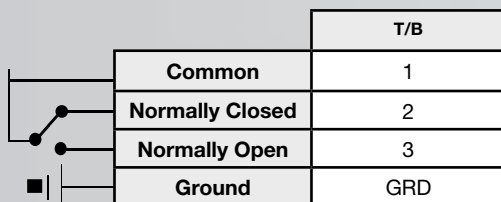
General Specifications*

Repeatability:	±2% (typical)
Microswitch: Type: Rating:	SPDT contact Silver contacts: 10A @ 250 VAC 6A @ 24 VDC
Switching Frequency:	Max. 60/min.
Wetted Parts: Dynamic Seal:	Buna-N (NBR) Viton® (FKM) EPDM (EPR)
Fitting: Piston:	Stainless Steel / Aluminum Steel
Electrical Connection:	DIN 43650 (EN 175301-8013-A plug)
Adjustment Ranges:	90 to 5800 psi (6 to 400 bar)
Ambient Temperature Range: Storage: Ambient/Media:	-40 °F to +176 °F (-40 °C to +80 °C) -4 °F to +176 °F (-20 °C to +80 °C)

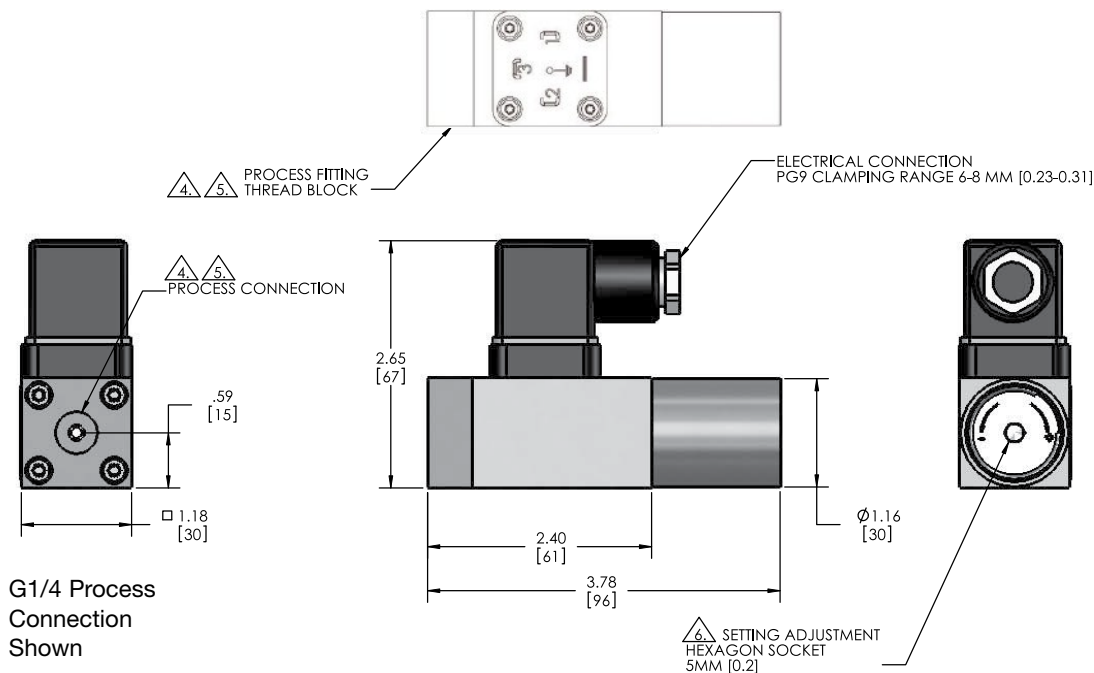
Enclosure Rating:	IP65 / NEMA 4
Material: Housing: Electrical plug: Adjustment screw:	Standard: Aluminum Optional: Stainless steel (1.4305) / AISI 303, Version - VA Polyamide Standard: Aluminum Optional: Stainless steel, 1.4305 / AISI 303 (SW5), captive
Process Connection (female):	1/4" NPT; G1/4 7/16 - 20 UNF SAE 4
Adjustment Instructions: Setpoint Adjustment:	Turn adjustment screw clockwise to increase pressure; counterclockwise to decrease pressure.
Weight:	0.39 lbs (175 g)

* See Product Configurator for additional options.

Wiring and Connection Diagram



Technical Drawing



Product Configurator

Example	9	A	A	1	T	V		
---------	---	---	---	---	---	---	--	--

Series

9 Series 9000

Process Connection

2	G1/4" female
3	G1/4" IG DIN ISO 228-1 with 2 mounting wholes (Ø 5,5mm / 20mm distance)
A	1/4" NPT female
E	7/16-20 UNF (SAE-4) female

Pressure Range

Range	Adjustable Range		Max. Hysteresis at full range max %	Max. Operating Pressure psi (bar)	Proof Pressure psi (bar)
	Decreasing Press. psi (bar)	Increasing Press. psi (bar)			
A	90 - 630 (6 - 44)	145 - 725 (10 - 50)	10%	3620 (250)	4350 (300)
B	220 - 2680 (15-185)	290 - 2900 (20 - 200)		3620 (250)	4350 (300)
C	510 - 5220 (35 - 360)	580 - 5800 (40 - 400)		7250 (500)	8700 (600)

SPDT Contact

1 Silver

Electrical Connection

T	DIN 43650A, IP65 (formerly PL1)
B	DIN 43650A, without mating plug, IP65

Accessories

/N	DIN 43650 type A connector with molded cable, 6.56 feet (2 meters)
/O	DIN 43650 type A connector with molded cable, 16.40 feet (5 meters)

Options

XXXXR*	Factory setpoint rising (standard)
XXXXF*	Factory setpoint falling

*Example: if setpoint is 2000 rising, order 2000R
If setpoint is 500 falling, order 0500F

Seals

B	BUNA-N (NBR)
V	Viton® (FKM)
E	EPDM (EPR)

Pressure

Explosion Proof Compact Switch

Series 9671X, 9681X, 9692X

Features

- ▶ IECEx & ATEX approved
- ▶ NEMA 4X, 7 & 9
- ▶ NACE compliant
- ▶ SPDT and DPDT switch
- ▶ Safe to adjust during operation
- ▶ Dia-seal/piston sensor
- ▶ Hazardous location dual seal approved for Canada
- ▶ Lower ambient temperature option (-40° F to 149° F)

Applications

- ▶ BOP closing units
- ▶ Safety panels
- ▶ Pipelines
- ▶ Chemical and petrochemical plants
- ▶ Pulp and paper mills
- ▶ Pump and gas compressors
- ▶ Turbines
- ▶ Oil & gas applications

General Specifications*

Accuracy:	±2% of full scale
Typical Life:	2.5 million cycles
Switch:	SPDT, snap action, simulated DPDT (optional)
Wetted Parts:	
Process Fitting:	316 stainless steel
Seals:	Viton® Diaphragm (9671X & 9681X) Viton® O-ring and Teflon® backup ring (9692X)
Piston:	Stainless steel (on 9692X)
Enclosure:	316 stainless steel or aluminum
Electrical Connection:	1/2" NPT male conduit connection, 18 AWG, 18" (300 mm) free leads
Electrical Rating:	11 amps @ 125/250VAC 5 amps @ 30 VDC (CC Class)
Enclosure Ratings:	NEMA 4X, 7 & 9 (SS) NEMA 4, 7, & 9 (AL)

* See product configurator for additional options.



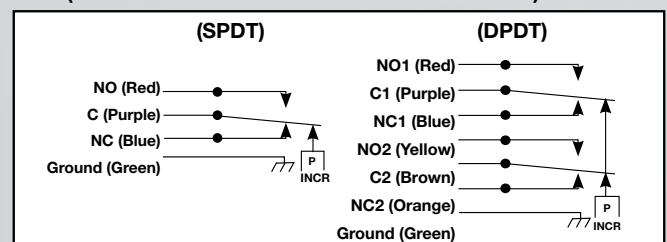
Pressure Connection:	1/4" NPT female (standard) See configurator for more options
Approvals: ATEX/IECEX	CE 0081, LCIE 08 ATEX 6074X II 2 G, Ex d IIC T6 Gb IECEX LCIE 17.0001X UL # E37043 CSA # LR22354
Ambient Temperature:	-4° to +104°F (-20° to +40°C) LT Option: (not UL or CSA) -40° F to 149° F (-40°C to +65°C) (Consult factory)
EMI/RFI:	EN55011
Vibration:	10g's 10-500 Hz, MIL-STD-202F
Shock:	50g's, 11 mS, MIL-S-901C
Adjustment:	Internal adjustment wheel with built in locking set-screws (#6) ¹
Shipping Weight:	Approximately 1.85 lbs.

¹ Need to loosen set screw (#6) at all times when resetting adjustment.

Wiring Code

	9692X/9681X (Pressure)		9671X (Vacuum)	
Lead	Circuit #1	Circuit #2	Circuit #1	Circuit #2
Normally Open	Red	Yellow	Blue	Orange
Common	Purple	Brown	Purple	Brown
Normally Closed	Blue	Orange	Red	Yellow
Ground	Green		Green	

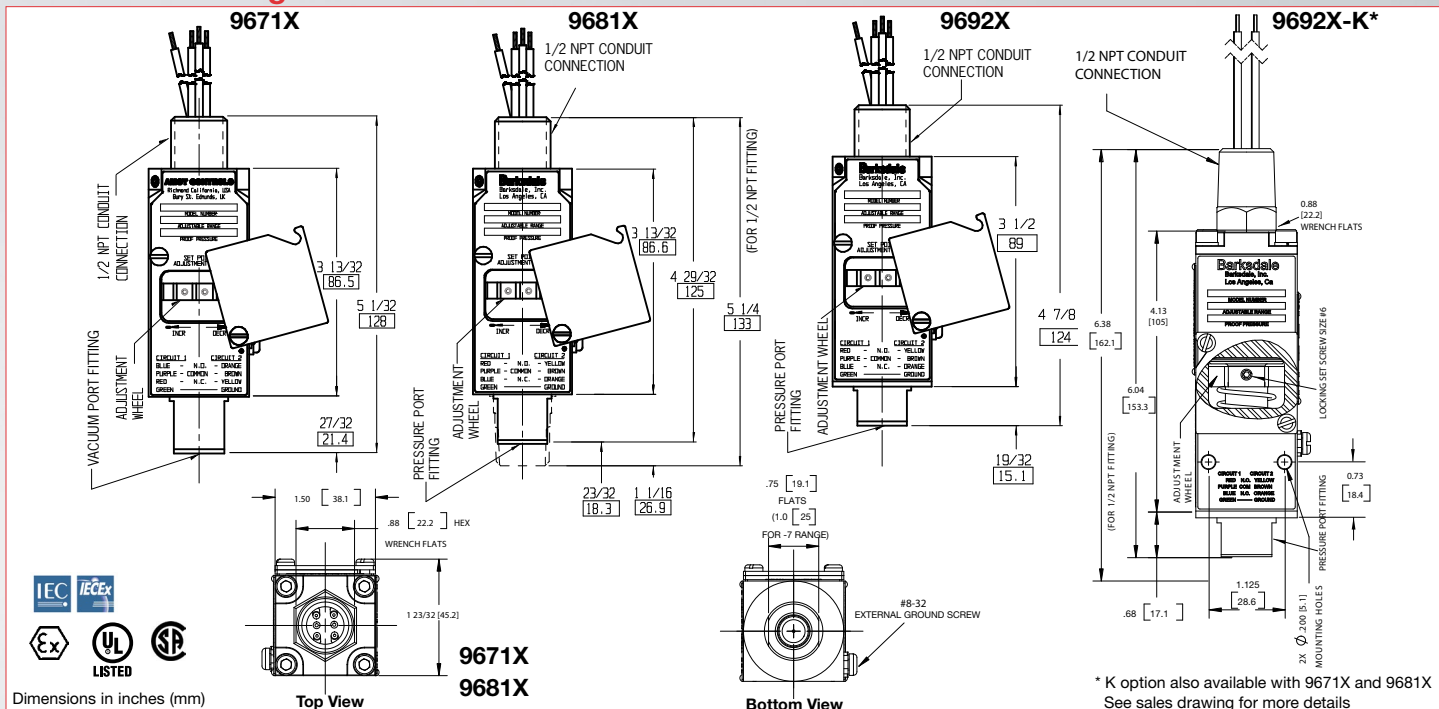
Wiring Diagram (9681X/9692X models) (NO/NC contacts are reversed on 9671X model)



Explosion Proof Compact Switch

Series 9671X, 9681X, 9692X

Technical Drawings



Product Configurator

Example: **A** **9681X** **-1CC** **-2** **-AL** **-K** **-W036-LT**

Approvals

Blank	All approvals (ATEX & IECEx, UL & CSA)
A ¹	ATEX & IECEx only

Base Model

9671X	Vacuum switch, 1 - 30 in. Hg.
9681X	Pressure switch, 2 - 500 psi
9692X	Pressure switch, 100 - 10000 psi

Limit Switch

-1CC	SPDT Switch, 11 amps @ 125/250 VAC; 5 amps @ 30 VDC
-2CC	DPDT Switch, 11 amps @ 125/250 VAC; 5 amps @ 30 VDC
-1GH	SPDT gold contact switch, 1 amp @ 125 VAC
-2GH	DPDT gold contact switch, 1 amp @ 125 VAC

Pressure Ranges for 9681X & Vacuum Ranges for 9671X

		Adjustable Range				Approx. Deadband ² (Actuation Value)	Proof Pressure
		Decreasing - psi (bar)		Increasing - psi (bar)			
		Min	Max	Min	Max	psi-(bar)	psi (bar)
9671X	Blank	1" Hg	21" Hg	5" Hg	30" Hg	4 - 9" Hg	30" Hg
9681X	-1	2 (.1)	12 (.8)	3 (.2)	15 (1)	1 - 3 (.07 - .2)	1000 (69)
	-2	5 (.3)	125 (8.6)	7 (.5)	150 (10.3)	2 - 25 (.1 - 1.7)	1000 (69)
	-3	25 (1.7)	260 (17.9)	32 (2.2)	300 (20.6)	7 - 40 (.5 - 2.8)	1000 (69)
	-4	50 (3.4)	440 (30.3)	65 (4.5)	500 (34.4)	15 - 60 (1 - 4.1)	1000 (69)

Pressure Range for 9692X

9692X	Adjustable Range				Approx. Deadband ² (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi-(bar)	psi (bar)
-1	100 (6.9)	600 (41.4)	150 (10.3)	750 (51.7)	50 - 150 (3.4 - 10.3)	15000 (1034)
-2	150 (10.3)	800 (55.2)	220 (15.2)	1000 (69)	70 - 200 (4.7 - 13.8)	15000 (1034)
-3	400 (27.6)	2600 (179)	500 (34.5)	3000 (207)	100 - 400 (6.7 - 27.6)	15000 (1034)
-4	700 (48.2)	4400 (303)	840 (57.9)	5000 (345)	140-600 (9.6 - 41.4)	15000 (1034)
-5	1000 (69)	6700 (462)	1200 (82.8)	7500 (517)	140-800 (9.6 - 55.2)	15000 (1034)
-6	150 (10.3)	800 (55.2)	220 (15.2)	3000 (207)	50-1000 (3.4-68.9)	15000 (1034)
-7	5000 (344.8)	8800 (606.9)	5200 (358.6)	10000 (689.7)	200-2000 (13.8-137.9)	15000 (1034)

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Options

-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory preset (consult factory)
-T	Wire lock feature for adjustment cover screws
-LT ¹	Low temp: -40° F to 149° F [Must select option 'A'] Consult factory
-K	Mounting holes and conduit wrench flats

Housing Option

Blank	316 stainless steel housing
-AL	Aluminum housing (-K only)

Process Connection³

Blank	1/4" NPT female (standard)
-P1	7/16-20 SAE female process connection
-P3	1/2" NPT female process connection
-P4	1/2" NPT male process connection

Wetted Material

Blank	Viton® diaphragm/O-rings (standard)
Blank ¹	For -LT Option (consult factory)
-B	Buna-N diaphragm/O-rings
-E	EPR diaphragm/O-rings (UL and ATEX not available with this option; CSA only available on the 9692X models)

NOTES:

¹ For -LT, Low temperature option, 'A' option in approvals must be selected. Not UL or CSA approved.

² Consult factory for lead-time and availability.

³ Deadband values indicated when used with the "CC" limit switch.

⁴ Contact factory for other possible connection options.

Barksdale®
CONTROL PRODUCTS

Diaphragm Seals

Diaphragm Seals

Product Overview

Introduction

Diaphragm Seals (or Chemical Seals) use a flexible barrier, or diaphragm, to isolate a pressure sensor (switch or transducer) from adverse effects of the process fluid.

Diaphragm seals are useful to:

- ▶ Protect the sensor from the process media (corrosive, abrasive, viscous, crystallizing media, or high process temperature)
- ▶ Protect the process from the contaminants (sanitary process requiring clean-out, or high purity media).

HOW IT WORKS

A diaphragm seal, when properly mounted to a sensor and filled, will accurately transmit process pressure to the instrument. The pressure applied by the process media is hydraulically transmitted from the flexible diaphragm, through the fill fluid between the diaphragm and the instrument, to the pressure element, thus engaging the switch or transducer.

TARGET MARKETS & APPLICATIONS

- ▶ Oil, gas & petrochemical refining
- ▶ Food & beverage processing
- ▶ Waste water facilities
- ▶ Pharmaceutical
- ▶ Pulp & paper
- ▶ Chemical
- ▶ Sanitary/High Purity applications
- ▶ Power generation
- ▶ Automotive/Paint



Diaphragm Seals

Diaphragm Seals

Product Overview

Application Considerations

The following should be considered when choosing a diaphragm seal:

- ▶ **Process Characteristics:** Pressure, temperature, chemical compatibility, and viscosity.
- ▶ **Seal Mounting:** Connection to process (threaded, flanged, clamped, or remote) and connection to instrument (usually NPT).
- ▶ **Ambient Characteristics:** Temperature, corrosive atmosphere, etc.
- ▶ **Instrument Considerations:** Sufficient fluid displacement is required to drive instrument through its full range. This means, for example, you can't put an instrument with a large displacement on a seal with a small displacement. Remote instrument placement requires a capillary connecting instrument to seal.
- ▶ **Vacuum Considerations:** High vacuums (over 25" Hg) or vacuums with high temperatures require special fill selection, preparation, and procedures, as well as careful diaphragm selection.

NOTE

Improper seal selection may result in increased system error, system failure, and possible damage or injury. Barksdale can provide application assistance, but final compatibility is the responsibility of the buyer.

HOW TO ORDER

Follow the Barksdale switch, transducer or solid state part number with a slash (/) and then the diaphragm seal part number.

Examples:

D1H-H18SS/TS5
E1H-H250-BR/FF1
BPS34NVM015OP/SSI
425X-03/MS6

SEAL TYPES

Threaded Off-line Seals:

Threaded off-line and flanged off-line seals are commonly used in a variety of applications. These have a standard cleanout feature, allowing removal of the process flange or lower housing without losing the fill. Mounted on a nipple off the line or using a standard ANSI flange.

Flush Face Seals:

Designed for low displacement applications where a build-up of solids across the diaphragm is a concern. Threaded process connection.

Sanitary Seals:

Designed for food, pharmaceutical and other sanitary applications. Available to fit most standard piping systems with "Tri-clamp" connection. Standard fill is food grade glycerin.

Mini-Seals:

Designed for low displacement applications where size or economy are the primary considerations.

Special Designs:

Barksdale is ready to work with you on any high-performance diaphragm seal application, (that might exceed the stated limits) such as high vacuum, high temperature, high sterility, custom design, high static pressure with a low differential span, or high vacuum with high temperature.

Diaphragm Seals

Diaphragm Seals

Applicable Mechanical Switch Products

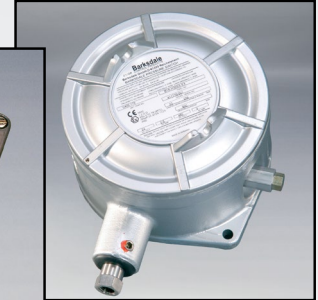
The following Barksdale pressure switches are approved for use with diaphragm seals.

Barksdale's electro-mechanical switches use a sensor such as a diaphragm, dia-seal piston, or bourdon tube which actuates an electro-mechanical limit switch that opens or closes a circuit. Mechanical switches do not require any power input to operate, and thus make excellent fail-safe devices.

Bourdon Tube

Bourdon Tube Explosion Proof Bourdon Tube

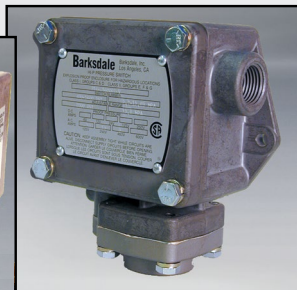
- ▶ B1T / B2T
- ▶ B1X / B2X



Dia-Seal Piston

Explosion Proof Dia-Seal Piston

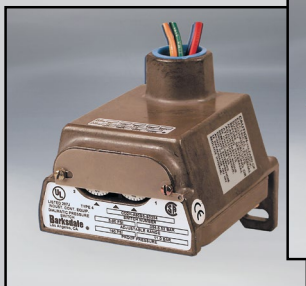
- ▶ E1H
- ▶ P1H
- ▶ P1X



Diaphragm Switches

Explosion Proof Diaphragm Switch

- ▶ D1H / D2H
- ▶ D1T / D2T
- ▶ D1X / D2X
- ▶ CD1H / CD2H



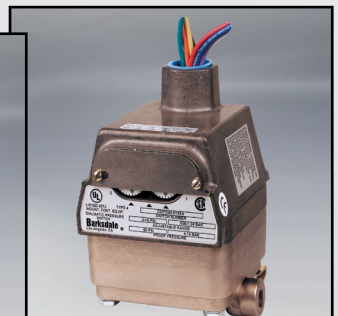
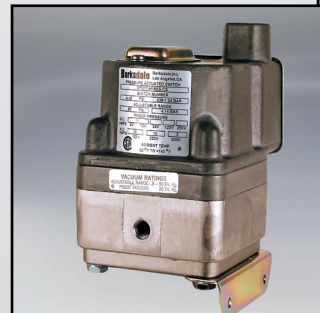
NOTE

Adding a diaphragm seal to Barksdale's pressure instruments will affect some of the product's performance and accuracy - the degree of variability depends on the environmental, installation, service, and/or measurement methods and conditions. The end user should determine the final overall product suitability and acceptability in the specific application.

Differential

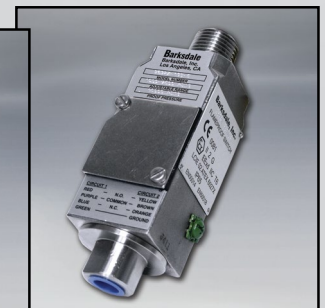
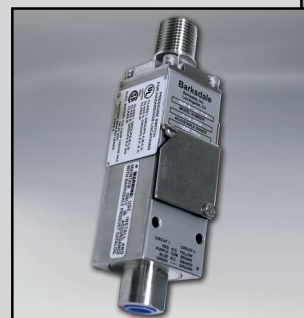
Differential Pressure Switches

- ▶ CDPD1H / CDPD2H
- ▶ DPD1T / DPD2T



Explosion Proof Compact Switch

- ▶ 9671X / 9681X



Diaphragm Seals

Diaphragm Seals

Applicable Electronic Products

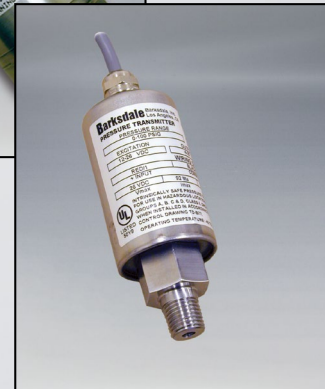
The following Barksdale transducer and solid state products are approved for use with diaphragm seals.

Barksdale's electronic switches use a piezo-resistive pressure sensing technology that transmits a voltage or current signal proportional to the system pressure or vacuum. These switches provide added functionality to any system they are used in.

