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.

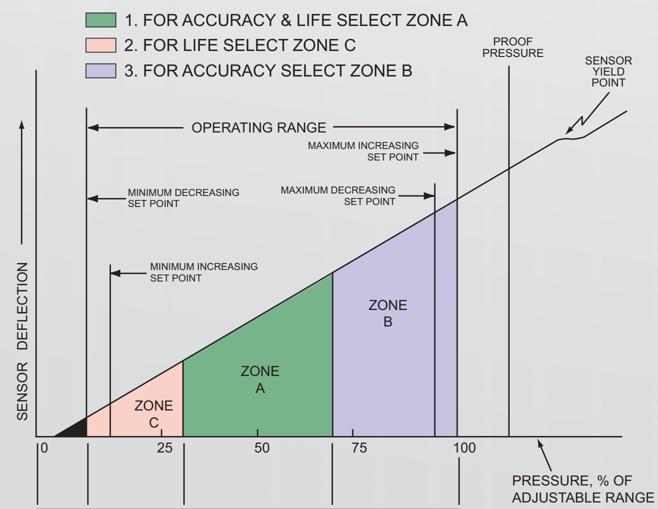
Housed pressure switches are completely enclosed to avoid possible hazard from loose wires in exposed locations.

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.

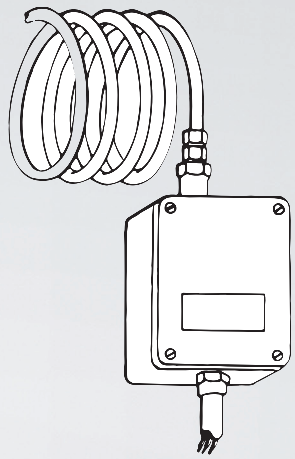


ACCURACY	POOR	FAIR	VERY GOOD	EXCELLENT
LIFE	EXCELLENT		VERY GOOD	FAIR

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

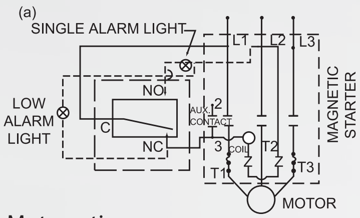
Barksdale housed and explosion proof pressure switches intended for use in hostile and/or corrosive environments can be painted with green epoxy paint (color per Federal Standard 595A #24300). The complete switch is painted after assembly and test at Barksdale. For best results, exposed metal surfaces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

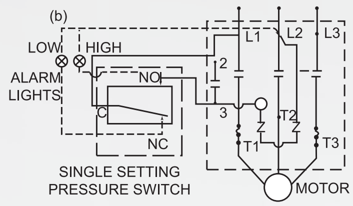
Typical Wiring Diagrams

Single Pressure Control

1. Low-Voltage Release

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



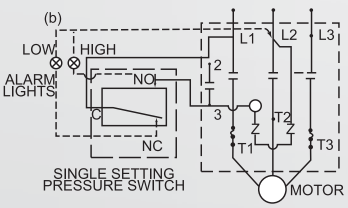


Motoraction

(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

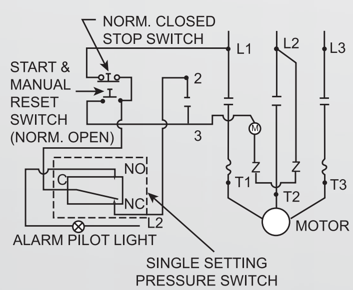
2. Low-Voltage Protection

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

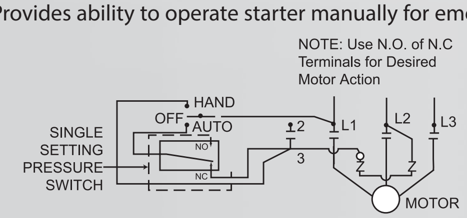
3. High or Low Level Shut-down Electrical Manual Reset with Alarm-Low Voltage Protection



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.

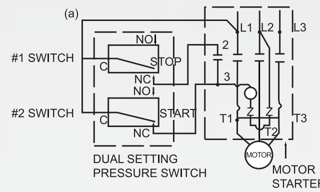


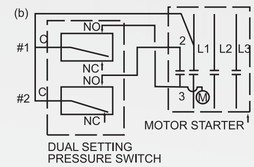
"Auto" position pressure switch controls motor.
"Hand" position bypasses pressure switch and motor runs continuously.
"Off" position motor cannot run.

