Mechanical Pressure Switches

- **Pressure**
  - Electronic Pressure Switches
  - Mechanical Pressure Switches
  - Pressure Transducer
- **Valves & Regulators**
- **Temperature**
- **Level**
- **Flow**
- **Air Suspension Valves**

Barksdale
CONTROL PRODUCTS
CRANE
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Barksdale
CONTROL PRODUCTS

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Mechanical Pressure Switches

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.

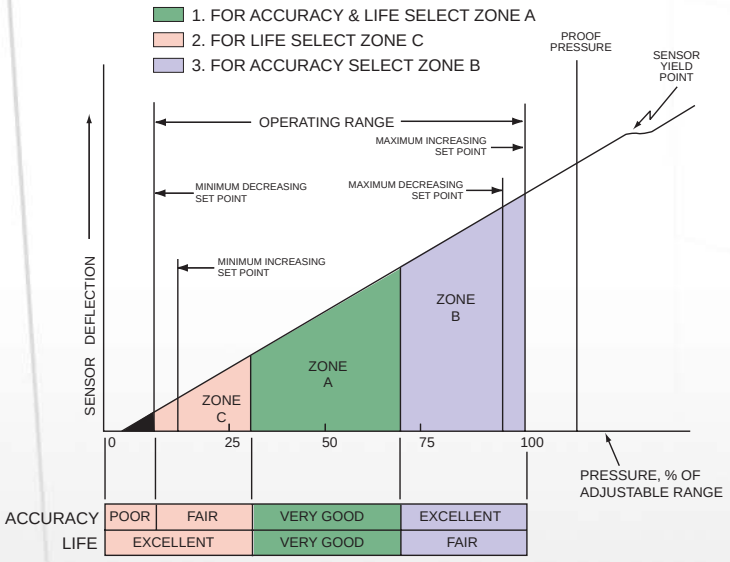
Terminal block pressure switches are housed and, in addition, are equipped with enclosed terminal blocks, thus eliminating the expense of buying and installing external junction boxes.

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.

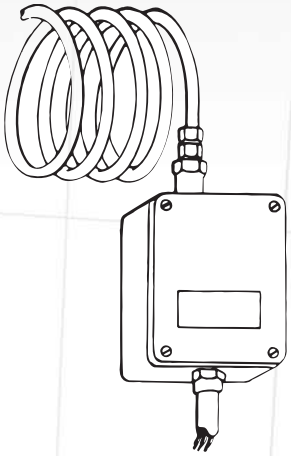
For greatest accuracy, the set point should fall in the upper 65% of the adjustable range. For the most favorable life factor, the set point should be in the lower 65% of the adjustable range. Therefore, the most favorable combination of accuracy and life factor lies in the middle 30% of the adjustable 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

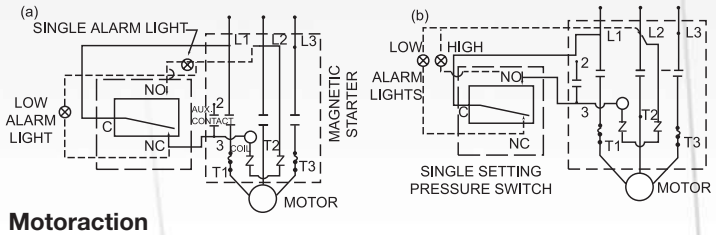
Barksdale housed and explosion proof pressure switches intended for use in hostile and/or corrosive environments can be painted with green epoxy paint (color per Federal Standard 595A #24300). The complete switch is painted after assembly and test at Barksdale. For best results, exposed metal surfaces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

Typical Wiring Diagrams

Single Pressure Control

1. Low-Voltage Release

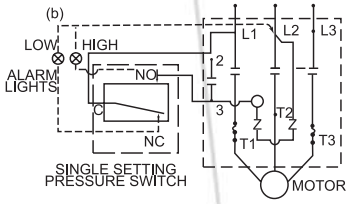
Starter drops out when voltage fails but will pull in when voltage is restored.



Motoraction	
(1) Stop at high pressure start when pressure falls by amount of actuation value	(1) Start at high pressure stop when pressure falls by amount of actuation value
(2) Start at low pressure stop when press. pressure value.	(2) Stop at low pressure start when pressure rises by amount of actuation value

2. Low-Voltage Protection

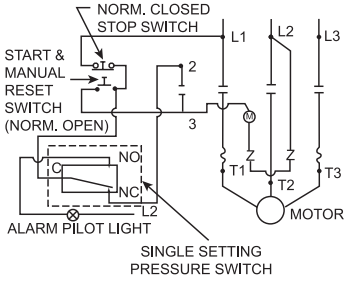
Starter drops out when voltage fails but does not start when voltage is restored because relay will open. Manual start switch will close relay again.



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

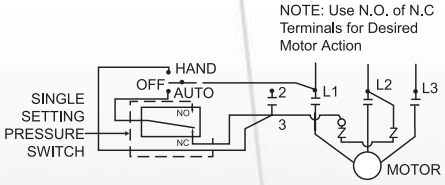
3. High or Low Level Shut-down Electrical Manual Reset with Alarm-Low Voltage Protection

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.

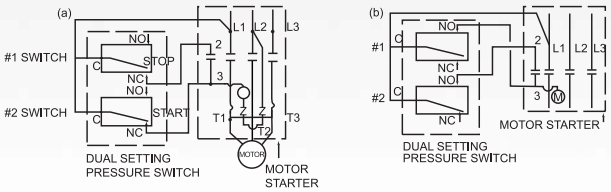


"Auto" position pressure switch controls motor.
"Hand" position bypasses pressure switch and motor runs continuously.
"Off" position motor cannot run.

High/Low Pressure Control

5. Low Voltage Release

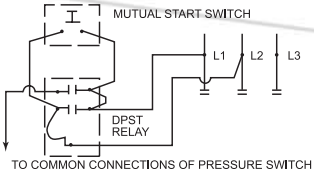
(Starter drops out when voltage fails; will pull in when voltage is restored)



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

6. Low Voltage Protection

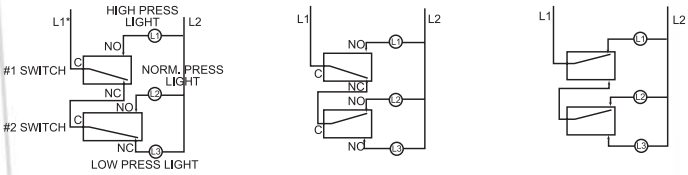
Starter drops out when voltage fails but does not start when voltage is restored because relay will open. Manual start switch will close relay again.



Insert relay as shown in line between LI 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



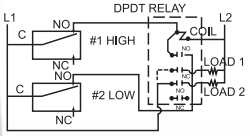
Condition: Pressure level at or below low; Pressure low; Pressure light on, others off

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

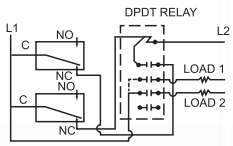
Condition: Pressure at or above high; Pressure high; Pressure light on, others off

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 area 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./H20) X 0.07353 = In./Hg

Inches of Mercury (In./Hg) X 13.6 = In./H20
Inches of Water (In./H,0) X .036 = psi
Feet of Water (Ft./H20) 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/H20	psi	in/Hg	mm/Hg
1	.04	.07	2.
2	.07	.15	4.
3	.11	.22	5.5
4	.15	.29	7.5
5	.18	.37	9.5
6	.22	.44	11.5
7	.25	.51	13.
8	.29	.59	15.
9	.32	.66	16.5
10	.36	.74	18.5
11	.40	.81	20.5
12	.43	.89	22.5
13	.47	.96	24.5
14	.50	1.03	26.
15	.54	1.10	28.
16	.58	1.17	30.
17	.61	1.25	31.5
18	.65	1.32	33.5
19	.68	1.40	35.5
20	.72	1.47	37.
21	.76	1.54	39.
22	.79	1.62	41.
23	.83	1.69	43.
24	.87	1.76	44.5
25	.90	1.84	46.5
26	.94	1.91	48.5
27	.97	1.98	50.
28	1.01	2.06	52.
29	1.05	2.13	54.
30	1.08	2.21	56.
31	1.12	2.28	57.5
32	1.15	2.35	59.5
33	1.19	2.43	61.5
34	1.23	2.50	63.
35	1.26	2.57	65.
36	1.30	2.65	67.
37	1.33	2.72	68.5
38	1.37	2.79	70.5
39	1.41	2.87	72.5
40	1.44	2.94	74.5
41	1.48	3.01	76.5
42	1.50	3.09	78.
43	1.55	3.16	80.
44	1.59	3.23	82.
45	1.62	3.31	84.
46	1.66	3.38	85.5
47	1.69	3.45	87.5
48	1.72	3.53	89.5
49	1.76	3.60	91.
50	1.80	3.68	93.
51	1.84	3.75	95.
52	1.87	3.82	97.
53	1.91	3.90	98.5
54	1.95	3.97	100.5
55	1.98	4.04	102.5
56	2.02	4.12	104.
57	2.05	4.19	106.
58	2.09	4.26	108.
59	2.13	4.34	109.5
60	2.16	4.41	111.5
61	2.20	4.48	113.5
62	2.23	4.56	115.5
63	2.27	4.63	117.5
64	2.31	4.70	119.
65	2.34	4.78	121.
66	2.38	4.85	123.
67	2.41	4.92	124.5
68	2.44	5.00	126.5
69	2.48	5.07	128.5
70	2.52	5.15	130.5
71	2.55	5.22	132
72	2.59	5.29	134.
73	2.63	5.37	136.
74	2.66	5.44	137.5
75	2.70	5.51	139.5
76	2.73	5.59	141.5
77	2.77	5.66	143.
78	2.80	5.73	145.
79	2.84	5.81	147.
80	2.88	5.88	149.
81	2.91	5.95	151.
82	2.95	6.03	152.5
83	2.98	6.10	154.5
84	3.02	6.17	156.5
85	3.06	6.25	158.5
86	3.09	6.32	160
87	3.13	6.39	162
88	3.16	6.47	164
89	3.20	6.55	165.5
90	3.24	6.62	167.5
91	3.27	6.69	169.5
92	3.31	6.77	171.5
93	3.34	6.84	173.
94	3.38	6.92	175.
95	3.42	6.99	177.
96	3.45	7.06	179.
97	3.49	7.13	180.5
98	3.52	7.21	182.5
99	3.56	7.28	184.5
100	3.60	7.35	186.5

psi	in/Hg	in/H20	mm/Hg
.01	.02	.3	.5
.02	.04	.6	1.
.03	.06	.8	1.6
.04	.08	1.1	2.1
.05	.10	1.4	2.6
.06	.12	1.7	3.1
.07	.14	1.9	3.6
.08	.16	2.2	4.1
.09	.18	2.5	4.7
.10	.20	2.8	5.2
.11	.22	3.0	5.7
.12	.24	3.3	6.2
.13	.26	3.6	6.8
.14	.28	3.9	7.3
.15	.31	4.2	7.8
.16	.33	4.4	8.3
.17	.35	4.7	8.8
.18	.37	5.0	9.3
.19	.39	5.3	9.9
.20	.41	5.6	10.4
.21	.43	5.8	10.9
.22	.45	6.1	11.4
.23	.47	6.4	12.0
.24	.49	6.7	12.5
.25	.51	7.0	13.0
.26	.53	7.2	13.5
.27	.55	7.5	14.0
.28	.57	7.8	14.5
.29	.59	8.0	15.0
.30	.61	8.3	15.5
.31	.63	8.6	16.0
.32	.65	8.9	16.5
.33	.67	9.2	17.1
.34	.69	9.4	17.5
.35	.71	9.7	18.1
.36	.73	10.0	18.6
.37	.76	10.3	19.1
.38	.78	10.5	19.6
.39	.80	10.8	20.2
.40	.82	11.1	20.7
.41	.84	11.4	21.2
.42	.86	11.7	21.7
.43	.88	12.0	22.3
.44	.90	12.2	22.8
.45	.92	12.5	23.3
.46	.94	12.8	23.8
.47	.96	13.0	24.3
.48	.98	13.3	24.8
.49	1.00	13.6	25.4
.50	1.02	13.9	25.9
.51	1.04	14.2	26.4
.52	1.06	14.4	26.9
.53	1.08	14.7	27.5
.54	1.10	15.0	28.0
.55	1.12	15.3	28.5
.56	1.14	15.5	29.0
.57	1.16	15.8	29.5
.58	1.18	16.1	30.0
.59	1.20	16.4	30.6
.60	1.22	16.7	31.1
.61	1.25	17.0	31.6
.62	1.27	17.2	32.1
.63	1.29	17.5	32.6
.64	1.31	17.8	33.2
.65	1.33	18.0	33.7
.66	1.35	18.3	34.2
.67	1.37	18.6	34.7
.68	1.39	18.9	35.2
.69	1.41	19.2	35.8
.70	1.43	19.4	36.2
.71	1.45	19.7	36.7
.72	1.47	20.0	37.2
.73	1.49	20.3	37.8
.74	1.51	20.5	38.3
.75	1.53	20.8	38.8
.76	1.55	21.1	39.3
.77	1.57	21.4	39.8
.78	1.59	21.6	40.3
.79	1.61	21.9	40.9
.80	1.63	22.2	41.4
.81	1.65	22.5	41.9
.82	1.67	22.8	42.4
.63	1.69	23.0	43.0
.84	1.71	23.3	43.5
.85	1.73	23.6	44.0
.86	1.76	23.9	44.5
.87	1.78	24.1	45.0
.88	1.80	24.4	45.5
.89	1.82	24.7	46.1
.90	1.84	25.0	46.6
.91	1.86	25.3	47.1
.92	1.88	25.5	47.6
.93	1.90	25.8	48.2
.94	1.92	26.1	48.7
.95	1.94	26.4	48.2
.96	1.96	26.6	49.7
.97	1.98	26.9	50.2
.98	2.00	27.2	50.7
.99	2.02	27.5	51.3
1.00	2.04	27.8	51.8

psi	in/Hg	in/H20	mmHg
1.1	2.25	30.5	57.
1.2	2.45	33.3	62.
1.3	2.65	36.1	67.
1.4	2.86	38.9	72.5
1.5	3.06	41.6	77.5
1.6	3.27	44.4	83.
1.7	3.47	47.2	88.
1.8	3.67	50.0	93.
1.9	3.88	52.7	98.5
2.0	4.08	55.5	103.5
2.1	4.29	58.3	108.5
2.2	4.49	61.1	114.
2.3	4.69	63.8	119.
2.4	4.90	66.6	124.
2.5	5.10	69.4	129.5
2.6	5.31	72.2	134.5
2.7	5.51	74.9	139.5
2.8	5.71	77.7	145.
2.9	5.92	80.5	150.
3.0	6.12	83.3	155.
3.1	6.33	86.0	160.5
3.2	6.53	88.8	165.5
3.3	6.73	91.6	171.
3.4	6.94	94.4	176.
3.5	7.14	97.1	181.
3.6	7.35	99.9	186.5
3.7	7.55	102.7	191.5
3.8	7.76	105.5	196.5
3.9	7.96	108.2	202.
4.0	8.16	111.0	207.
4.1	8.37	113.8	212.
4.2	8.57	116.6	217.5
4.3	8.78	119.3	222.5
4.4	8.98	122.1	227.5
4.5	9.18	124.9	233.
4.6	9.39	127.7	238.
4.7	9.59	130.4	243.
4.8	9.80	132.2	248.5
4.9	10.00	136.0	253.5
5.0	10.21	138.8	259.
5.1	10.41	141.6	264.
5.2	10.61	144.3	269.
5.3	10.82	147.1	274.5
5.4	11.02	149.9	279.5
5.5	11.23	152.7	284.5
5.6	11.43	155.4	290.
5.7	11.63	158.2	295.
5.8	11.84	161.0	300.
5.9	12.04	163.8	305.5
6.0	12.25	166.5	310.5
6.1	12.45	169.3	315.5
6.2	12.65	172.1	321.
6.3	12.86	174.9	326.
6.4	13.06	177.6	331.
6.5	13.27	180.4	336.5
6.6	13.47	183.2	341.5
6.7	13.67	186.0	347.
6.8	13.88	188.7	352.
6.9	14.08	191.5	357.
7.0	14.29	194.3	362.5
7.1	14.49	197.1	367.5
7.2	14.70	199.8	372.5
7.3	14.90	202.6	378
7.4	15.10	205.4	383.
7.5	15.31	208.2	388.
7.6	15.51	210.9	393.5
7.7	15.72	213.7	398.5
7.8	15.92	216.5	403.5
7.9	16.12	219.3	409
8.0		222.0	414.
8.1	16.33	224.8	419.
8.2		227.6	424.5
8.3	16.53	230.4	429.5
8.4	16.74	233.1	435.
8.5	16.94	235.9	440.
8.6	17.14	238.7	445.
8.7	17.35	241.5	450.5
8.8	17.55	244.2	455.5
8.9	17.76	247.0	460.5
9.0	17.96	249.8	466.
9.1	18.16	252.6	471.
9.2	18.37	255.3	476.
9.3	18.57	258.1	481.5
9.4	18.78	260.9	486.5
9.5	18.98	263.7	491.5
9.6	19.19	266.4	497.
9.7	19.39	269.2	502.
9.8	19.59	272.0	507.
9.9	19.80	274.8	512.5
10.0	20.00	277.6	517.5
14.7	20.21	408.	760.
	20.41		
	30.		

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Barksdale CONTROL 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 t 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 Elostomer 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	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	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	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 – 15†	.2 to 2.3	.1 to .8•	.2 to 1.2		.1 to .8
– 90 – 90†	1.0 to 10.5	.5 to 8.0•	1.0 to 10.0	SEE	.5 to 8.0
– 250– 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.

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		INDUC-TIVE*	RESIS-TIVE
		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		INDUC-TIVE**	RESIS-TIVE
		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.

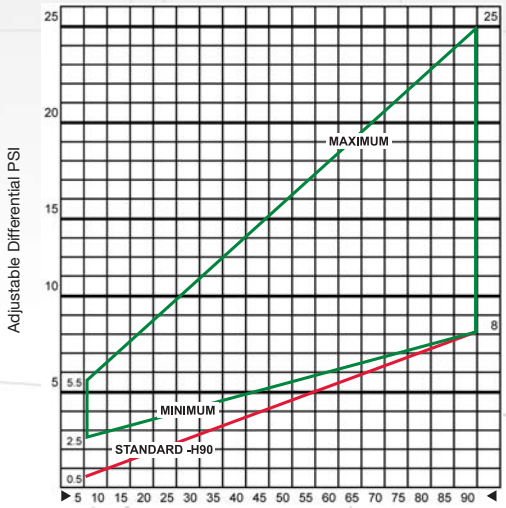
- Class GH switches are SPDT with gold contacts.
- Class R & S switches are SPDT with fine silver contacts and adjustable differentials.
- All other switch classes are SPDT with fine silver contacts and fixed differentials.
- Class A, H & M switches meet humidity requirements of MIL-S-6743.

