

Pressure and Differential Pressure Switches, Watertight Enclosure, Type 400, B-Series

This general purpose Ashcroft® switch series is ideal for use in virtually all Industrial and OEM applications.

- Watertight NEMA 4X enclosure, IP66
- Choice of switch elements for all applications, including hermetically sealed
- Wide choice of wetted materials, including all-welded Monel or stainless steel
- Fixed or limited adjustable deadband
- Approved for UL, CSA and FM ratings

1 - ENCLOSURE

B4 - Pressure switch, type 400, watertight enclosure meets NEMA 3, 4, 4X and 13, IP66 requirements

D4 - Differential pressure switch, type 400, watertight enclosure meets NEMA 3, 4, 4X and 13, IP66 requirements

2 - SWITCH ELEMENTS

Order Code	Description/Maximum Electrical Ratings UL/CSA listed SPDT	
20 ⁽⁴⁾	Narrow deadband	15A, 125/250 Vac
21	Ammonia service	5A, 125/250 Vac
22 ⁽³⁾	Hermetically sealed switch, narrow deadband	5A, 125/250 Vac
23	Heavy duty ac	20A, 125/250 Vac
24 ⁽¹⁾	General purpose	15A, 125/250/480 Vac 1/2A, 125 Vdc 1/4A, 250 Vdc
25	Heavy duty dc	10A, 125/ Vac or dc 1/8HP 125/ Vac or dc
26 ⁽⁴⁾	Sealed environment proof	15A, 125/250 Vac
27	High temp. 300°F	15A, 125/250 Vac
28	Manual reset trip on increasing	15A, 125/250 Vac
29	Manual reset trip on decreasing	15A, 125/250 Vac
31	Low level (gold) contacts	1A, 125/250 Vac
32	Hermetically sealed switch, general purpose	11A, 125/250 Vac 5A, 30 Vdc
50	Variable deadband	15A, 125/250 Vac

UL/CSA listed dual SPDT⁽²⁾

61 ⁽⁴⁾	Dual narrow deadband	15A, 125/250 Vac
62 ⁽⁴⁾	Dual narrow environment proof	15A, 125/250 Vac
63	Dual high temp. 300°F	15A, 125/250 Vac
64	Dual general purpose	15A, 125/250/480 Vac 1/2A, 125 Vdc 1/4A, 250 Vdc
65	Dual ammonia service	5A, 125/250/480

- Choice of actuators, including designs for fire-safe and NACE applications⁽⁶⁾

- Readily available

- Standard pressure connection materials:

Pressure psi ranges
- 316L SS

Differential psid ranges
- Nickel-plated brass

Pressure and differential inches of water ranges
- Carbon steel



3 - ACTUATOR SEAL⁽⁷⁾

Code & Material	Process Temp. ⁽⁶⁾ Limits °F	Range			
		Vac H ₂ O	0-600 psi	1000 psi	2000-3000 psi
B-Buna N	0 to 150	●	●	●	●
V-Viton	20 to 300	●	●	●	
T-Teflon	0 to 150	●	●	●	●
S-SS ⁽⁶⁾	0 to 300		●	●	
P-Monel ⁽⁶⁾	0 to 300		●	●	

4 - OPTIONS

See page 163-164

5 - STANDARD PRESSURE RANGES

See page 160

NOTES:

1. Standard switch.
2. Dual switches are 2 SPDT snap-action switches not independently adjustable.
3. Estimated dc rating, 2.5A, 28 Vdc (not UL listed).
4. Estimated dc rating, .4A, 120 Vdc (not UL listed).
5. Available on pressure only.
6. Ambient operating temperature limits -20 to 150°F, all styles. Setpoint shift of ±1% of range per 50°F is normal.
7. Items are wetted by process fluid.
8. Refer to Option Table.

TO ORDER THIS B-SERIES PRESSURE SWITCH:

Select: **B4 20 B XPK 600 psi**

1. Enclosure: _____
2. Switch Element: _____
3. Actuator Seal: _____
4. Options (page 163-164): _____
5. Pressure Range (page 160): _____