Solid States

Solid State Products Electronic Pressure Switches

- ▶ BPS3000
- ▶ UDS3



Transducers

General Industrial Transducers Explosion Proof Transducers

- ▶ 423 / 425 / 426
- ▶ 423X / 425X / 426X
- ▶ 433 / 435 / 436
- ▶ 443 / 445 / 446

NOTE

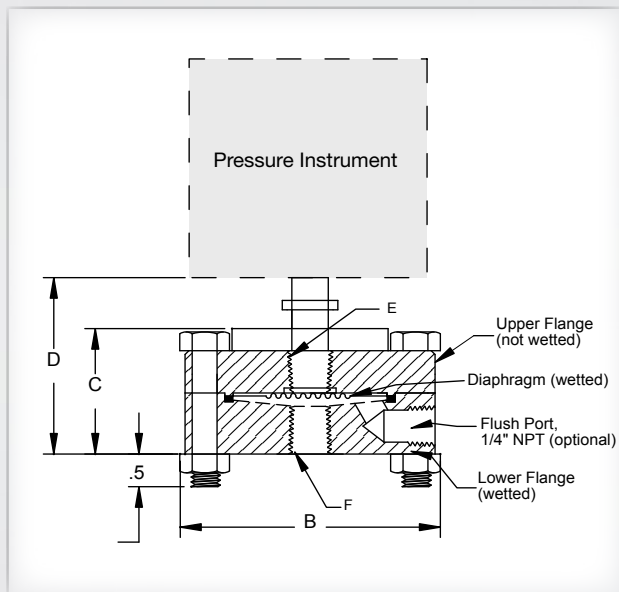
Adding a diaphragm seal to Barksdale's pressure instruments will affect some of the product's performance and accuracy - the degree of variability depends on the environmental, installation, service, and/or measurement methods and conditions. The end user should determine the final overall product suitability and acceptability in the specific application.

Diaphragm Seals

Threaded Off-Line Diaphragm Seals

Series TS & TC

Threaded Off Line Diaphragm Seals are a popular choice for most applications. The flush port is recommended for applications where there may be a build up of solids and requires a simple means of cleaning. These seals are available in all stainless steel construction, as well as a carbon steel upper flange for a more economical choice.



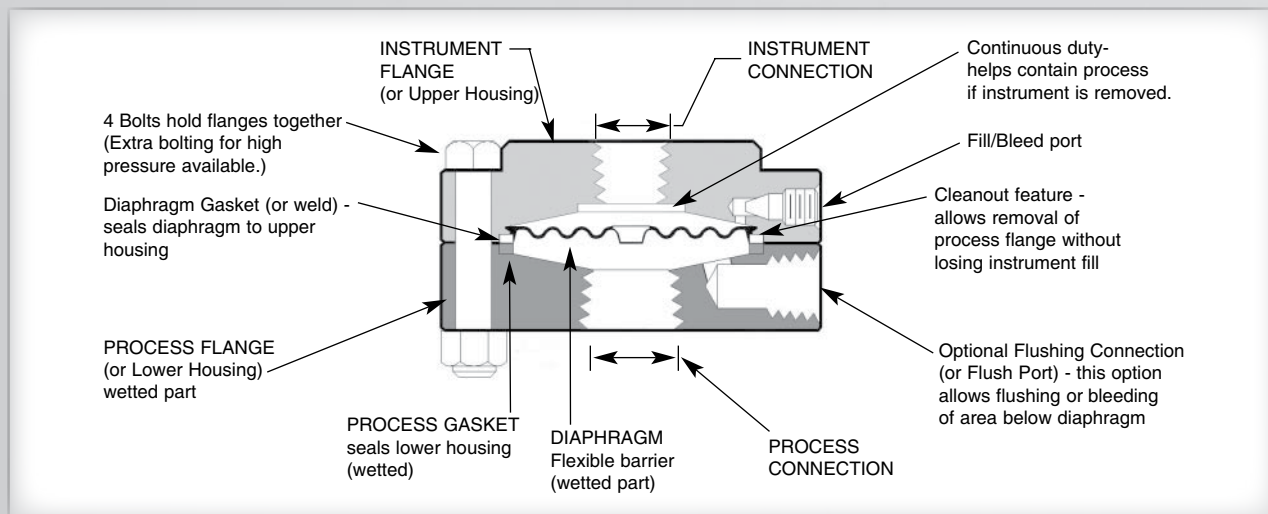
Diaphragm Size	B	C	D	Instrument Connection E (NPTF)	Process Connection F (NPTF)
5	3.5" max	1.8" max	3.0" max	1/4"	1/4", 1/2"
6	4-1/8" max	1.9" max	3.1" max	1/4"	1/4", 1/2"

Materials

Lower housings: 316SS standard. Other materials available for custom applications.

Diaphragms: Standard metal diaphragms are convoluted and made of 316SS. Other materials (such as Teflon or tantalum) are available for corrosion resistance or extra sensitivity.

Gaskets: Standard Teflon gaskets are on the process side of diaphragm (grafoil for high temperature.) Other materials are available.



Diaphragm Seals

Threaded Off-Line Diaphragm Seals

Series TS & TC

Seal Specifications

- ▶ 316 SS lower housing
- ▶ 1/4" NPTF instrument connection
- ▶ Welded 316 SS diaphragm
- ▶ DC 200 silicone fill fluid (-50 to 450°F operating range)

Diaphragm Size	Upper Housing Material ⁹	Process Connection (NPTF) ⁸	Flush Port Configuration ⁶	Part #
5 (2-1/4" [diaphragm])	Carbon Steel	1/4"	With flush port	TC1
			Without flush port	TC2
		1/2"	With flush port	TC3
			Without flush port	TC4
		Flanged (specify pipe size and rating)	With flush port	C/F
			Without flush port	C/F
6 (3" [diaphragm])		1/4"	With flush port	TC5
			Without flush port	TC6
		1/2"	With flush port	TC7
			Without flush port	TC8
		Flanged (specify pipe size and rating)	With flush port	C/F
			Without flush port	C/F
5 (2-1/4" [diaphragm])	316 S.S.	1/4"	With flush port	TS1
			Without flush port	TS2
		1/2"	With flush port	TS3
			Without flush port	TS4
		Flanged (specify pipe size and rating)	With flush port	C/F
			Without flush port	C/F
6 (3" [diaphragm])		1/4"	With flush port	TS5
			Without flush port	TS6
		1/2"	With flush port	TS7
			Without flush port	TS8
		Flanged (specify pipe size and rating)	With flush port	C/F
			Without flush port	C/F
Recommended Control Device ⁷ :		Transducer series ¹ : 423/425/426, 423X/425X/426X, 433/435/436, 443/445/446		
		Solid State ¹ : BPS3000, UDS3		
		Bourdon Tube: B1T/B2T, B1X/B2X		
		Diaphragm Switches ^{3,4,5} : D1H/D2H, D1T/D2T, D1X/D2X, CD1H/CD2H, DPD1T/DPD2T, CDPD1H/CDPD2H		
		Dia-Seal Piston: E1H, P1H, P1X		
		Compact Explosion Proof: 9681X		

Temperature Limits (for reference)

Maximum Temperature	Diaphragm Material	Lower Housing
650°F	Welded metal ¹⁰	Metal
450°F	Teflon option ¹⁰	Metal
300°F	Viton option ¹⁰	Metal
140°F	-	Nonmetal

¹ Seals not recommended for transducers and solid state devices with ranges lower than 15 psi. Use higher pressure ranges, or absolute ranges.

² The maximum working pressure is the lower of the maximum seal working pressure and the maximum adjustable range of the switch.

³ Diaphragm differential pressure switches will require two seals and two capillaries for remote mounting. Consult Factory.

⁴ Do not use diaphragm switches in the -2SS pressure range.

⁵ Use the size 6 switch with diaphragm switches.

⁶ Cleanout style configuration: the lower housing can be removed without losing the fill.

⁷ Recommend selecting brass or stainless steel process fittings only for pressure switch or transducer.

⁸ 3/4" NPTF and 1" NPTF also available. Consult factory.

⁹ Standard steel bolting is rated at 2500 psi maximum pressure.

¹⁰ Seals have standard 316 SS diaphragm. Pressure and temperature limits for metal diaphragms apply. Other metals such as hastelloy, tantalum, as well as viton and Teflon diaphragms are available for customized applications. Please consult factory.

Pressure Limits² (for reference)

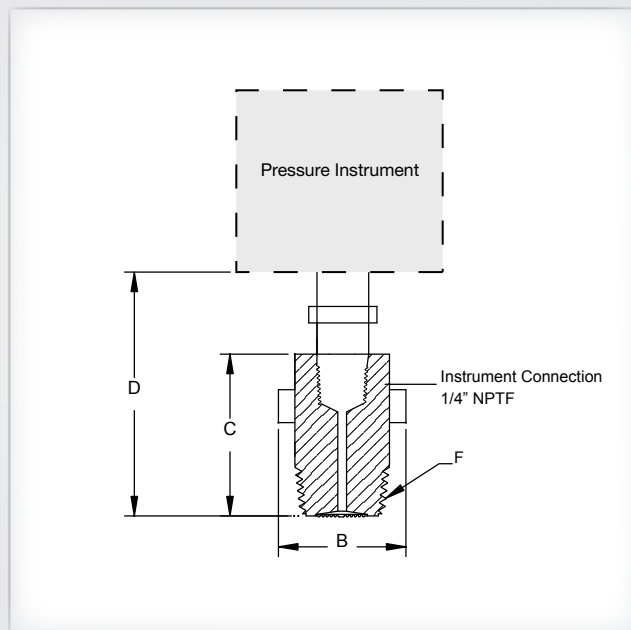
Maximum Working Pressure ²	psi Lower Housing		
	1,500	metal, with ss bolting	(at 100°F)
	2,500	metal, std bolting	(at 100°F)
	5,000	metal, hi-press bolting	(at 100°F)
	per flange rating	ASA flange	(per flange spec)
Minimum Working Pressure	300	non-metallic	(at 140°F)
	Diaphragm		
	Size 5 Seal		
	Size 6 Seal		
	Metal ¹⁰	25 psi	10 psi
Vacuum Limits	Teflon option ¹⁰	20 psi	5 psi
	Viton option ¹⁰	3 psi	n/a
	Metal ¹⁰	-21" Hg	-24" Hg
	Teflon option ¹⁰	-23" Hg	-26" Hg
	Viton option ¹⁰	-29" Hg	n/a

Diaphragm Seals

Flush Face Diaphragm Seals

Series FF

Flush Face Diaphragm Seals are useful in applications where a continuous flow of process media across the diaphragm is required to prevent solids buildup.



F Process Connection	B	C	D	Max. Pressure @ 100°F ²	Min. Pressure Range (Mechanical)	Min. Pressure Range (Electrical)
1/2" NPT	1.1" max	1.4" max	2.6" max	5000 psi	100 psi	100 psi
3/4" NPT	2.1" max	2.5" max	3.7" max	2500 psi	100 psi	15 psi
1" NPT	2.1" max	2.7" max	3.9" max	1500 psi	100 psi	30 psi

Seal Specifications

- ▶ All 316 SS construction
- ▶ Welded 316 SS diaphragm
- ▶ DC200 silicone fill fluid
- ▶ 1/4" NPT instrument connection

Diaphragm Size	Process Connection (NPTM)	Part #
Same as Process Connection	1"	FF1
	1/2"	FF2 ⁴
	3/4"	FF3
Recommended Control Device⁷:	Transducer series ¹ : 423/425/426, 423X/425X/426X, 433/435/436, 443/445/446 Solid State ¹ : BPS3000, UDS3 Bourdon Tube: B1T/B2T, B1X/B2X Dia-Seal Piston: E1H ³ , P1H ⁵ , P1X (Recommend 1.5 connection / Consult factory) Compact Explosion Proof: 9681X ⁶	

¹ Seals not recommended for transducers and solid state devices with ranges lower than 15 psi. Use higher pressure ranges, or absolute ranges.

² The maximum working pressure is the lower of the maximum seal working pressure and the maximum adjustable range of the switch.

³ Do not use E1H pressure range 15 with flush face seal.

⁴ FF2 only recommended for high pressure applications.

⁵ Use only FF1 seal with P1H / P1X pressure range 30.

⁶ Do not use 9681X with FF2 seal.

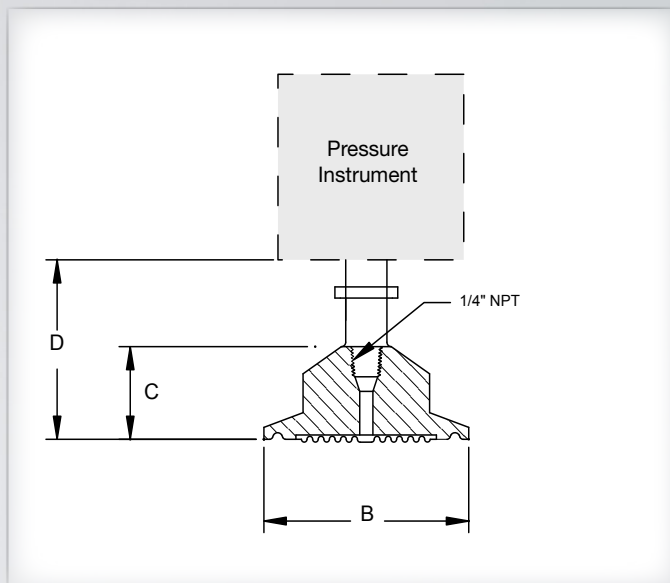
⁷ Recommend selecting brass or stainless steel process fittings only for pressure switch or transducer.

Diaphragm Seals

Sanitary Diaphragm Seals

Series SS

Sanitary Diaphragm Seals are specially designed to meet the demanding sanitary requirements of food, dairy, beverage, pharmaceutical, and biotech applications.



Process Connection	B	C	D	Max. Pressure @ 100°F ^{2,5}	Min. Range
Size 1-1/2"	2.0" max	1.2" max	2.4" max	600 psi	60 psi
Size 2"	2.5" max	1.3" max	2.5" max	600 psi	60 psi

Seal Specifications

- ▶ All 316 SS welded diaphragm construction
- ▶ Certified for 3A sanitary standards
- ▶ Food grade glycerin fill
- ▶ Weld mount control device to seal
- ▶ 1/4" NPT instrument connection

Process Connection	Part #
1 1/2" Tri-clamp	SS1
2" Tri-clamp	SS2
3/4" Tri-clamp	C/F
Recommended Control Device⁶:	Transducer series¹: 423/425/426, 423X/425X/426X, 433/435/436, 443/445/446 Solid State¹: BPS3000, UDS3 Bourdon Tube: B1T/B2T, B1X/B2X Dia-Seal Piston: E1H ³ , P1H ⁴ , P1X Compact Explosion Proof: 9681X

¹ Seals not recommended for transducers and solid state devices with ranges lower than 15 psi. Use higher pressure ranges, or absolute ranges.

² The maximum working pressure is the lower of the maximum seal working pressure and the maximum adjustable range of the switch.

³ Do not use E1H pressure range 15 with seal SS1.

⁴ Do not use P1H / P1X pressure range 30 with seal SS1.

⁵ 1000 psi maximum pressure with customer supplied heavy duty clamp. Not to exceed the instrument pressure rating.

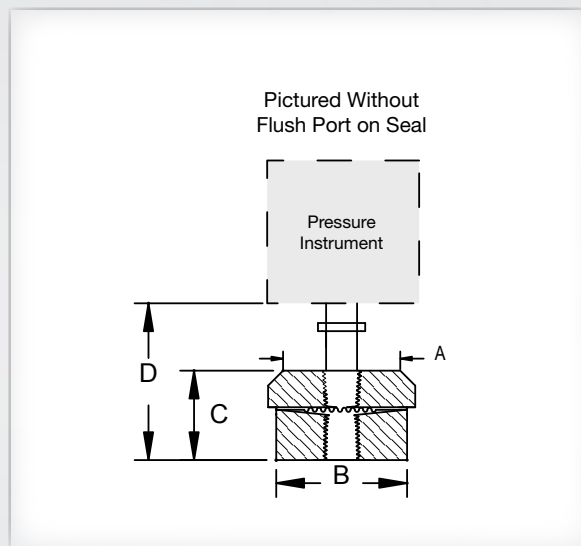
⁶ Recommend selecting brass or stainless steel process fittings only for pressure switch or transducer.

Diaphragm Seals

Mini Diaphragm Seals

Series MS

Mini-Seals are all-welded, gasketless, threaded off-line seals. The mini-seal is an economical choice for isolation of smaller instruments, or where high sensitivity is not required.



Seal Size	A	B	C	D	Max. Pressure @ 100°F ²	Min. Range
4G	1.73" max	1.5" max	1.5" max	2.7" max	2000 psi	100 psi
6G	2.25" max	1.95" max	1.6" max	2.8" max	1000 psi	15 psi

Seal Specifications

- ▶ All welded, gasketless, 316 SS construction
- ▶ 1/4" NPT instrument connection
- ▶ DC200 silicone fill fluid

Seal Size	Process Connection (NPTF)		Flush Port Configuration	Part #
4G	1/4"		With flush port	MS1
			Without flush port	MS2
	1/2"		With flush port	MS3
			Without flush port	MS4
6G	1/4"		With flush port	MS5
			Without flush port	MS6
	1/2"		With flush port	MS7
			Without flush port	MS8
Recommended Control Device ⁴ :		Transducer series ¹ : 423/425/426, 423X/425X/426X, 433/435/436, 443/445/446 Solid State ¹ : BPS3000, UDS3 Compact Explosion Proof: 9681X ³		

¹ Seals not recommended for transducers and solid state devices with ranges lower than 15 psi. Use higher pressure ranges, or absolute ranges.

² The maximum working pressure is the lower of the maximum seal working pressure and the maximum adjustable range of the switch.

³ Do not use 9681X pressure range 1 with MS1, MS2, MS3, MS4 seals.

⁴ Recommend selecting brass or stainless steel process fittings for pressure switch or transducer.

Diaphragm Seals

Diaphragm Seals

Application Worksheet

1. SEAL INFORMATION:

Description (or Model) of Seal Requested:

Process Connection:

- ☐ Threaded: ☐ 1/4" NPT ☐ 1/2" NPT
☐ Flanged: _____ inches _____ lbs.
☐ Sanitary Tri-clamp connection: ☐ 1-1/2" ☐ 2" ☐ 3/4"
☐ Capillary (remote mount): _____ feet
☐ Other _____

Seal Materials: Upper _____ Lower _____ Diaphragm _____

For Office Use Only

Quotation #: _____

Order #: _____

Fill Fluid:

- ☐ Standard DC 200 silicone (-50°F to 450°F)
☐ Food grade glycerin 30°F to 300°F
☐ High temperature (>450°F)

2. PROCESS INFORMATION:

	Maximum	Working	Minimum	Setpoint
Process Pressure (psi)				
Process Temperature (°F)				N/A

Process Fluid: _____

Process Pulsation: ☐ Yes ☐ No If yes, specify _____

Vibration: ☐ Yes ☐ No If yes, specify _____

3. SENSOR INFORMATION:

- ☐ Switch Barksdale part number or family: _____
☐ Transducer Adjustable pressure range: _____
☐ Solid State Other: _____

4. AMBIENT CONDITIONS:

Temperature Range: High _____ Low _____
Check where applicable: ☐ Indoor ☐ Outdoor
☐ Sunny ☐ Shaded
☐ Wet ☐ Dry
☐ Corrosive

NOTE

Adding a diaphragm seal to Barksdale's pressure instruments will affect some of the product's performance and accuracy - the degree of variability depends on the environmental, installation, service, and/or measurement methods and conditions. The end user should determine the final overall product suitability and acceptability in the specific application.

5. APPLICATION DESCRIPTION:

6. OTHER INFORMATION, SPECIAL NEEDS, AND NOTES:

**NOTE: Barksdale Inc. is glad to provide applications assistance, based on limited information, but final compatibility is the responsibility of the buyer.

Diaphragm Switch

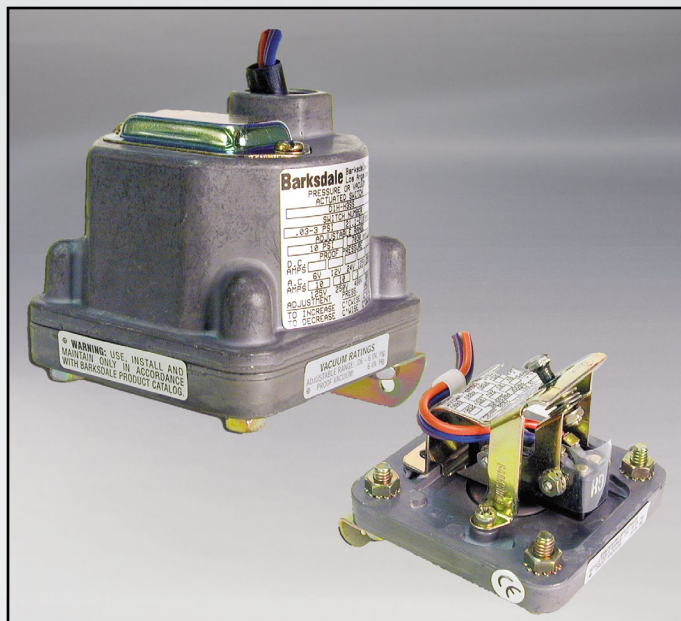
D1S, D2S, D1H, D2H Series

Features

- ▶ Stripped and housed versions available
- ▶ High accuracy
- ▶ Ideal for pressure or vacuum
- ▶ Easy setpoint adjustment
- ▶ NEMA 4 (Housed Models)
- ▶ Up to 3 setpoints available in one switch

Applications

- ▶ Pump & compressor monitoring
- ▶ Engine monitoring
- ▶ Machine tools
- ▶ Hydraulic power units
- ▶ Medical equipment
- ▶ Waste management
- ▶ Food & beverage
- ▶ Factory automation
- ▶ Metal working



General Specifications*

Accuracy:	± 0.5% of the adjustable range
Switch:	
Type:	Single pole double throw (SPDT) Snap Action; single or dual circuit
Rating:	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (Class A or H limit switch). Consult sales drawing for ratings of optional limit switches.
Wetted Parts:	
Process Fitting:	304 stainless steel
Diaphragm:	17-7 PH stainless steel
Enclosure:	Anodized aluminum (housed models)
Electrical Connection:	Free leads approximately 18" long, #16 AWG and 1/2" NPT conduit connection for housed models
Enclosure Ratings:	Housed Models: NEMA 4 Stripped Models: NEMA 1
Pressure Connection:	1/4" NPT Female
Approvals:	
UL (optional):	Stripped (D1S and D2S) models may be ordered as UL Recognized components (UR) on request. Housed (D1H and D2H) models may be ordered as UL Listed on request (UL File No. E42816).

* See product configurator for additional options.

Wiring Code

Lead	Circuit #1		Circuit #2	
	Pressure	Vacuum	Pressure	Vacuum
Normally Closed	Blue	Red	Orange	Yellow
Common	Purple	Purple	Brown	Brown
Normally Open	Red	Blue	Yellow	Orange

Approvals (cont.):

CSA (optional):

All models may be ordered as CSA listed under Class 3231 02, File LR22355 on request.

PED (European):

Compliant to PED 97/23/EC

Temperature Range:

Operating:

-40° to +165°F (-40° to +74°C)

Storage:

-65° to +200°F (-54° to +93°C)

Adjustment Instructions:

Pressure:

Turn adjustment screw counterclockwise to raise actuation point.

Vacuum:

Turn adjustment screw clockwise to increase setpoint (higher vacuum).