How to Select Adjustable Differential from Charts

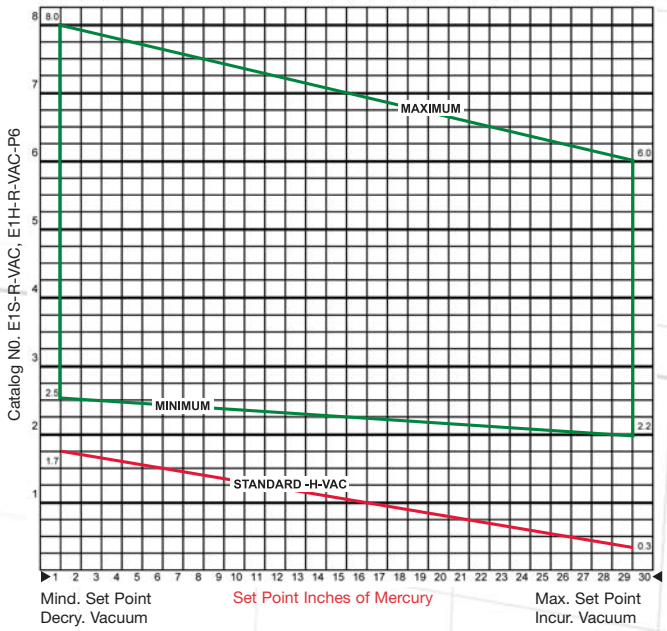
Econ-O-Trol Models

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.

Catalog No. E1S-R90, E1H-R90



Catalog N0. E1S-R-VAC, E1H-R-VAC-P6



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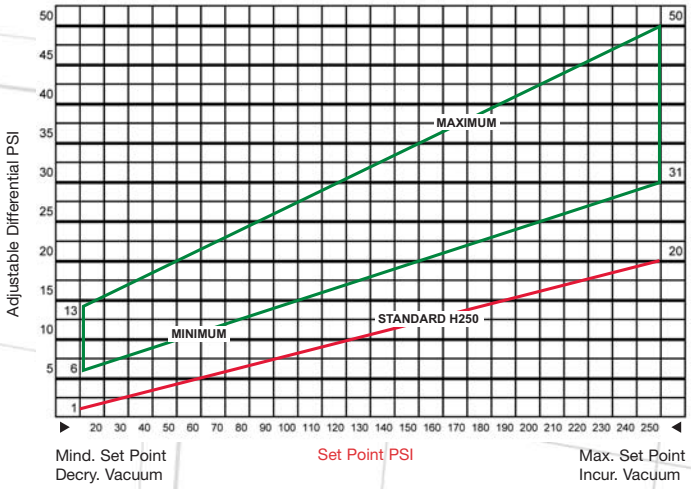
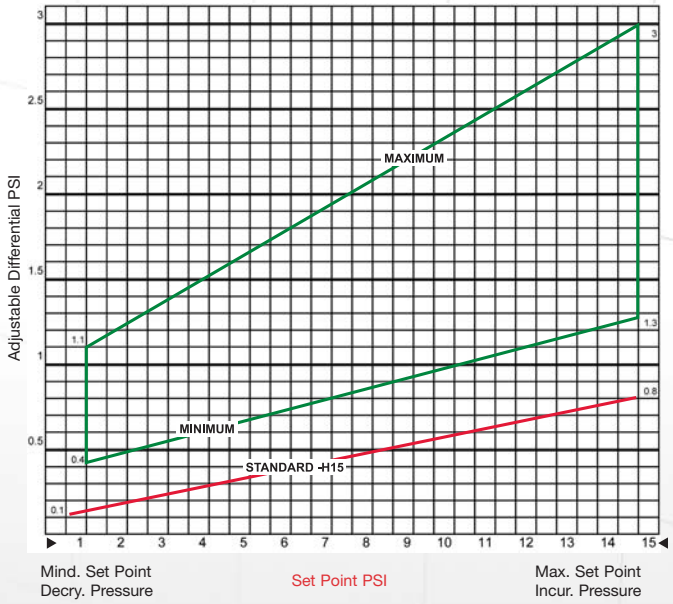
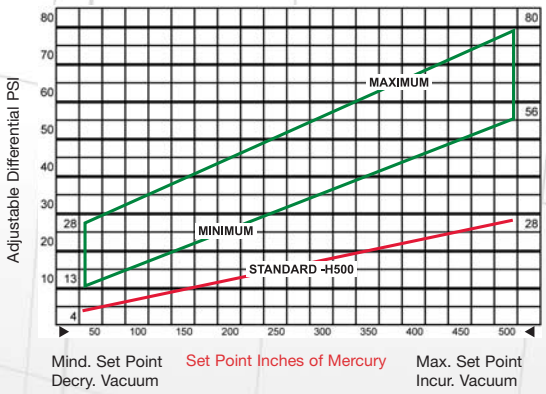


Catalog No. E1S-R15, E1H-R15



Catalog N0. E1S-R500, E1H-R500



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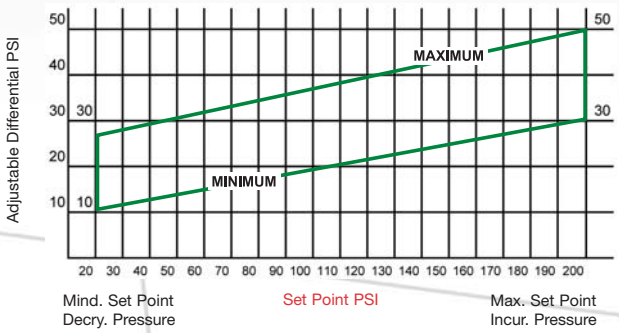
Barksdale CONTROL PRODUCTS

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”.

Catalog No. A9675-0-AA



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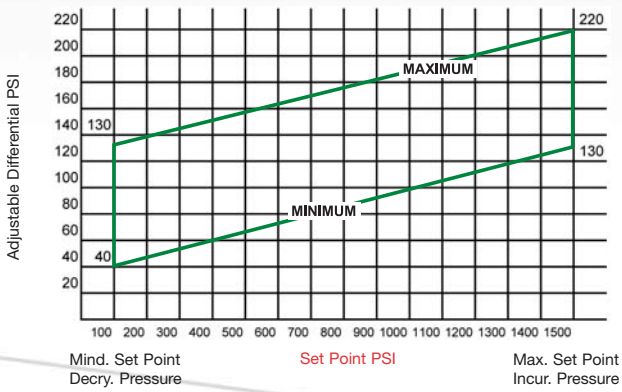

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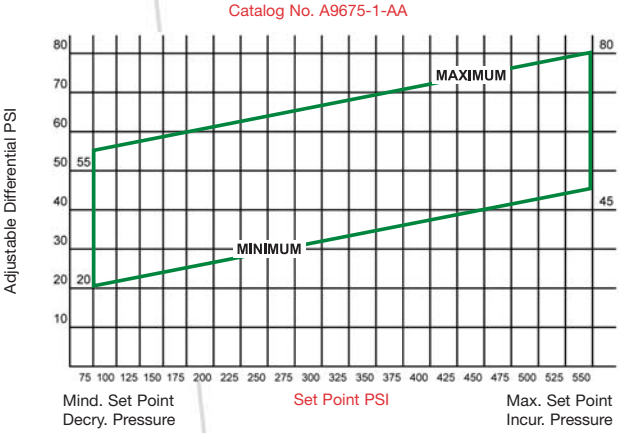

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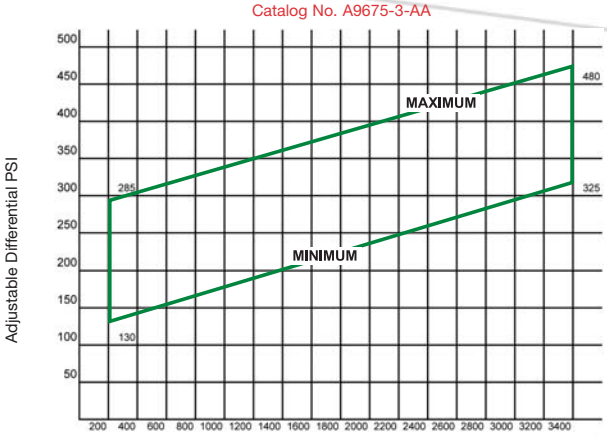

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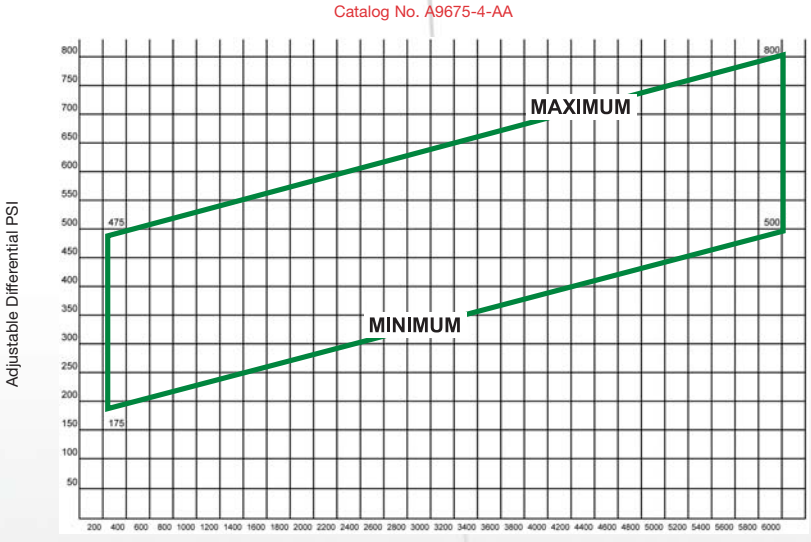

Trouble-Shooting Pointers

Barksdale Diaphragm and Bourdon Tube Pressure Switches

Suspected Pressure Switch Trouble	Check	Possible Causes	Remedy
A. Will not actuate at desired pressure.	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.	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.	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.	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.	1. Specification does not match switch. 2. See 3 thru 9 Trouble A.	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.	1. Check for instantaneous rapid pressure fluctuation in system. 2. Mechanical vibration of switch.	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.	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.	1. Check maximum and minimum temperatures. 2. Check for loose adjustment screw or bracket.	1. Temperature changes drastic (i.e. over plus or minus 50°F).	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.	1. Maximum current through switch. 2. Number of pressure cycles on switch. 3. Moisture in switch.	1. Overloading of switch contacts. 2. Service life of switch exceeded (consult data). 3. Corrosion of parts.	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.	1. Check for power at switch. 2. Check maximum current through switch. 3. Poor electrical connections. 4. Desired electrical circuit.	1. Line not “hot.” 2. Corroded or loose connections. 3. Connected to wrong leads on switch. 4. Contacts fused.	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.

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.	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.	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.	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: (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). **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.
B. Rapidly actuates and reactuates (chatters); or unwanted actuations.	1. Rapid pressure fluctuations in system. 2. Mechanical vibration of switch.	1. Surges are in excess of actuation value of switch. 2. Vibration causes unwanted actuation when switch is near set point.	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.	1. Maximum and minimum temperatures.	1. Temperature changes drastic (i.e. over plus or minus 50°F).	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.	1. Maximum current through switch. 2. Number of pressure cycles on switch. 3. Moisture in switch.	1. Overloading of switch contacts. 2. Service life of switch exceeded (consult data). 3. Corrosion of parts.	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.	1. Power at switch. 2. Poor electrical connections. 3. Desired electrical circuit. 4. Maximum current through switch.	1. Line not "hot." 2. Corroded or loose connections. 3. Connected to wrong leads on switch. 4. Contacts fused.	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.

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

Trouble-Shooting Pointers

Barksdale Diaphragm and Bourdon Tube Pressure Switches

Suspected Pressure Switch Trouble	Possible Causes	Remedy
A. Erratic operation	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	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	1. Faulty switching element 2. Loose connections 3. Damaged insulator	1. Replace switching element. 2. Tighten connections. 3. Replace insulator.
C. Leakage	1. Damaged O-ring (Surges) 2. Damaged O-ring (Galling) 3. Worn O-ring 4. O-ring shrinkage	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.

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Barksdale CONTROL PRODUCTS

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

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
UDS7-05-N-3/SS1
425X-03/MS6

SEAL TYPES

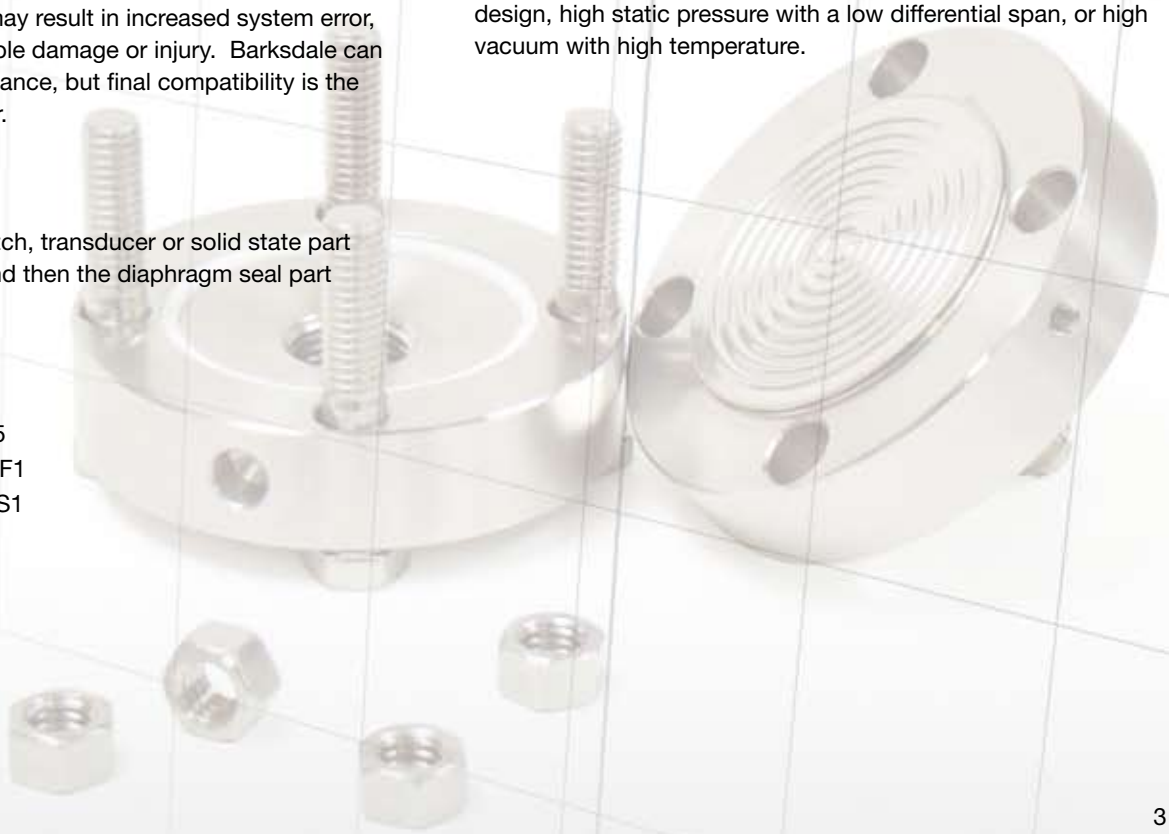
Threaded Off-line Seals:
Threaded off-line and flanged off-line seals are commonly used in a variety of applications. These have a standard cleanout feature, allowing removal of the process flange or lower housing without losing the fill. Mounted on a nipple off the line or using a standard ANSI flange.

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

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.

Dia-Seal Piston

Dia-Seal Piston
Explosion Proof Dia-Seal Piston

- E1H
- P1H
- P1X

Diaphragm

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.

Bourdon Tube

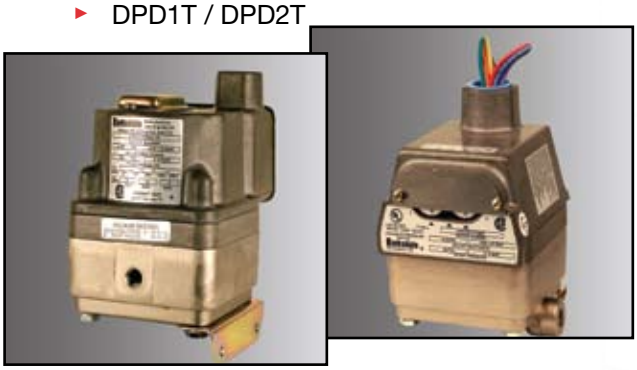
Bourdon Tube
Explosion Proof Bourdon Tube

- B1T / B2T
- B1X / B2X

Differential

Differential Pressure Switches

- CDPD1H / CDPD2H
- DPD1T / DPD2T



Compact

Explosion Proof Compact Switch

- 9671X / 9681X

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

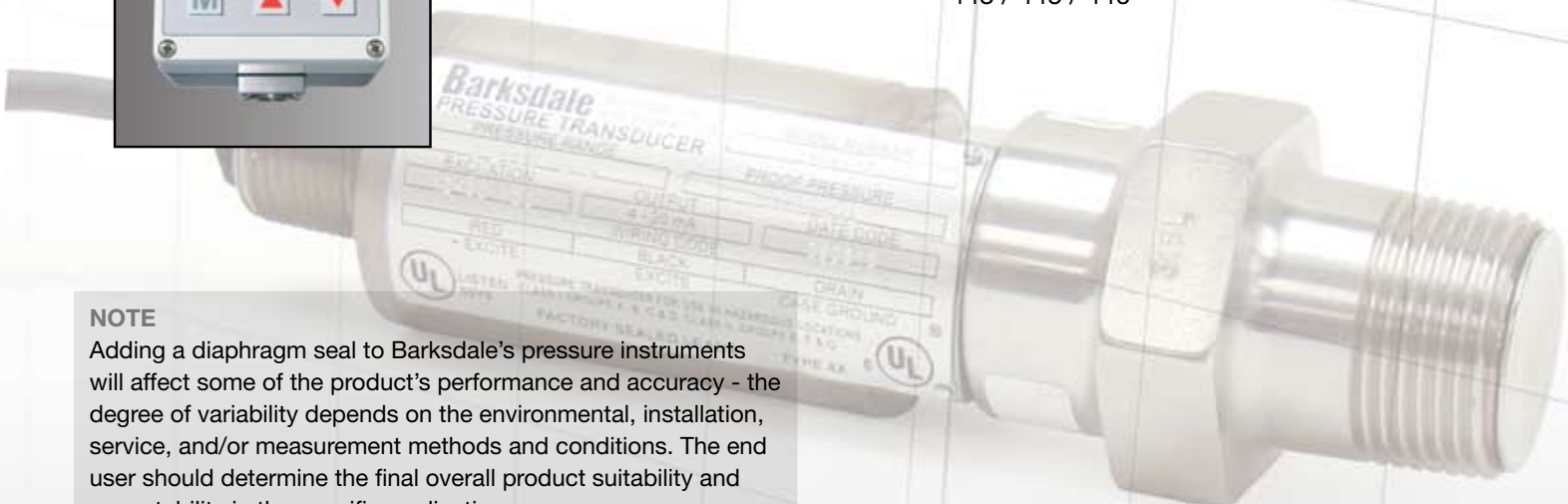
Solid State Products
Electronic Pressure Switches

- SW2000
- UDS7
- UDS3

Transducers

General Industrial Transducers
Explosion Proof Transducers

- 423 / 425 / 426
- 423N1 / 425N1 / 426N1
- 423X / 425X / 426X
- 433 / 435 / 436
- 443 / 445 / 446

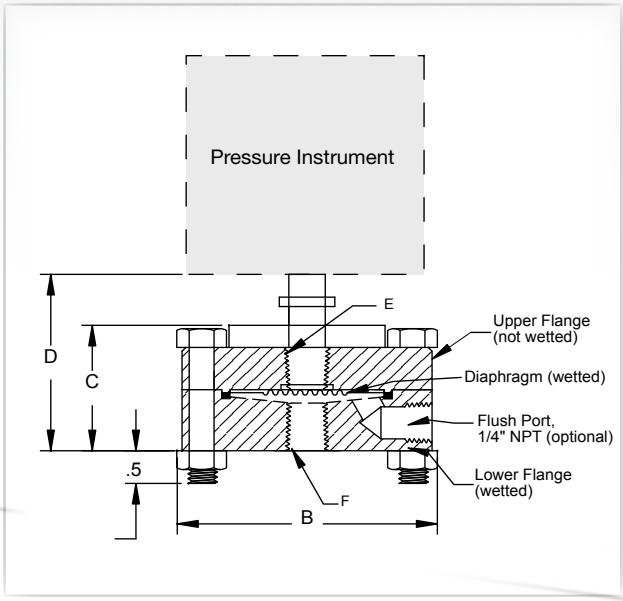


NOTE
Adding a diaphragm seal to Barksdale's pressure instruments will affect some of the product's performance and accuracy - the degree of variability depends on the environmental, installation, service, and/or measurement methods and conditions. The end user should determine the final overall product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

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.