High/Low Pressure Control

5. Low Voltage Release

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



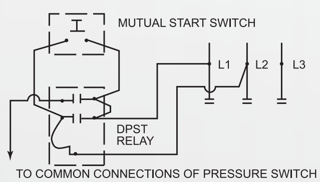


Motoraction

(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

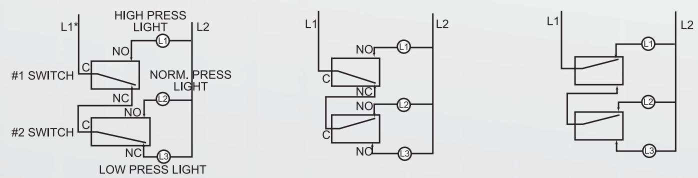
Starter drops out when voltage fails but does not start when voltage is restored because relay will open. Manual start switch will close relay again.



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

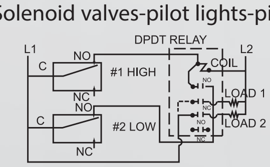
To show remotely the Press. condition in system

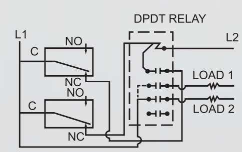


Condition: Pressure level at or below low; Pressure low; Pressure light on, others off	Condition: Pressure normal, normal; Pressure light on, others off	Condition: Pressure at or above high; Pressure high; Pressure light on, others off

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	(a) At low 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	(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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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	A	B	C	E	H	M	GH
		Approximate Actuation Value (Differential, Dead Band, Hysteresis) by Class of Electrical Switch						
— 2SS	3.00	—	—	—	—	0.02 to 0.05	0.03 to 0.18	.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)	A	B	C	D	E	H	J	K	M	GH
		Approximate Actuation Value (Differential, Change to Reset) by Class of Electrical Switch									
— 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.

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Electrical Ratings

(Current Given in Ampere)

A.C. RATINGS (60 Cycles)
All altitudes to 45,000 feet
30° C Maximum temperature rise.

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

*50% Power Factor

D.C. RATINGS
All altitudes to 45,000 feet

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

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

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

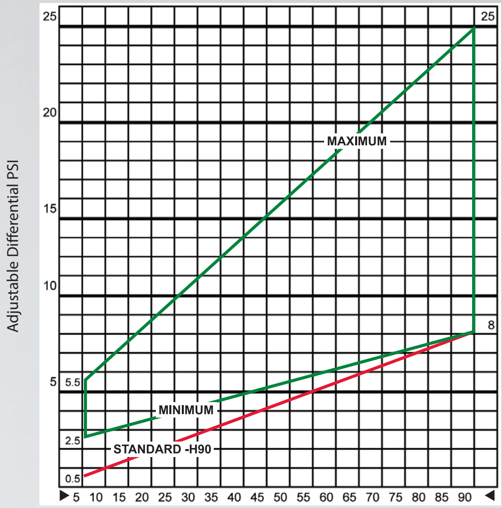
- Class GH switches are SPDT with gold contacts.
- Class R & S switches are SPDT with fine silver contacts and adjustable differentials.
- All other switch classes are SPDT with fine silver contacts and fixed differentials.
- Class A, H & M switches meet humidity requirements of MIL-S-6743.