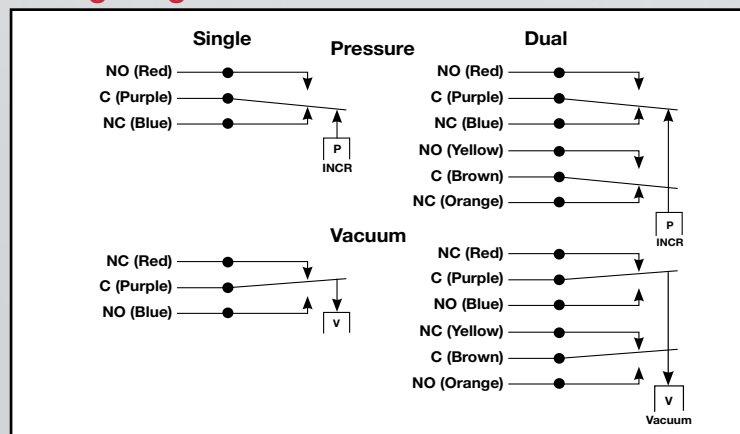
Options:

- NEMA 4X enclosure (housed models only)
- Cleaned for oxygen service
- Factory pre-set

Shipping Weight:

Stripped Versions: 1.5 lbs. approximate
Housed Versions: 1.75 lbs. approximate

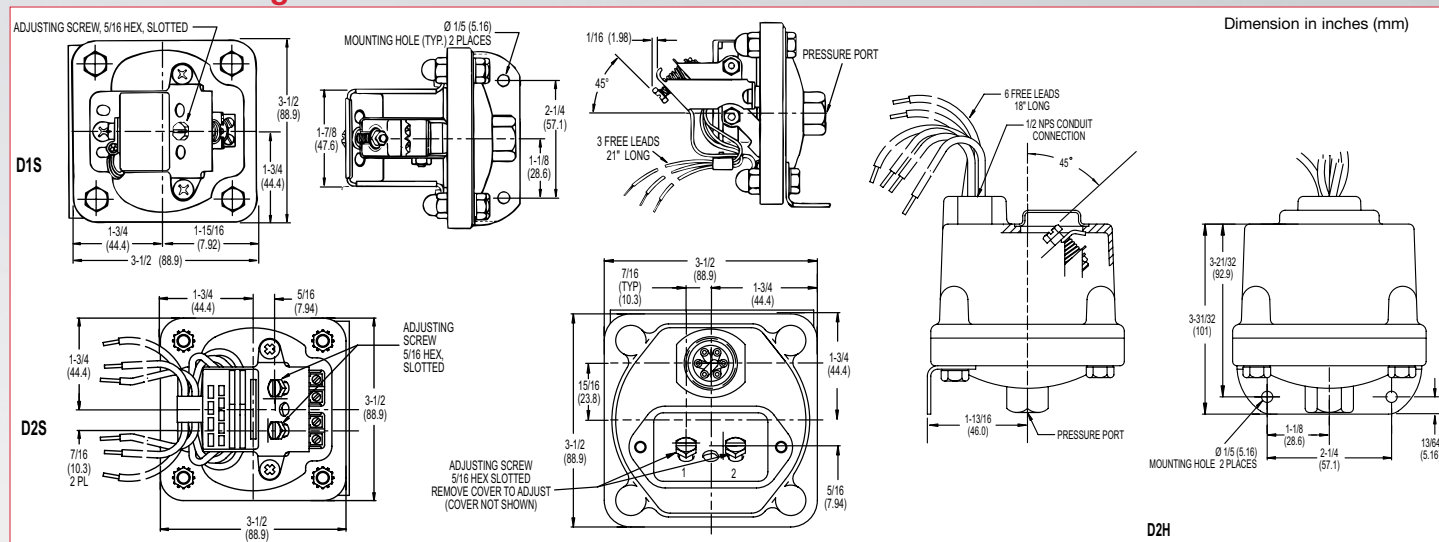
Wiring Diagram



Diaphragm Switch

D1S, D2S, D1H, D2H Series

Technical Drawing



Product Configurator

Example	D1H	-A	80SS	-CS
---------	-----	----	------	-----

H Hermetically sealed limit switch option - Class I, Division II (requires AA, CC, GH or HH limit switch; not available on vacuum models; no agency approval on D1S and D2S models)

Base Configuration

D1H	Single setpoint housed version
D1S	Single setpoint stripped version
D2H	Dual setpoint housed version
D2S	Dual setpoint stripped version
D3H ⁴	Triple setpoint housed version

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 3SS, 80SS or 150SS)
-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-C	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.1 amps @ 125 VDC; 0.05 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 2SS or 18SS)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC (not UL approved)
-GH	1 Amp @ 125 VAC; 1 Amp @ 24 VDC with gold contacts (not UL approved)
-AA	Hermetically sealed; 4 amps @ 125/250 VAC (not available on 2SS or vacuum models)
-CC	Hermetically sealed; 10 amps @ 125/250 VAC (not available on 2SS or vacuum models)
-GH	Hermetically sealed; 1 Amp @ 125 VAC with gold contacts (not available on 2SS or vacuum models)
-HH	Hermetically sealed; 5 amps @ 125/250 VAC (not available on 2SS or vacuum models)
-AA	Triple setpoint limit switch 4 amps @ 125/250 VAC (not available on hermetically sealed models)

Options

-FX	NEMA 4X enclosure
-Z1	Oxygen cleaned
-U	UL Approved (Industrial Control)
-CS	CSA Approved Model
-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory pre-set (consult factory)

Pressure Connection

Blank	Std 1/4" NPT female pressure connection
-P2	1/2" NPT female pressure connection

Adjustable Range

	Adjustable Range (PRESSURE)				Approx. Deadband ² (Actuation Value) psi (bar)	Proof Pressure psi (bar)
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max		
2SS ³	0.018 (.0)	1.65 (.1)	0.068 (.0)	1.7 (.1)	.02 - .05 (.0 - .0)	3 (.2)
3SS	.03 (.00)	2.85 (.2)	.18 (.02)	3 (.2)	.07 - .15 (.0 - .01)	10 (.7)
18SS	.4 (.03)	17.74 (1.2)	.66 (.05)	18 (1.2)	.12 - .26 (.01 - .02)	60 (4.1)
80SS	.5 (.03)	76.6 (5.3)	3.9 (.3)	80 (5.5)	1.6 - 3.4 (.1 - .2)	160 (10.9)
150SS	1.5 (.1)	144 (9.9)	7.5 (.5)	150 (10.3)	2.3 - 6 (.2 - .4)	300 (20.4)

	Adjustable Range (VACUUM)				Approx. Deadband ² (Actuation Value) In. Hg	Proof Pressure In. Hg
	Decreasing - In. Hg		Increasing - In. Hg			
	Min	Max	Min	Max		
3SS	0.06	5.72	0.34	6	.14 - .28	20
18SS	0.8	29.2	1.6	30	.4 - .8	30

NOTES:

- Consult Supplemental Guide for specific deadband values
- Deadband values indicated when used with the "standard" limit switch
- Not available with hermetically sealed limit switches (no CSA)
- Available only with AA (not hermetically sealed) limit switch

Terminal Block Diaphragm Switch

D1T, D2T Series

Features

- ▶ High reliability
- ▶ High accuracy
- ▶ NEMA 4
- ▶ Ideal for pressure and vacuum applications
- ▶ Single and dual switching capability
- ▶ Tamper-proof external adjustment

Applications

- ▶ Machine tools
- ▶ Pneumatics
- ▶ Medical
- ▶ Marine & shipbuilding
- ▶ Pump & compressor monitoring
- ▶ Oil & gas
- ▶ Water equipment
- ▶ Mining
- ▶ Lubrication equipment



General Specifications*

Accuracy:	± 0.5% of the adjustable range
Switch:	
Type:	Single pole double throw (SPDT)
Rating:	Snap Action; single circuit
	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (Class A or H limit switch). Consult sales drawing for ratings of optional limit switches.
Wetted Parts:	
Process Fitting:	304 stainless steel
Diaphragm:	17-7 PH stainless steel
Enclosure:	Anodized aluminum
Electrical Connection:	Terminal block through 1/2" NPT conduit connector
Enclosure Rating:	NEMA 4
Pressure Connection:	1/4" NPT Female
Approvals:	
UL (Optional):	D1T models may be ordered as UL listed on request. D2T models may be ordered as UL Recognized components on request. File No. E42816
CSA (Optional):	All models may be ordered as CSA listed under Class 3231 02, File LR22355 on request.

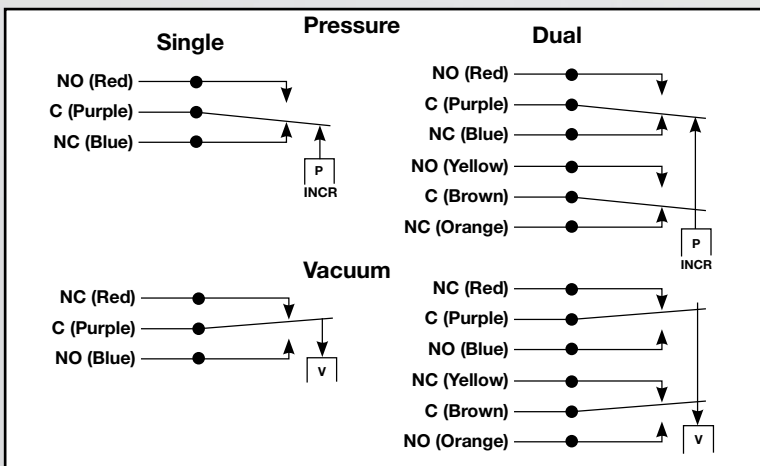
* See product configurator for additional options.

Wiring Code

Lead	Circuit #1		Circuit #2	
	Pressure	Vacuum	Pressure	Vacuum
Normally Closed	Blue	Red	Orange	Yellow
Common	Purple	Purple	Brown	Brown
Normally Open	Red	Blue	Yellow	Orange

Approvals (cont.):	
PED (European):	Compliant to PED 97/23/EC
Temperature Range:	
Operating:	-40° to +165°F (-40° to +74°C) Hermetic Div. 2 models: -4° to +140°F (-20° to +60 °C)
Storage:	-65° to +200°F (-54° to +93°C)
Adjustment Instructions:	
Pressure:	Turn adjustment screw counterclockwise to raise actuation point.
Vacuum:	Turn adjustment screw clockwise to increase setpoint (higher vacuum).
Options:	- NEMA 4X enclosure - Cleaned for oxygen service - Factory pre-set - Six-pin terminal block
Shipping Weight:	2.0 lbs. approximate

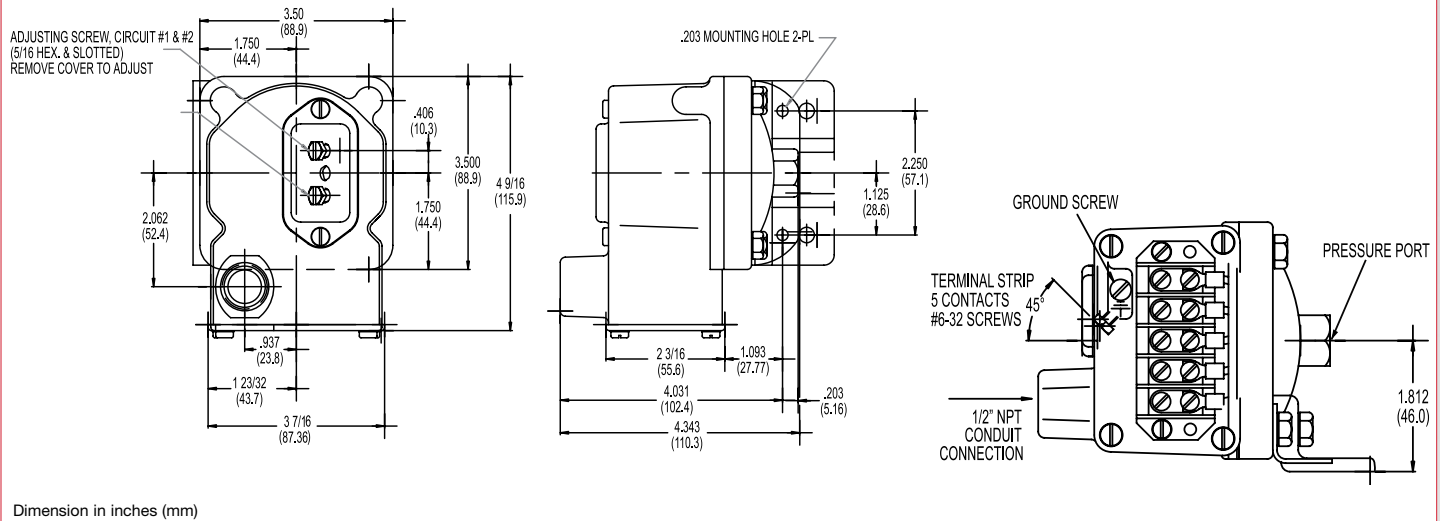
Wiring Diagram



Terminal Block Diaphragm Switch

D1T, D2T Series

Technical Drawing



Product Configurator

Example	D1T	-A	80SS	-U
H	Hermetically sealed limit switch option - Class I, Division II (requires AA, CC, GH or HH limit switch)			

Base Configuration

D1T	Single setpoint housed with terminal block
D2T	Dual setpoint housed with terminal block

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 3SS, 80SS or 150SS)
-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-C	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.1 amps @ 125 VDC; 0.05 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 2SS or 18SS)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC (not -U or -UL approved)
-GH	1 amp @ 125 VAC; 1 amp @ 24 VDC with gold contacts
-AA	Hermetically sealed; 4 amps @ 125/250 VAC (not available on 2SS or vacuum models)
-CC	Hermetically sealed; 10 amps @ 125/250 VAC (not available on 2SS or vacuum models)
-GH	Hermetically sealed; 1 amp @ 125 VAC with gold contacts (not available on 2SS or vacuum models)
-HH	Hermetically sealed; 5 amps @ 125/250 VAC (not available on 2SS or vacuum models)

Options

-U	UL Approved (Industrial Control)
-CS	CSA Approved Model
-Z1 ³	Oxygen cleaned
-FX	NEMA 4X enclosure
-TC	Temperature stabilization and pre-cycle (non-agency)
-L6	6-Pin Terminal Block (for D2T models only. Non-UL listed)
-Sxxx	Factory pre-set (consult factory)

Adjustable Range

	Adjustable Range (PRESSURE)				Approx. Deadband ² (Actuation Value) psi (bar)	Proof Pressure psi (bar)
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max		
2SS ³	0.018 (.0)	1.65 (.1)	0.068 (.0)	1.7 (.1)	.02 - .05 (.0 - .0)	3 (.2)
3SS	.03 (.00)	2.85 (.2)	.18 (.02)	3 (.2)	.07 - .15 (.0 - .01)	10 (.7)
18SS	.4 (.03)	17.74 (1.2)	.66 (.05)	18 (1.2)	.12 - .26 (.01 - .02)	60 (4.1)
80SS	.5 (.03)	76.6 (5.3)	3.9 (.3)	80 (5.5)	1.6 - 3.4 (.1 - .2)	160 (10.9)
150SS	1.5 (.1)	144 (9.9)	7.5 (.5)	150 (10.3)	2.3 - 6 (.2 - .4)	300 (20.4)

Pressure Connection

Blank	Std 1/4" NPT female pressure connection
-P2	1/2" NPT female pressure connection

Adjustable Range (VACUUM)

	Adjustable Range (VACUUM)				Approx. Deadband ² (Actuation Value) In. Hg	Proof Pressure In. Hg
	Decreasing - In. Hg		Increasing - In. Hg			
	Min	Max	Min	Max		
3SS	0.06	5.72	0.34	6	.14 - .28	6
18SS	0.8	29.2	1.6	30	.4 - .8	30

NOTES:
¹ Consult Supplemental Guide for specific deadband values

² Deadband values indicated when used with the standard "H" limit switch

³ Not available with hermetically sealed limit switches (no CSA)

Explosion Proof Diaphragm Switch

D1X, D2X Series

Features

- ▶ Hermetically sealed
- ▶ Explosion proof housing for hazardous location
- ▶ Tamper proof setpoint adjustment
- ▶ Ideal for pressure or vacuum
- ▶ UL, CSA, ATEX approved
- ▶ NEMA 4, 7, 9 & IP66

Applications

- ▶ Pump & compressor monitoring
- ▶ Hydraulic power units
- ▶ Oil & gas
- ▶ Food & beverage
- ▶ Utility & power generation
- ▶ Mining

General Specifications*

Accuracy:	± 0.5% of the adjustable range
Switch: Type: Rating:	Single pole double throw (SPDT) Snap Action; single circuit 10 amps @ 125/250 VAC; 3 amps @ 480 VAC (Class A or H limit switch). Consult sales drawing for ratings of optional limit switches.
Wetted Parts: Process Fitting: Diaphragm: Enclosure:	303 stainless steel 17-7 PH stainless steel Die-cast aluminum, anodized and painted
Electrical Connection:	Screw terminals on covered terminal strip via 1/2" NPT (D1X) and 3/4" NPT (D2X) conduit connection.
Enclosure Ratings:	NEMA 4, 7, 9
Pressure Connection:	1/4" NPT Female
Approvals: UL (standard):	All models are UL approved for use in hazardous locations Class I, Groups B, C, & D; Class II, Groups E, F, & G. UL File No. E37043

* See product configurator for additional options.

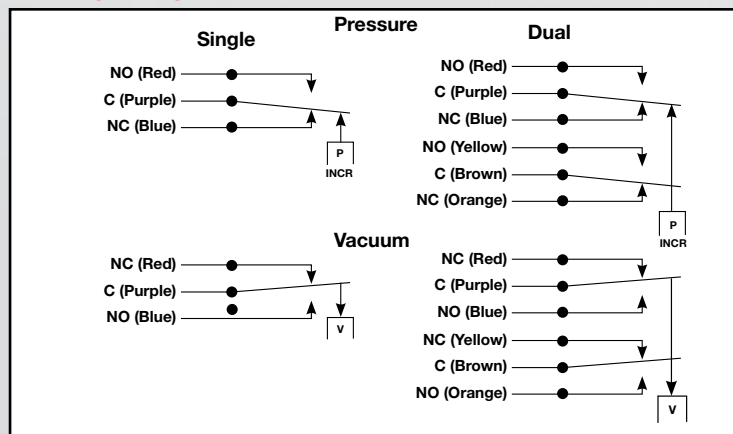
Wiring Code

Lead	Circuit #1		Circuit #2	
	Pressure	Vacuum	Pressure	Vacuum
Normally Closed	Blue	Red	Orange	Yellow
Common	Purple	Purple	Brown	Brown
Normally Open	Red	Blue	Yellow	Orange



Approvals (cont.): CSA (standard): ATEX (optional):	All models are CSA approved for use in hazardous locations Class I, Groups B, C & D; Class II, Groups E, F, & G. CSA File No. LR22354 EX models are ATEX marked as follows: CE 0081, ISSEp 08 ATEX024X II 2G D, Ex d IIC T6 Ex tD A21 IP66 T80°C -40°C ≤ Tamb ≤ +75°C
Temperature Range: Operating:	-40° to +165°F (-40° to +74°C)
Storage:	-65° to +200°F (-54° to 93°C)
Adjustment Instructions: Pressure:	Turn adjustment screw counterclockwise to raise actuation point.
Vacuum:	Turn adjustment screw clockwise to increase setpoint (higher vacuum).
Options:	Factory pre-set
Shipping Weight:	Single - approximate 5.0 lbs. Double - approximate 5.5

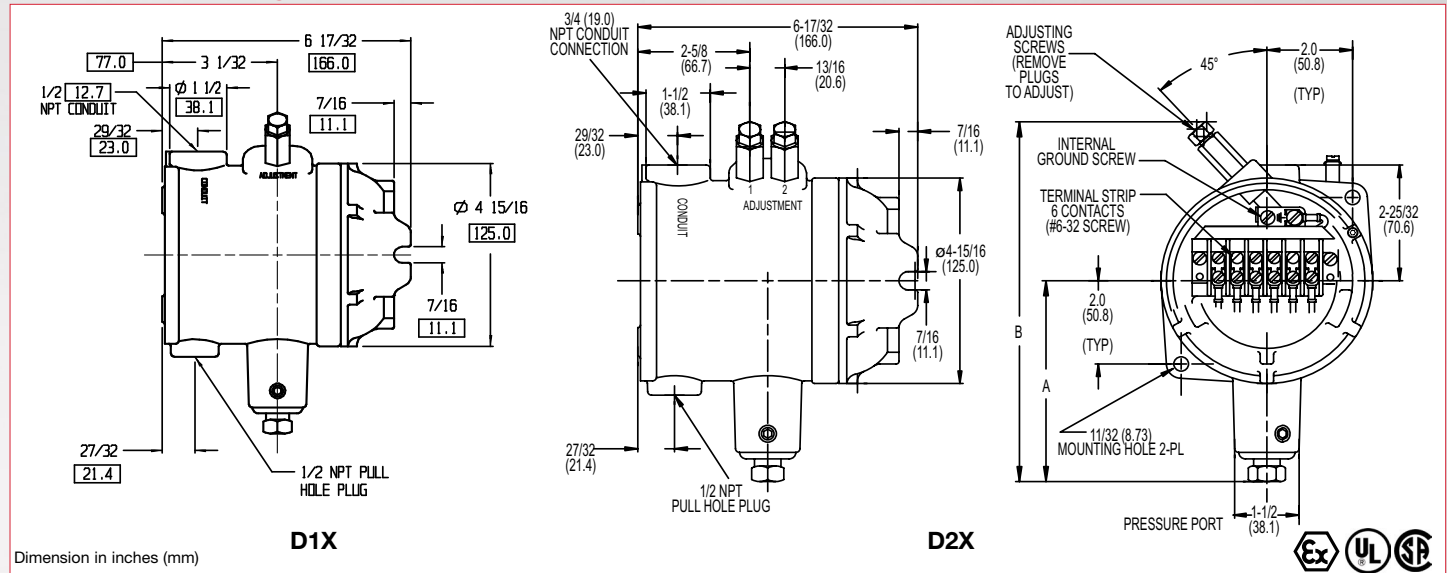
Wiring Diagram



Explosion Proof Diaphragm Switch

D1X, D2X Series

Technical Drawing



Product Configurator

Example		D1X	-A	3SS	-P2	-UL
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H	Hermetically sealed limit switch option - Class I, Division II (requires AA, CC or HH limit switch)
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Base Configuration

D1X	Single setpoint housed version
D2X	Dual setpoint housed version

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 3SS, 80SS or 150SS)
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 18SS)
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (comes with an elastomer boot)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-GH	1 amp @ 125 VAC; 1 amp @ 24 VDC with Gold Contacts
-AA	Hermetically sealed; 4 amps @ 125/250 VAC (not available on vacuum models)
-CC	Hermetically sealed; 10 amps @ 125/250 VAC (not available on vacuum models)
-HH	Hermetically sealed; 5 amps @ 125/250 VAC (not available on vacuum models)

Options

-UL	UL & CSA Approval
-EX	ATEX Certified, -EX in place of UL for ATEX only
-Sxxx	Factory pre-set (consult factory)

Pressure Connection

Blank	1/4" NPT female pressure connection (standard)
-P2	1/2" NPT female pressure connection

Adjustable Pressure Range

	Adjustable Range (PRESSURE)				Approx. Deadband ² (Actuation Value) psi-(bar)	Proof Pressure psi (bar)
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max		
3SS	.03 (.00)	2.85 (.2)	.18 (.01)	3 (.2)	.07 - .15 (0 - .01)	10 (.7)
18SS	.4 (.03)	17.74 (1.2)	.66 (.04)	18 (1.2)	.12 - .26 (.01 - .02)	60 (4.1)
80SS	.5 (.03)	76.6 (5.2)	3.9 (.3)	80 (5.4)	1.6 - 3.4 (.1 - .2)	160 (10.9)
150SS	1.5 (.10)	144 (9.8)	7.5 (.5)	150 (10.2)	2.3 - 6.0 (.2 - .4)	300 (20.4)

	Adjustable Range (VACUUM)				Approx. Deadband ² (Actuation Value) In. Hg	Proof Pressure In. Hg
	Decreasing - In. Hg		Increasing - In. Hg			
	Min	Max	Min	Max		
3SS	0.06	5.72	0.34	6	.14 - .28	6
18SS	0.8	29.2	1.6	30	.4 - .8	30

NOTES:

¹ Consult Supplemental Guide for specific deadband values

² Deadband values indicated when used with the "standard" limit switch

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Barksdale®

Diaphragm Switch

CD1H, CD2H Series

Features

- ▶ High reliability
- ▶ Extremely versatile
- ▶ Calibrated dial for easy setpoint adjustment
- ▶ Ideal for pressure or vacuum

Applications

- ▶ Medical
- ▶ Water equipment
- ▶ Food & beverage
- ▶ Air proving in HVAC systems
- ▶ Engine monitoring
- ▶ Factory automation



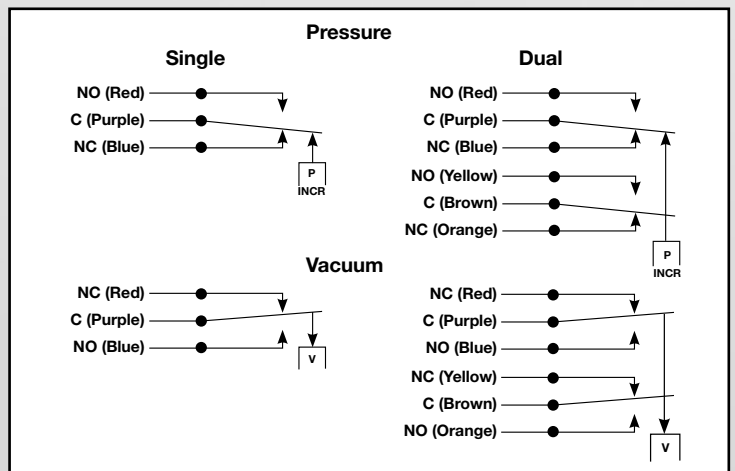
General Specifications*

Accuracy:	+/- 0.5% of the adjustable range
Switch: Type:	Single pole double throw (SPDT) single or dual circuit
Rating:	10 amps @ 125/250 VAC, 3 amps @ 480 VAC (Class A or H limit switch); Consult sales drawing for ratings of optional limit switches.
Wetted Parts: Process Fitting:	304 stainless steel
Diaphragm:	17-7 PH stainless steel
Enclosure:	Anodized aluminum
Electrical Connection:	Free leads approximately 18" long, 16 AWG through 3/4" NPT conduit connector.
Enclosure Ratings:	NEMA 4
Pressure Connection:	1/4" NPT female
Approvals: UL:	All models are Underwriters' Laboratories listed in the Electrical Construction Materials Directory under Industrial Control Equipment, float and pressure-operated; File E42816, and Canadian Standards Association listed under Guide 380-W-1.16, Class 3231, File 22355.