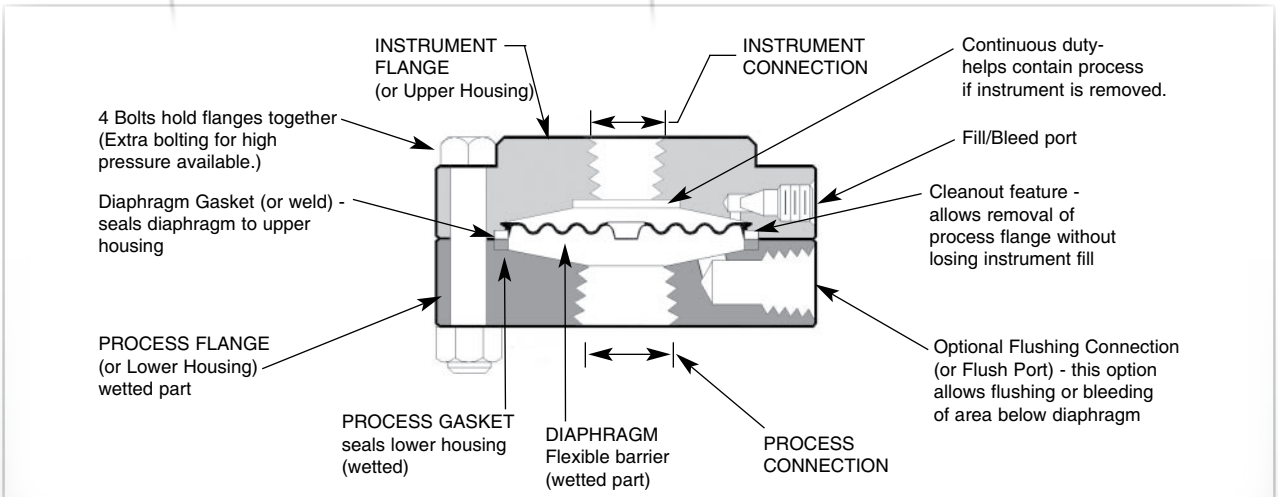
Diaphragm Size	B	C	D	Instrument Connection E (NPTF)	Process Connection F (NPTF)
5	3.5" max	1.8" max	3.0" max	1/4"	1/4", 1/2"
6	4-1/8" max	1.9" max	3.1" max	1/4"	1/4", 1/2"

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.



Threaded Off-Line Diaphragm Seals

Series TS & TC

Seal Specifications

- 316 SS lower housing
- Welded 316 SS diaphragm
- 1/4" NPTF instrument connection
- 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, 423N1/425N1/426N1, 423X/425X/426X, 433/435/436, 443/445/446 **Solid State[1]:** SW2000, UDS7, 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

Pressure Limits[2] (for reference)

	psi	Lower Housing	
Maximum Working Pressure[9]	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)
	300	non-metallic	(at 140°F)

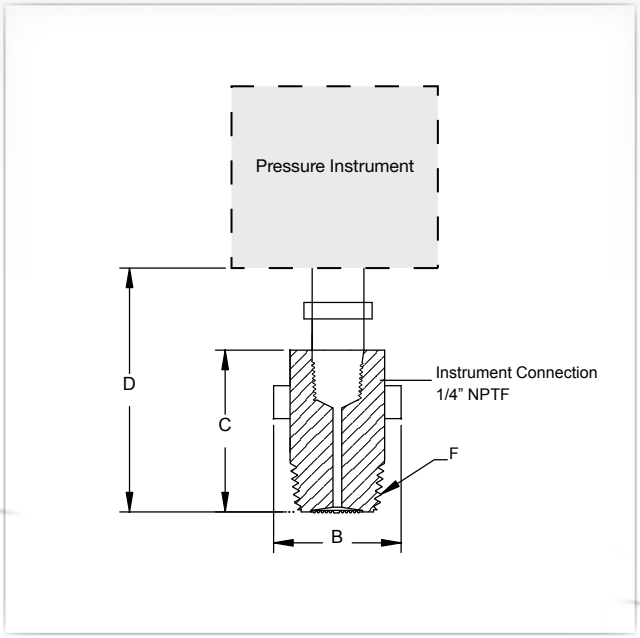
	Diaphragm	Size 5 Seal	Size 6 Seal
Minimum Working Pressure	Metal[10]	25 psi	10 psi
	Teflon option[10]	20 psi	5 psi
	Viton option[10]	3 psi	n/a
Vacuum Limits	Metal[10]	-21" Hg	-24" Hg
	Teflon option[10]	-23" Hg	-26" Hg
	Viton option[10]	-29" Hg	n/a

[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.

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

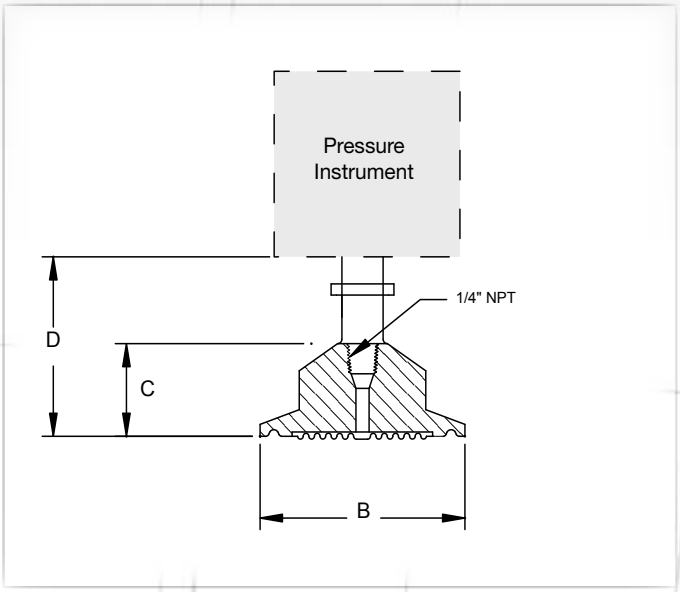
Diaphragm Size	Process Connection (NPTM)	Part #
Same as Process Connection	1"	FF1
	1/2"	FF2[4]
	3/4"	FF3
Recommended Control Device[7]:	**Transducer series[1]:** 423/425/426, 423N1/425N1/426N1, 423X/425X/426X, 433/435/436, 443/445/446 **Solid State[1]:** SW2000, UDS7, UDS3 **Bourdon Tube:** B1T/B2T, 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.

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

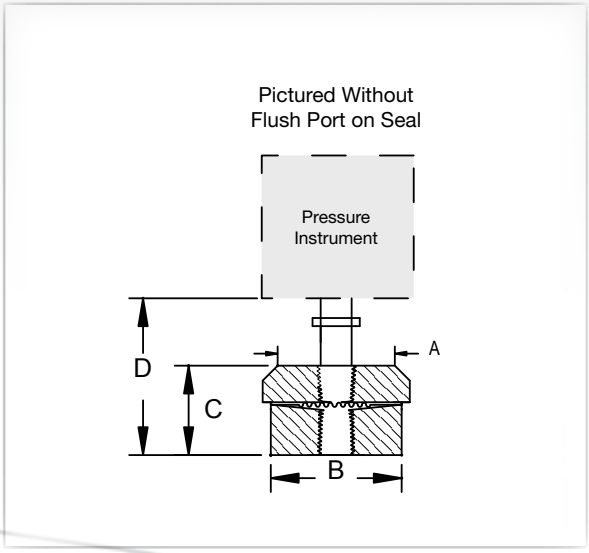
Process Connection	Part #
1 1/2” Tri-clamp	SS1
2” Tri-clamp	SS2
3/4” Tri-clamp	C/F
Recommended Control Device[6]:	**Transducer series[1]:** 423/425/426, 423N1/425N1/426N1, 423X/425X/426X, 433/435/436, 443/445/446 **Solid State[1]:** SW2000, UDS7, UDS3 **Bourdon Tube:** B1T/B2T, B1X/B2X **Dia-Seal Piston:** 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.

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, 423N1/425N1/426N1, 423X/425X/426X, 433/435/436, 443/445/446 **Solid State[1]:** SW2000, UDS7, 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

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
- ☐ Transducer
- ☐ Solid State

Barksdale part number or family: _____
Adjustable pressure range: _____
Other: _____

4. AMBIENT CONDITIONS:

Temperature Range: High _____ Low _____

Check where applicable:

- ☐ Indoor ☐ Outdoor
- ☐ Sunny ☐ Shaded
- ☐ Wet ☐ Dry
- ☐ Corrosive

NOTE
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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.

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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: Rating:	 Single pole double throw (SPDT) Snap Action; single or dual 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:	 304 stainless steel 17-7 PH stainless steel 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).

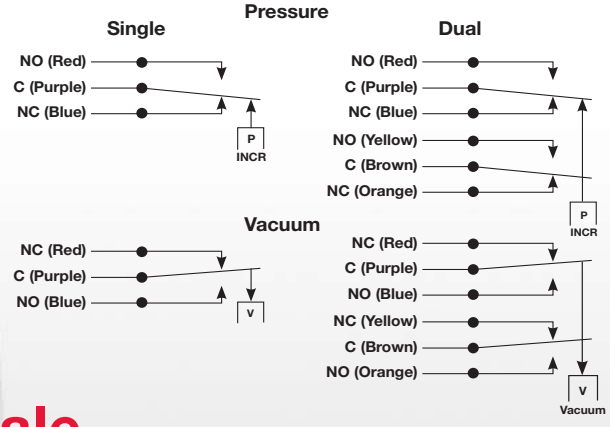
* See product configurator for additional options.

Approvals (cont.): CSA (optional): PED (European):	 All models may be ordered as CSA listed under Class 3231 02, File LR22355 on request. Compliant to PED 97/23/EC
Temperature Range: Operating: Storage:	 -65° to +165°F (-54° to +74°C) -65° to +200°F (-54° to 93°C)
Adjustment Instructions: Pressure: Vacuum:	 Turn adjustment screw counterclockwise to raise actuation point. 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 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

Wiring Diagram



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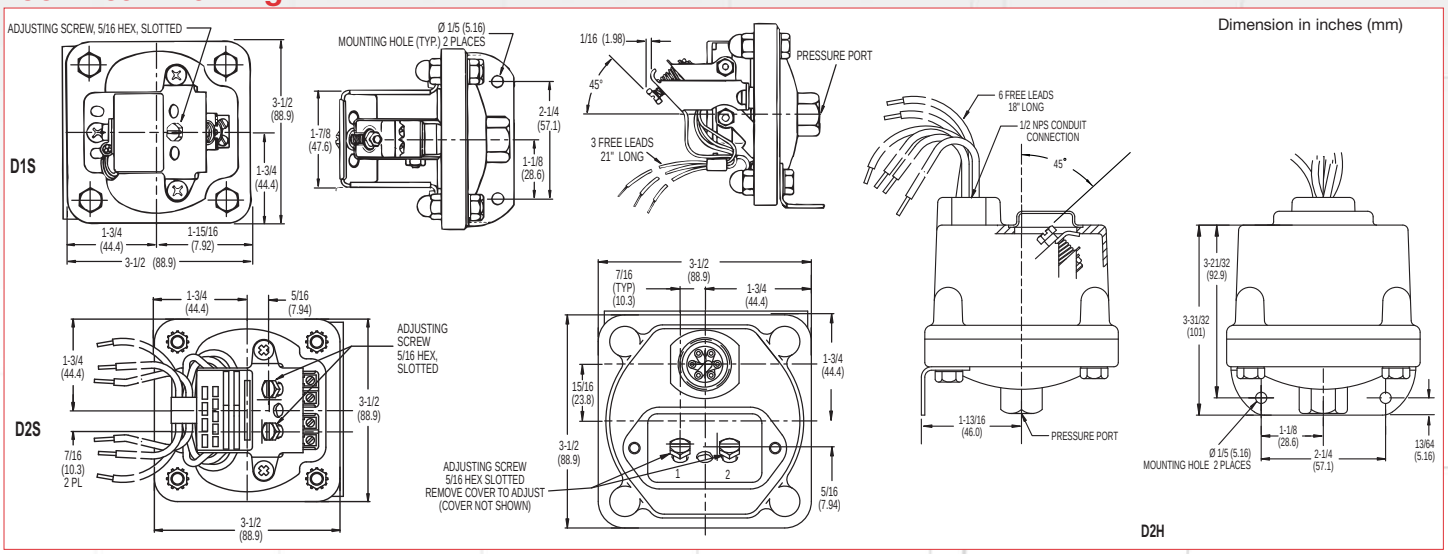
Technical Drawing



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)

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 Switch[1]

-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)
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (comes with an elastomer boot, not UL approved)
-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)

Options

-FX	NEMA 4X enclosure
-Z1	Oxygen cleaned
-U	UL Approved (Industrial Control)
-UL	UL Approved
-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:
[1] Consult Supplemental Guide for specific deadband values
[2] Deadband values indicated when used with the "standard" limit switch
[3] Not available with hermetically sealed limit switches
[4] Available only with AA (not hermetically sealed) limit switch

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Barksdale CONTROL PRODUCTS

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

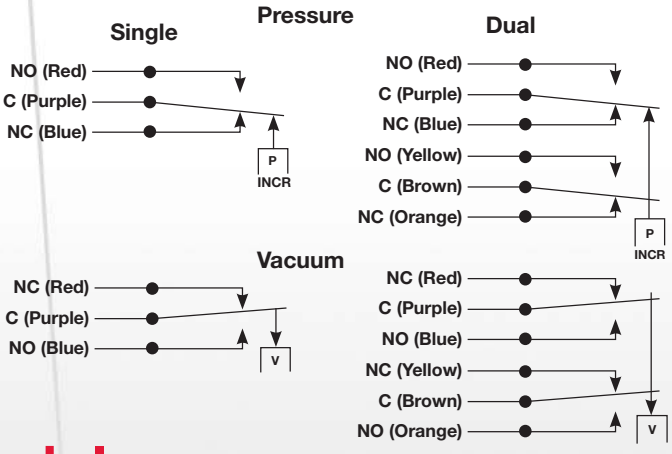
General Specifications*

Accuracy:	± 0.5% of the adjustable range
Switch: Type: 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:	 304 stainless steel, viton seals 17-7 PH stainless steel 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):	 All models may be ordered as UL listed. File No. E42816

* See product configurator for additional options.

Approvals (cont.): CSA (Optional): PED (European):	 All models may be ordered as CSA listed under Class 3231 02, File LR22355 on request. Compliant to PED 97/23/EC
Temperature Range: Operating: Storage:	 -65° to +165°F (-54° to +74°C) -65° to +200°F (-54° to 93°C)
Adjustment Instructions: Pressure: Vacuum:	 Turn adjustment screw counterclockwise to raise actuation point. 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



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

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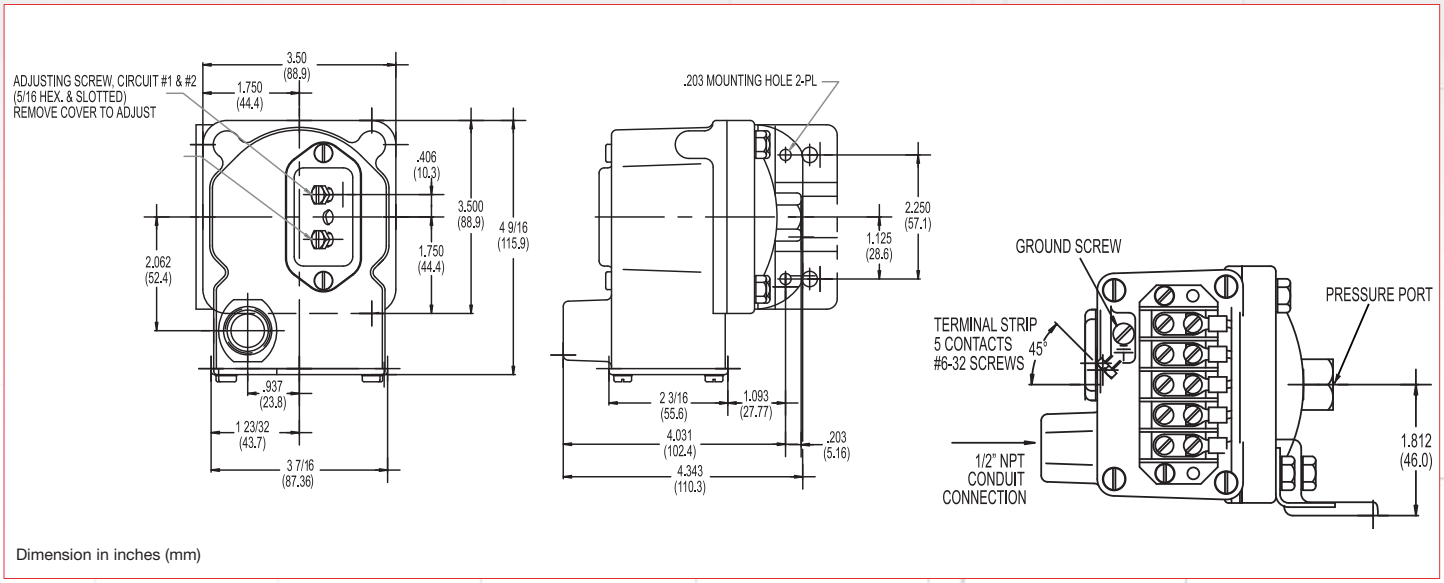
Technical Drawing



Dimension in inches (mm)

Product Configurator

Example		D1T	-A	80SS		UL

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 Switch[1]

-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)
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (comes with an elastomer boot, not -U or -UL approved)
-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 (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)

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

Options

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

* For hermetically sealed

Pressure Connection

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

NOTES:

[1] Consult Supplemental Guide for specific deadband values

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

[3] Not available with hermetically sealed limit switches

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Barksdale CONTROL PRODUCTS

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

Applications

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

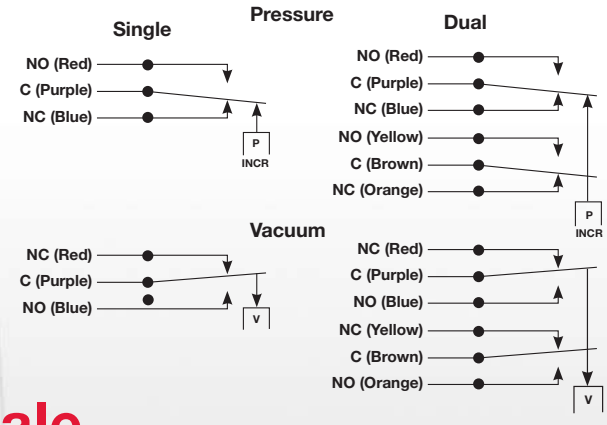
General Specifications*

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 fittings.
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.