How to Select Adjustable Differential from Charts

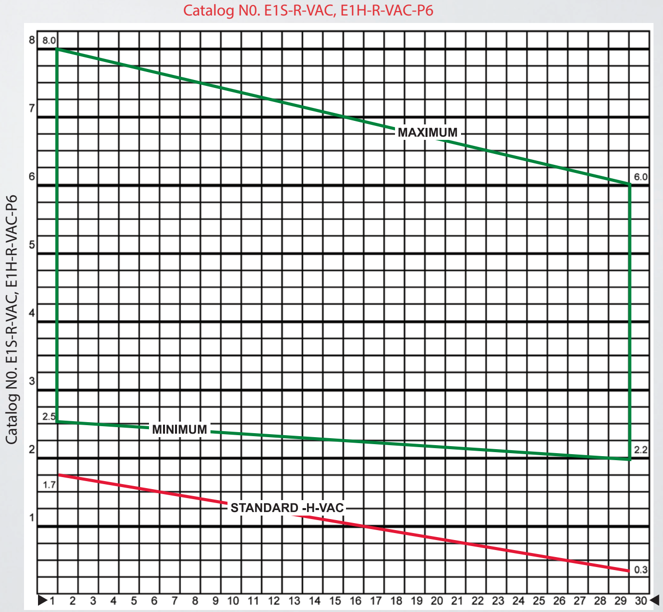
Econ-O-Trol Models

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

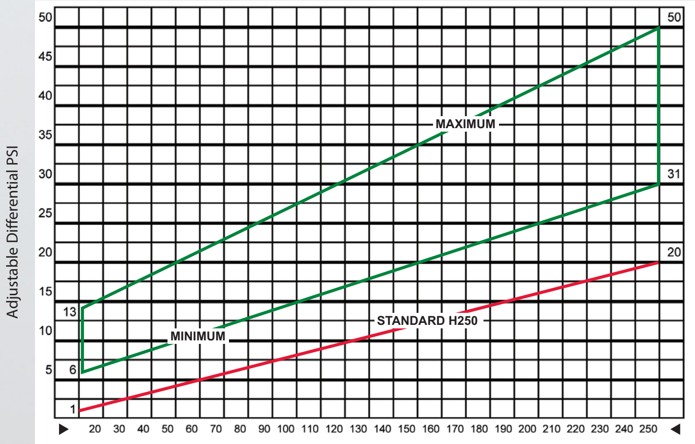
Catalog No. E1S-R90, E1H-R90



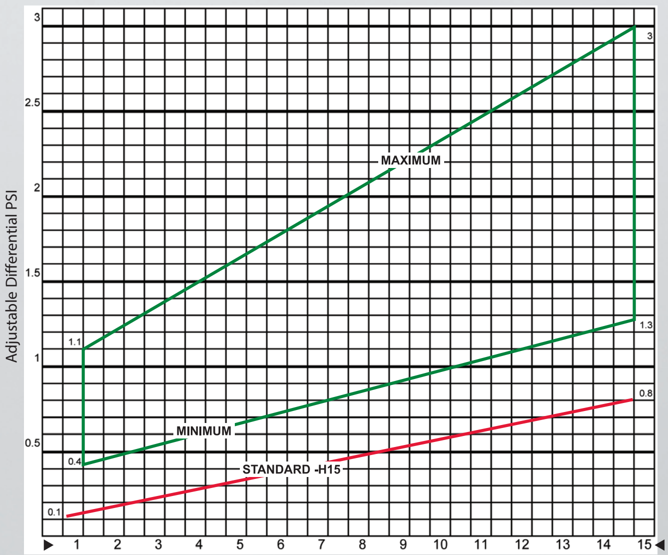
Catalog N0. E1S-R-VAC, E1H-R-VAC-P6



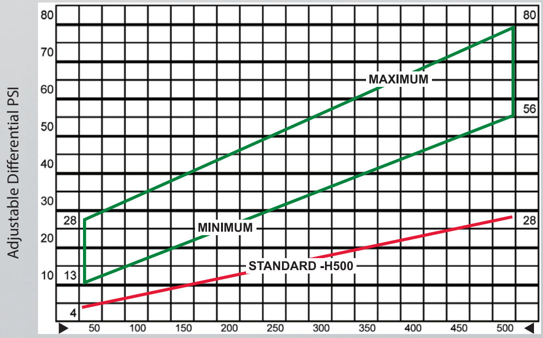
Catalog N0. E1S-R250, E1H-R250



Catalog No. E1S-R15, E1H-R15



Catalog N0. E1S-R500, E1H-R500



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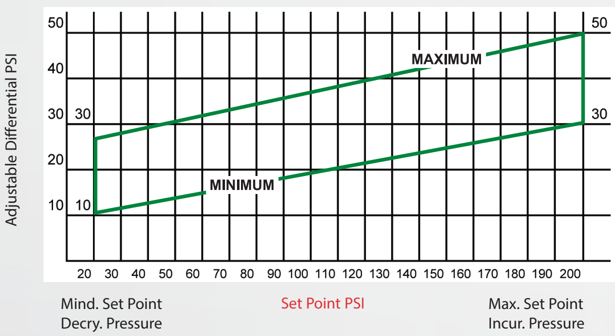
How to Select Adjustable Differential from Charts