PRESSURE SWITCH OPTIONS (ALL SERIES)										
OPTION CODE	DESCRIPTION	SWITCH SERIES								NOTES
		A	B	L	P	G	H	F	N	
XBE	Bendable extension probe		●	●	●	●				Temperature switches only.
XBH	Brad Harrison connector		●	●	●	●			●	9-pin B-H P/N 47005.
XBP	Wall mounting bracket (~H ₂ O)		●	STD	STD	STD				
XBX	69C bushing (St. St.)									Assembled to capillary. Remote Temperature only
XCH	Chained cover		●	●	●	●	●		●	
XCN	Cenelec approval on 700 Series		●							
XC8	CSA approval		●		●					Standard on NEMA 4 enclosures. F series and A series.
XEC	Epoxy coating							●		
XFM	FM approval – Single element – Dual element		●	●						N/A on compound ranges.
XFP	Fungus proofing		●	●	●	●	●	●	●	
XFS	Factory adjusted setpoint		●	●	●	●	●	●	●	Setpoint must be given as well as increase or decrease
XG3	Belleville actuator		●							
XG4	Teflon actuator and pressure connection psi ranges		●	●	●	●				Available in 30-600 psi ranges only.
XG5	Gas/oil UL limit differential pressure control to 150" H ₂ O		●	●						Buna N and Viton diaphragm only. L series single setpoint only.
XG6	Gas/oil UL limit pressure control to 600 psi		●	●						Buna N and Viton diaphragm only. L series single setpoint only.
XG7	Special actuator with redundant seal design (SS primary diaphragm)		●	●	●	●				
XG8	Steam limit pressure control to 300 psi		●	●						Stainless steel or Viton diaphragm only.
XG9	Fire safe actuator		●	●	●	●				
XHF	Hastelloy C pressure connection		●	●	●	●				Select elastomer diaphragm also.
XHS	High static differential		●	●	●	●				Available with Buna N and Viton diaphragms only.
XHX	40 psi static pressure/dp only 160 psi proof pressure/dp only 100 psi proof pressure/press only Inches of water ranges		●	●	●	●				
XJK	Left side conduit connection		●	●			●		●	Standard on 700 series. N/A with DPDT element on 400 series.
XJL	¾" to ½" conduit reducing bushing		●	●	●	●	●		●	
XK3	Terminal block		●	●	●	●		●		Terminal blocks standard with dual switches on 700 series. N/A on 400 series.
XLE	Long leads on the micro switch	●	●	●	●	●	●	●		Per foot per micro switch.
XL9	Low hardness SS pressure conn.		●	●	●	●				N/A on 3000 psi ranges, Teflon only.
XMD	Metric range on label		●							Required on N7 switches only.
XNH	Stainless steel tagging		●	●	●	●	●	●	●	
XNN	Paper tag		●	●	●	●	●	●	●	Specify tag information.
XPJ	24 Vdc pilot light(s) – Single – Dual		●	●	●		●			B, L & P Nema 4 only.

PRESSURE AND DIFFERENTIAL PRESSURE SWITCHES

B-Series pressure, differential pressure and vacuum switches use two different actuators depending on setpoint requirements. For setpoints between 2 and 3000 psi, the simple, rugged diaphragm-sealed piston actuator is used. This design features high reliability and choice of actuator seal materials for virtually every application. An optional welded design is also available for setpoints up to 1000 psi for maximum reliability. This design is available in

316 SS or Monel. Differential pressure models use a unique, dual diaphragm-sealed piston design that features very high static operating pressures and small size.

For setpoints between 4.5 and 150 inches of H₂O, a large diaphragm is used for increased sensitivity in both pressure and differential pressure designs with good choice of materials of construction.

All standard models feature ± 1 percent of range setpoint repeatability and a minimum of 400 percent of range proof pressures.

These standard designs perform well in applications where shock and vibration could be a problem and may be used in conjunction with Ashcroft diaphragm seals in extreme services such as slurries or abrasive process fluids.