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 certified per ISSeP 03 ATEX 122X & marked as follows: CE 0081 II2 GD EEx d IITC, T6 T85°C
Temperature Range: Operating: Storage:	 -65° to +165°F (-54° to +74°C) -65° to +200°F (-54° to 93°C)
Adjustment Instructions: Pressure: Vacuum:	 Turn adjustment screw counterclockwise to raise actuation point. Turn adjustment screw clockwise to increase setpoint (higher vacuum).
Options:	- Cleaned for oxygen service - Factory pre-set
Shipping Weight:	7.0 lbs. approximate

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

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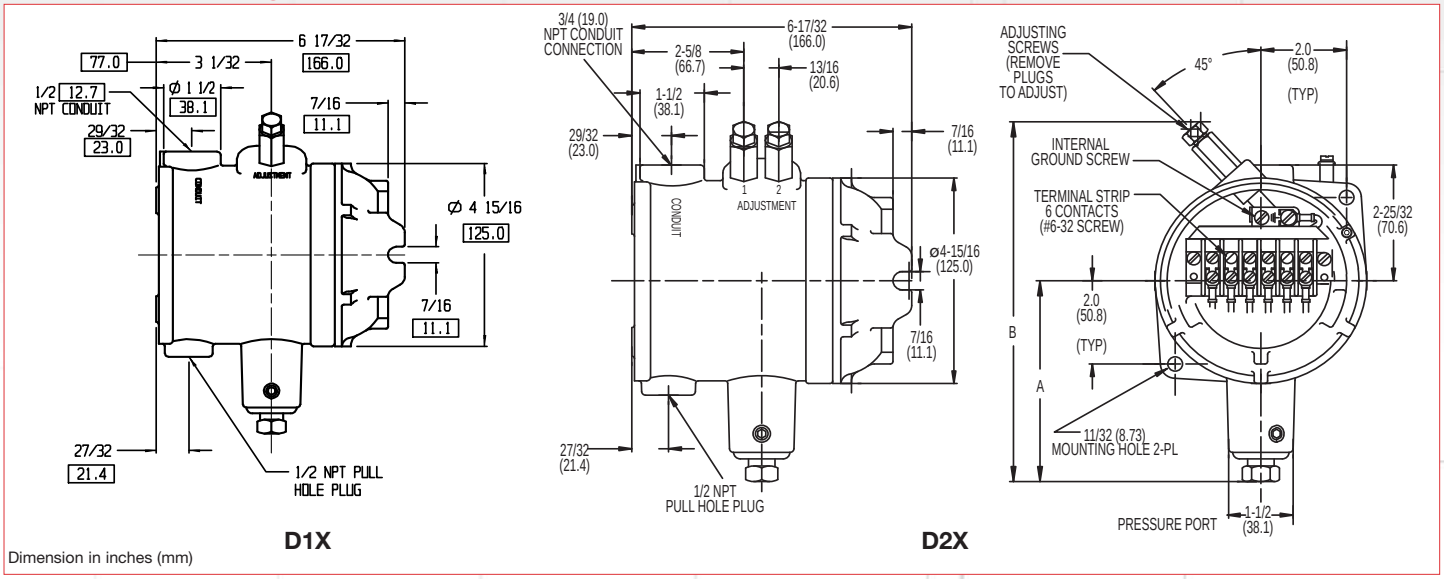
Technical Drawing



Dimension in inches (mm)

Product Configurator

Example		D1X	-A	3SS	-P2	-UL

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

Base Configuration

D1X	Single setpoint housed version
D2X	Single setpoint housed version

Limit Switch[1]

-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
-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
-Z1	Oxygen cleaned (not available w/ UL)
-Sxxx	Factory pre-set (consult factory)

Pressure Connection

Blank	Std 1/4" NPT female pressure connection
-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 CONTROL PRODUCTS

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: Rating:	 Single pole double throw (SPDT) single or dual 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:	 304 stainless steel 17-7 PH stainless steel 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.

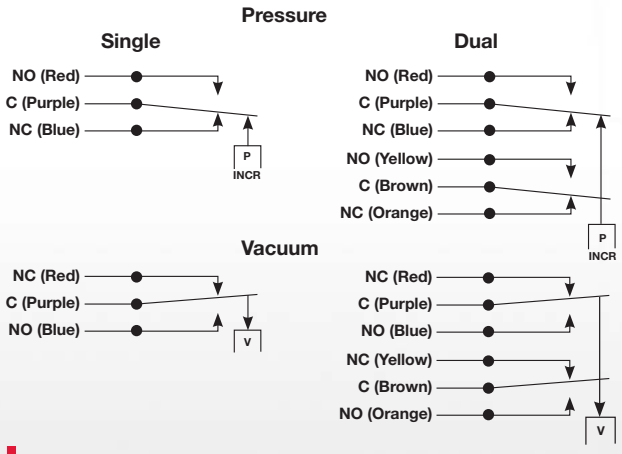
Approvals (Cont.): CSA:	 Listed under Guide 380-W-1.16, Class 3231, File 22355
Temperature Range: Operating: Storage:	 -65° to +165°F (-54° to +74°C) -65° to +200°F (-54° to +93°C)
Adjustment Instructions: Pressure: Vacuum:	 Turn self-locking adjustment screw counter clockwise to increase pressure setting 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.

* 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

Wiring Diagram



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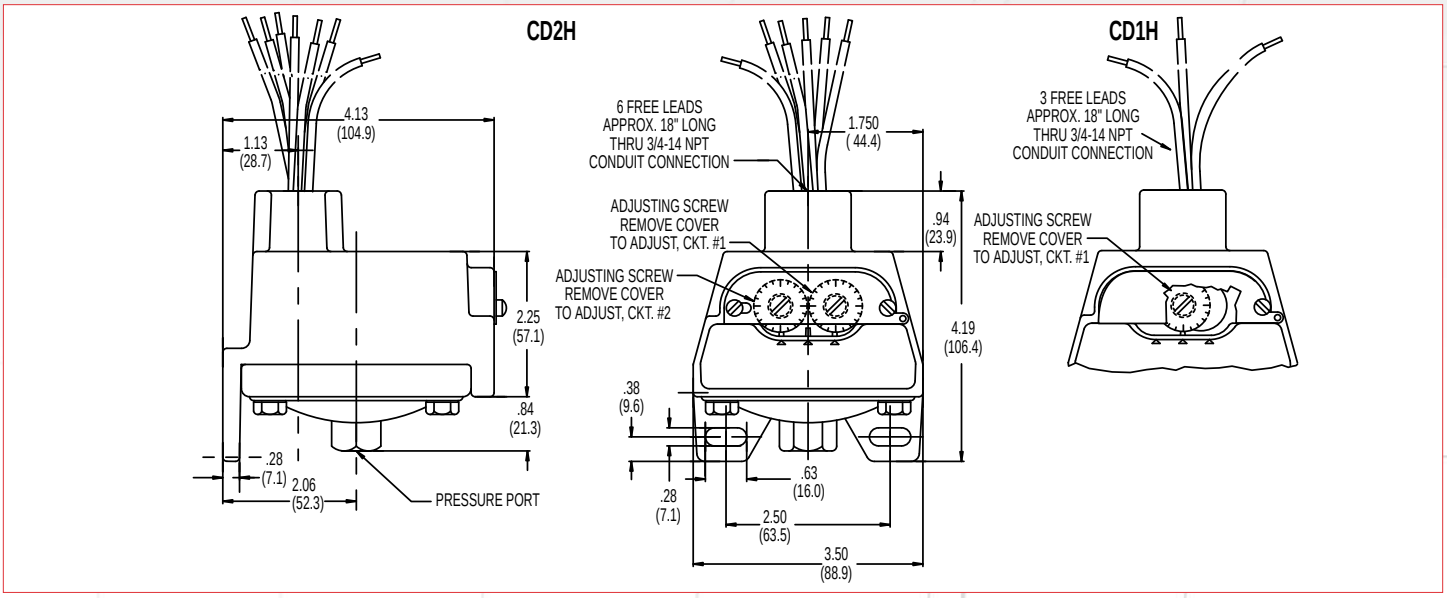
Technical Drawing



Product Configurator

Example		CD1H	-A	3SS		

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 Switch[1]

-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)
-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 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

-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	psi-(bar)	psi (bar)
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	In. Hg	In. Hg
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
3 The '-2SS' range is specified in inches of H_2O

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Barksdale CONTROL PRODUCTS

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: Rating:	 SPDT snap action; single or dual circuit 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: Seals: Enclosure: Other Parts:	 17-7 PH stainless steel Viton® Die-cast aluminum anodized 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.

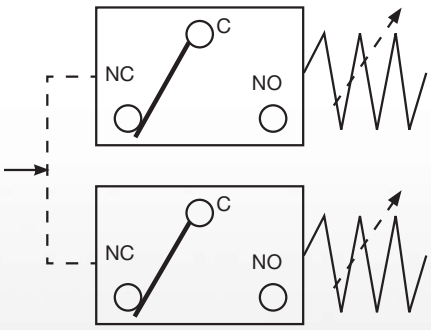
Approvals/Listings: PED (European):	 Compliant to PED 97/23/EC
Temperature Range: Operating:	 -65°F to +165°F (-54°C to +74°C)
Adjustment Instructions: Pressure: Vacuum Differential:	 Turn adjustment screw clockwise to decrease pressure difference; counterclockwise to increase pressure difference Turn 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 Code

Lead	Circuit #1		Circuit #2	
	Pressure	Vacuum	Pressure	Vacuum
NormallyClosed	Blue	Red	Orange	Yellow
Common	Purple	Purple	Brown	Brown
NormallyOpen	Red	Blue	Yellow	Orange

Wiring Diagram

(contact status at atmospheric pressure)



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CONTROL PRODUCTS
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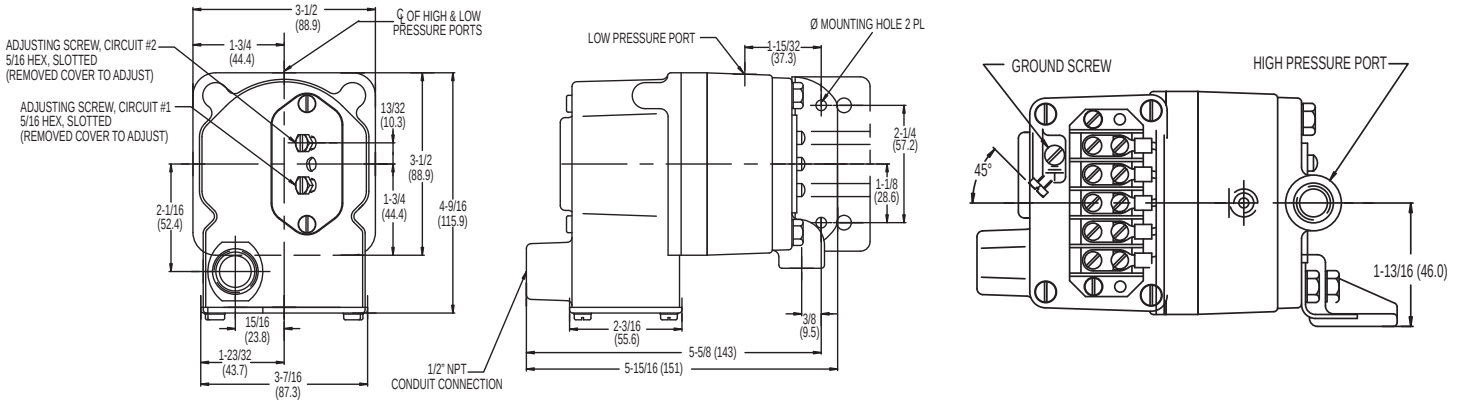
Technical Drawing



Dimension in inches (mm)

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 Switch[1]

-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
-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; 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)
-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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Barksdale CONTROL PRODUCTS

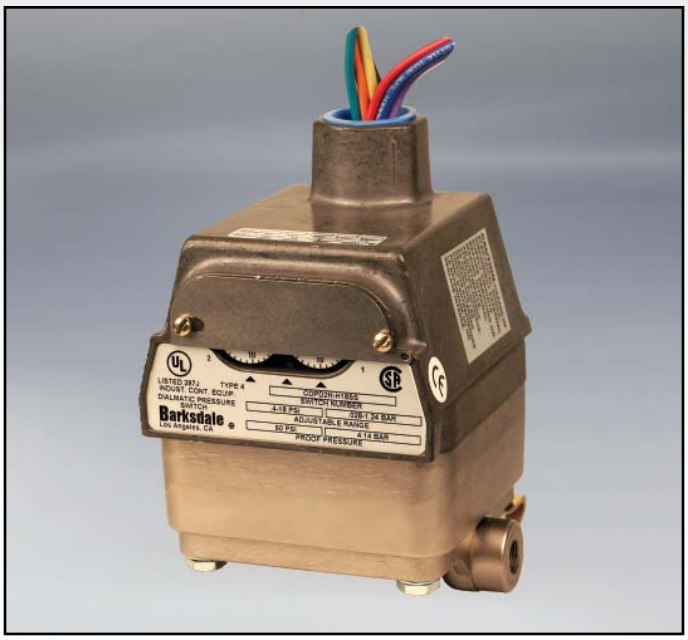
Calibrated Differential Switch *Series CDPD1H, CDPD2H, VCDPD1H, VCDPD2H*

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: Rating:	 SPDT single or dual circuit 10 amps @ 125/250 VAC; 3 amps @ 480 VAC (Class A or H limit switch)
Wetted Parts: Diaphragm: Seals: Enclosure: Other Parts:	 17-7 PH stainless steel Viton® Die-cast aluminum anodized 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.

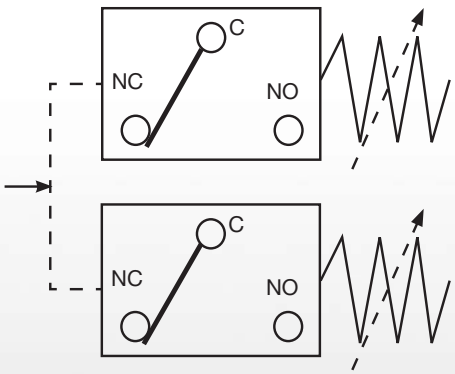
Approvals/Listings: UL: CSA:	 UL listed; File # E42816 CSA listed under guide 380-W-1.16, Class 3231, File # 22355
Temperature Range: Operating:	 -65°F to +165°F (-54°C to 74°C)
Adjustment Instructions: Pressure: Vacuum Differential:	 Turn adjustment screw clockwise to decrease pressure difference; counterclockwise to increase pressure difference 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 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			

Wiring Diagram

(contact status at atmospheric pressure)



Barksdale
CONTROL PRODUCTS
CRANE
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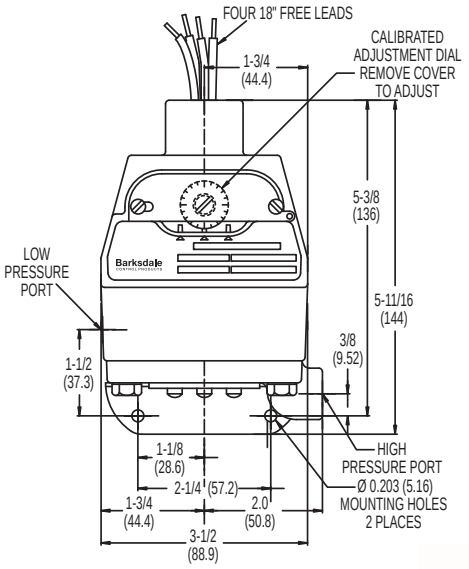
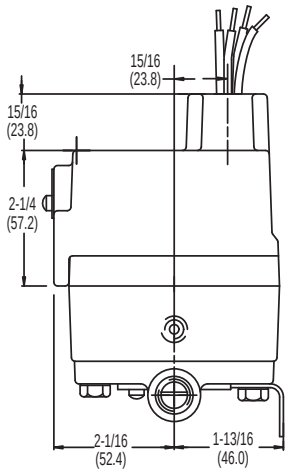
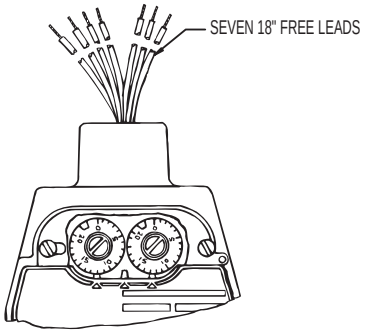
Technical Drawing

Dimension in inches (mm)



CDPD1H





CDPD2H

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

Limit Switch[1]

-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
-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; 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)
-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 (not UL/CSA approved)
-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory pre-set (consult factory)

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

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Barksdale CONTROL PRODUCTS

Low Cost Differential Switch

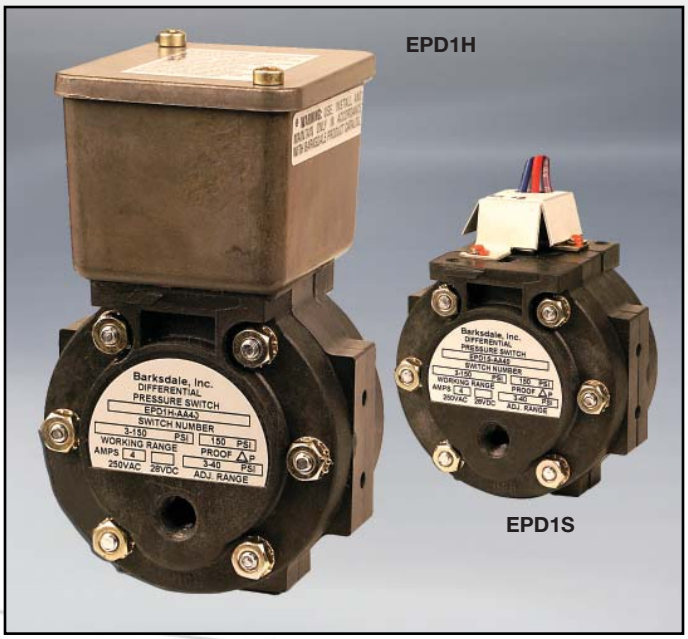
EPD1S, EPD1H Series

Features

- High reliability
- Easy setpoint adjustment
- Low cost

Applications

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



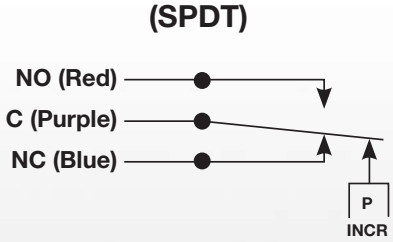
General Specifications*

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: Rating:	 SPDT snap action 4 amps @ 125/250 VAC (Class AA limit switch); 5 amps @ 125/250 VAC (Class BB limit switch).
Wetted Parts: Process Fitting: Diaphragm: Enclosure:	 Polysulfone, 40% glass filled Dacron reinforced neoprene Polysulfone, 40% glass filled
Electrical Connection: EPD1S Models: EPD1H Models:	 12” free leads 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: Storage:	 -20° to +165°F (-54° to +74°C) -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: EPD1H Models:	 1.0 lbs. approximate 1.5 lbs. approximate