* See product configurator for additional options.

Approvals (Cont.): CSA:	Listed under Guide 380-W-1.16, Class 3231, File 22355
Temperature Range: Operating:	-40° to +165°F (-40° to +74°C)
Storage:	-65° to +200°F (-54° to +93°C)
Adjustment Instructions: Pressure:	Turn self-locking adjustment screw counterclockwise to increase pressure setting
Vacuum:	Turn self-locking adjustment screw clockwise to increase vacuum setting
Options:	-Cleaned for Oxygen Service -1/2" NPT Pressure Port -NEMA 4X enclosure
Shipping Weight:	Approximate 1.75 lbs.

Wiring Diagram



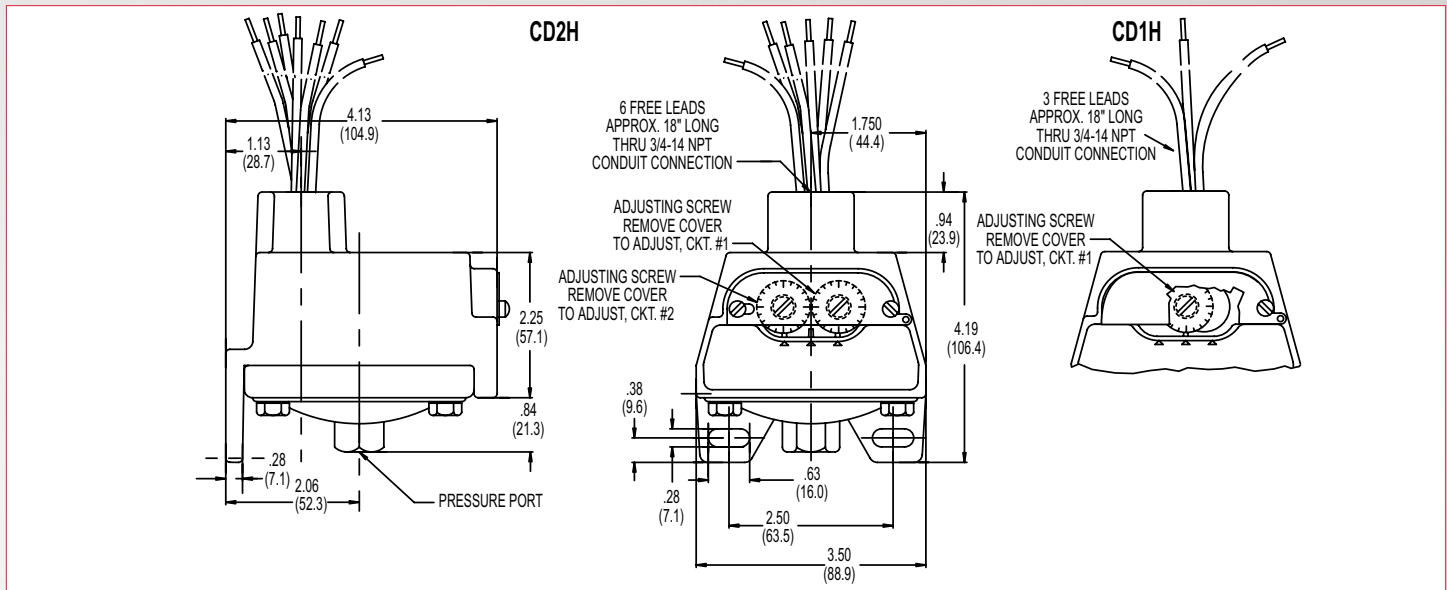
Wiring Code

Lead	Circuit #1		Circuit #2	
	Pressure	Vacuum	Pressure	Vacuum
Normally Closed	Blue	Red	Orange	Yellow
Common	Purple	Purple	Brown	Brown
Normally Open	Red	Blue	Yellow	Orange

Diaphragm Switch

CD1H, CD2H Series

Technical Drawing



Product Configurator

Example	CD1H	-A	3SS		
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H	Hermetically sealed limit switch option - Class I, Division II (requires AA, CC, GH, HH limit switch, not available in vacuum models)
---	---------------------------------------------------------------------------------------------------------------------------------------

Base Configuration

CD1H	Single setpoint housed
CD2H	Dual setpoint housed
VCD1H	Single setpoint housed - Vacuum
VCD2H	Dual setpoint housed - Vacuum

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 3SS, 80SS or 150SS; not available on 2SS option)
-C	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.1 amps @ 125 VDC; 0.05 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 2SS or 18SS)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-GH	1 amp @ 125 VAC; 1 amp @ 24 VDC with gold contacts
-CC	Hermetically sealed; 10 amps @ 125/250 VAC (not available on 2SS or vacuum models)
-GH	Hermetically sealed; 1 amp @ 125 VAC with gold contacts (not available on 2SS or vacuum models)
-HH	Hermetically sealed; 5 amps @ 125/250 VAC (not available on 2SS or vacuum models)

Options

-Z1	Oxygen cleaned
-FX	NEMA 4X Enclosure
-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory pre-set (consult factory)

Pressure Connection

Blank	Standard 1/4" NPT female
-P2	1/2" NPT female pressure fitting

Adjustable Range

	Adjustable Range (PRESSURE)				Approx. Deadband ² (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max		
2SS ³	.5 (.03)	34.6 (2.4)	1.9 (.13)	36 (2.4)	.6 - 1.4 (.04 - .1)	83.3" H2O
3SS	.3 (.02)	2.85 (.2)	.18 (.01)	3 (.2)	.07 - .15 (0 - .01)	10 (.7)
18SS	.4 (.03)	17.74 (1.2)	.66 (.04)	18 (1.2)	.12 - .26 (.01 - .02)	60 (4.1)
80SS	.5 (.03)	76.6 (5.2)	3.9 (.3)	80 (5.4)	1.6 - 3.4 (.1 - .2)	160 (10.9)
150SS	1.5 (.1)	144.0 (9.8)	7.5 (.5)	150 (10.2)	2.3 - 6.0 (.2 - .4)	300 (20.4)

	Adjustable Range (VACUUM)				Approx. Deadband ² (Actuation Value)	Proof Pressure
	Decreasing - In. Hg		Increasing - In. Hg			
	Min	Max	Min	Max		
3SS	0.06	5.72	0.34	6	.14 - .28	6
18SS	0.8	29.2	1.6	30	.4 - .8	30

NOTES:

¹ Consult Supplemental Guide for specific deadband values

² Deadband values indicated when used with the standard "H" limit switch

³ The "2SS" range is specified in inches of H₂O

Diaphragm Differential Switch

Series DPD1T, DPD2T

Features

- ▶ High reliability
- ▶ Dual switching capability
- ▶ High accuracy
- ▶ Tamper-proof external adjustment
- ▶ NEMA 4

Applications

- ▶ Pump & compressor monitoring
- ▶ HVAC systems
- ▶ Engine monitoring
- ▶ Machine tools
- ▶ Hydraulic power units
- ▶ Filtration systems
- ▶ Metal working
- ▶ Utility & power generation



General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements.
Accuracy:	± 0.5% of the adjustable range
Switch:	
Type:	SPDT snap action; single or dual circuit
Rating:	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (Class A or H limit switch). Consult product configurator for ratings of optional limit switches.
Wetted Parts:	
Diaphragm:	17-7 PH stainless steel
Seals:	Viton®
Enclosure:	Die-cast aluminum anodized
Other Parts:	Nickel plated aluminum 300 series stainless steel
Electrical Connection:	Screw terminals on covered terminal strip through 1/2" NPT conduit fitting
Enclosure Ratings:	NEMA 4
Pressure Connection:	1/8" NPT female high + low

* See product configurator for additional options.

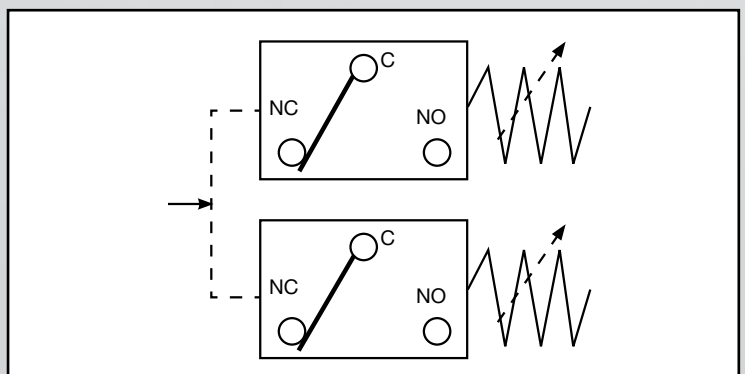
Wiring Code

Lead	Circuit #1		Circuit #2	
	Pressure	Vacuum	Pressure	Vacuum
Normally Closed	Blue	Red	Orange	Yellow
Common	Purple	Purple	Brown	Brown
Normally Open	Red	Blue	Yellow	Orange

Approvals/Listings: PED (European):	Compliant to PED 97/23/EC
Temperature Range: Operating:	-65°F to +165°F (-54°C to +74°C)
Adjustment Instructions: Pressure:	Turn adjustment screw clockwise to decrease pressure difference; counterclockwise to increase pressure difference
Vacuum Differential:	Turn adjustment screw counterclockwise to decrease vacuum difference; clockwise to increase vacuum difference
Options:	-Factory pre-set -NEMA 4X enclosure
Shipping Weight:	Single & dual - approximate 3.50 lbs.

Wiring Diagram

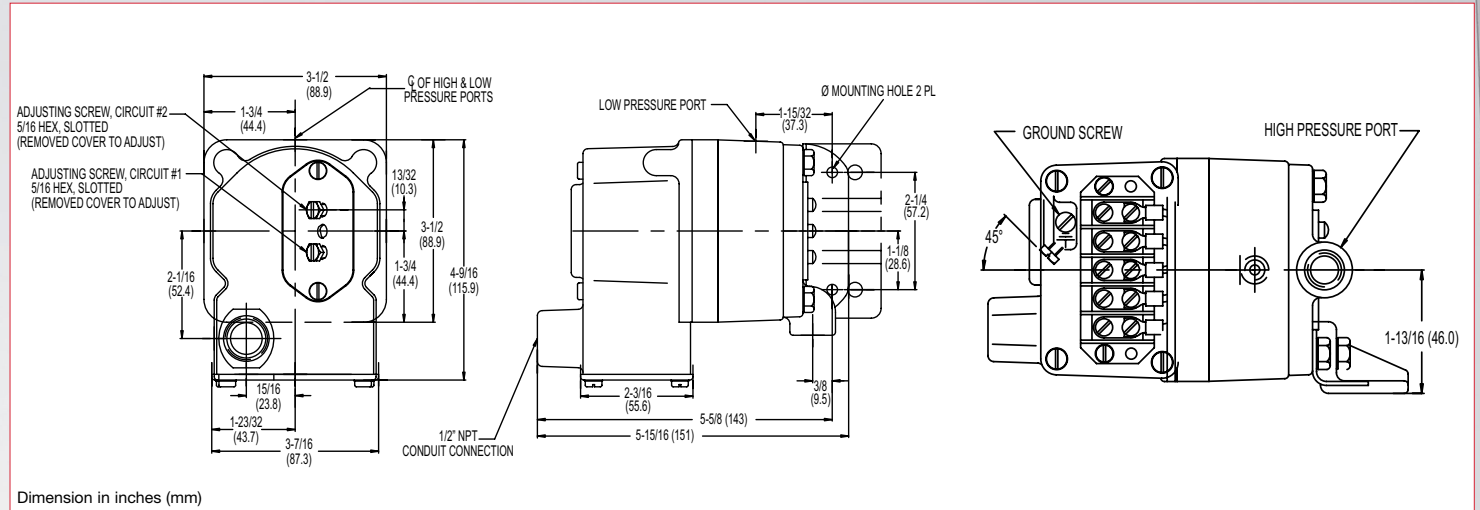
(contact status at atmospheric pressure)



Diaphragm Differential Switch

Series DPD1T, DPD2T

Technical Drawing



Product Configurator

Example **DPD1T** **-A** **3SS**

H Hermetically sealed limit switch option - Class I, Division II (requires AA, CC or HH limit switch)

Base Configuration

DPD1T	Single setpoint housed
DPD2T	Dual setpoint housed

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 3SS, 80SS or 150SS)
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 18SS)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-GH	1 amp @ 125 VAC; with gold contacts
-GH	Hermetically sealed; 1 amp @ 125 VAC with gold contacts (not available on vacuum models)
-HH	Hermetically sealed; 5 amps @ 125/250 VAC (not available on vacuum models)

Options

-FX	NEMA 4X enclosure
-L6	6-contact terminal block (DPD2T only)
-CS	CSA approved
-Sxxx	Factory preset (consult factory)

Adjustable Range

	Working Range	Adjustable Range (PRESSURE) ³				Approx. Deadband ² (Actuation Value)	Max. Diff. Pressure (Proof)
		Decreasing - psi (bar)		Increasing - psi (bar)			
	psi (bar)	Min	Max	Min	Max	psi (bar)	psi (bar)
3SS	.03-10	.03 (.00)	2.76 (.2)	.27 (.02)	3 (.2)	.09 - .24 (.01 - .02)	10 (.7)
18SS	.4-60	.4 (.03)	17.68 (1.2)	.72 (.05)	18 (1.2)	.18 - .32 (.01 - .02)	60 (4.1)
80SS	.5-160	.5 (.03)	75.3 (5.2)	5.2 (.4)	80 (5.4)	2.2 - 4.7 (.1 - .3)	160 (10.9)
150SS	1.5-300	1.5 (.10)	141.3 (9.7)	10.2 (.7)	150 (10.2)	3.5 - 8.7 (.2 - .6)	300 (20.4)

	Working Range	Adjustable Range (VACUUM) ⁴				Approx. Deadband ² (Actuation Value)	Max. Diff. Pressure (Proof)
		Decreasing (In. Hg)		Increasing (In. Hg)			
	In. Hg	Min	Max	Min	Max	In. Hg	In. Hg
3SS	.06-20	0.06	5.49	0.57	6	.17 - .51	20
18SS	.8-30	0.8	29	1.8	30	.44 - 1.00	30

NOTES:

¹ Consult supplementary guide for specific deadband values

² Deadband values indicated when used with the "standard" limit switch

³ Working range may be extended to 400 psi provided the maximum differential pressure (proof) is not exceeded

⁴ Working range may be extended to 30 in.Hg provided the maximum differential pressure (proof) is not exceeded

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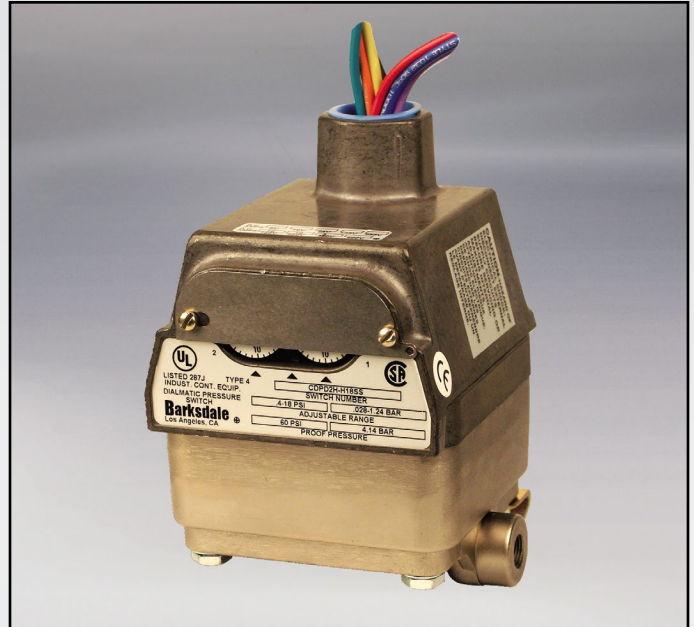
Calibrated Differential Switch *Series CDPD1H, CDPD2H, VCDPD1H, VCDPD2H*

Features

- ▶ Pressure and vacuum differential switch
- ▶ High accuracy diaphragm switch
- ▶ Calibrated dial for easy setpoint adjustment
- ▶ Factory preset or field adjustable

Applications

- ▶ Pump & compressor monitoring
- ▶ Air proving in HVAC systems
- ▶ Engine monitoring
- ▶ Machine tools
- ▶ Hydraulic power units
- ▶ Metal working
- ▶ Utility and power generation



General Specifications*

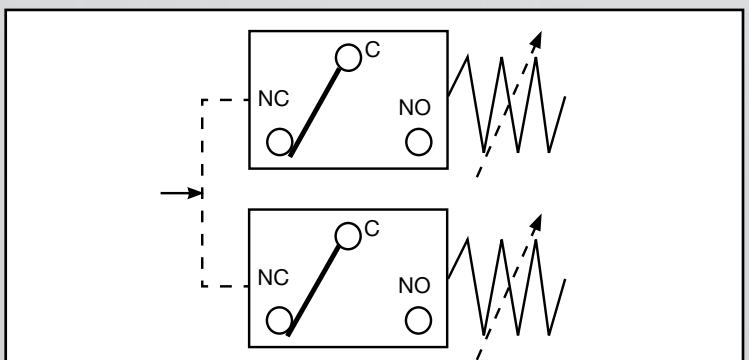
Electrical Characteristics:	All models incorporate Underwriters' Laboratories, Inc. listed single pole double throw snap-action switching elements. Switches may be wired "normally open" or "normally closed".
Accuracy:	± 0.5% of the adjustable range
Switch:	
Type:	SPDT single or dual circuit
Rating:	10 amps @ 125/250 VAC; 3 amps @ 480
	VAC (Class A or H limit switch)
Wetted Parts:	
Diaphragm:	17-7 PH stainless steel
Seals:	Viton®
Enclosure:	Die-cast aluminum anodized
Other Parts:	Nickel painted aluminum 300 series stainless steel
Electrical Connection:	Free leads approximately 18" long No. 16 AWG standard AWN 105/c wire through 3/4" conduit connection.
Enclosure Ratings:	Housed watertight housing (NEMA 4) Tamper-proof external adjustment.
Pressure Connection:	1/8" NPT female.

* See product configurator for additional options.

Approvals/Listings:	
UL:	UL listed; File # E42816
CSA:	CSA listed under guide 380-W-1.16, Class 3231, File # 22355
Temperature Range:	
Operating:	-65°F to +165°F (-54°C to 74°C)
Adjustment Instructions:	
Pressure:	Turn adjustment screw clockwise to decrease pressure difference; counterclockwise to increase pressure difference
Vacuum Differential:	Turn adjustment screw counterclockwise to decrease vacuum difference; clockwise to increase vacuum difference
Options:	-NEMA 4X -Cleaned for oxygen service
Shipping Weight:	Single & dual - approximate 3.50 lbs.

Wiring Diagram

(contact status at atmospheric pressure)

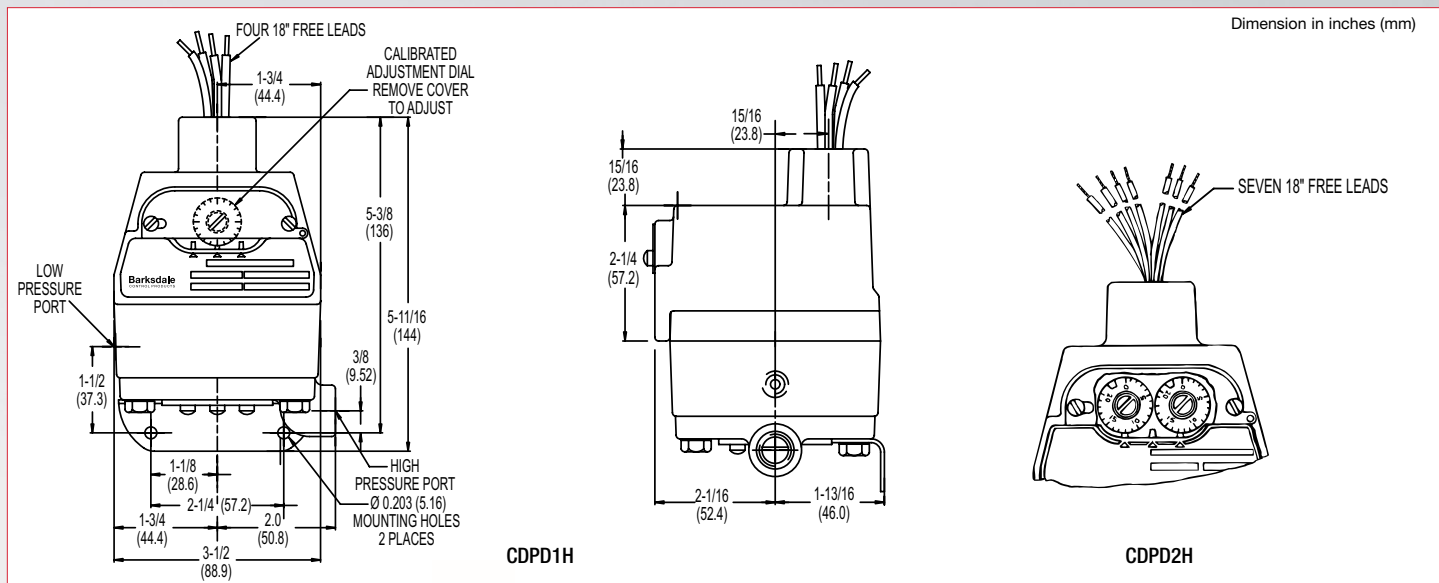


Wiring Code

Lead	Circuit #1		Circuit #2	
	Pressure	Vacuum	Pressure	Vacuum
Normally Closed	Blue	Red	Orange	Yellow
Common	Purple	Purple	Brown	Brown
Normally Open	Red	Blue	Yellow	Orange
Ground	Green			

Calibrated Differential Switch *Series CDPD1H, CDPD2H, VCDPD1H, VCDPD2H*

Technical Drawing



Product Configurator

Example		CDPD1H	-A	18SS	
---------	--	--------	----	------	--

H Hermetically sealed limit switch option - Class I, Division II (requires AA, CC or HH limit switch)

Base Configuration

CDPD1H	Single setpoint housed
CDPD2H	Dual setpoint housed
VCDPD1H	Single setpoint housed - vacuum
VCDPD2H	Dual setpoint housed - vacuum

Options

-FX	NEMA 4X enclosure (not UL/CSA approved)
-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory pre-set (consult factory)

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 3SS, 80SS or 150SS)
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 18SS)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-GH	1 amp @ 125 VAC; with gold contacts
-GH	Hermetically sealed; 1 amp @ 125 VAC with Gold Contacts (not available on vacuum models)
-HH	Hermetically sealed; 5 amps @ 125/250 VAC (not available on vacuum models)