PRESSURE/VACUUM SWITCHES

Nominal Range ⁽¹⁾			Overpressure Ratings		Approximate Deadband ⁽²⁾ Switch Element					
			Proof psi	Burst psi	20, 26, 27	21, 24, 31	50	22	32	
Vacuum										
-30" Hg	-760mm Hg	-100 kPa	250	400	0.3-0.7	1.5-3.0	0.5-2.2	0.4-1.5	2.1-4.2	
Compound										
-15" H ₂ O/ 15" H ₂ O	-375mm H ₂ O/ 375mm H ₂ O	-3.7 kPa/ 3.7 kPa	20	35	0.15-75/ 0.15-75	1.5-2.5/ 1.5-2.5	0.45-2.0/ 0.45-2.0	0.5-1.2/ 0.5-1.2	2.1-3.5/ 2.1-3.5	
-30" H ₂ O/ 30" H ₂ O	-760mm H ₂ O/ 760mm H ₂ O	-7.5 kPa/ 7.5 kPa	20	35	0.30-60/ 0.30-60	1.5-2.5/ 1.5-2.5	0.45-2.0/ 0.45-2.0	0.5-1.5/ 0.5-1.5	2.1-3.5/ 2.1-3.5	
-30" Hg/ 15 psi	-760mm Hg/ 1.0 kg/cm ²	-100 kPa/ 100 kPa	250	400	0.5-1.0/ 0.3-0.7	2.0-3.0/ 0.5-1.5	0.75-2.5/ 0.5-1.0	0.7-1.8/ 0.7-1.4	2.8-4.2/ 0.7-2.1	
-30" Hg/ 30 psi	-760mm Hg/ 2.0 kg/cm ²	-100 kPa/ 200 kPa	250	400	1.0-1.5/ 0.3-0.8	3.0-6.0/ 1.0-2.0	1.2-4.5/ 0.7-1.5	1.4-2.4/ 0.4-1.3	4.2-8.4/ 1.4-2.8	
-30" Hg/ 60 psi	-760mm Hg/ 4.0 kg/cm ²	-100 kPa/ 400 kPa	250	400	2.0-3.0/ 0.7-1.5	5.0-9.0/ 3.0-5.0	2.5-7.0/ 1.1-4.0	2.8-4.5/ 1.0-2.3	7.0-12.0/ 4.2-7.0	
Pressure										
10" H ₂ O	250mm H ₂ O	2.5 kPa	20	35	0.2-0.5	1.0-2.0	0.35-1.5	0.4-1.0	1.4-2.8	
30" H ₂ O	750mm H ₂ O	7.5 kPa	20	35	0.3-0.6	1.5-2.5	0.45-2.0	0.5-2.0	2.1-3.5	
60" H ₂ O	1500mm H ₂ O	15 kPa	20	35	0.5-1.3	1.5-3.5	0.9-2.5	0.7-3.0	2.1-5.0	
100" H ₂ O	2500mm H ₂ O	25 kPa	20	35	0.6-1.6	2.5-5.5	1.1-4.0	1.0-4.0	3.5-7.7	
150" H ₂ O	3750mm H ₂ O	37 kPa	20	35	1.0-2.5	4.5-8.5	1.7-6.5	2.0-6.0	6.0-12.0	
15 psi	1.0 kg/cm ²	100 kPa	500	1500	0.1-0.35	0.5-1.5	0.2-1.0	0.4-1.0	0.7-2.1	
30 psi	2.0 kg/cm ²	200 kPa	500	1500	0.1-0.50	0.5-1.5	0.3-1.0	0.4-1.0	0.7-2.1	
60 psi	4.0 kg/cm ²	400 kPa	500	1500	0.3-1.0	1.0-3.5	0.7-2.5	0.6-2.0	1.4-5.0	
100 psi	7.0 kg/cm ²	700 kPa	1000	3000	0.5-1.7	1.5-5.0	1.1-3.5	1.0-4.5	2.1-7.0	
200 psi	14 kg/cm ²	1400 kPa	1000	3000	1-3	5-13	2-9	3.0-7.5	7.0-18.2	
400 psi	28 kg/cm ²	2800 kPa	2400	3000	4-7.5	5-24	5.5-15	4.0-11.0	7.0-33.6	
600 psi	42 kg/cm ²	4200 kPa	2400	3000	4-11	9-30	7-20	5.0-23.0	12.6-42	
1000 psi	70 kg/cm ²	7000 kPa	12000	18000	7-30	30-110	18-70	15-80	42-154	
3000 psi	210 kg/cm ²	2100 kPa	12000	18000	15-60	80-235	37-160	30.0-230	112-329	