Wiring Diagram



Barksdale
CONTROL PRODUCTS
CRANE Barksdale, Inc./Barksdale GmbH
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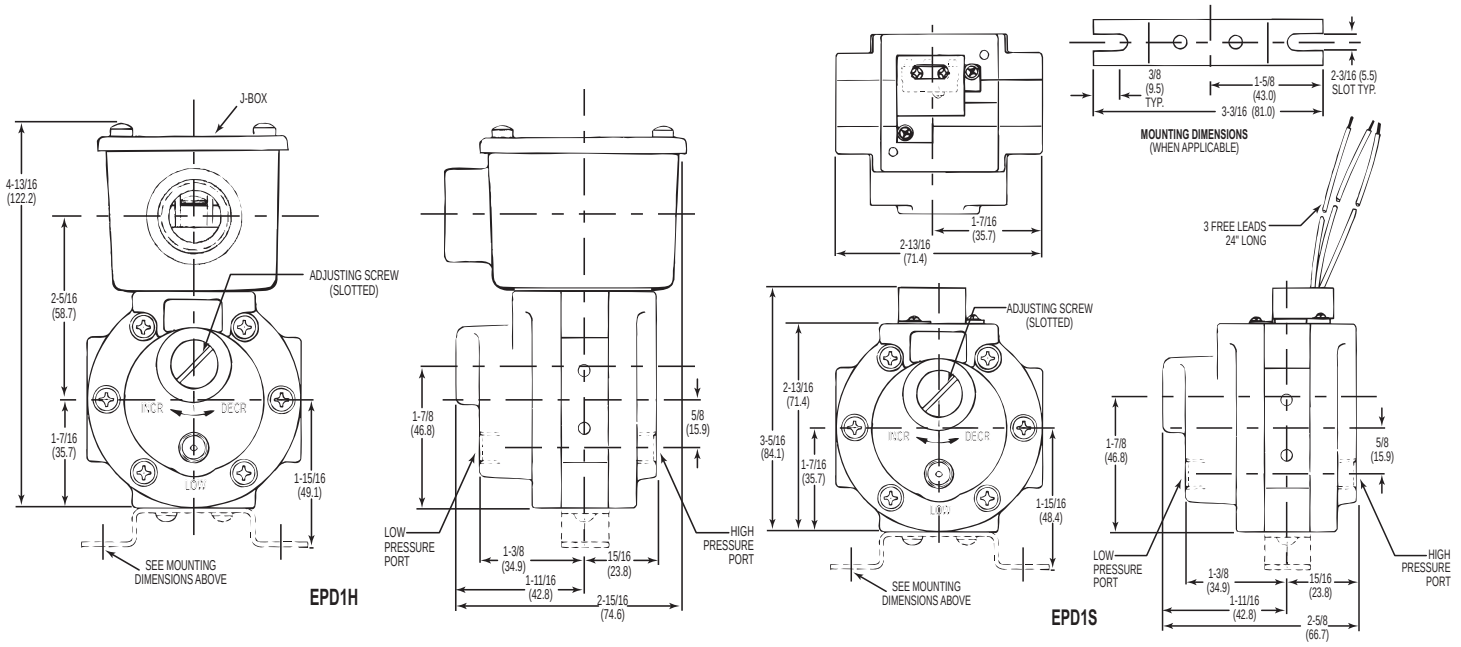
Technical Drawing



Dimension in inches (mm)

Product Configurator

Example	EPD1S	-AA	40	-W048

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

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Barksdale CONTROL PRODUCTS

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: Seals & Diaphragms: Enclosure:	 304 stainless steel (standard) Buna-N (standard) 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)

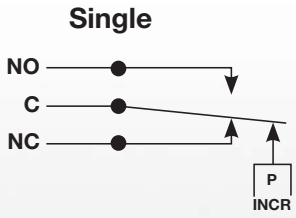
* See product configurator for additional options.

Approvals: UL: CSA: PED (European):	 All models shown are UL recognized components under industrial control equipment, motor controllers, float and pressure operated (NKPZ2) files MH8147 and E42816. All models and modifications shown are CSA listed under Class 3231 02, File LR22355. 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 counterclock wise to decrease the set point.
Options:	-FDA approved diaphragm -Oxygen cleaning -Factory preset -NSF approved switch
Shipping Weight: Housed Versions: Stripped Versions:	 0.5 lb. approximate 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



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CONTROL PRODUCTS
CRANE
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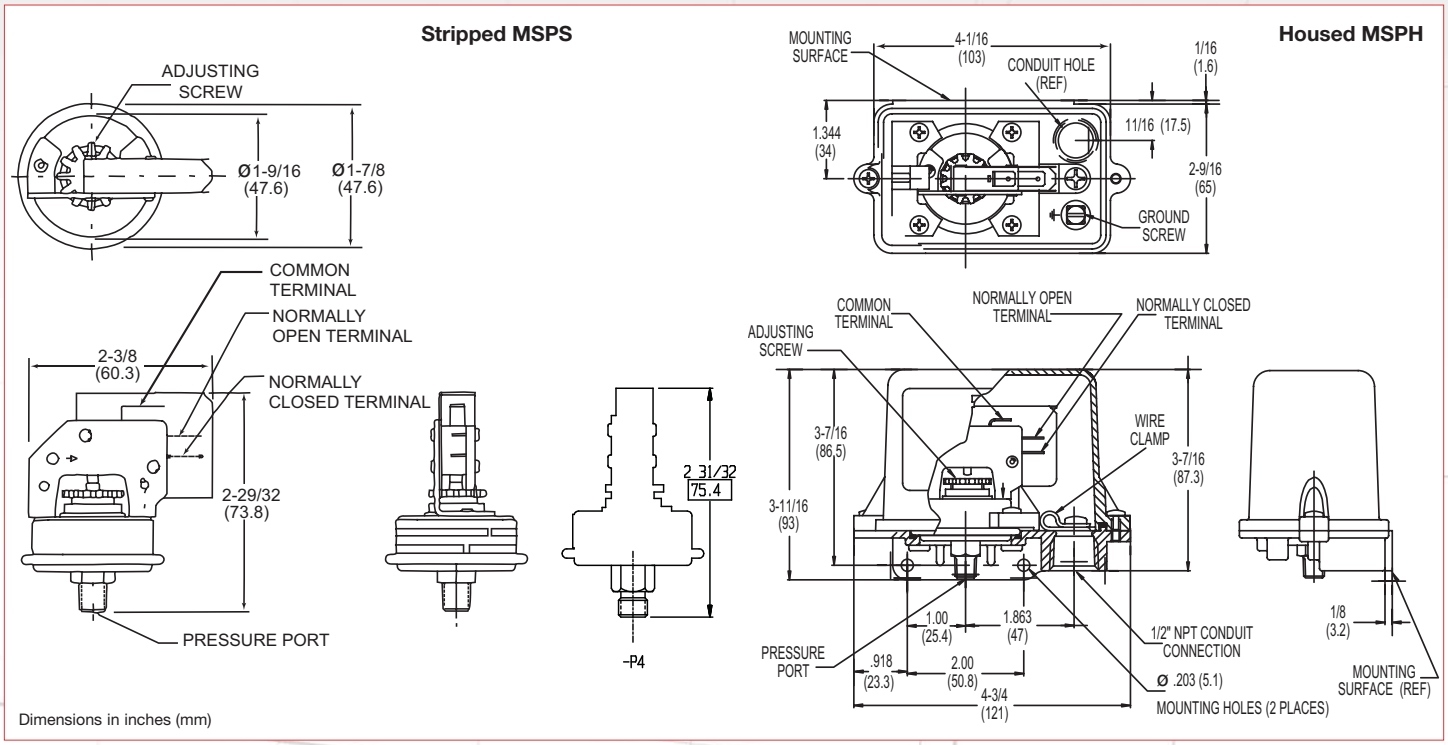
Technical Drawing



Dimensions in inches (mm)

Product Configurator

Example	MSPS	-EE	15	SS		

Enclosure

MSPS	Stripped version
MSPH	Housed version

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 Connection

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

Diaphragm Material

Blank	Buna-N (standard)
-E	Ethylene propylene (EPR)[1]
-F	FDA approved Buna-N
-N	Neoprene
-V	Viton® diaphragm

Options

-Z1	Oxygen cleaned
-Sxxx	Factory preset (consult factory)
SF [3]	NSF 18 approved

Pressure Range

Limit Switch	Pressure Range	Adjustable Range				Approx. Deadband (Actuation Value)	Proof Pressure
		Decreasing - psi (bar)		Increasing - psi (bar)			
		Min.	Max.	Min.	Max.	psi (bar)	psi (bar)
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.

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

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Barksdale CONTROL PRODUCTS

Econ-O-Trol Switch

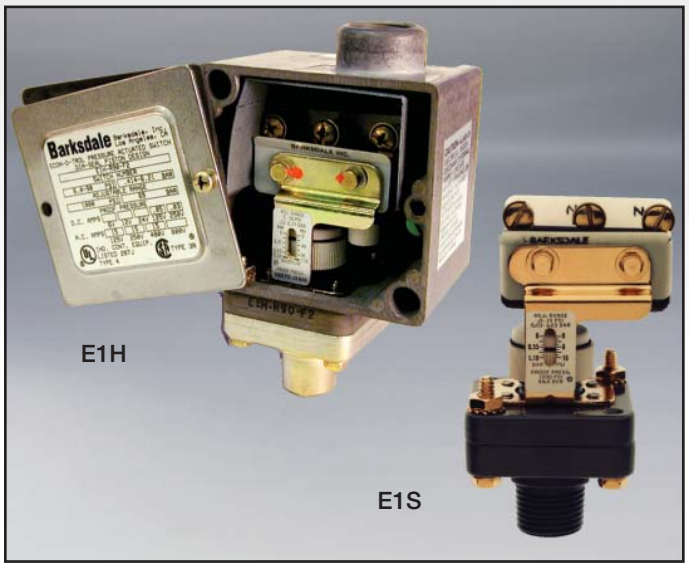
E1S, E1H Series

Features

- Superior resolution
- Long life
- Easy setpoint adjustment
- Ideal for pressure or vacuum applications
- NEMA 1, 3 & 4, IP65
- Stripped and housed versions available

Applications

- Medical equipment
- Pump & compressor monitoring
- Air proving in HVAC systems
- Irrigation systems
- Engine monitoring
- Machine tools
- General industrial applications
- Metal working
- Food & beverage



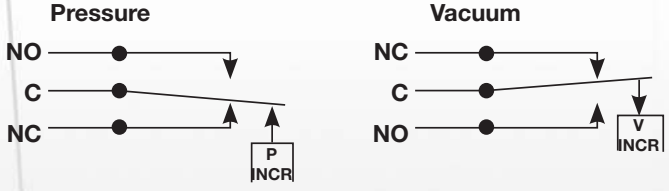
General Specifications*

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

Temperature Range: Operating:	 -20° to +165°F (-29 to +74°C)
Adjustment Setpoint: Positive Pressure: Vacuum: Adjustable Deadband (Optional):	 Turn self locking adjustment nut clockwise to increase setpoint; counterclockwise to decrease setpoint. Turn self locking adjustment nut counterclockwise to increase setpoint, clockwise to decrease setpoint (towards 30” Hg). 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: Stripped models:	 1.5 lbs. approx. 0.75 lbs. approx.

* See product configurator for additional options.

Wiring Diagram



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CONTROL PRODUCTS
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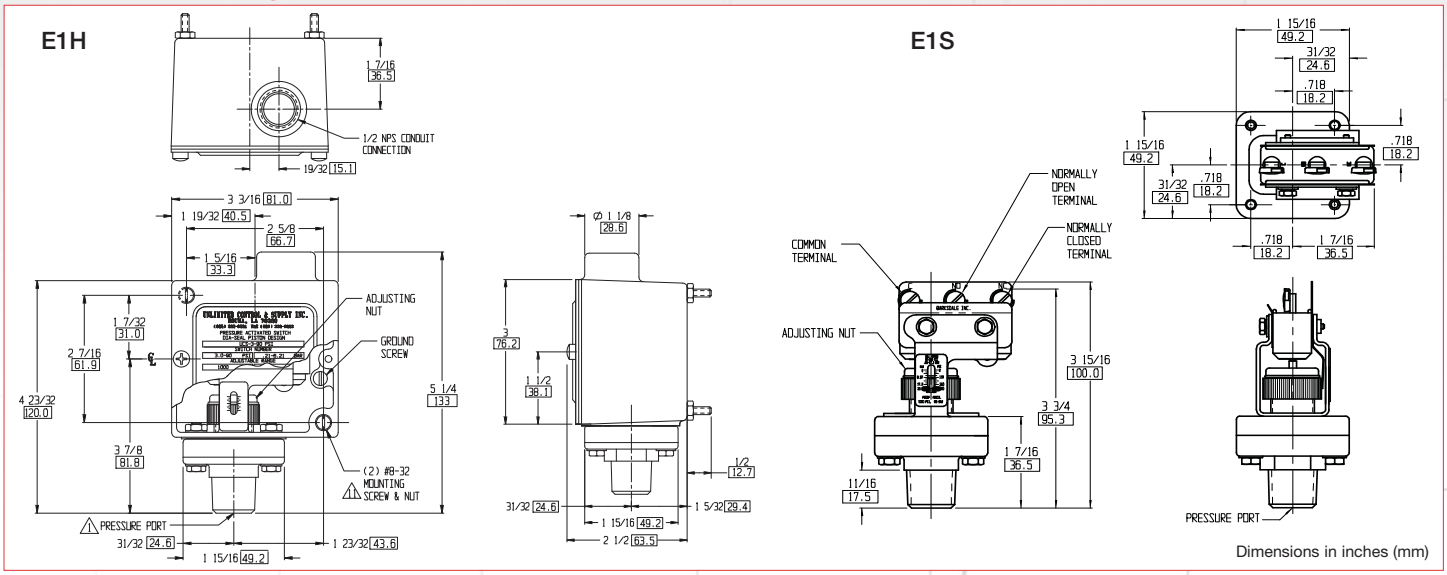
Technical Drawing



Dimensions in inches (mm)

Product Configurator

Example	E1H	-H	500	-P6		

Base Configuration

E1S	Stripped models
E1H	Housed models

Limit Switch[1]

-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (standard)
-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
-R[7]	15 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC **ADJUSTABLE DEADBAND**
-G	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)
-GH	1 amp @ 125 VAC; gold contact

Pressure Range

	Adjustable Range				Approx. Deadband[2] (Actuation Value) psi (bar)	Proof Pressure psi (bar)	
	Decreasing - psi (bar)		Increasing - psi (bar)				
	Min	Max	Min	Max			
VAC[3]	.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[3]	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)	

Options

-E1	Plastic cover (E1S models only)
-FX	NEMA 4X enclosure (E1H models only)
-RD	Manual reset (must select class G limit switch)
-Z1	Cleaned for oxygen service
-Sxxx	Factory preset (consult factory)

O-Ring Material

Blank	Buna-N
-E	Ethylene propylene (EPR)
-T	Teflon
-V	Viton® diaphragm

Pressure Connection

Blank	E1S version: 1/8" int & 1/2" ext NPT; E1H version: 1/4" NPT female
-P4	1/4" NPT female (avialable on E1S only - not available on PLS version)
-P6	1/8" int & 1/2" ext NPT (E1H models only)
-F1	Impregnated fitting (not UL or CSA approved)
-F2	Nickel plated fitting
-BR[4,6]	Brass fitting: 1/8" int & 1/2" ext NPT (for E1S models or with -P6 option)
-BR[4,6]	Brass fitting: 1/4" NPT (for E1H models or with -P4 option)
-P6-PLS[5,6]	Polysulfone 40% glass filled; 1/8" - 1/2" NPT (E1H Only). Max adjustable pressure: 250 psi.
-PLS[5,6]	Polysulfone 40% glass filled; 1/8" - 1/2" NPT (E1S Only). Max adjustable pressure: 250 psi.

NOTES:
[1] Consult sales drawing for specific deadband values
[2] Deadband values indicated when used with the "H" limit switch
[3] Vacuum models are provided with 1/2" NPT External, 1/8" NPT Internal "Combo" fitting only on E1S models
[4] Not available on vacuum models
[5] Plastic fittings have a proof pressure of 400 psi
[6] Not available in range 500
[7] To increase differential, turn small, self-locking adjusting nut counter-clockwise

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Barksdale CONTROL PRODUCTS

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

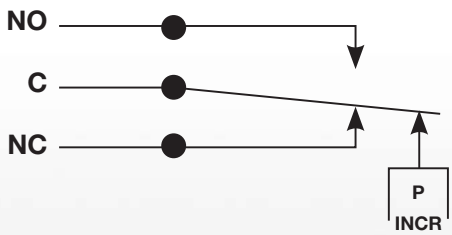
General Specifications*

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: Diaphragm: Enclosure:	 Anodized aluminum (standard) Buna-N Anodized aluminum
Electrical Connection:	Internal screw terminals via ½" NPT conduit connector
Enclosure Ratings:	NEMA 4, 13
Pressure Connection:	1/4" NPT female (standard)
Approvals: CSA: PED (European):	 Class 3231 02, File No. LR22355 Compliant to PED 97/23/EC
Temperature Range: Operating: Storage:	 -20° to +165°F (-29° to +74 °C) -40° to +200°F (-40° to +93°C)

* See product configurator for additional options.

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

Wiring Diagram



Barksdale
CONTROL PRODUCTS
CRANE
Barksdale, Inc./Barksdale GmbH
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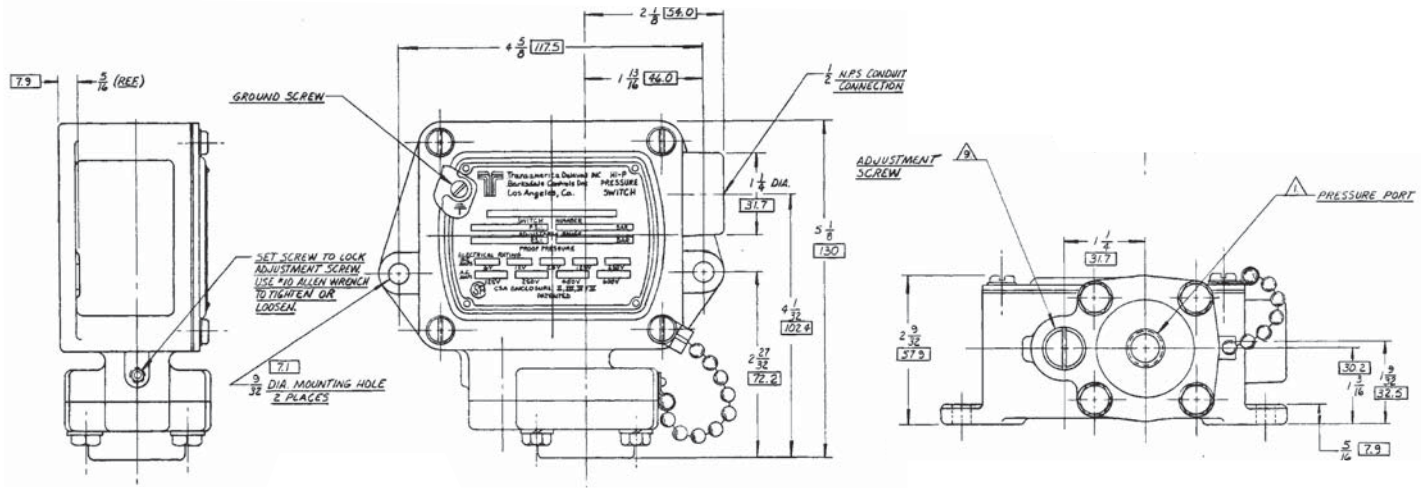
Technical Drawing



Dimensions in inches (mm)

Product Configurator

Example		P1H	-B	340	SS	-V	-P2

Prefix

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

Enclosure

P1H	NEMA 4 & NEMA 13 enclosure

Limit Switch[1]

-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)

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

Presssure Range

	Adjustable Range				Approx. Deadband[2]	Proof
	Decreasing - psi (bar)		Increasing - psi (bar)		(Actuation Value)	Pressure
	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

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Barksdale CONTROL PRODUCTS

Explosion Proof Dia-Seal Piston

P1X Series

Features

- Explosion proof housing
- High reliability
- Extremely long life
- UL & CSA listed
- Oil & dust tight

Applications

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

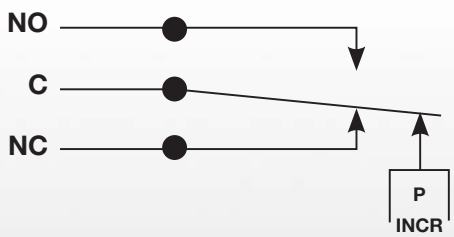
General Specifications*

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
Wetted Parts: Process Fitting: Diaphragm: Enclosure:	 Anodized aluminum Buna-N 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: CSA: PED (European):	 File No. E37043; approved for hazardous locations, Class I , DIV 2 Groups C&D, Class II Groups E, F, & G; not available on 1600 psi range Class 3238-01, File No. 022354-0-000 (Not approved with hermetically sealed limit switch Compliant to PED 97/23/EC

* See product configurator for additional options.