Adjustable Range

	Working Range ³	Adjustable Range (PRESSURE)				Approx. Deadband ² (Actuation Value)	Max. Diff. (Proof)
		Decreasing - PSI (Bar)		Increasing - PSI (Bar)			
	Max	Min	Max	Min	Max	psi-(bar)	psi (bar)
3SS	.03 to 10	.03 (0)	2.76 (.2)	.27 (.02)	3 (.2)	.09 - .24 (.01 - .02)	10 (.7)
18SS	.40 to 60	.4 (.03)	17.68 (1.2)	.72 (.05)	18 (1.2)	.18 - .32 (.01 - .02)	60 (4.1)
80SS	.50 to 160	.5 (.03)	75.3 (5.1)	5.2 (.4)	80 (5.4)	2.2 - 4.7 (.1 - .3)	160 (10.9)
150SS	1.50 to 300	1.5 (.1)	141.3 (9.6)	10.2 (.7)	150 (10.2)	3.5 - 8.7 (.2 - .6)	300 (20.4)

	Working Range ⁴	Adjustable Range (VACUUM)				Approx. Deadband ² (Actuation Value)	Max. Diff. (Proof)
		Decreasing - In. Hg		Increasing - In. Hg			
	Max	Min	Max	Min	Max	In. Hg	In. Hg
3SS	.06 to 20	0.06	5.49	0.57	6	.17 - .51	20
18SS	.80 to 30	0.8	29.0	1.8	30	.44 - 1.00	30

NOTES:

¹ Consult Supplemental Guide for specific deadband values

² Deadband values indicated when used with the "standard" limit switch

³ Working range may be extended to 400 psi provided the maximum differential pressure (proof) is not exceeded

⁴ Working range may be extended to 30 in.Hg provided the maximum differential pressure (proof) is not exceeded

Low Cost Differential Switch

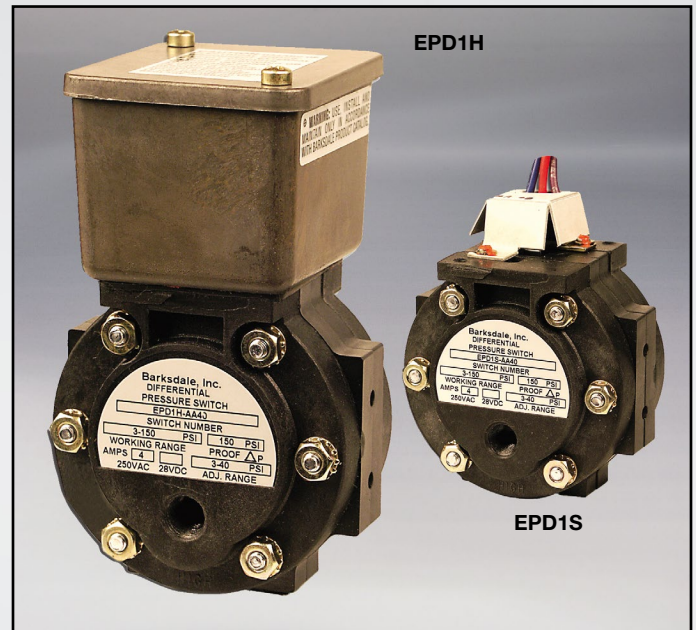
EPD1S, EPD1H Series

Features

- ▶ High reliability
- ▶ Easy setpoint adjustment
- ▶ Low cost

Applications

- ▶ Filtration systems
- ▶ Air proving in HVAC systems
- ▶ Pump & compressor monitoring
- ▶ Fluid leak detection
- ▶ Food & beverage



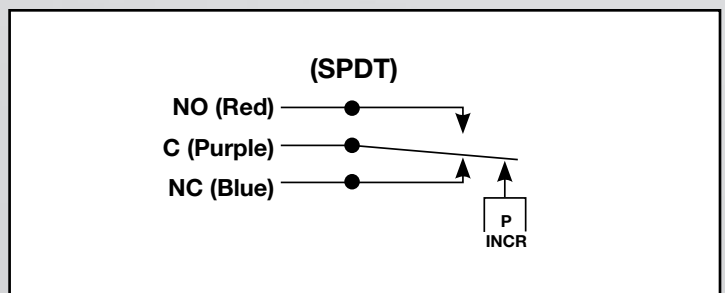
General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements
Accuracy:	± 5% of the adjustable range
Switch:	
Type:	SPDT snap action
Rating:	4 amps @ 125/250 VAC (Class AA limit switch); 5 amps @ 125/250 VAC (Class BB limit switch).
Wetted Parts:	
Process Fitting:	Polysulfone, 40% glass filled
Diaphragm:	Dacron reinforced neoprene
Enclosure:	Polysulfone, 40% glass filled
Electrical Connection:	
EPD1S Models:	12" free leads
EPD1H Models:	3-contact terminal block

* See product configurator for additional options.

Enclosure Ratings:	NEMA 4 on EPD1H
Pressure Connection:	1/8" NPT female
Temperature Range:	
Operating:	-20° to +165°F (-54° to +74°C)
Storage:	-65° to +200°F (-40° to 93°C)
Adjustment Instructions:	Turn adjustment screw clockwise to increase, counter-clockwise to decrease pressure difference (switch setting)
Shipping Weight:	
EPD1S Models:	1.0 lbs. approximate
EPD1H Models:	1.5 lbs. approximate

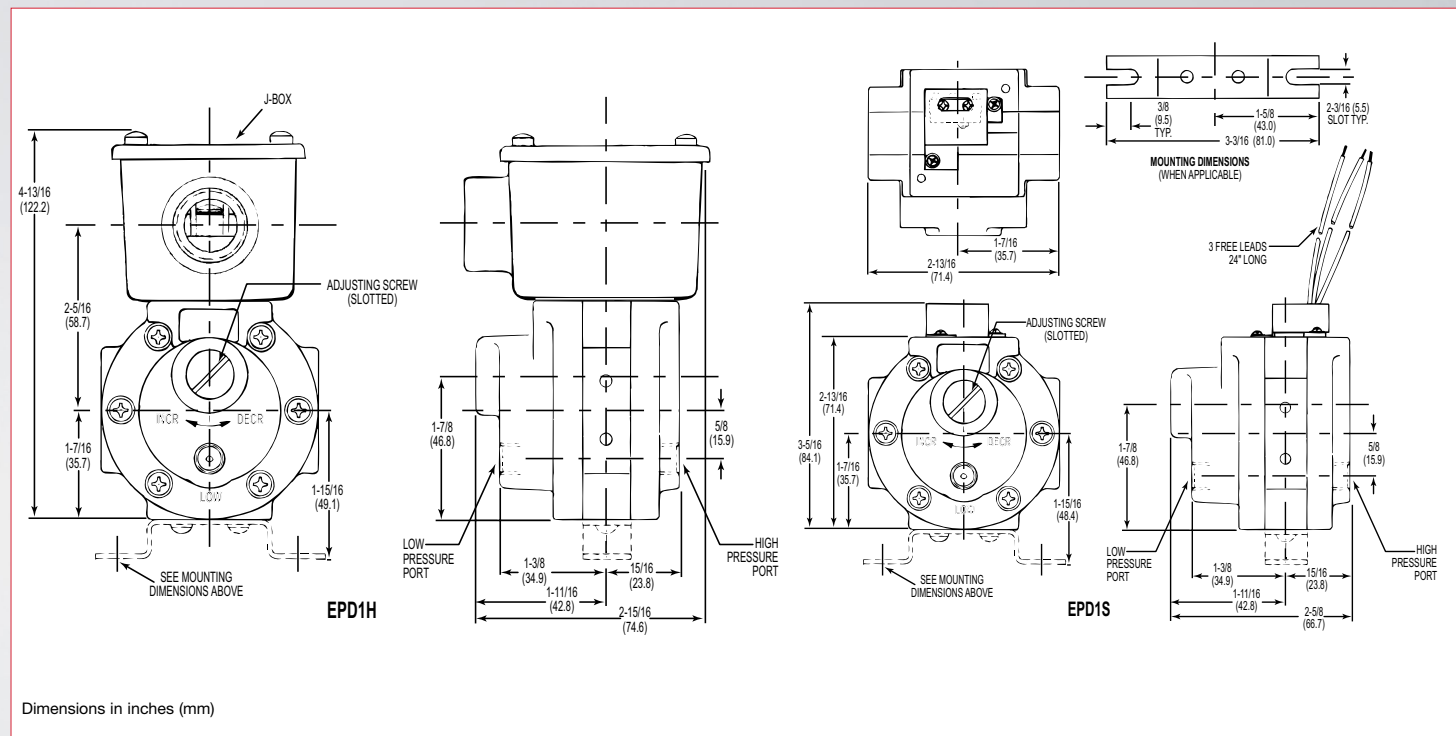
Wiring Diagram



Low Cost Differential Switch

EPD1S, EPD1H Series

Technical Drawing



Dimensions in inches (mm)

Product Configurator

Example	EPD1S	-AA	40	-W048
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Base Configuration

EPD1S	Single Setpoint
EPD1H	Single Setpoint with J-Box

Limit Switch

-AA	4 amps @ 125/250 VAC
-BB	5 amps @ 125/250 VAC
-CC ³	10 amps @ 125/250 VAC

Adjustable Range

	Working Range ²	Adjustable Range				Approx. Deadband ¹ (Actuation Value)	Max. Diff. (Proof)
		Decreasing - psi (bar)		Increasing - psi (bar)			
	psi (bar)	Min	Max	Min	Max	psi-(bar)	psi (bar)
3 ²	.22 - 12	.22 (.01)	2.71 (.2)	.51 (.03)	3 (.2)	.07 - .29 (0 - .02)	12 (.8)
40	3 - 150	3.0 (.2)	38.8 (2.6)	4.2 (.3)	40 (2.7)	.15 - 1.2 (.01 - .08)	150 (10.2)

Options

-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory pre-set (consult factory)

NOTES:

¹ Deadband values indicated when used with the "AA" limit switch, see drawing for "BB" & "CC" deadbands

² Working range may be extended to 90 psi provided that the maximum differential pressure (proof) is not exceeded

³ Only available with EPD1H models

The Little General

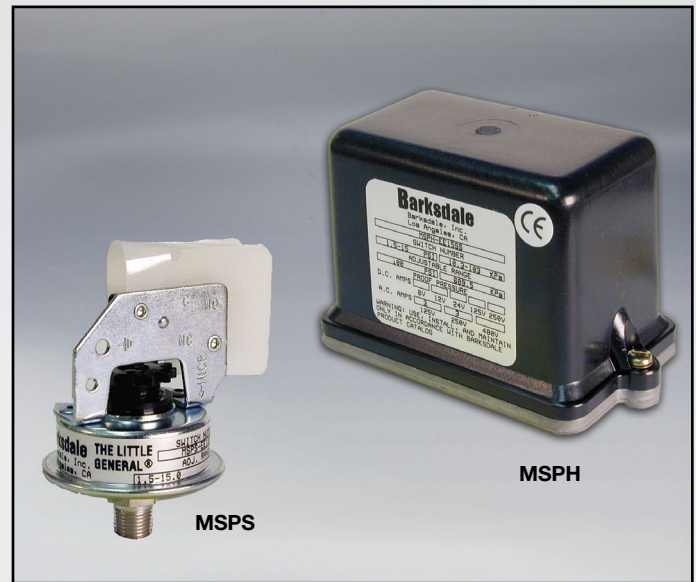
MSPS, MSPH Series

Features

- ▶ Compact size
- ▶ Stripped and housed versions available
- ▶ Easy setpoint adjustment
- ▶ High reliability
- ▶ NEMA 1 & 4

Applications

- ▶ Pool & spa heaters
- ▶ Beverage dispensers
- ▶ Medical gas delivery systems
- ▶ General industrial applications



General Specifications*

Electrical Characteristics:	All models incorporate Underwriters' Laboratories, Inc. listed single pole double throw or single pole single throw snap-action switching elements.
Accuracy:	+/- 2.0% of the adjustable range
Switch:	See table below
Wetted Parts:	
Process Fitting:	304 stainless steel (standard)
Seals & Diaphragms:	Buna-N (standard)
Enclosure:	Anodized aluminum base plate; Polysulfone housing
Electrical Connection:	.250" wide x .032" thick quick connect terminals (via 1/2" NPT conduit connector on housed models)
Enclosure Ratings:	Housed models: NEMA 4 Stripped models: NEMA 1
Pressure Connection:	1/8" NPT male (standard)

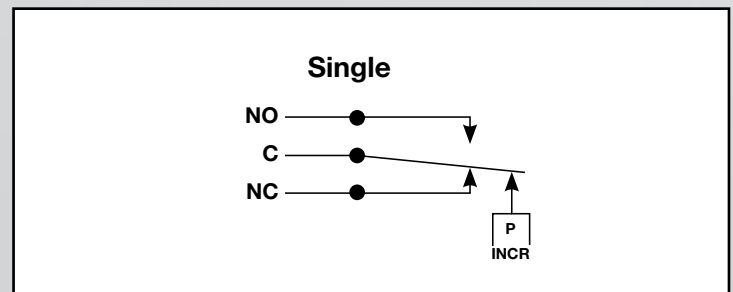
* See product configurator for additional options.

Approvals:	
UL:	MSPS models shown are UL recognized components under industrial control equipment, motor controllers, float and pressure operated (NKPZ2) files E42816.
CSA:	MSPS models are CSA certified under Class 3231 02, File LR22355.
PED (European):	Compliant to PED 97/23/EC
Temperature Range:	
Operating:	+20° to +165°F (-7° to +74°C)
Adjustment Instructions:	Turn adjustment nut clockwise to increase and counterclockwise to decrease the set point.
Options:	-FDA approved diaphragm -Oxygen cleaning -Factory preset -NSF approved switch
Shipping Weight:	
Housed Versions:	0.5 lb. approximate
Stripped Versions:	0.25 lb. approximate

Electrical Rating

Limit Switch Class	Voltage (Volts)	Maximum Continuous Current (Amps)
		Inductive
EE, FF	125/250 VAC	3
MM	125/250 VAC	25
DD, JJ	125/250 VAC	15
DD, JJ	125 VDC	0.5
	250 VDC	0.25

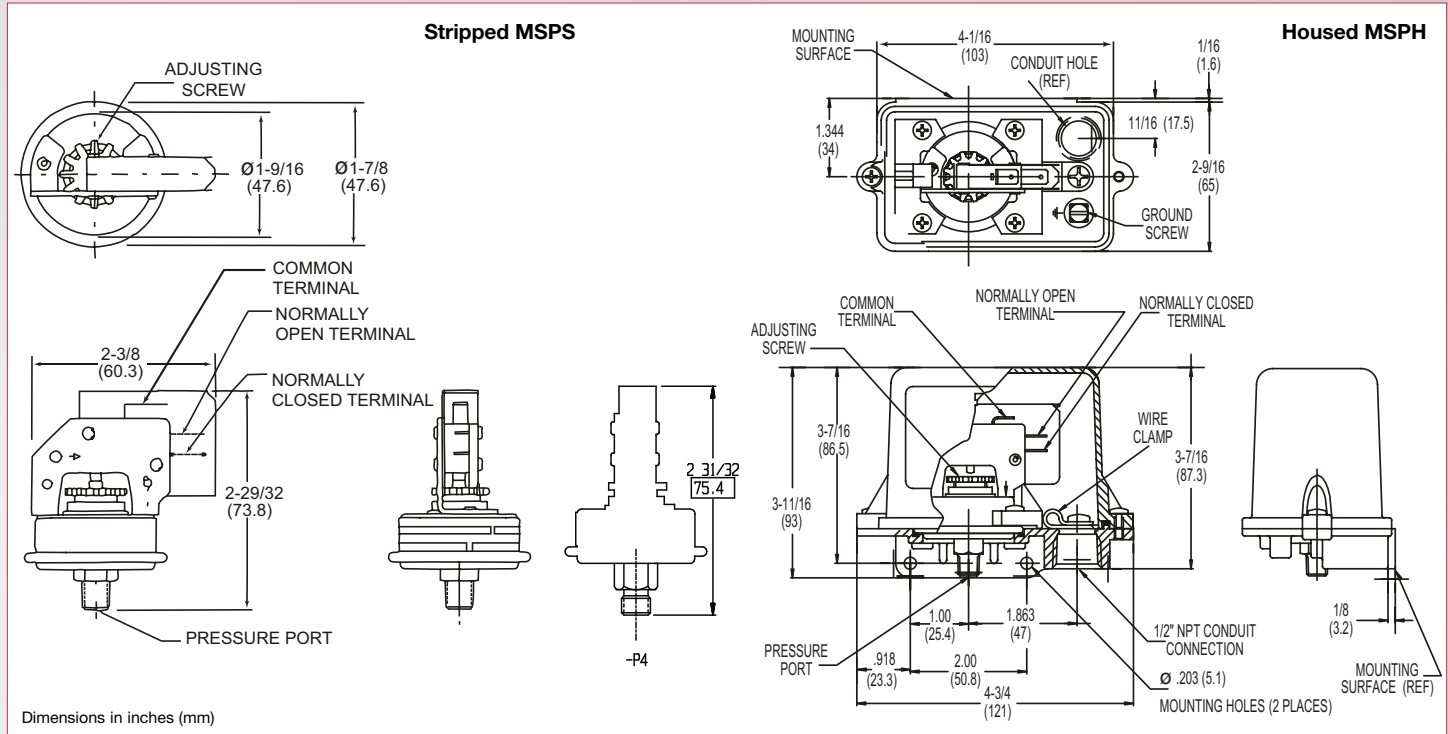
Wiring Diagram



The Little General

MSPS, MSPH Series

Technical Drawing



Product Configurator

Example	MSPS	-EE	15	SS		
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Enclosure

MSPS	Stripped version
MSPH	Housed version (not UL or CSA approved)

Limit Switch

-DD	SPST normally open; 15 amps @ 125/250 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-EE	SPST normally open; 3 amps @ 125/250 VAC
-FF	SPDT; 3 amps @ 125/250 VAC
-JJ	SPDT; 15 amps @ 125/250 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-MM	SPST normally open; 25 amps @ 125/250 VAC

Pressure Range

Limit Switch	Pressure Range	Adjustable Range				Approx. Deadband (Acuation Value) psi (bar)	Proof Pressure psi (bar)
		Decreasing - psi (Bar)		Increasing - psi (Bar)			
		Min.	Max.	Min.	Max.		
EE, FF	05	.5 (.03)	4.5 (.3)	1 (.07)	5 (.3)	.2-.5 (.01-.03)	100 (6.7)
	15	1.5 (.1)	14.2 (.9)	2.3 (.2)	15 (1)	.3-.8 (.02-.05)	100 (6.7)
	100	10 (.6)	92.1 (6.1)	17.9 (1.2)	100 (6.7)	2-7.9 (.1-.5)	150 ² (10)
DD, or JJ	05	.5 (.03)	4.3 (.3)	1.2 (.08)	5 (.3)	.2-.7 (.01-.05)	100 (6.7)
	15	1.5 (.1)	14 (.9)	2.5 (.2)	15 (1)	.3-1 (.02-.07)	100 (6.7)
	100	10 (.6)	91 (6)	19 (1.3)	100 (6.7)	2.6-9 (.2-.6)	150 ² (10)
MM	05	.5 (.03)	4.2 (.3)	1.3 (.09)	5 (.3)	.2-.8 (.01-.06)	100 (6.7)
	15	1.5 (.1)	13.8 (1)	2.7 (.2)	15 (1)	.3-1.2 (.02-.08)	100 (6.7)
	100	10 (.6)	89.5 (6.2)	20.5 (1.4)	100 (6.7)	2.8-10.5 (.2-.7)	150 ² (10)

Consult Sales Drawing for alternative limit switches.

Pressure Connection

SS	Stainless steel, 1/8" NPT male
PLS ⁴	Plastic, 1/8" NPT male
P4	Brass, 7/16-24UNS-2A for 1/4" tube connection

Diaphragm Material

Blank	Buna-N (standard)
-E ¹	Ethylene propylene (EPR)
-F	FDA approved Buna-N (No UL/CSA)
-V	Viton® diaphragm

NOTES:

- Only available with 05 and 15 pressure ranges.
- MSPS - 100 range models are 100 psi proof.
- Not available with MSPH. SF option automatically selects FDA approved diaphragm, O-Ring, and 300 Series SS pressure port.
- Only available with 05 pressure range.

Econ-O-Trol Switch

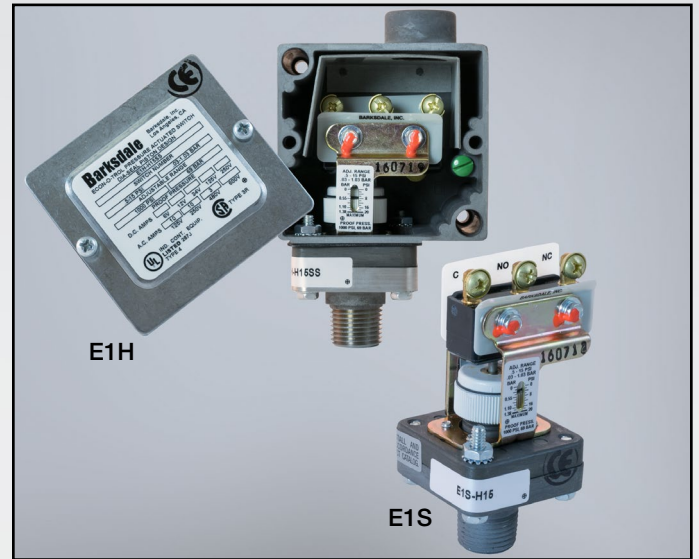
E1S, E1H Series

Features

- ▶ Superior resolution
- ▶ Long life
- ▶ Easy setpoint adjustment
- ▶ Ideal for pressure or vacuum applications
- ▶ NEMA 1, 3 & 4
- ▶ Stripped and housed versions available

Applications

- ▶ Medical equipment
- ▶ Pump & compressor monitoring
- ▶ Air proving in HVAC systems
- ▶ Irrigation systems
- ▶ Engine monitoring
- ▶ Machine tools
- ▶ Water & sewage treatment facilities
- ▶ Pulp & Paper Mills
- ▶ Metal working
- ▶ Food & beverage
- ▶ Steel mills

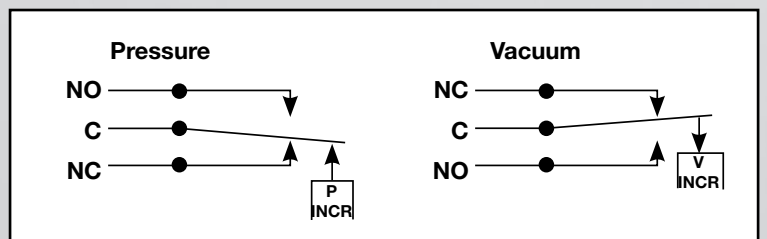


General Specifications*

Accuracy:	± 2% of the adjustable range
Switch: Type:	Single pole double throw (SPDT) snap action; single circuit
Rating:	Class H limit switch: 10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 24 VDC (standard).
Wetted Parts: Process Fitting:	Anodized aluminum (standard)
Seals & Diaphragms:	Buna-N (standard)
Enclosure:	Anodized aluminum (housed models)
Electrical Connection: Stripped Models:	Screw terminals
Housed models:	Screw terminals via 1/2" NPT female conduit connection
Enclosure Ratings: Stripped models:	NEMA 1
Housed models:	NEMA 4 & IP65
Pressure Connection: Stripped models:	1/2" NPT external with 1/8" NPT internal
Housed models:	1/4" NPT female
Approvals: UL:	Stripped models: UL recognized component (UR) Housed models: UL listed. File No. E42816
CSA:	All models and modifications shown are CSA listed under Guide 380-W-1.16, Class 3231, File LR22355
PED (European):	Compliant to PED 97/23/EC

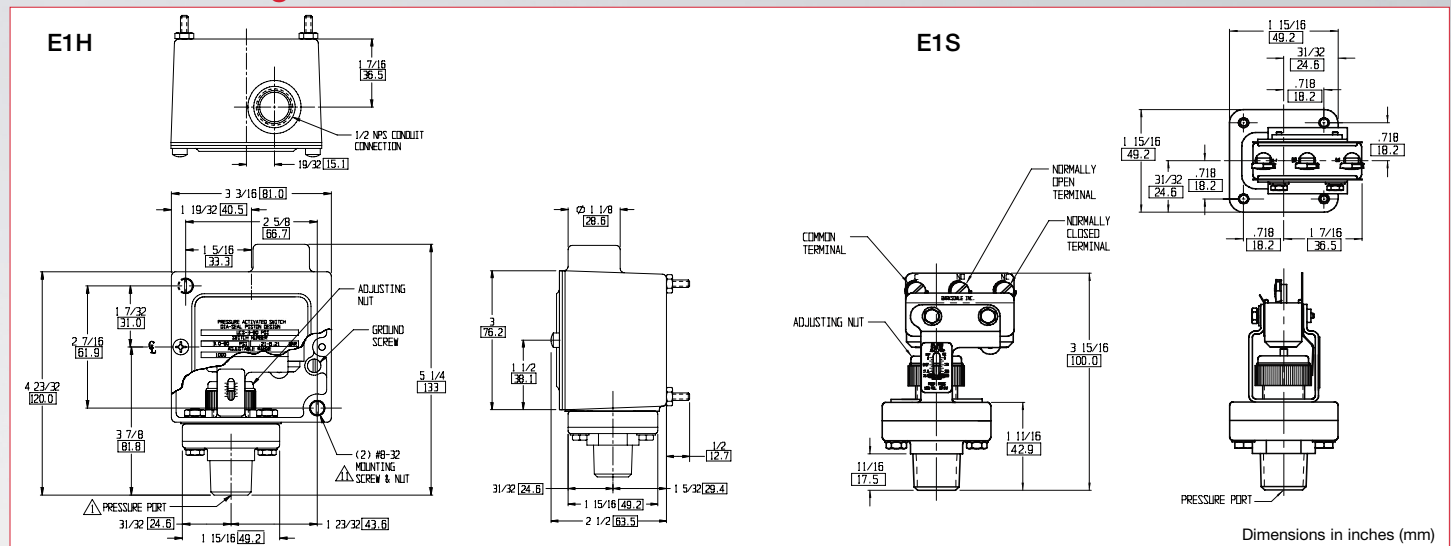
Temperature Range: Operating:	-20° to +165°F (-29 to +74°C)
Adjustment Setpoint: Positive Pressure:	Turn self locking adjustment nut clockwise to increase setpoint; counterclockwise to decrease setpoint.
Vacuum:	Turn self locking adjustment nut counterclockwise to increase setpoint, clockwise to decrease setpoint (towards 30" Hg).
Adjustable Deadband (Optional):	Turn small self locking adjustment nut on limit switch counterclockwise to increase differential. As the differential is increased, the setpoint is also increased. Balance one adjustment against the other to obtain the desired setpoint.
Options:	-Plastic cover (stripped models only) -NEMA 4X enclosure (housed models only) -Cleaned for oxygen service -Manual reset -Adjustable deadband
Shipping Weight: Housed models:	1.5 lbs. approx.
Stripped models:	0.75 lbs. approx.