PRESSURE/VACUUM SWITCHES

Nominal Range ⁽¹⁾			Pressure Ratings		Approximate Deadband ⁽²⁾ Switch Element					
			Static Working Pressure	Proof psi	20, 26, 27	21, 24, 31	50	22	32	
30" H ₂ O	750mm H ₂ O	7.5 kPa	5.4	21.6	0.3-0.6	1.5-2.5	0.45-2.0	0.5-2.0	2.1-3.5	
60" H ₂ O	1500mm H ₂ O	15 kPa	5.4	21.6	0.5-1.3	1.5-3.5	0.9-2.5	0.7-3.0	2.1-5.0	
100" H ₂ O	2500mm H ₂ O	25 kPa	5.4	21.6	0.6-1.6	2.5-5.5	1.1-4.0	1.0-4.0	3.5-7.7	
150" H ₂ O	3750mm H ₂ O	37 kPa	5.4	21.6	1.0-2.5	4.5-8.5	1.8-6.5	2.0-6.0	6.3-12.0	
15 psid	1.0 kg/cm ²	100 kPa	500	2000	0.5-1.0	2.0-5.0	0.7-3.5	0.7-1.4	2.8-7.0	
30 psid	2.0 kg/cm ²	200 kPa	500	2000	1.0-2.0	2.0-5.0	1.5-3.5	1.4-2.8	2.8-7.0	
60 psid	4.0 kg/cm ²	400 kPa	500	2000	2.0-4.0	3.0-6.0	3.0-4.5	2.8-5.6	4.2-8.5	
100 psid	7.0 kg/cm ²	700 kPa	1000	4000	4.0-10.0	11.0-20.0	7.0-15.0	6.0-14.0	16.0-28.0	
200 psid	14.0 kg/cm ²	1400 kPa	1000	4000	5.0-15.0	12.0-40.0	10.0-26.0	7.0-21.0	17.0-56.0	
400 psid	28.0 kg/cm ²	2800 kPa	1000	8000	10.0-20.0	20.0-60.0	15.0-40.0	14.0-28.0	28.0-84.0	
600 psid	42.0 kg/cm ²	4200 kPa	2000	8000	20.0-40.0	80.0-150.0	30.0-115.0	30.0-56.0	112.0-210.0	

Values shown are for zero static working pressure.

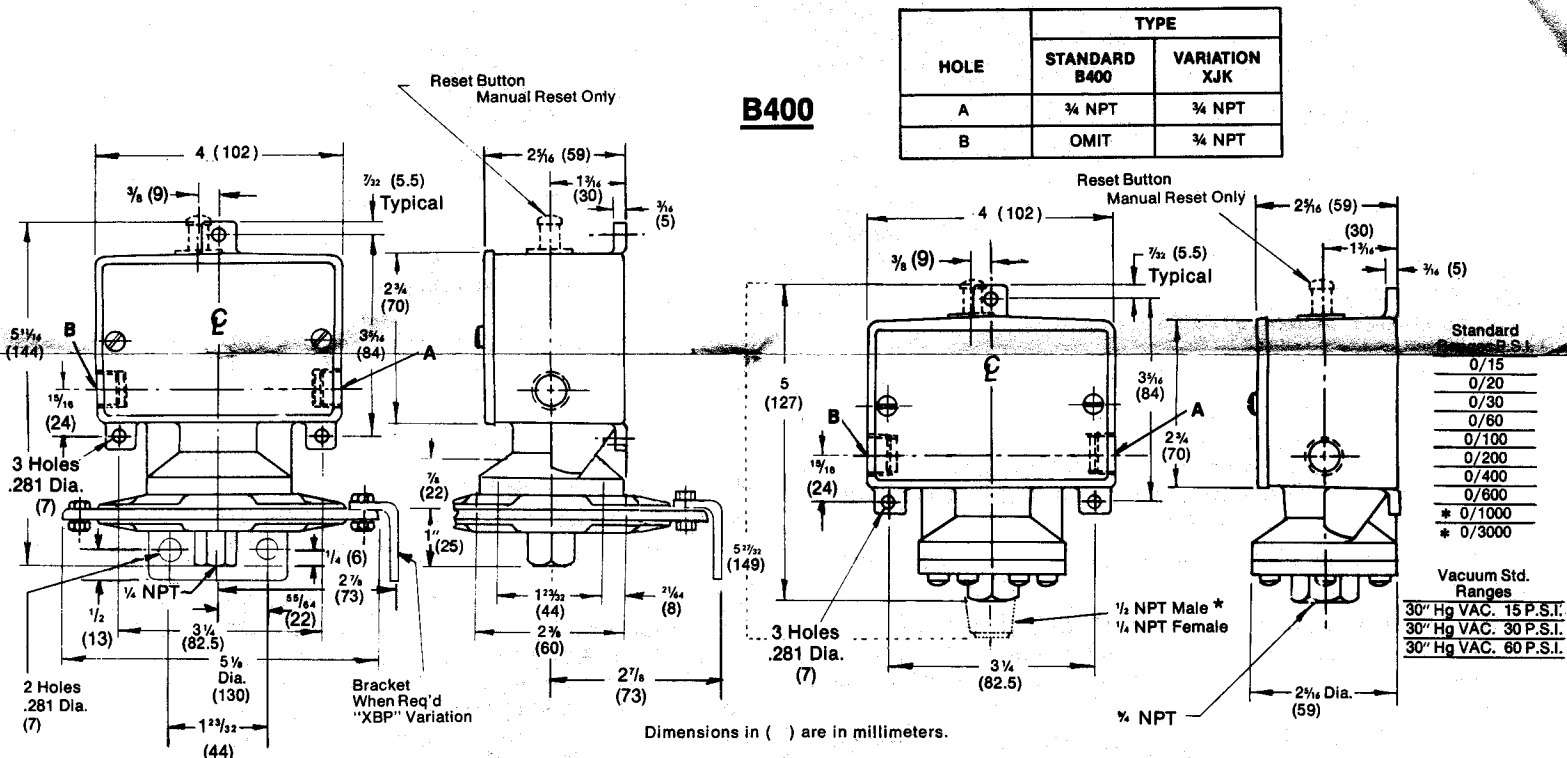
NOTES:

1 Switches may generally be set between 15% and 100% of nominal range on increasing pressure. Consult factory for applications where setpoints must be lower.

2 All deadbands are given in English units as shown in the nominal range column. Deadbands shown are for switches with Buna N diaphragm. Approximate deadbands for optional diaphragms:

Viton: Multiply Buna N value by 1.4
 Teflon: Multiply Buna N value by 1.2
 Stainless Steel: Multiply Buna N value by 1.7
 Monel: Multiply Buna N value by 1.7
 Dual Switch Element: Multiply single switch element value by 1.6 for approximate deadband.

INSTALLATION AND MAINTENANCE B400 & B700 SERIES ASHCROFT® SNAP ACTION SWITCHES FOR PRESSURE CONTROL



HOLE	TYPE	
	STANDARD B400	VARIATION XJK
A	3/4 NPT	3/4 NPT
B	OMIT	3/4 NPT

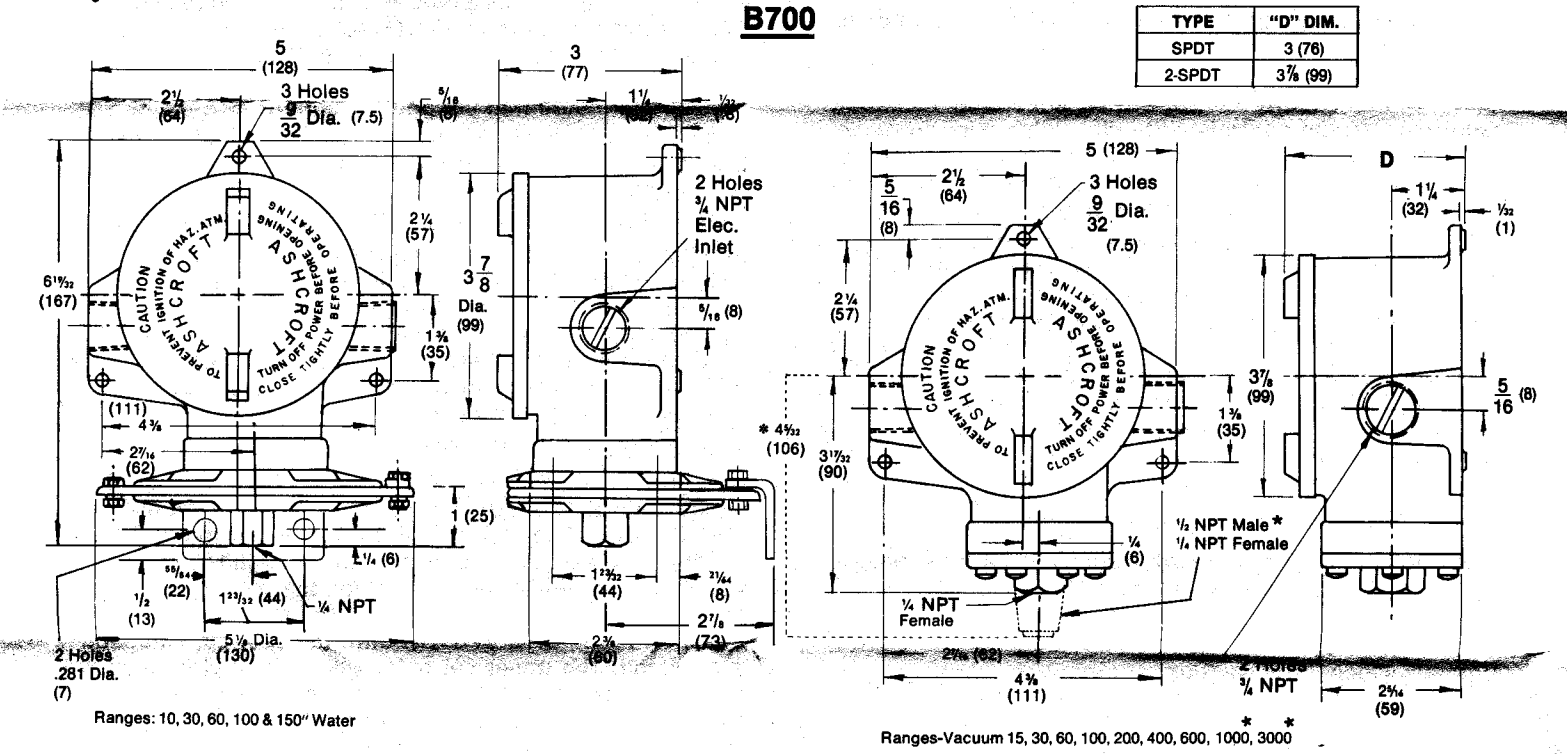
B400

Standard P.S.I.
0/15
0/20
0/30
0/60
0/100
0/200
0/400
0/600
* 0/1000
* 0/3000

Vacuum Std. Ranges
30" Hg VAC. 15 P.S.I.
30" Hg VAC. 30 P.S.I.
30" Hg VAC. 60 P.S.I.

Dimensions in () are in millimeters.

Ranges: 10, 30, 60, 100 & 150" Water



TYPE	"D" DIM.
SPDT	3 (76)
2-SPDT	3 3/8 (99)

Ranges-Vacuum 15, 30, 60, 100, 200, 400, 600, 1000, 3000

Dimensions in () are in millimeters.

INTRODUCTION

The Ashcroft pressure switch is a precision built U.L. and F.M. approved control device which features a mechanical snap action switch. Controllers are available for operation on pressure or vacuum with fixed or variable differential. Also manual reset types for operation on increasing or decreasing pressure. The manual reset types remain tripped until reset by pressing a button on top of the enclosure. Standard electrical switch is SPDT, available

with various electrical characteristics. Two SPDT switch elements mounted together are available except on variable Deadband and manual reset types. Various wetted material constructions for compatibility with a range of pressure media may be obtained.

The Ashcroft snap action pressure switch is furnished in the standard NEMA 4 and explosion-proof NEMA 7 & 9 enclosure styles. Both enclosures are epoxy coated aluminum castings.