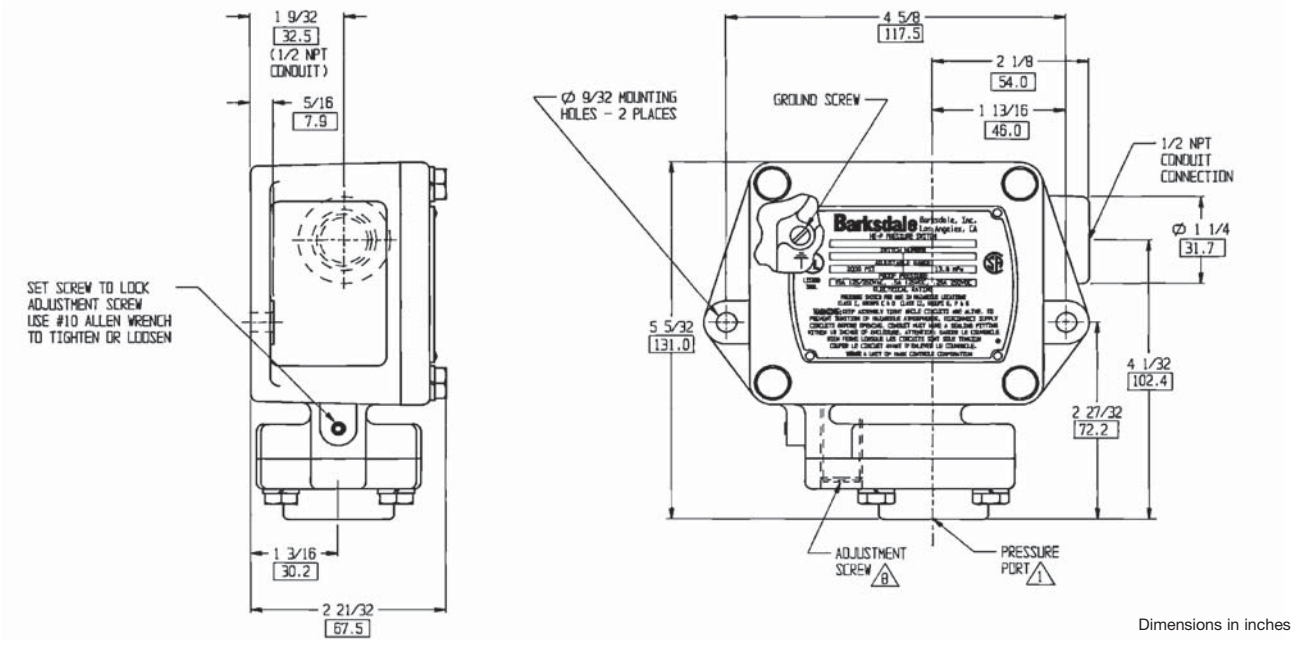
Temperature Range: Operating: Storage:	 -20° to +165 °F (-29° to +74°C) -40° to +200 °F (-40° to +93°C)
Adjustment Instructions:	Loosen setscrew with a #10 allen wrench. With screwdriver, turn adjustment screw clockwise to increase and counterclockwise to decrease the actuation point. Tighten setscrew after desired setting is reached.
Options:	- Viton® diaphragm - Teflon diaphragm - NEMA 4X enclosure - Hermetically sealed limit switch - Factory preset - Cleaned for oxygen service - CSA approval
Shipping Weight:	3.75 lbs. approximate

Wiring Diagram



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

Technical Drawing



Dimensions in inches (mm)

Product Configurator

Example		P1X	-H	85	SS		

Options

-P2	1/2" NPT pressure fitting (available only with stainless steel models)
-FX	NEMA 4X enclosure
-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	psi-(bar)	psi (bar)
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	400 (27)	1520 (101)	480 (32)	1600 (107)	20 - 80 (1.3 - 5.3)	2000 (133)

Enclosure

P1X	NEMA 7 & NEMA 9 enclosure

Limit Switch[1]

-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

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

[1] Consult sales drawing for specific deadband values
[2] Deadband values indicated when used with the "standard" limit switch

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Barksdale CONTROL PRODUCTS

Compact Pressure Switch

Series 7000

Features

- Compact size
- Multiple electrical connections
- True SPDT snap action micro-switch
- NEMA 1 or 4X
- Factory preset or field adjustable
- Available in corrosion-resistant thermoplastic, stainless steel or brass

Applications

- Pool & spa heaters
- Beverage dispensers
- 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:	±0.5 psi for range "0" ±1 psi for range "1" ±8% typical for ranges "2" to "7"
Switch:	SPDT snap action; single circuit
Wetted Parts: Diaphragm type: (range 0, 1, 2, 3) Piston type: (ranges 4, 5, 6, 7)	 NORYL® plastic fitting with NORYL® plastic housing, or 300 series stainless steel fitting, or brass fitting and Buna-N diaphragm. 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.

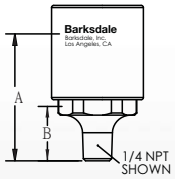
Approvals: UL: CSA: FDA/NSF: PED (European):	 Recognized components per UL 508 standard, industrial control equipment. Listed per CSA Guide 380-W1.16 class 3231 Certified per NSF 18 Compliant to PED 97/23/EC standard
Temperature Range: Operating: Storage:	 -40° to +180°F - piston type 0° to 180°F - diaphragm type -40° to +200°F
EMI/RFI: Vibration: Shock:	 10 g's per MIL-STD 202, method 204, condition A 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:	Plastic: approximate .10 lbs. 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 LENGTH TO ABOVE DIMENSIONS 'A' AND 'B'

* Available in stainless steel only



FREE LEADS VERSION

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

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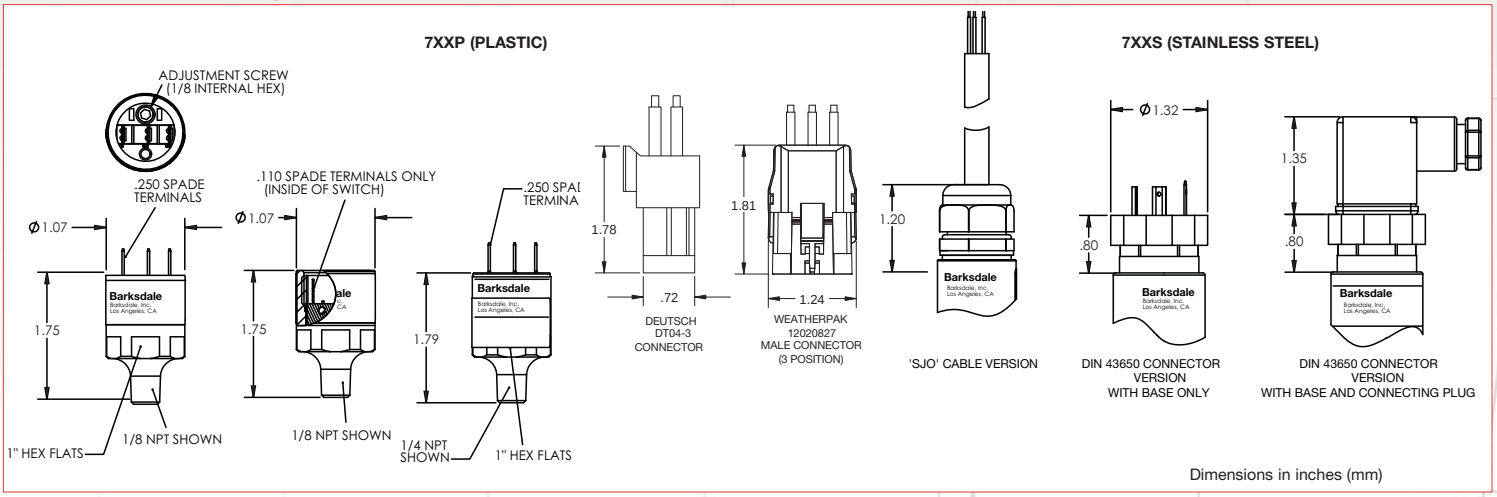
Technical Drawing



Dimensions in inches (mm)

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
0[1]	1.25	3	2	4	1.5 (MAX)	20	20
1	2	7	3	10	.5 - 4	20	50
2	6	35	8	50	2 - 15	80	100
3[2]	30	90	40	120	5 - 30	130	140
4[3]	150	700	250	1000	30 - 300	4000	6000
5[3]	500	2300	600	3000	100 - 800	4000	6000
6[4]	20	150	30	200	10 - 100	700	2000
7[4]	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

P	Noryl® plastic (available with pressure ranges 0 - 3 only)
F	Noryl® plastic with NSF/FDA compliance (available with pressure ranges 0 - 3 only)
S	300 series stainlesss steel
B[7]	Brass (only available with pressure ranges 6 and 7, and 1/8" NPT process connection)

Limit Switch

-1[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[1]	SPST, N.O., snap-action switch, 5 Amps @ 125/250 VAC (silver contacts)
-5[1]	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 models)
R	Rising pressure
F	Falling pressure

Process Connection [6]

-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)

Wetted Material

B	Buna-N
N	Neoprene (not available with "F" fitting material)
V	Viton® Diaphragm (not available with "F" fitting material)
D	Disogrin O-ring (available in stainless steel & piston models only)
F	FDA approved - Buna-N (available in stainless steel & piston models only)

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)
3	Free leads. 18 gauge, 18" long (available only with stainless steel models - NEMA 1)
4	Unshielded PVC jacketed cable, 18 AWG, 18" long, (available only with stainless steel models - NEMA 4)
5[5]	DIN 43650-type connector - base only (available only with stainless steel & factory set models - NEMA 4)
6[5]	DIN 43650-type connector - with base & plug (available only with stainless steel & factory set models - NEMA 4)
7[5]	SJO type cable, 3 wire, 18 AWG, 18" long (available only with stainless steel & factory set models - NEMA 4)
8[6]	Weatherpak connector, female, 2-position, two 18" free wires, for normally closed circuits
9[6]	Weatherpak connector, female, 2-position, two 18" free wires, for normally open circuits
10[6]	Weatherpak, connector, male, 3-position, three 18" free wires, used only with SPDT limit switches
11[6]	Deutsch connector, female, 3-position, three 18" free wires, used only with SPDT limit switches

NOTES:
[1] Only 3 amps available @ 125/250VAC with silver contact limit switches for range '0'
[2] Not UL/CSA certified
[3] Piston models - only available in stainless steel
[4] Available only in brass fittings (use Viton diaphragms as standard - no price adder)
[5] Available only with stainless steel or brass, factory set & locked models
[6] Minimum quantities may be required.
[7] Brass fitting only available in 1/8" NPT, pressure ranges 6 or 7, electrical connections 3 or 4.

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Barksdale CONTROL PRODUCTS

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: Rating:	 SPDT snap action; single circuit 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)
Wetted Parts: Process Fitting: O-Ring Seals & Diaphragms: Piston (96201 models):	 Brass (standard); 416 stainless steel (optional) Buna-N (standard) Stainless steel; Teflon back-up ring
Electrical Connection:	12” free leads, #18 AWG
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: CSA:	 UL recognized component (UR); With optional conduit connector (-T4 or -T5 option) becomes UL listed. UL File No. E42816. CSA #LR22354

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

	PRESSURE		VACUUM	
LEAD	**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.

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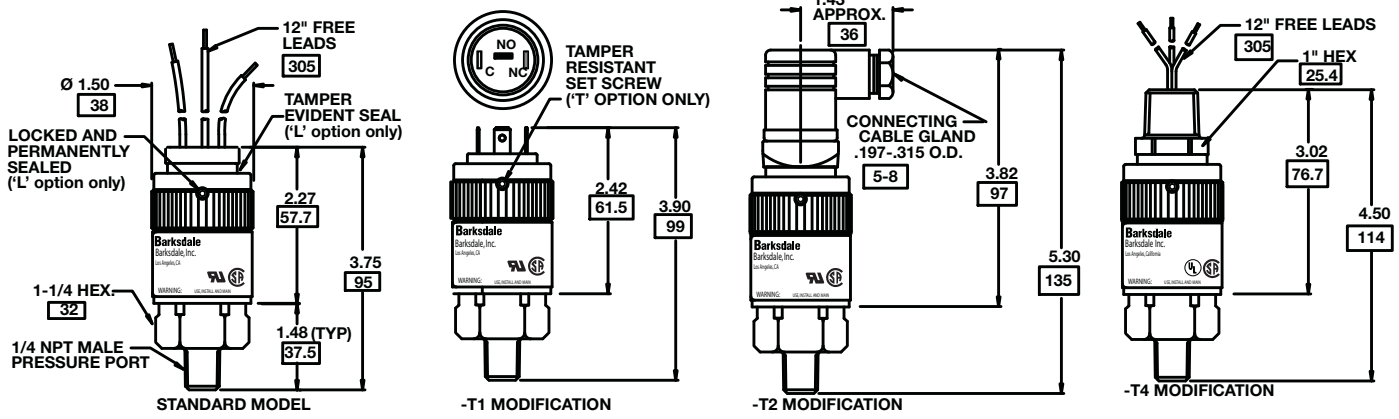
Technical Drawings

Dimensions in inches (mm)



Product Configurator

Example:		96211-BB3	SS	-T5	-V	

Prefix

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

Base Model

	Adjustable Range Decreasing - psi (bar) Min.	Adjustable Range Decreasing - psi (bar) Max.	Adjustable Range Increasing - psi (bar) Min.	Adjustable Range Increasing - psi (bar) Max.	Approx. Deadband (Actuation Value) psi (bar)	Proof Pressure 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 Diaphragms
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	Stainless steel (not available with vacuum models)

Electrical Connectors

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

Options

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

Diaphragm/O-ring Material[2]

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

NOTES:
[1] Not available with DIN connector (-T2 option)
[2] Minimum quantities may apply
[3] Only available with –T5 electrical connection

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, IP65, IP68
- Modular concept

Applications

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

General Specifications*

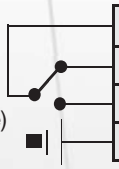
Repeatability:	±1% typical, piston models ±2% typical, diaphragm models
Microswitch: Type: Rating:	 SPDT contact Silver contacts: 3A @ 250 VAC 5A @ 120 VAC 0.4A @ 120 VDC Gold contacts: 0.1A @ 125 VAC 0.1A @ 30 VDC
Switching Frequency:	max. 60 /min piston switch max. 30/ min diaphragm switch
Wetted Parts: Process Fitting: Housing: Seals & Diaphragms: Adjustment Screw:	 304 stainless steel Aluminum die-cast 230 Buna-N (NBR), Viton® (FKM), EPDM, Neoprene (CR) 300 stainless steel (HEX 5)
Electrical Connection:	See options on next page
Enclosure Ratings:	UL Listed, Type 4 for indoor and outdoor use.
Pressure Connection:	Standard CETOP (multiple pressure connections available)

Approvals: Standard: Ex Option: Ex II1G Ex ia IIB T6 Ex II1G Ex ia IIC T6 Ex II1GD Ex ia D20 T100	UL / cULus (CSA) IP65 (DIN-plug), IP68 (cable) GOST R Intrinsically safe DIN plug version Cable version DIN plug and cable version
Ambient Temperature Range: Piston Switch: Diaphragm Switch:	 -40°F to +176°F (-40°C to +80°C) -4°F to +176°F (-20°C to +80°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 (PL2/5)	Cable Gland (CA)	1/2" NPT Conduit w/ Free Leads (CD1)
Common	1	1	Brown	Purple
Normally Closed	2	2	Black	Blue
Normally Open	3	4	Gray	Red
Ground	GRD	3*	Green/Yellow	Green/Yellow

* PL5 is without ground

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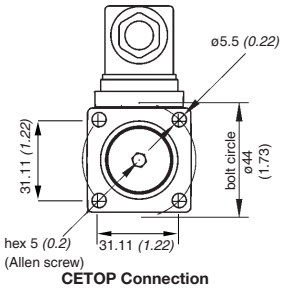
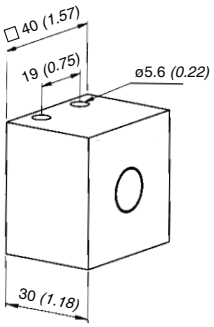
Technical Drawings

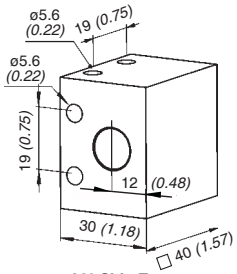
Process Connections



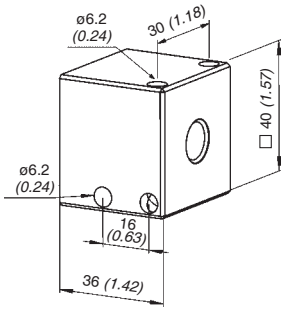
CETOP Connection



Standard Straight

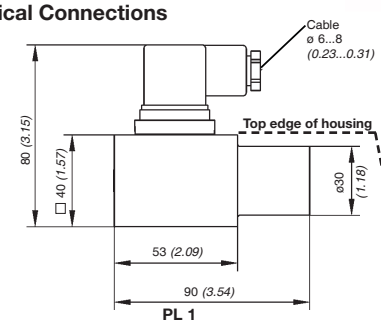


90° Side Entry

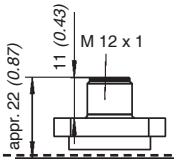


Retrofit Connection
For 96100 & X1T

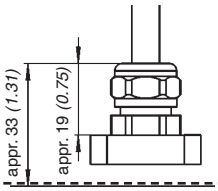
Electrical Connections



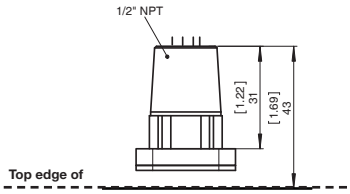
PL 1



PL2 & PL5



CA3



CD 1

Dimensions in mm (inch)

Product Configurator

Example:	8	A	A	1	- PL1	- B		-UL[5]

Series 8000

Process Connections[7]

1[1]	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 (UR only)
- PL2	Plug M12, 4-pol. without female plug, IP67 (UR only)
- PL5	Plug M12, 5-pol. without female plug. (UR only)
- CA3	Cable gland, 27.5" (0.7 m) cable, neoprene jacketed, IP68
- CD1[2]	1/2" NPTM AWG 20 with 24" (60 cm) leads (3 leads + ground)

Options[3]

- EXI	Intrinsically safe EXia (not UL)
- LH	Small hysteresis[6]
- VA	300 series stainless steel housing

Seals

- B	Buna -N (NBR)
- V	Viton® (FKM)
- E	EPDM
- N	Neoprene (CR)

Adjustable Range

	Adjustable Ranges (decreasing pressure) psi	(bar)	(increasing pressure) psi	(bar)	Max. Hysteresis[4] (Dead-band)	Proof Pressure psi	(bar)
Diaphragm							
A	5.8 - 82	(0.4 - 5.7)	8.7 - 87	(0.6 - 6.0)	≤15% of max adjustable range	1200	(80)(*)
B	29 - 246	(2.0 - 17)	4.3 - 250	(3.0 - 20)		1200	(80)(*)
C	43 - 600	(3.0 - 41)	60 - 650	(4.0 - 45)		1200	(80)(*)
Piston							
D	43 - 2320	(3.0 - 160)	75 - 2600	(5.0 - 180)	≤15% of max adjustable range	8700	(600)
E	430 - 4300	(30 - 300)	750 - 5000	(50 - 350)		8700	(600)
F	800 - 7550	(55 - 520)	1200 - 8700	(80 - 600)		15000	(900)

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

Notes:
[1] 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.
[2] Contact rating for silver contact is 3A @ 125 VAC.
[3] Consult factory for additional options.
[4] Consult sale drawing for dead-band chart
[5] Not applicable with -EXI options
[6] Only for piston version.
[7] Consult factory for other process connections. Minimum quantities may apply.