Wiring Diagram



* See product configurator for additional options.

Technical Drawing



Product Configurator

Example	E1H	-H	250	-P6	-PLS		
---------	-----	----	-----	-----	------	--	--

Base Configuration

E1S	Stripped models
E1H	Housed models

Limit Switch¹

-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-BT ²	15 amps @ 125/250/480 Vac (E1S Series only)
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (standard)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-R ³	15 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
ADJUSTABLE DEADBAND	
-G ⁴	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.4 amps @ 125 VDC; 0.2 amps @ 250 VDC MANUAL RESET (Available only with housed version). Requires -RD option.
-GH	1 amp @ 125 VAC; gold contact

Pressure Range

	Adjustable Range				Approx. Deadband ⁵ (Actuation Value) psi (bar)	Proof Pressure psi (bar)	
	Decreasing - psi (bar)		Increasing - psi (bar)				
	Min	Max	Min	Max			
VAC ⁶	.5" Hg	29" Hg	3.0" Hg	30" Hg	.3 - 2.5" Hg	30 psi	Fixed Deadband
15	.5 (.03)	14.2 (.98)	.6 (.04)	15 (1)	.1 - 1.2 (.01 - .08)	1000 (67)	
90	3 (.2)	82 (5.5)	3.5 (.2)	90 (6)	.5 - 8 (.03 - .5)	1000 (67)	
250	10 (.7)	230 (15)	11 (.7)	250 (17)	1 - 20 (.07 - 1.3)	1000 (67)	
500	25 (1.7)	472 (31)	29 (2)	500 (33)	4 - 28 (.3 - 1.9)	1000 (67)	
VAC ⁶	1" Hg	30" Hg	Must select class R limit switch. Consult sales drawing for deadband charts			30 psi	Adjustable Deadband
15	1 (.07)	15 (1)				1000 (67)	
90	6 (.4)	90 (6)				1000 (67)	
250	15 (1)	250 (17)				1000 (67)	
500	35 (2.3)	500 (33)				1000 (67)	

NOTES:

- Consult sales drawing for specific deadband values
- Available on E1S Series only (terminals are on horizontal plane)
- To increase differential, turn small, self-locking adjusting nut counter-clockwise
- Add -LC suffix at end of -G -RD (manual reset) models for UL approval as limit controls (No UL without -LC suffix). -LC is not available in range 500.
- Deadband values indicated when used with the "H" limit switch
- Vacuum models are provided with 1/2" NPT External, 1/8" NPT Internal "Combo" fitting only on E1S models. Vacuum switches have terminals in the orientation: C-NC-NO.
- Not available on vacuum models
- Not available in range 500
- "-BR" models have a proof pressure of 500 psi
- "-PLS" models have a proof pressure of 400 psi
- "-Z1" option requires use with SS option (include suffix -SS-Z1 in the part number)
- Only available with 1/4" NPT internal Threads

Options

-E1	Plastic cover (E1S models only) (Not UL approved)
-FX	NEMA 4X enclosure (E1H models only)
-RD ⁴	Manual reset (must select class G limit switch)
-Z1 ¹¹	Cleaned for oxygen service
-Sxxx	Factory preset (consult factory)

O-Ring/Diaphragm Material

Blank	Buna-N
-T ⁷	Teflon
-V	Viton® diaphragm

Pressure Connection (Material Option)

Blank	Anodized Aluminum (standard)
-F1	Impregnated fitting (not UL or CSA approved)
-F2	Nickel plated fitting
-SS ^{7,12}	316 Stainless steel fitting
-BR ^{7,8,9}	Brass fitting (Max adjustable pressure: 250 psi)
-PLS ^{7,8,10}	Polysulfone 40% glass filled; for 1/8" NPT Internal with 1/2" NPT external thread type only. (Max adjustable pressure: 250 psi)

Pressure Connection (Thread Type)

E1S (Stripped models)	
Blank	1/8" NPT Internal with 1/2" NPT External Threads (standard)
-P4	1/4" NPT Internal Threads (Not available with -PLS option)
E1H (Housed models)	
Blank	1/4" NPT Internal Threads (standard) (Not available with -PLS option)
-P6	1/8" NPT Internal with 1/2" NPT External Threads

Dia-Seal Piston

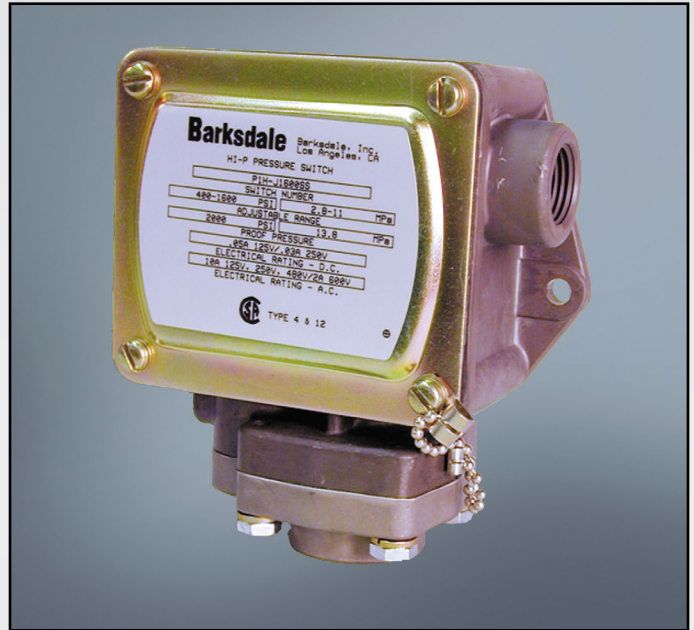
P1H Series

Features

- ▶ Superior resolution
- ▶ High reliability
- ▶ Oil & dust tight
- ▶ Extremely versatile
- ▶ NEMA 4 & 13
- ▶ CSA approved

Applications

- ▶ Pump & compressor monitoring
- ▶ Air proving in HVAC systems
- ▶ Irrigation systems
- ▶ Engine monitoring
- ▶ Machine tools
- ▶ General industrial applications

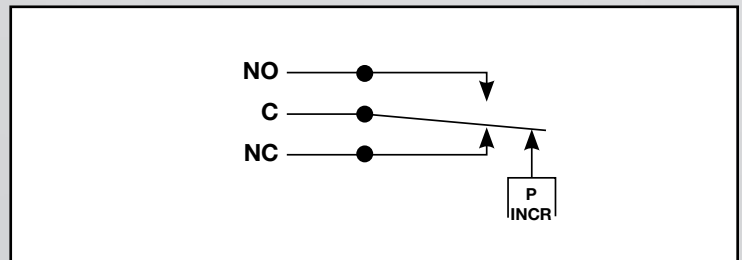


General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements
Accuracy:	± 2% of the adjustable range
Switch:	Single pole double throw (SPDT) snap action; single circuit (see order key for ratings)
Wetted Parts: Process Fitting:	Anodized aluminum (standard)
Diaphragm:	Buna N
Enclosure:	Anodized aluminum
Electrical Connection:	Internal screw terminals via 1/2" NPT conduit connector
Enclosure Ratings:	NEMA 4, 13
Pressure Connection:	1/4" NPT female (standard)
Approvals: CSA:	Class 3231 02, File No. LR22355
PED (European):	Compliant to PED 97/23/EC
Temperature Range: Operating:	-20° to +165°F (-29° to +74 °C) Hermetic Div. 2 models: -4° to +140°F (-20° to +60 °C)
Storage:	-40° to +200°F (-40° to +93°C)

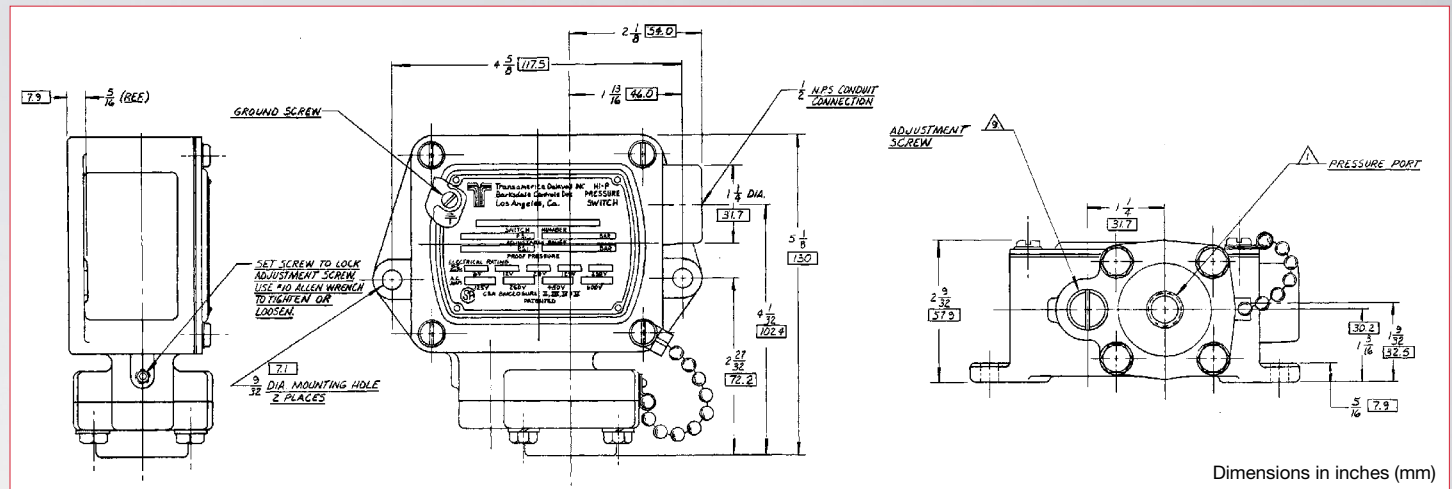
Adjustment Instructions:	Loosen setscrew with a #10 allen wrench. With screwdriver, turn adjustment screw clockwise to increase and counterclockwise to decrease the actuation point. Tighten setscrew after desired setting is reached.
Options:	- NEMA 4X - Hermetically sealed limit switch - Factory preset - CSA approval
Shipping Weight:	3.75 lbs. approximate

Wiring Diagram



* See product configurator for additional options.

Technical Drawing



Order Number Key / Options

Example		P1H	-B	340	SS	-V	-P2
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Prefix

H Hermetically sealed limit switch option
- Class I, Division II (requires HH limit switch)

Enclosure

P1H NEMA 4 & NEMA 13 enclosure

Limited Switch¹

-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC (standard for 30, 85, and 340 ranges)
-F	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.4 amps @ 125 VDC; 0.2 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (standard for 600 range)
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC with elastomer boot (standard for 1600 range)
-K	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC (with boot)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-GH	1 amp @ 125 VAC gold contacts
-HH	Hermetically sealed; 5 amps @ 125/250 VAC

Options

Blank	1/4" NPT (standard)
-P2	1/2" NPT pressure fitting (only available in stainless steel)
-FX	NEMA 4X enclosure
-Z1	Cleaned for oxygen service*
-Sxxx	Factory preset (consult factory)

* Not available on hermetic Div 2 models

Diaphragm/O-Ring

Blank	Buna-N diaphragm
-T	Teflon diaphragm
-V	Viton® diaphragm

Pressure Fitting

Blank	Anodized aluminum, 1/4" NPT
SS	Stainless steel, 1/4" NPT

Pressure Range

	Adjustable Range				Approx. Deadband2 (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi-(bar)	psi (bar)
30	.5 (.03)	28 (1.9)	1.5 (.1)	30 (2)	.4 - 2 (.03 - .13)	2000 (133)
85	3 (.2)	78 (5.2)	4.5 (.3)	85 (5.7)	.8 - 7 (.05 - .5)	2000 (133)
340	6 (.4)	318 (21)	10 (.6)	340 (23)	2 - 22 (.13 - 1.5)	2000 (133)
600	25 (1.7)	583 (39)	27 (1.8)	600 (40)	2 - 17 (.13 - 1.1)	2000 (133)
1600	400 (27)	1520 (101)	480 (32)	1600 (107)	20 - 80 (1.3 - 5.3)	2000 (133)

NOTES:

1 Consult sales drawing for specific deadband values

2 Deadband values indicated when used with the "standard" limit switch

Explosion Proof Dia-Seal Piston

P1X Series

Features

- ▶ Explosion proof housing
- ▶ High reliability
- ▶ Extremely long life
- ▶ UL & CSA listed

Applications

- ▶ Power plants
- ▶ Water pumps
- ▶ Hydraulic power units
- ▶ Pneumatic devices
- ▶ General industrial applications
- ▶ Oil & gas applications

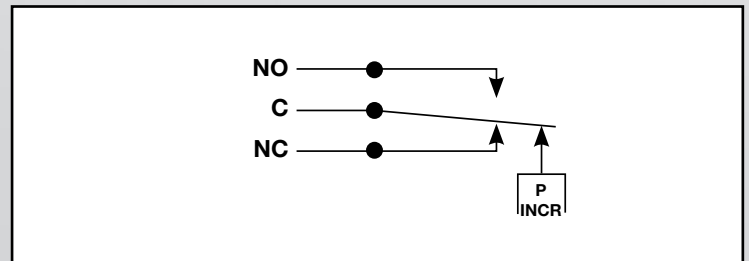


General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snapaction switching elements
Accuracy:	± 2% of the adjustable range
Switch:	Single pole double throw (SPDT) snap action; single circuit
Wetted Parts:	
Process Fitting:	Anodized aluminum
Diaphragm:	Buna N
Enclosure:	Anodized aluminum
Electrical Connection:	Internal screw terminals via 1/2" NPT conduit connector
Enclosure Ratings:	NEMA 7, 9
Pressure Connection:	1/4"-18 NPT female (standard)
Approvals:	
UL:	File No. E37043; approved for hazardous locations, Class I, DIV 1, Groups C&D, Class II Groups E, F, & G; not available on 1600 psi range
CSA:	Class 3238-01, File No. 022354-0-000
PED (European):	Compliant to PED 97/23/EC

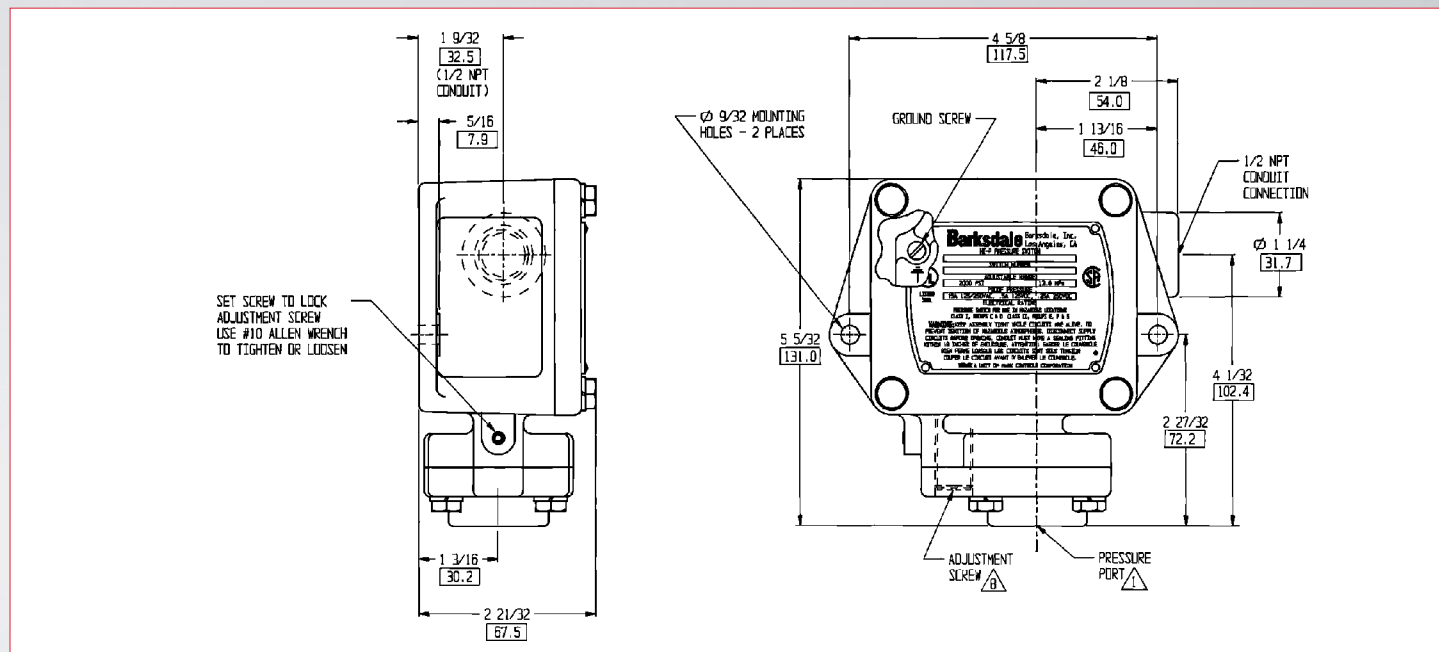
Temperature Range:	
Operating:	-4° to +140°F (-20° to +60 °C)
Storage:	-40° to +200 °F (-40° to +93°C)
Adjustment Instructions:	Loosen setscrew with a #10 allen wrench. With screwdriver, turn adjustment screw clockwise to increase and counterclockwise to decrease the actuation point. Tighten setscrew after desired setting is reached.
Options:	<ul style="list-style-type: none"> - Viton® Diaphragm - Teflon diaphragm - Hermetically sealed limit switch - Factory preset
Shipping Weight:	3.75 lbs. approximate

Wiring Diagram



* See product configurator for additional options.

Technical Drawing



Order Number Key / Options

Example	P1X	-H	85	SS		
---------	-----	----	----	----	--	--

H Hermetically sealed limit switch option

Enclosure
P1X NEMA 7 & NEMA 9 enclosure

Limited Switch¹

-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC (standard for 30, 85, and 340 ranges)
-F	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.4 amps @ 125 VDC; 0.2 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (standard for 600 range)
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC with elastomer boot (standard for 1600 range)
-K	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-GH	1 amp @ 125 VAC gold contacts
-HH	Hermetically sealed; 5 amps @ 125/250 VAC

Options

-P2	1/2" NPT pressure fitting (available only with stainless steel models)
-Sxxx	Factory preset (consult factory)

Diaphragm/O-Ring

Blank	Buna-N diaphragm
-T	Teflon
-V	Viton® diaphragm (not available for 1600 range)

Pressure Fitting

Blank	Anodized aluminum, 1/4" NPT female
SS	Stainless steel, 1/4" NPT female

Pressure Range

	Adjustable Range				Approx. Deadband ² (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max		
30	.5 (.03)	28.5 (1.9)	1 (.1)	30 (2)	.1 - 1.5 (.07 - .1)	2000 (133)
85	3 (.2)	81.5 (5.4)	4 (.3)	85 (5.7)	.25 - 3.5 (.02 - .23)	2000 (133)
340	6 (.4)	331.5 (22)	7 (.5)	340 (23)	1 - 8.5 (.07 - .6)	2000 (133)
600	25 (1.7)	581 (39)	27 (1.8)	600 (40)	2 - 19 (.13 - 1.3)	2000 (133)
1600 ³	400 (27)	1520 (101)	480 (32)	1600 (107)	20 - 80 (1.3 - 5.3)	2000 (133)

* Min. quantity may apply for select configurations.

Sealed Piston Switch

Series 9675, A9675

Features

- ▶ Double make double break capability
- ▶ Extremely long life
- ▶ Calibrated dial for easy setpoint adjustment
- ▶ Tamper-proof external adjustment
- ▶ Oil & dust tight
- ▶ Easy setpoint adjustment

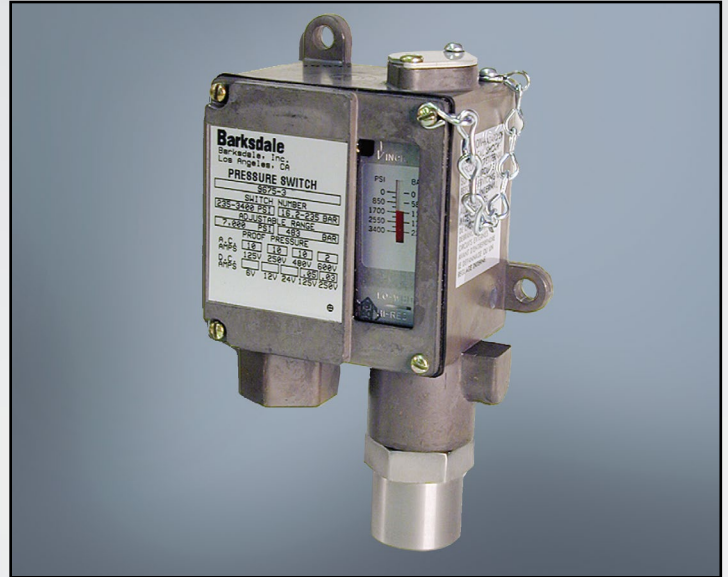
Applications

- ▶ Hydraulic applications
- ▶ Machine tools
- ▶ Compressors
- ▶ Mining
- ▶ Specialty vehicles
- ▶ Lubrication equipment
- ▶ Metal working

General Specifications*

Accuracy:	± 2% of the adjustable range
Switch: Type:	Single pole double throw (SPDT) or double make double break (DMDB) snap action; single circuit
Rating:	9675: (one SPDT) 10 amps @ 125, 250, or 480 VAC; 2.0 amps @ 600 VAC; 0.03 amps at 250 VDC A9675: (one DMDB) 15 amps @ 125, 250, or 480 VAC; 7.5 amps @ 600 VAC; 0.5 amps at 250 VDC
Wetted Parts: Process Fitting:	416 stainless steel
O-ring:	Buna-N with Teflon® backup ring
Piston:	416 stainless steel
Enclosure:	Anodized aluminum
Electrical Connection:	Through 1/2" NPT conduit connection to screw terminals
Enclosure Ratings:	NEMA 13
Pressure Connection:	1/4" NPT female
Approvals: PED (European) :	Compliant to PED 97/23/EC
Temperature Range: Operating:	-20° to +165°F (-29° to +74°C)
Storage:	-40° to +200°F (-40° to +93°C)

* See Order Number Key for additional options.