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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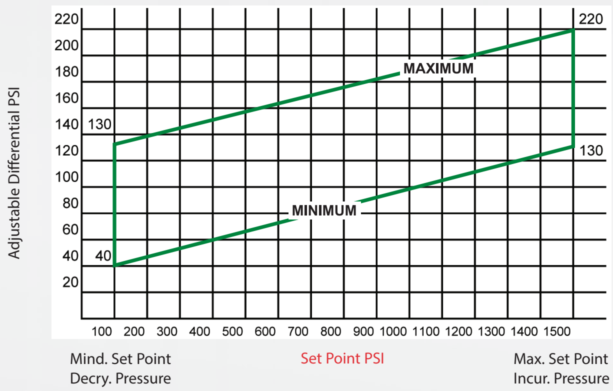

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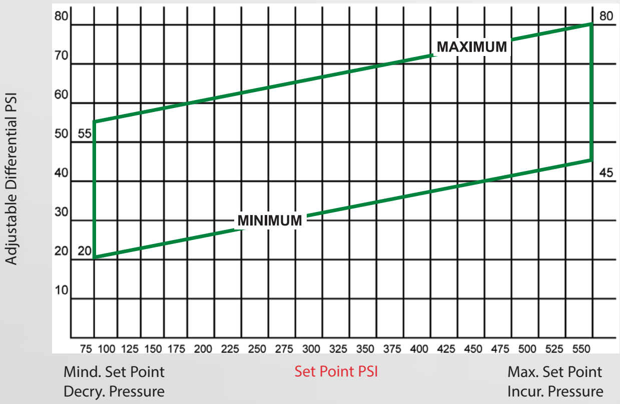
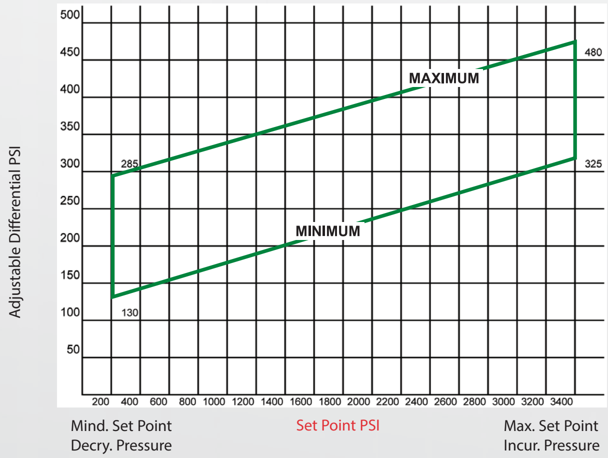


Catalog No. A9675-3-AA



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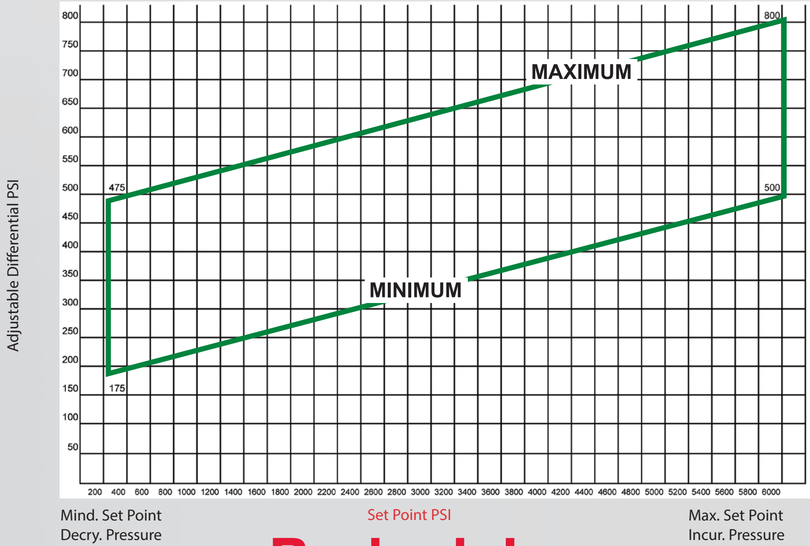

Trouble-Shooting Pointers

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.

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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.

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