Explosion Proof Compact Switch *Series 9671X, 9681X, 9692X*

Features

- ATEX approved
- NEMA 4X, 7 & 9
- NACE compliant
- SPDT and DPDT switch
- Safe to adjust during operation
- Dia-seal/piston sensor
- Dual sealed for DIV 1 & DIV 2 applications

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, Class CC simulated DPDT (optional)
Wetted Parts: Process Fitting: Seals: Piston: Enclosure:	 316 stainless steel Viton® Diaphragm (9671X & 9681X) Viton® O-ring and Teflon® backup ring (9692X) Stainless steel (on 9692X) 316 stainless steel
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

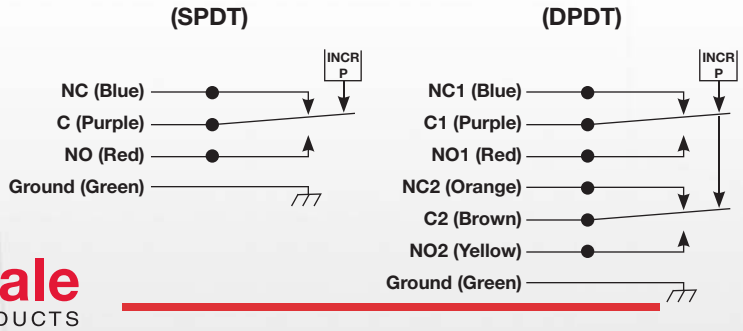
Pressure Connection:	1/4” NPT female
Approvals: UL # E37043 CSA # LR22354	CE 0081 Ex 2 G, EEX d IIC T6, LCIE 08 ATEX 6074X UL&CSA Approved for use in hazardous locations Class I, Groups A,B,C,& D; Class II, Groups E,F,& G (Group A, UL Only)
Ambient Temperature:	-20° to +165°F (-29° to +74°C)
EMI/RFI:	EN55011
Vibration:	10g’s 10-500 Hz, MIL-STD202F
Shock:	50g’s, 11 mS, MIL-S-901C
Adjustment:	Internal self locking adjustment wheel
Shipping Weight:	Approximately 1.85 lbs.

* See product configurator for additional options.

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



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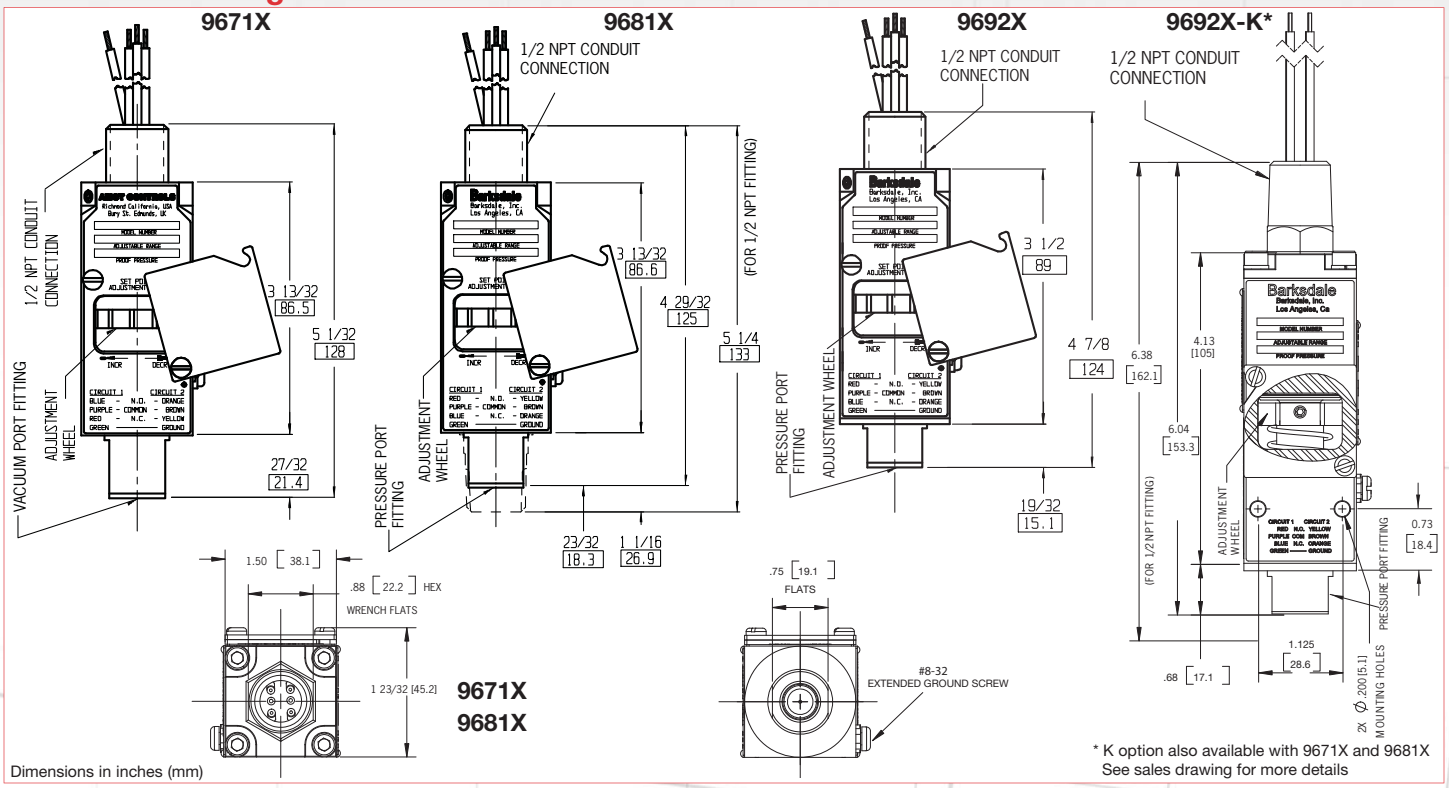
Explosion Proof Compact Switch — *Series 9671X, 9681X, 9692X*

Technical Drawings



Product Configurator

Example:	9681X	-1CC	-2			-K	-W036

Base Model

9671X	Vacuum switch, 1 - 30 in. Hg.
9681X	Pressure switch, 2 - 500 psi
9692X	Pressure switch, 100 - 7500 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

Options

-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory preset (consult factory)
-K	Mounting holes and conduit wrench flats
-T	Wire locking for adjustment cover (no UL, CSA, ATEX)

Process Connection[2]

Blank	1/4" NPT Female (standard)
-P1	7/16-20 SAE female process connection

Wetted Material

Blank	Viton® diaphragm/O-rings (standard)
-B	Buna-N diaphragm/O-rings
-E	EPR diaphragm/O-rings (UL, CSA, and ATEX not available for this option)

Pressure Ranges for 9681X & Vacuum Ranges for 9671X

		Adjustable Range				Approx. Deadband[1] (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[1] (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)

NOTES:
[1] Deadband values indicated when used with the "CC" limit switch
[2] Contact factory for other possible connection options

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Barksdale CONTROL PRODUCTS

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

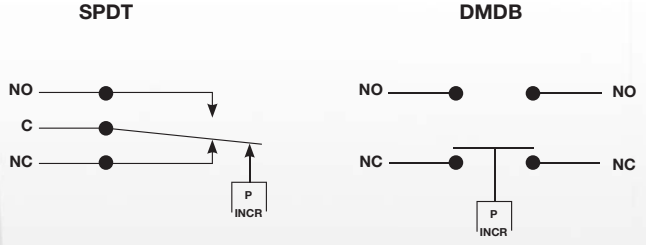
General Specifications*

Accuracy:	± 2% of the adjustable range
Switch: Type: Rating:	 Single pole double throw (SPDT) or double make double break (DMDB) snap action; single circuit 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: O-ring: Piston: Enclosure:	 416 stainless steel Buna-N with Teflon® backup ring 416 stainless steel 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: Storage:	 -20° to +165°F (-29° to +74°C) -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: DMDB:	 Normally Open (NO), Normally Closed (NC), and Common (C) terminals are identified on the limit switches 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



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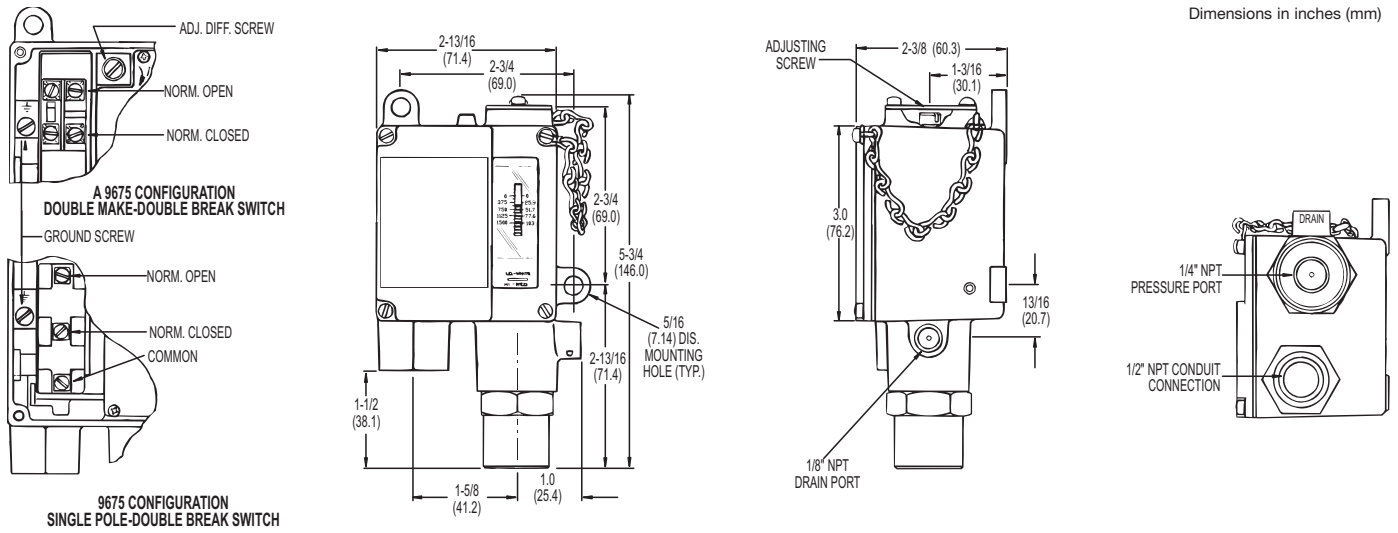
Technical Drawing



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

-E	EPR O-ring
-N	Neoprene O-ring
-V	Viton® O-ring
-Z1	Cleaned for oxygen service
Sxxx	Factory pre-set (consult factory)

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

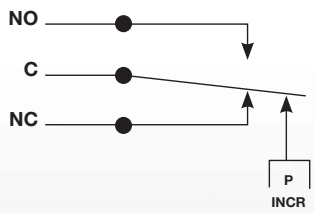
General Specifications*

Accuracy:	± 2% of the adjustable range
Switch: Type: Rating:	 Single pole double throw (SPDT) snap action; single circuit 15 Amps @ 125, 250, or 480 VAC (Class B)
Wetted Parts: Process Fitting: O-ring: Piston: Enclosure:	 Brass Buna-N 440C stainless steel 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: CSA:	 UL File No. E42816 Class 32311 02; File No. 022355-0.00

* See product configurator for additional options.

Temperature Range: Operating: Storage:	 -20° to +165°F (-29° to +74°C) -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



Terminals are identified on the limit switches

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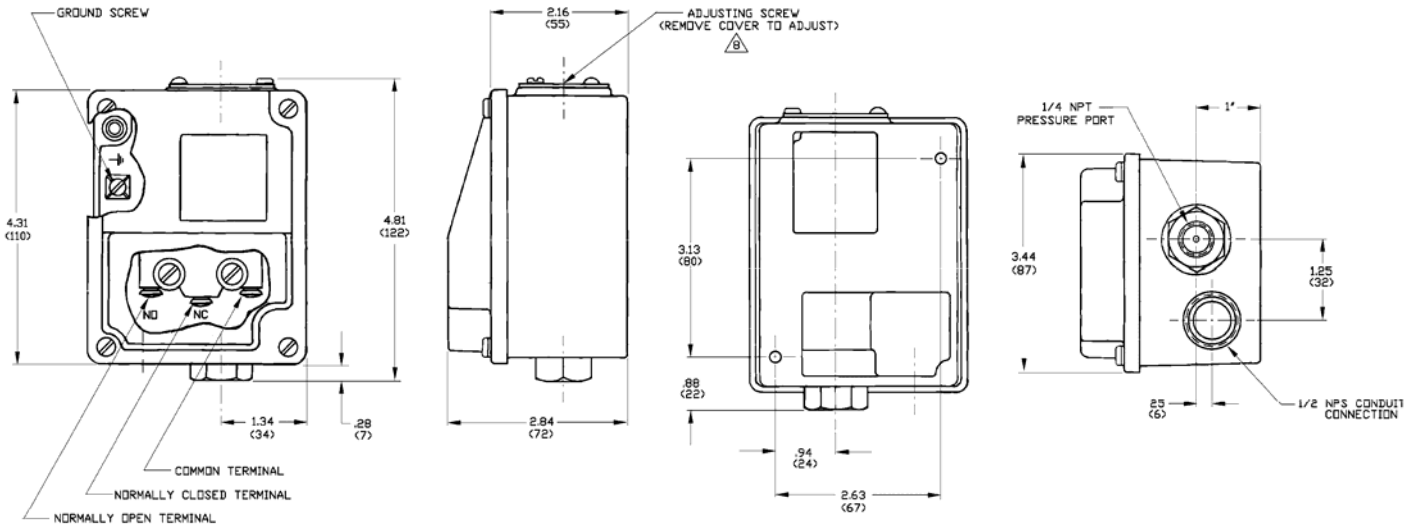
Technical Drawing

Dimension in inches (mm)



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
-N	Neoprene 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

Sealed Piston

Series 9048

Features

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

Applications

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

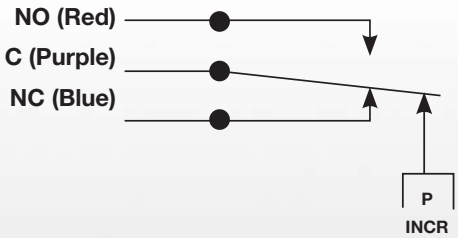
General Specifications*

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:	 300 series stainless steel Buna N 416 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: Storage:	 -40° to +165°F (-40° to +74°C) -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 T9048 Series: 3.0 lbs. approximate

Wiring Diagram



Barksdale CONTROL PRODUCTS
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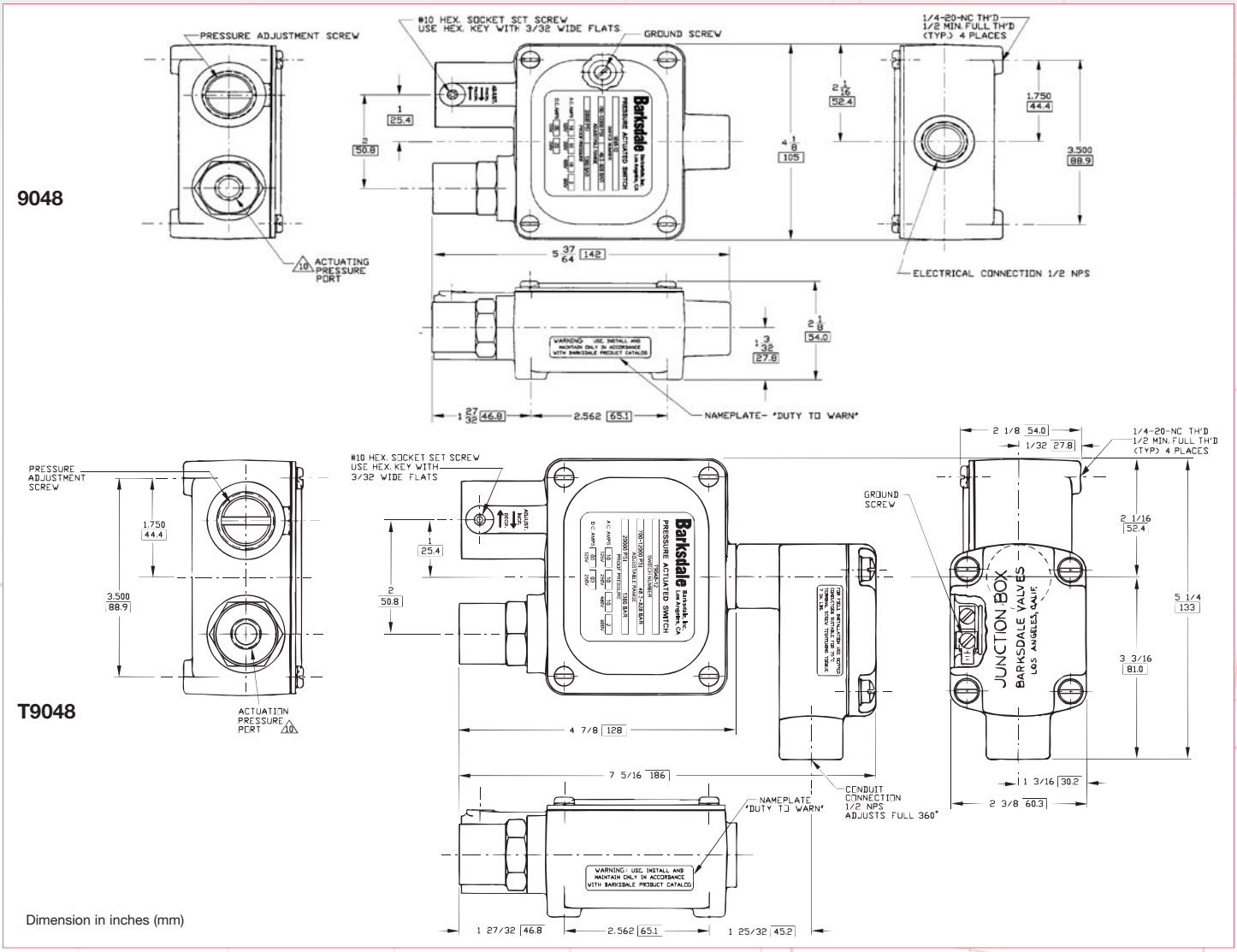
Technical Drawing