Adjustment Instructions:

Setpoint:

Loosen adjustment screw cover and open. Using a 5/16" allen wrench, turn adjustment screw clockwise to increase setpoint, counterclockwise to decrease setpoint. The setpoint indicator (located inside enclosure) provides a visual indication of the approximate setpoint.

Optional adjustable differential models remove front cover and locate adjustment screw (identified) using screwdrivers, rotate screw clockwise to increase differential.

Wiring Code:

SPDT:

Normally Open (NO), Normally Closed (NC), and Common (C) terminals are identified on the limit switches

DMDB:

Two normally open (NO) and two normally closed.

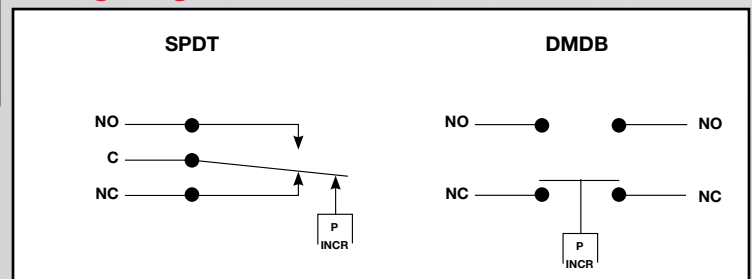
Options:

- Factory pre-set
- Cleaned for oxygen service
- Adjustable deadband
- Drain port, 1/8" NPT

Shipping Weight:

1.75 lbs. approximate

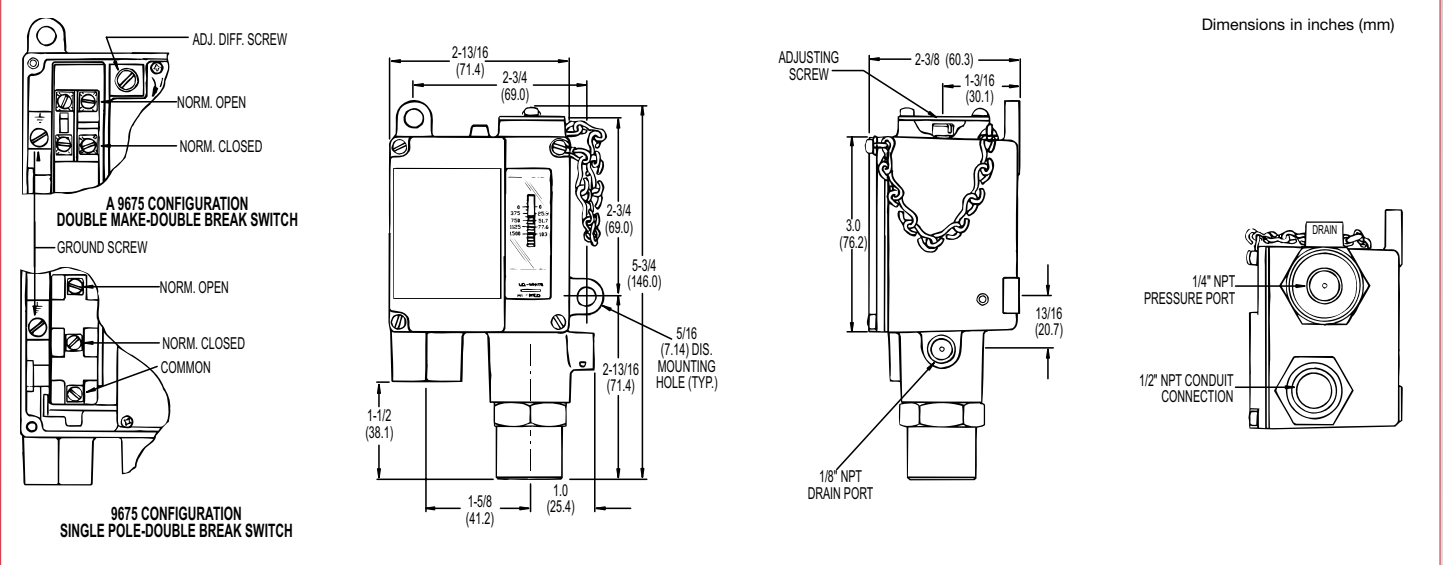
Wiring Diagram



Sealed Piston Switch

Series 9675, A9675

Technical Drawing



Order Number Key / Options

Example	D	9675	-2		-V	
---------	---	------	----	--	----	--

D Drain port 1/8" NPT

Base Model

9675	Base part number (with SPDT limit switch)
A9675	Base part number (with DMDB limit switch)

Pressure Range

For base model: 9675

	Adjustable Range				Approx. Deadband (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi-(bar)	psi (bar)
-0	20 (1.4)	180 (12.2)	25 (1.7)	200 (13.6)	5 - 20 (.3 - 1.4)	3000 (204)
-1	75 (5.1)	505 (34.3)	85 (5.8)	540 (36.7)	10 - 35 (.7 - 2.4)	3000 (204)
-2	100 (6.8)	1400 (95.2)	130 (8.8)	1500 (102)	30 - 100 (2.0 - 6.8)	7000 (483)
-3	235 (16.0)	3200 (218)	295 (20.0)	3400 (231)	60 - 300 (4.1 - 20.6)	7000 (483)
-4	425 (28.9)	5640 (384)	545 (37.0)	6000 (408)	120 - 360 (8.2 - 24.4)	12000 (816)

For base model: A9675

	Adjustable Range				Approx. Deadband (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max		
					psi-(bar)	psi (bar)
-0	20 (1.4)	170 (11.6)	30 (2)	200 (13.6)	10 - 30 (.7 - 2.0)	3000 (204)
-1	75 (5.1)	495 (33.7)	95 (6.5)	540 (36.7)	20 - 45 (1.4 - 3.1)	3000 (204)
-2	100 (6.8)	1370 (93)	140 (9.5)	1500 (102)	40 - 130 (2.7 - 8.8)	7000 (483)
-3	235 (16.0)	3075 (209)	365 (24.8)	3400 (231)	130 - 325 (8.8 - 22.1)	7000 (483)
-4	425 (28.9)	5500 (374)	600 (40.8)	6000 (408)	175 - 500 (11.9 - 34.0)	12000 (816)

Options

-Z1	Cleaned for oxygen service
Sxxx	Factory pre-set (consult factory)

O-Ring Material

-V	Viton® O-ring
----	---------------

Deadband

Blank	Standard
AA ¹	Adjustable deadband (only available with A9675 model)

NOTES:

¹ Consult Supplementary Guide for specific deadband value

Sealed Piston

Series 9617

Features

- ▶ Unique leaf spring design
- ▶ High reliability
- ▶ Extremely long life
- ▶ UL & CSA listed
- ▶ High proof pressure upto 15 kpsi
- ▶ Calibrated dial for easy setpoint adjustment

Applications

- ▶ Factory automation
- ▶ Hydraulic presses
- ▶ Compactors and balers
- ▶ Hydraulic controllers
- ▶ Machine tools



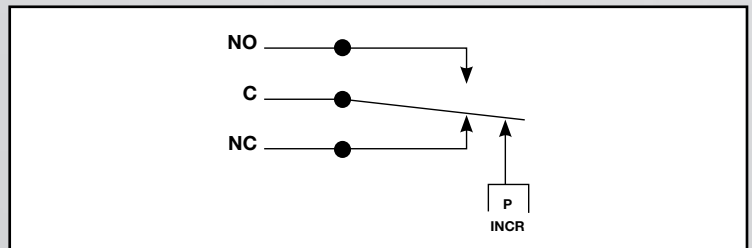
General Specifications*

Accuracy:	± 2% of the adjustable range
Switch:	
Type:	Single pole double throw (SPDT) snap action; single circuit
Rating:	15 Amps @ 125, 250, or 480 VAC (Class B)
Wetted Parts:	
Process Fitting:	Brass
O-ring:	Buna-N
Piston:	440C stainless steel
Enclosure:	Anodized aluminum
Electrical Connection	Through 1/2" NPT conduit connection to screw terminals
Enclosure Ratings:	NEMA 4
Pressure Connection:	1/4" NPT female
Approvals:	
UL:	UL File No. E42816
CSA:	Class 32311 02; File No. 022355-0.00

* See product configurator for additional options.

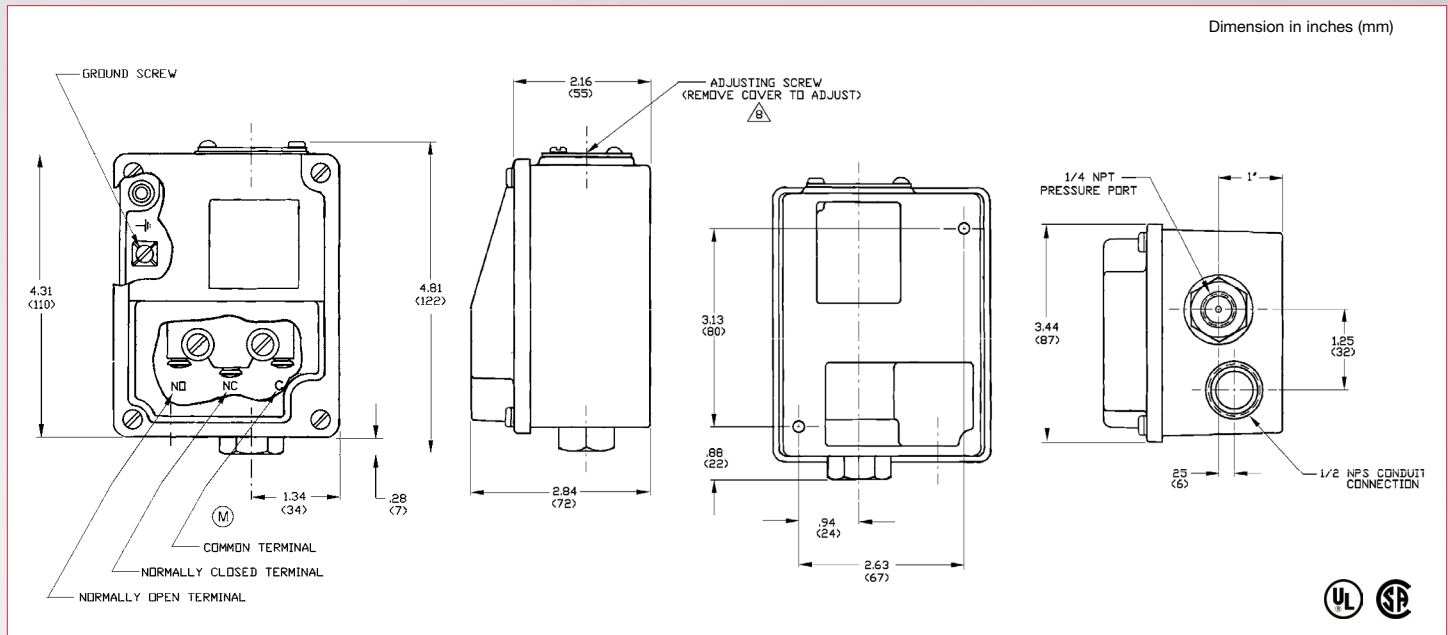
Temperature Range:	
Operating:	-20° to +165°F (-29° to +74°C)
Storage:	-40° to +200°F (-40° to +93°C)
Adjustment Instructions:	
Setpoint:	Loosen adjustment screw cover and open. Using a 5/16" allen wrench, turn adjustment screw clockwise to increase setpoint, counterclockwise to decrease setpoint. The setpoint indicator (located inside enclosure) provides a visual indication of the approximate setpoint.
Options:	-Factory Pre-set -Cleaned for oxygen service -Stainless steel fitting
Shipping Weight:	1.75 lbs. approximate

Wiring Diagram



Connections are identified on the terminal strip only

Technical Drawing



Product Configurator

Example	9617	-3	SS		
---------	------	----	----	--	--

Options

-Z1	Cleaned for oxygen service
-Z12*	Gold contact limit switch (GH)
-Sxxx	Factory pre-set (consult factory)

Basic Configuration

9617	Nema 4 Enclosure
------	------------------

O-Ring Material

Blank	Buna-N (standard)
-E*	Ethylene Propylene (EPR) - O-ring
-V	Viton® O-ring

Pressure Range

	Adjustable Range				Approx. Deadband (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi (bar)	psi (bar)
-3	80 (5.4)	1400 (95.2)	120 (8.2)	1500 (102)	40 - 100 (2.7 - 6.8)	7500 (510)
-4	180 (12.2)	2800 (190)	230 (15.6)	3000 (204)	50 - 200 (3.4 - 13.6)	10000 (680)
-5	295 (20.0)	4650 (316)	375 (25.5)	5000 (340)	80 - 350 (5.4 - 23.8)	10000 (680)
-6	450 (30.6)	7100 (483)	575 (39.1)	7500 (510)	125 - 400 (8.5 - 27.2)	15000 (1020)

Process Connection

Blank	Brass, 1/4" NPT Female (standard)
SS	Stainless Steel, 1/4" NPT Female

Note:
* Not agency approved.

Sealed Piston

Series 9048

Features

- ▶ High reliability
- ▶ Extremely long life
- ▶ Oil & dust tight
- ▶ Easy setpoint adjustment
- ▶ High proof pressure
- ▶ Rugged design

Applications

- ▶ Machine tools
- ▶ Hydraulic presses
- ▶ Compactors
- ▶ Hydraulic power units
- ▶ Compressors



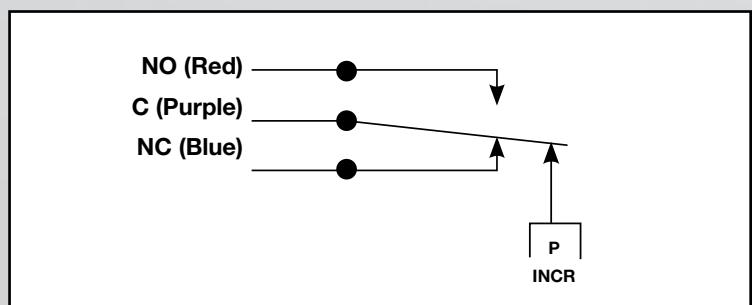
General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements
Accuracy:	± 2% of the adjustable range
Switch: Type: Rating:	Single pole double throw (SPDT) snap action; single circuit 10 Amps @ 125, 250, or 480 VAC; 0.03 Amps @ 250 VDC (Class B limit switch)
Wetted Parts: Process Fitting: O-ring: Piston: Enclosure:	416 series stainless steel Buna N 440 stainless steel Anodized aluminum
Electrical Connection:	Through 1/2" NPS conduit connection to screw terminals
Enclosure Ratings:	NEMA 13
Pressure Connection:	1/4"-18 NPT Female
Approvals: UL/CSA (Optional):	UL File E42816 Class 3231 02, File No. 022355-0-000 CSA File No. 022355-0-000

* See product configurator for additional options.

Temperature Range:	
Operating:	-40° to +165°F (-40° to +74°C)
Storage:	-40° to +200 °F (-40° to +93°C)
Adjustment Instructions:	Loosen setscrew with a #10 allen wrench. With screwdriver, turn adjustment screw clockwise to increase and counterclockwise to decrease the actuation point. Tighten setscrew after desired setting is reached.
Options:	-UL/CSA approval (maximum allowable voltage 300 VAC) -Factory Pre-set -Cleaned for oxygen service -CSA Approval
Shipping Weight:	9048 Series: 2.5 lbs. approximate

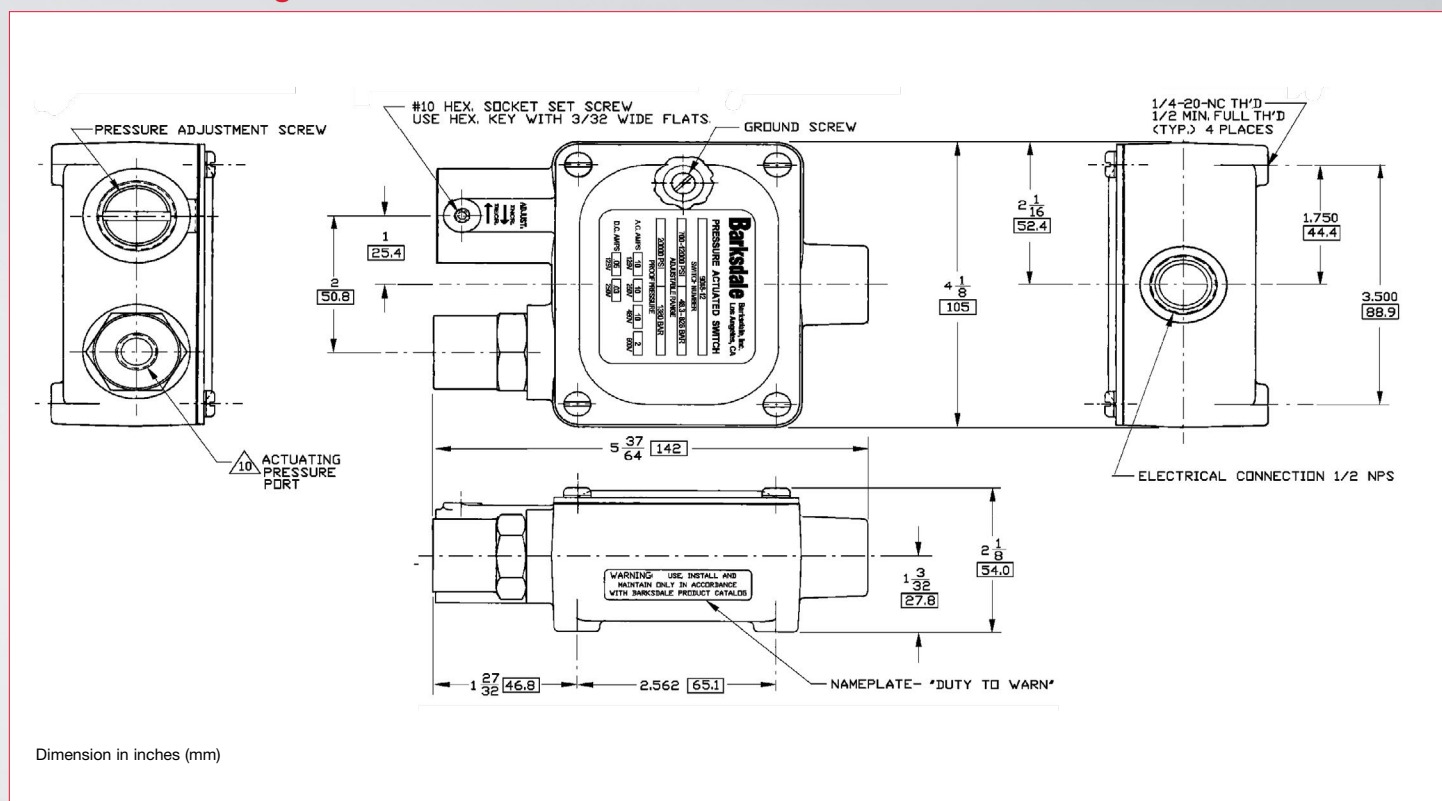
Wiring Diagram



Sealed Piston

Series 9048

Technical Drawing



Product Configurator

Example	9048	-3		
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Basic Configuration

9048 Base part number

Options

-CS	CSA Certification
-Z1	Cleaned for oxygen service
-Sxxx	Factory pre-set (consult factory)

Pressure Range

	Adjustable Range				Approx. Deadband (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max		
-1	35 (2.4)	235 (16.0)	40 (2.7)	250 (17.2)	5 - 30 (.3 - 2.1)	4500 (310)
-2	50 (3.4)	460 (31.2)	60 (4.1)	500 (34.5)	10 - 50 (.7 - 3.4)	6000 (414)
-3	100 (6.8)	1425 (96.9)	115 (7.8)	1500 (103)	15 - 110 (1.0 - 7.6)	7500 (517)
-4	200 (13.6)	2825 (192)	240 (16.3)	3000 (207)	40 - 250 (2.7 - 17.2)	10000 (690)
-5	350 (23.8)	4650 (316)	395 (26.9)	5000 (345)	45 - 350 (3.1 - 23.8)	10000 (690)
-6	700 (47.6)	9450 (643)	815 (55.4)	10000 (690)	115 - 550 (7.8 - 37.4)	15000 (1035)
-12	700 (47.6)	11250 (765)	815 (55.4)	12000 (828)	115 - 750 (7.8 - 51.0)	20000 (1380)

O-Ring

Blank	Buna-N (standard)
-E	EPR
-V	Viton®

Visual Indicating Sealed Piston Switch

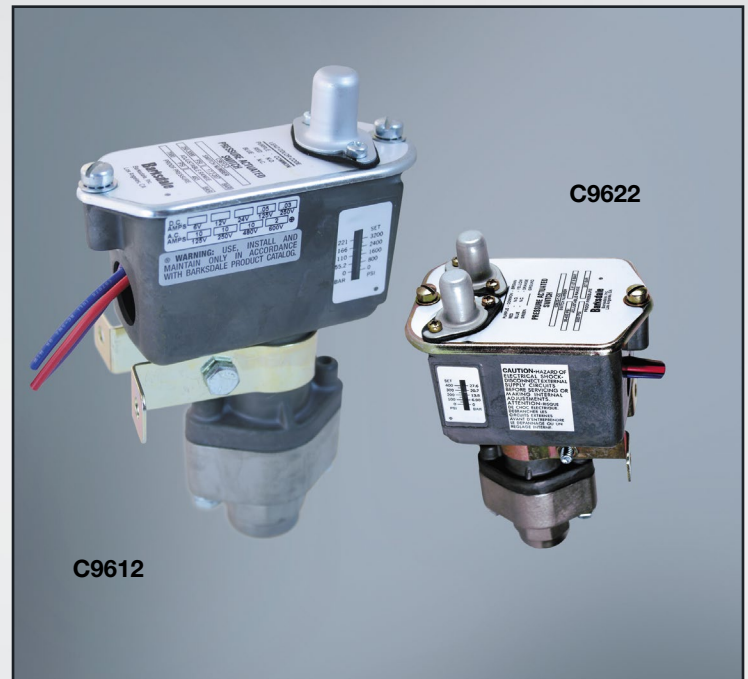
C9612, C9622 Series

Features

- ▶ Extremely long life
- ▶ Weather resistant housing
- ▶ Easy setpoint adjustment
- ▶ High reliability
- ▶ High proof pressure
- ▶ Single & dual setpoint

Applications

- ▶ Compactors & balers
- ▶ Machine tools
- ▶ Lubrication equipment
- ▶ Hydraulic presses
- ▶ Railroad
- ▶ Hydraulic power units
- ▶ Compressors
- ▶ Utility & power generation
- ▶ Metal working application



General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements
Accuracy:	± 2% of the adjustable range
Switch: Type:	Single pole double throw (SPDT) snap action; single or dual circuit
Rating:	10 amps @ 125, 250, or 480 VAC; 0.03 amps @ 250 VDC, Class B limit switch
Wetted Parts: Process Fitting:	Nickel plated aluminum
O-ring:	Buna-N (standard)
Piston:	416 stainless steel
Enclosure:	Anodized aluminum
Electrical Connection:	18" free leads (terminal block on "T" model)
Enclosure Ratings:	NEMA 3
Pressure Connection:	1/4" - 18 NPT female

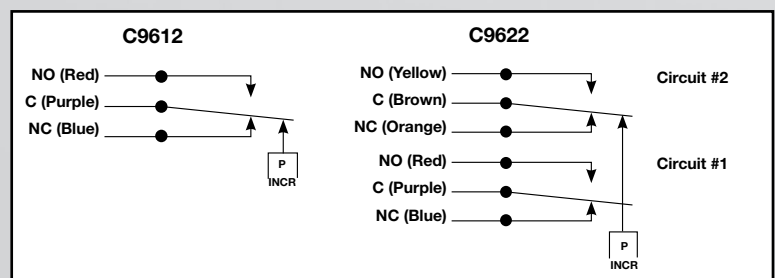
Approvals: UL/CSA (optional):	UL File E42816 Class 3231 02, File No. 022355-0-000
Temperature Range: Operating:	-20° to +165°F (-29° to +74°C)
Storage:	-40° to +200°F (-40 °to +93°C)
Adjustment Instructions:	With screwdriver, turn adjustment screw counterclockwise to increase and clockwise to decrease the actuation point.
Options:	-UL/CSA approval (maximum rating of 300 VAC) -Factory Pre-set -Cleaned for oxygen service -Alternate O-ring materials
Shipping Weight: C9612 Models:	2.5 lbs. approximate
C9622 Models:	3.0 lbs. approximate
TC9622 Models	3.5 lbs. approximate

* See product configurator for additional options.

Wiring Code

Lead	Circuit #1	Circuit #2
Normally Closed	Blue	Orange
Common	Purple	Brown
Normally Open	Red	Yellow

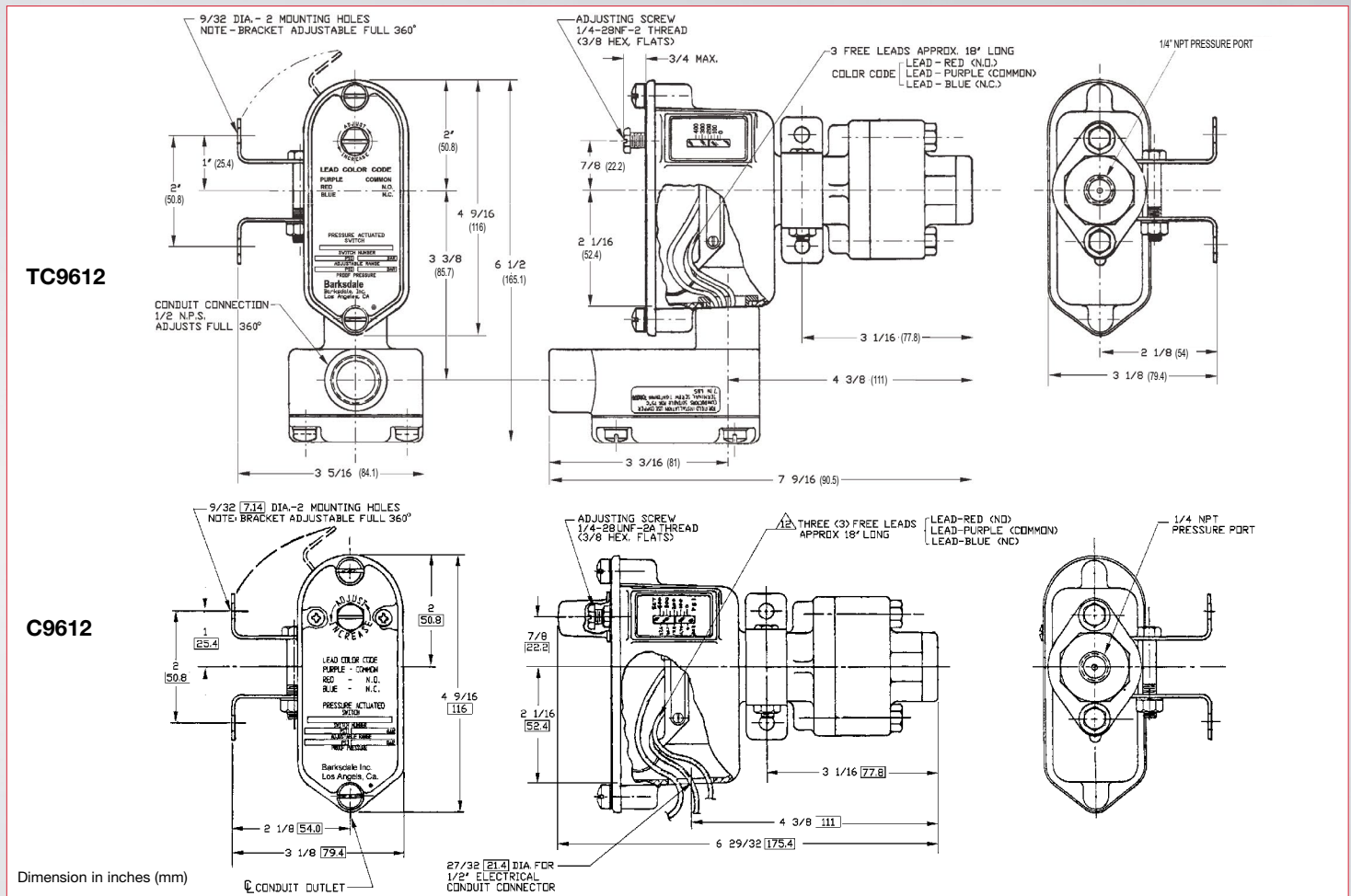
Wiring Diagram



Visual Indicating Sealed Piston Switch

C9612, C9622 Series

Technical Drawing



Product Configurator

Example	T	C9612	-3	-V	-Z1
---------	---	-------	----	----	-----

T JIC Junction Box with Terminal Strip (Optional)

Base Model

C9612	Single Setpoint
C9622	Dual Setpoint

Pressure Range

Options

-Z	Without mounting bracket
-Z1	Cleaned for Oxygen Service
-CS	CSA Approval
-Wxxx	Extra wire length
-Sxxx	Factory pre-set (consult factory)

O-Ring

Blank	Buna-N (standard)
-E	Ethylene Propylene (EPR) O-ring
-V	Viton® O-ring

	Adjustable Range				Approx. Deadband (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi (bar)	psi (bar)
-0	15 (1.0)	170 (11.6)	18 (1.2)	200 (13.6)	3 - 30 (0.2 - 2.0)	3000 (204.1)
-1	35 (2.4)	340 (23.1)	40 (2.7)	400 (27.2)	5 - 60 (0.3 - 4.1)	3000 (204.1)
-2	125 (8.5)	1360 (92.5)	135 (9.2)	1500 (102.0)	10 - 140 (0.7 - 9.5)	7000 (476.2)
-3	250 (17.0)	2650 (180.3)	280 (19.0)	3000 (204.1)	30 - 350 (2.0 - 23.8)	7000 (476.2)

Bourdon Tube Switch

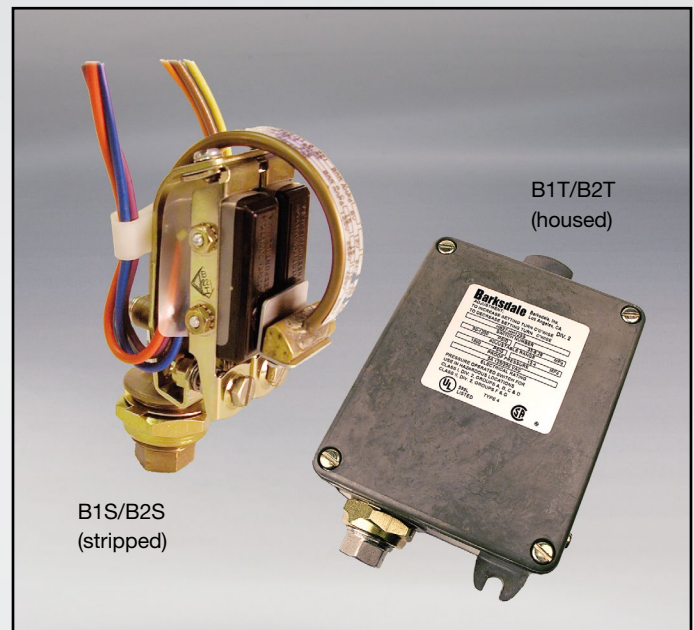
Series B1S, B2S, B1T, B2T

Features

- ▶ High accuracy
- ▶ High pressure up to 18,000 psi
- ▶ Tamper-proof external adjustment
- ▶ Single and dual switching capability
- ▶ Water tight housing versions available (NEMA 4)

Applications

- ▶ Oil & gas
- ▶ Medical applications
- ▶ Mining
- ▶ Compressors
- ▶ Power plants
- ▶ Water pumps
- ▶ Hydraulic power units
- ▶ Pneumatic devices
- ▶ General industrial applications



General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements.
Accuracy¹:	± 1% of the adjustable range
Switch: Type: Rating:	Single pole double throw (SPDT) snap action; single or dual circuit 10 amp @ 125/250 VAC 3 amp @ 480 VAC 0.5 amp @ 24 VDC
Wetted Parts: Process Fitting & Bourdon Tube:	316 series stainless steel
Enclosure:	Anodized aluminum
Electrical Connection: Stripped Model:	21" Free Leads
Housed Model:	Internal terminal strip via conduit connection
Enclosure Ratings: Housed Model:	NEMA 4
Pressure Connection:	Housed models with proof pressure up to 7,200 psi and stripped models with proof pressure up to 6,000 psi; 1/4" NPT female; All higher pressure ranges: superpressure fitting for 1/4" O.D. tube.

Approvals: UL/CSA (optional):	UL File E42816 CSA: Class 3231 02; File No. 022355-0.000
Temperature Range: Operating:	-40° to +165°F (-40° to +74 °C)
Adjustment Instructions:	Remove protective hex cap to remove adjustment screw. Turn main unit adjustment screw clockwise to lower setpoint, counterclockwise to raise setpoint. For optional adjustable actuation value (deadband) models, set the desired DECREASING setpoint first and then turn microswitch adjustment wheel counterclockwise to increase the amount of deadband until the desired INCREASING setpoint is achieved.
Options:	-UL/CSA approval (max rating 300 VAC) -NEMA 4X -Temperature stabilization and pre-cycle -Cleaned for oxygen service
Shipping Weight: Stripped Model:	1.5 lbs. approximate
Housed Model:	2.5 lbs. approximate

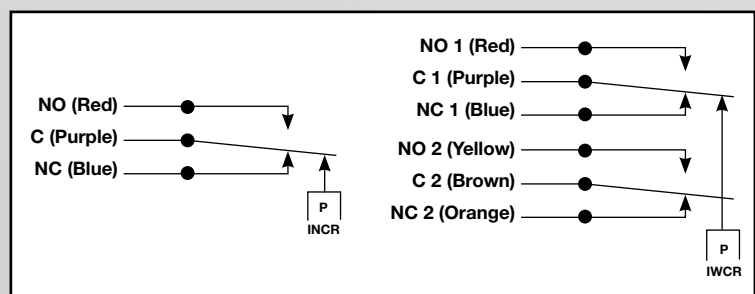
* See product configurator for additional options.

¹ ±1% for 32-110°F; ±2% for > 110°F; -2/+3°F for <32°F

Wiring Code

Lead	Circuit #1	Circuit #2
Normally Closed	Blue	Orange
Common	Purple	Brown
Normally Open	Red	Yellow

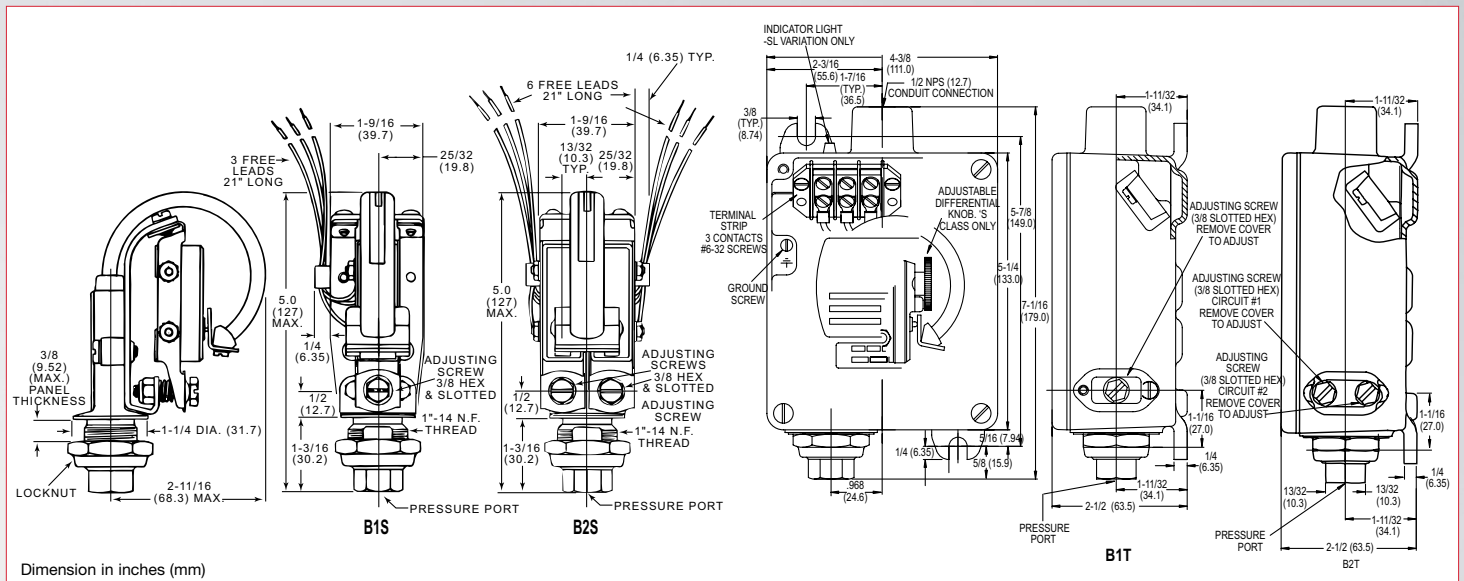
Wiring Diagram



Bourdon Tube Switch

Series B1S, B2S, B1T, B2T

Technical Drawing



Product Configurator

Example	H	B1T	-AA	180	SS		
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H	Hermetically sealed limit switch option (requires AA, CC, GH or HH limit switch)
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Series

B1T	Single Setpoint Housed
B2T	Dual Setpoint Housed
B1S	Single Setpoint Stripped
B2S	Dual Setpoint Stripped

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 12, 48, 65, 120 and 180)
-B	10 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC (standard for pressure range 32)
-H	10 amps @ 125/250/480 VAC; 0.1 amps @ 125VDC; 0.05 amps @ 250 VDC (standard for pressure range 32)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-S	15 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC (adjustable differentials)
-GH	1 amp @ 125 VAC with Gold Contacts
-AA	Hermetically sealed; 4 amps @ 125/250 VAC
-CC	Hermetically sealed; 10 amps @ 125/250 VAC
-GH	Hermetically sealed; 1 amp @ 125 VAC with Gold Contacts
-HH	Hermetically sealed; 5 amps @ 125/250 VAC

Options

-CS ⁴	UL & CSA Approval (only available with B1T & B2T)
-FX	NEMA 4X enclosure (only available with B1T & B2T)
-Z1	Cleaned for oxygen service
-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory preset (consult factory)

Process Connection

Blank	1/4" NPT for 12, 32 & 48 Pressure Ranges & 1/4" Tube for 65, 120 & 180 Pressure Ranges (standard)
-P4	1/4" NPT Female (available on 65, 120, and 180 ranges only)

Pressure Range⁵

SS	Stainless steel bourdon tube
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	Adjustable Range				Approx. Deadband ^{1, 2}	Proof	Proof
	Decreasing - psi (bar)		Increasing - psi (bar)		(Actuation Value)	B1T/B2T	B1S/B2S
	Min	Max	Min	Max	psi-(bar)	psi (bar)	psi (bar)
12	50 (3.4)	1180 (80.3)	70 (4.8)	1200 (81.6)	11 - 27 (0.7 - 1.8)	1800 (122)	1500 (103)
32	160 (11)	3161 (211)	199 (13.5)	3200 (213)	16 - 39 (1.1 - 2.7)	4800 (327)	4000 (275)
48	240 (16)	4715 (321)	325 (21.7)	4800 (327)	40 - 85 (2.7 - 5.8)	7200 (490)	6000 (414)
65	325 (22)	6385 (434)	440 (29.9)	6500 (442)	54 - 115 (3.7 - 7.8)	9750 (663)	8125 (560)
120 ³	600 (41)	11450 (779)	1150 (78)	12000 (816)	275 - 550 (18.7 - 37.4)	18000 (1224)	15000 (1034)
180 ³	600 (41)	17450 (1187)	1150 (78)	18000 (1224)	275 - 550 (18.7 - 37.4)	18000 (1224)	15000 (1034)

¹ Consult sales drawings for specific deadband values

² Deadband values indicated when used with the "standard" limit switch

³ This range is not available with any agency approval (no -CS)

⁴ Limited to 300VAC (-CS: CSA only on B1S/B2S models and no UL)

⁵ Subject to change

Explosion Proof Bourdon Tube

Series B1X, B2X

Features

- ▶ High accuracy, high proof
- ▶ Explosion-proof housing for hazardous location
- ▶ Hermetically sealed
- ▶ Tamper-proof setpoint adjustment
- ▶ Dual set point capability
- ▶ UL, CSA, ATEX approved
- ▶ NEMA 4, 7, 9 & IP66

Applications

- ▶ Power plants
- ▶ Water pumps
- ▶ Blow out preventers (BOP)
- ▶ Pneumatic devices
- ▶ General industrial applications
- ▶ Oil and gas



General Specifications*

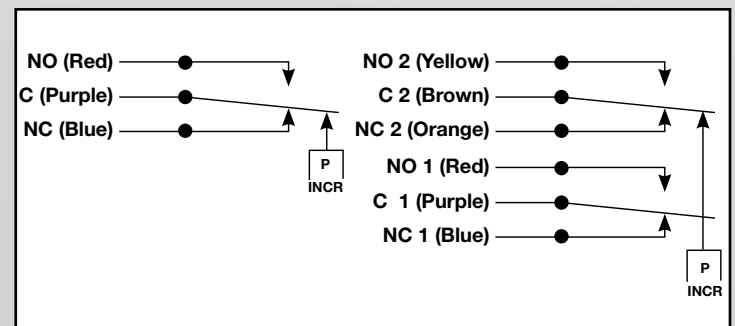
Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements.
Accuracy¹:	± 1% of the adjustable range
Switch: Type:	Single pole double throw (SPDT) snap action; single or dual circuit
Rating:	3 amps @ 480 VAC (standard)
Wetted Parts: Process Fitting & Bourdon Tube:	316 series stainless steel
Enclosure:	Die-cast aluminum
Electrical Connection:	Internal terminal strip via conduit connection (1/2" NPT on B1X models, 3/4" NPT on B2X models)
Enclosure Ratings:	NEMA 4, 7, 9
Pressure Connection:	Models with proof pressures up to 7,200 psi: 1/4" NPT Female; Models with higher pressure ranges: Superpressure Fitting for 1/4" O.D. tube
Approvals: UL/CSA (standard):	UL File No.#E37043; CSA File No. #LR22354 Hazardous Locations, Class I Division I, Groups B, C, & D; Class II Groups E, F, & G
ATEX (optional):	Ex models are ATEX marked as follows: CE 0081, ISSEp 08 ATEX024X Ex II 2G D, Ex d IIC T6Gb Ex tb IIIC T80°C Db IP66 -40°C ≤ Tamb ≤ +75°C

* See product configurator for additional options.

¹ ±1% for 32-110°F; ±2% for > 110°F; -2/+3°F for <32°F

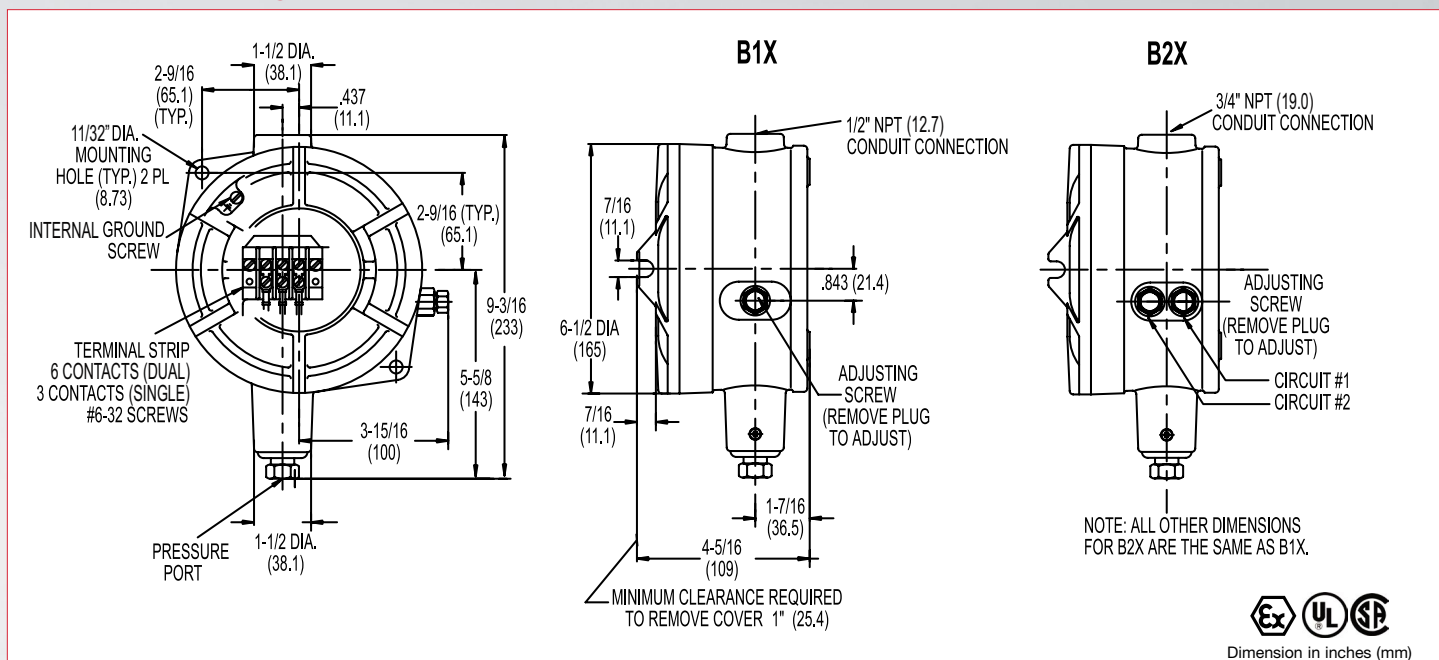
Temperature Range: Operating:	-40° to +165°F (-40° to +74°C)
Adjustment Instructions:	Remove protective hex cap to remove adjustment screw. Turn main unit adjustment screw clockwise to lower setpoint, counterclockwise to raise setpoint. For optional adjustable actuation value (deadband) models, set the desired DECREASING setpoint first and then turn microswitch adjustment wheel counterclockwise to increase the amount of deadband until the desired INCREASING setpoint is achieved.
Options:	- Gold contact Limit switch; 1 A @ 125 VAC - 1/2" NPT female process connection - Cleaned for oxygen service – consult factory for details - Adjustable deadband - Temperature compensation and pre-cycle - Hermetically sealed limit switch
Shipping Weight:	Single - approximate 6.0 lbs. Double - approximate 6.5 lbs.

Wiring Diagram



Series B1X, B2X

Technical Drawing



Product Configurator

Example		B1X	-H	32	SS	-P2	-UL
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Prefix

H	Hermetically sealed limit switch option - Class I, Division II (requires AA, CC or HH limit switch)
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Series

B1X	Single setpoint
B2X	Dual setpoint

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 12, 32, 48 and 72)
-B	10 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-C	10 amps @ 125/250/480 VAC; 0.1 amps @ 125VDC; 0.05 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard with pressure range 20)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-S	15 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC (adjustable deadband)
-GH	1 amp @ 125 VAC with gold contacts
-AA	Hermetically sealed; 4 amps @ 125/250 VAC
-CC	Hermetically sealed; 10 amps @ 125/250 VAC
-HH	Hermetically sealed; 5 amps @ 125/250 VAC

Option

-EX	ATEX certified, -EX in place of -UL for ATEX only
-UL	UL & CSA approval (standard)
-Sxxx	Factory preset (consult factory)

Process Connection

Blank	1/4" NPT for 12, 20 & 32 pressure ranges & 1/4" tube for 48 - 72 pressure ranges (standard)
-P2 ⁴	1/2" NPT female pressure fitting

Pressure Range²

	Adjustable Range				Approx. Deadband ³ (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi-(bar)	psi (bar)
12	50 (3.3)	1173 (78)	77 (5.1)	1200 (80)	11 - 27 (.7 - 1.8)	1800 (120)
20	160 (10.6)	1961 (131)	199 (13)	2000 (133)	16 - 39 (1.1 - 2.6)	4800 (320)
32	240 (16)	3115 (208)	325 (22)	3200 (213)	40 - 85 (2.7 - 5.7)	7200 (480)
48	325 (22.4)	4715 (321)	325 (22)	4800 (327)	40 - 85 (2.7 - 5.7)	7200 (480)
72	600 (40)	6650 (443)	1150 (77)	7200 (480)	275 - 550 (18 - 37)	18000 (1200)

¹ Consult sales drawings for specific deadband values

² Pressure range subject to change

³ Deadband values indicated when used with the “standard” limit switch

⁴ Consult sales drawings for dimensions



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