Dimension in inches (mm)

Product Configurator

Example	T	9048	-3		

T — Junction box with terminal strip

Basic Configuration

9048 — Base part number

Pressure Range

	Adjustable Range				Approx. Deadband (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi (bar)	psi (bar)
-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)

Options

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

O-Ring

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

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Barksdale CONTROL PRODUCTS

Visual Indicating Sealed Piston Switch

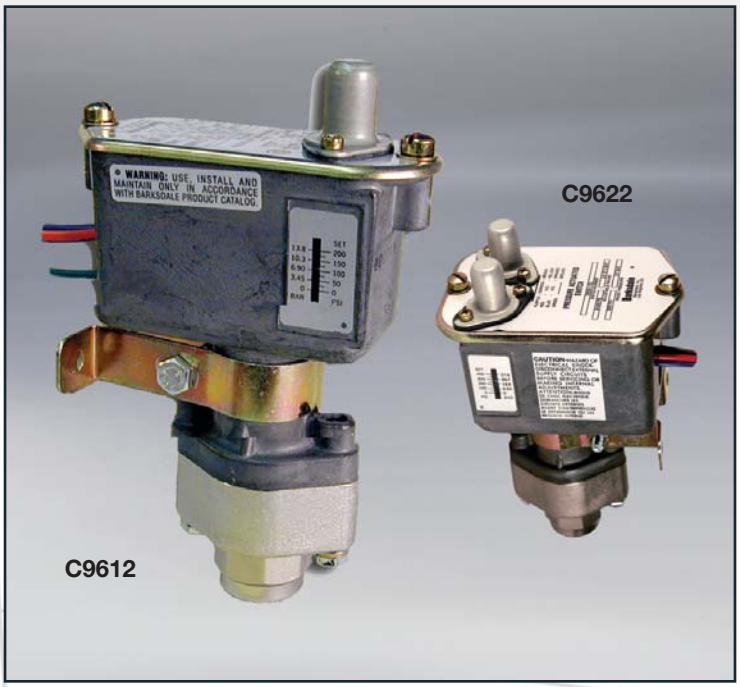
C9612, C9622 Series

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: Rating:	 Single pole double throw (SPDT) snap action; single or dual 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:	 Nickel plated aluminum Buna-N (standard) 416 stainless steel Anodized aluminum
Electrical Connection:	18” free leads (terminal block on “T” model)
Enclosure Ratings:	NEMA 3
Pressure Connection:	1/4” - 18 NPT female

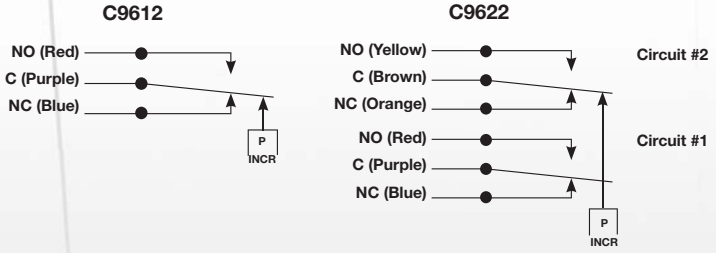
* See product configurator for additional options.

Approvals: UL/CSA (optional):	 UL File E42816 Class 3231 02, File No. 022355-0-000
Temperature Range: Operating: Storage:	 -20° to +165°F (-29° to +74°C) -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: C9622 Models: TC9622 Models	 2.5 lbs. approximate 3.0 lbs. approximate 3.5 lbs. approximate

Wiring Code

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

Wiring Diagram



Barksdale CONTROL PRODUCTS
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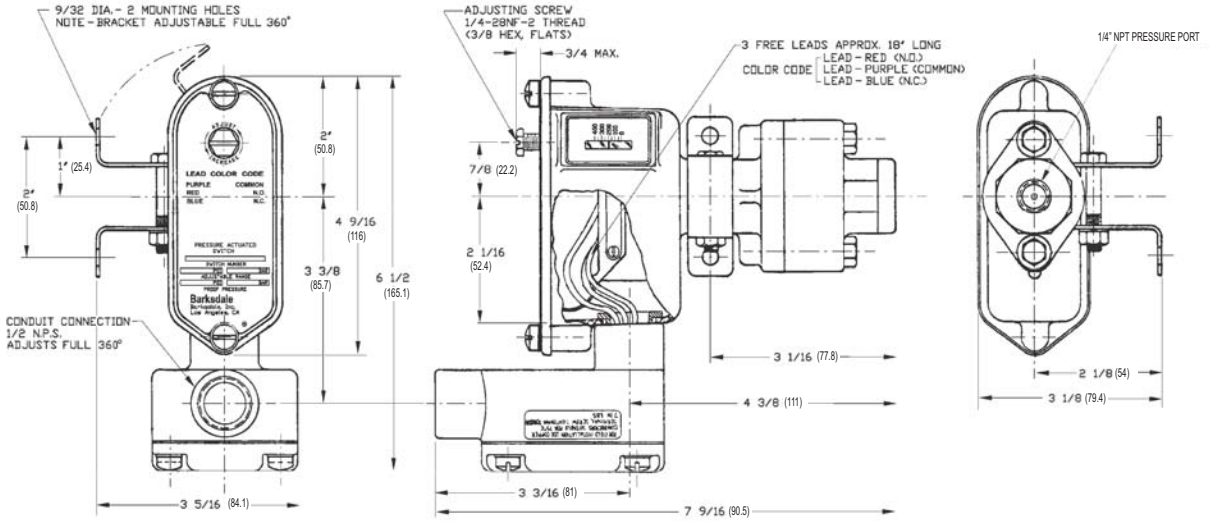
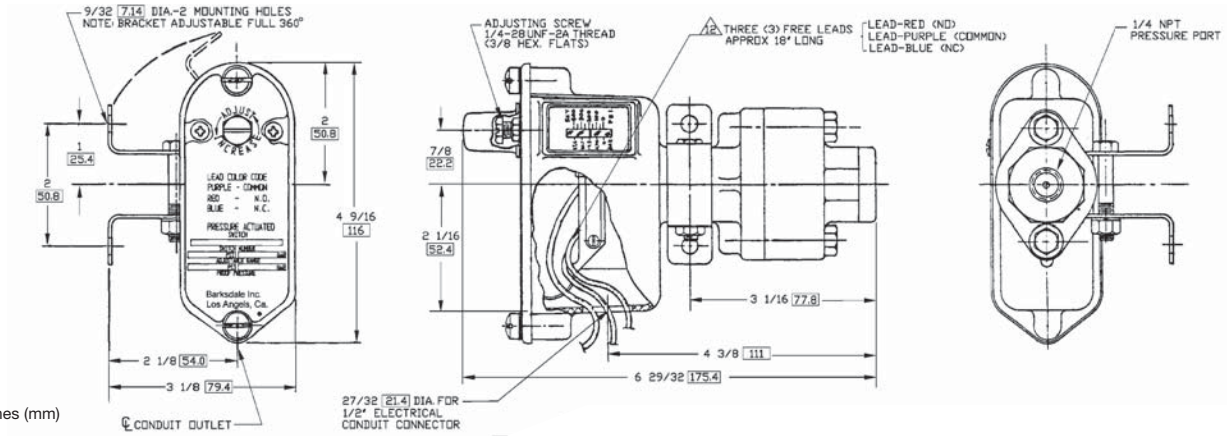
Technical Drawing

TC9612



C9612



Dimension in inches (mm)

Product Configurator

Example	T	C9612	-3	-V	-Z1

Options

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

T	JIC Junction Box with Terminal Strip (Optional)

Base Model

C9612	Single Setpoint
C9622	Dual Setpoint

O-Ring

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)
-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)

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Barksdale CONTROL PRODUCTS

Bourdon Tube Switch

Series B1S, B2S, B1T, B2T

Features

- High accuracy
- High proof pressure up to 24,000 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.
Accuracy[1]:	± 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: Enclosure:	 316 series stainless steel Anodized aluminum
Electrical Connection: Stripped Model: Housed Model:	 21" Free Leads Internal terminal strip via conduit connection
Enclosure Ratings: Housed Model:	 NEMA 4

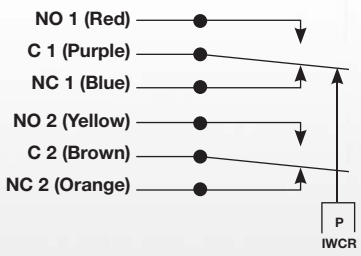
Pressure Connection:	Housed models with proof pressure up to 7,200 psi and stripped models with proof pressure up to 6,000 psi; 1/4" NPT female; All higher pressure ranges: superpressure fitting for 1/4" O.D. tube.
Approvals: UL/CSA (optional):	 UL File E42816 Class 3231 02; File No. 022355-0.000
Temperature Range: Operating:	 -40° to +165°F (-40° to +74 °C)
Adjustment Instructions:	Turn adjustment screw clockwise to lower setpoint, counterclockwise to raise setpoint
Options:	-UL/CSA approval (max rating 300 VAC) -NEMA 4X -Temperature stabilization and pre-cycle -Cleaned for oxygen service
Shipping Weight: Stripped Model: Housed Model:	 1.5 lbs. approximate 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



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CONTROL PRODUCTS
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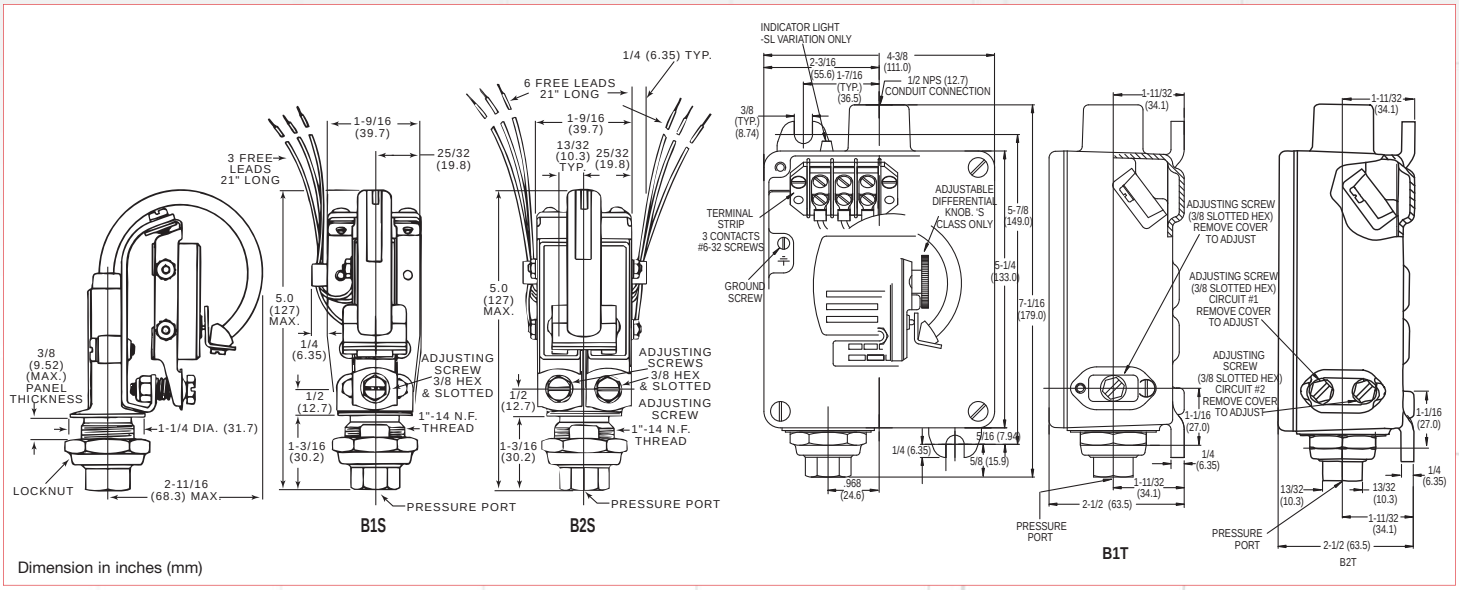
Technical Drawing



Dimension in inches (mm)

Product Configurator

Example	H	B1T	-AA	180	SS		

H	Hermetically sealed limit switch option (requires AA, CC, GH or HH limit switch)

Series

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

Limit Switch[1]

-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
-H	10 amps @ 125/250/480 VAC; 0.1 amps @ 125VDC; 0.05 amps @ 250 VDC
-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
-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
-TC	Temperature cycling and stabilization
-Wxxx	Extra wire length (XXX = inches)
-Sxxx	Factory preset (consult factory)

Process Connection

Blank	1/4" NPT for 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)

SS	Stainless steel bourdon tube

Pressure Range[5]

	Adjustable Range				Approx. Deadband [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)	24000 (1632)	20000 (1379)

[1] Consult sales drawings for specific deadband values
[2] Deadband values indicated when used with the "standard" limit switch
[3] Limited to CSA approval with '-CS' option
[4] Limited to 300VAC
[5] Subject to change

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Barksdale CONTROL PRODUCTS

Explosion Proof Bourdon Tube

Series B1X, B2X

Features

- High accuracy, high proof
- Explosion-proof housing
- Hermetically sealed
- Tamper-proof setpoint adjustment
- Dual set point capability
- UL, CSA, ATEX approved
- NEMA 4, 7, 9 & IP65

Applications

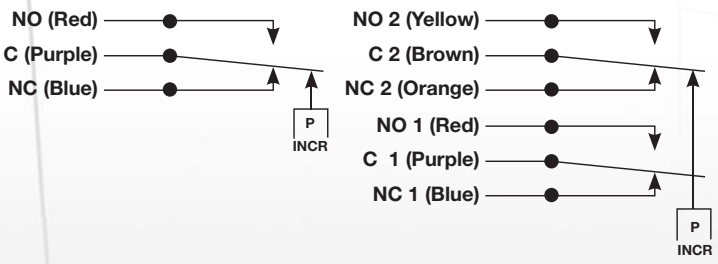
- Power plants
- Water pumps
- Blow out preventers (BOP)
- Pneumatic devices
- General industrial applications
- Oil and gas applications

General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements.
Accuracy[1]:	± 1% of the adjustable range
Switch: Type: Rating:	 Single pole double throw (SPDT) snap action; single or dual circuit 3 amps @ 480 VAC (standard)
Wetted Parts: Process Fitting & Bourdon Tube: Enclosure:	 316 series stainless steel 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): ATEX (optional):	 UL File No.#E37043; CSA File No. #LR22354 Hazardous Locations, Class I Division I, Groups B, C, & D; Class II Groups E, F, & G Ex models are ATEX certified per ISSeP 03 ATEX 122XC & marked as follows: CE 0081 Ⓔx II2 GD EEX d IIC T6, T85°C, IP65 -40°C ≤ Tamb ≤ 75°C

Temperature Range: Operating:	 -40° to +165°F (-40° to +74°C)
Adjustment Instructions:	Turn adjustment screw clockwise to lower actuation point (remove protective hex cap to remove adjustment screw)
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:	8.5 lbs. approximate

Wiring Diagram



* See product configurator for additional options.
[1] ±1% for 32-110°F; ±2% for > 110°F; -2/+3°F for <32°F

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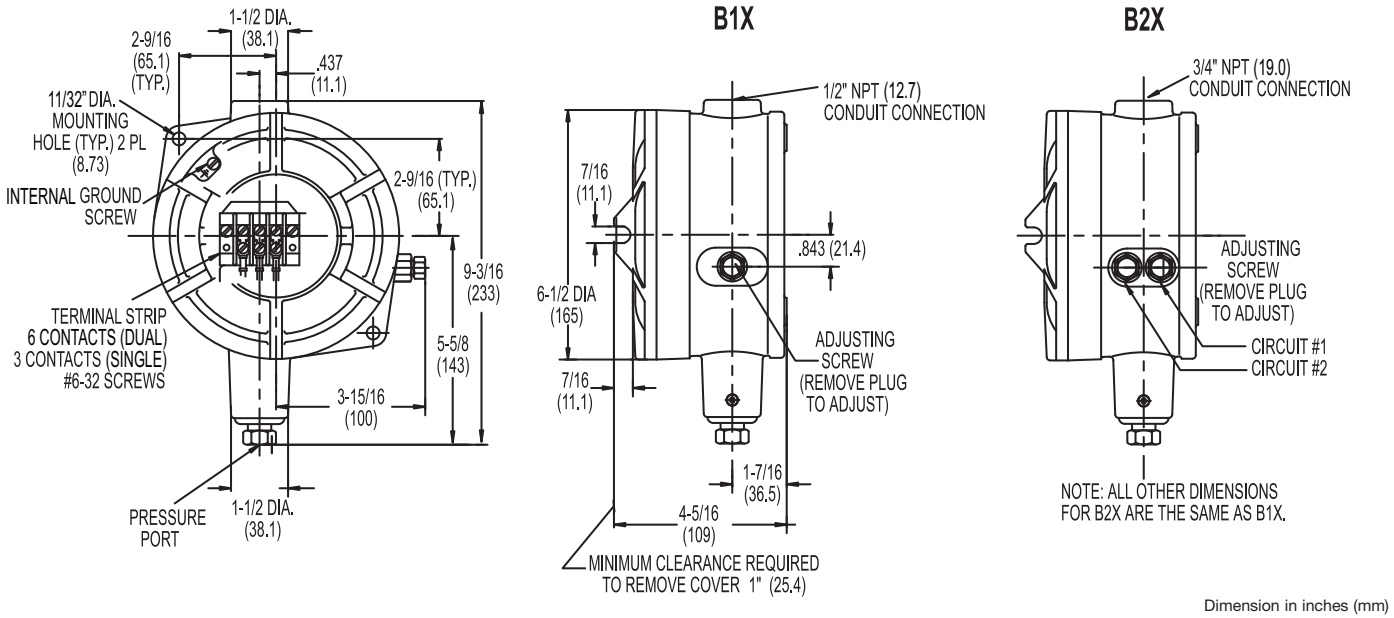
Technical Drawing



Dimension in inches (mm)

Product Configurator

Example		B1X	-H	-32	SS	-P2	-UL

Prefix

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

Series

B1X	Single setpoint
B2X	Dual setpoint

Limit Switch[1]

-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)
-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
-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
-GH	Hermetically sealed; 1 amp @ 125 VAC with gold contacts
-HH	Hermetically sealed; 5 amps @ 125/250 VAC

Pressure Range[4]

	Adjustable Range				Approx. Deadband[2] (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)

Option

-EX	ATEX certified, -EX inplace 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[3]	1/2" NPT female pressure fitting

SS	Stainless steel bourdon tube

[1] Consult sales drawings for specific deadband values
[2] Deadband values indicated when used with the "standard" limit switch
[3] Consult sales drawings for dimensions
[4] Pressure range subject to change

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Barksdale CONTROL PRODUCTS

Global Presence

Global Presence

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