INSTALLATION

These controls are precision instruments and should never be left with internal components exposed. During installation insure that covers are in place and conduit openings are closed except when actually working on the control.

MOUNTING B400 AND B700 SERIES

Three holes external to the enclosure for surface mounting. Location of these holes is shown on the general dimension drawing. They may also be mounted directly on pressure line using the pressure connection. **When tightening control to pressure line, always use the wrench flats or hex on the lower housing.**

ELECTRICAL CONNECTIONS

Remove cover

B400 Series — two screws hold cover to enclosure

B700 Series — cover unscrews

CONDUIT CONNECTIONS

NOTE — It is recommended that Teflon tape or other sealant be used on conduit, bushing or plug threads to ensure integrity of the enclosure.

B400 series standard — one 3/4" NPT conduit hole right side.

B700 series standard — two 3/4" NPT conduit holes with one permanent plug. NEMA 7 & 9 enclosures require proper conduit seals and breathers as per the National Electrical Code.

B400 & B700 series — XJL variation — two 3/4" NPT conduit holes with two 3/4" to 1/2" NPT reducing bushings.

B400 series — XJK variation — two 3/4" NPT conduit holes.

B400 SERIES

SPDT — Wire directly to the switch according to circuit requirements. On controls with pilot lights wire lights according to circuit diagram on inside of cover. See special wiring instruction tag for single switches with two pilot lights and dual switches with one or more lights.

2-SPDT — Dual switching elements consist of two SPDT switches mounted together in a bracket. Switches are calibrated to have simultaneous operation within 1% of range either on increasing or decreasing pressure but not in both directions. Wire directly to the front and rear switch according to circuit requirements. Leads are provided on rear switch color coded as follows:

Common	— White
Normally Closed	— Red
Normally Open	— Blue

See SPDT instructions for pilot light hook-up.

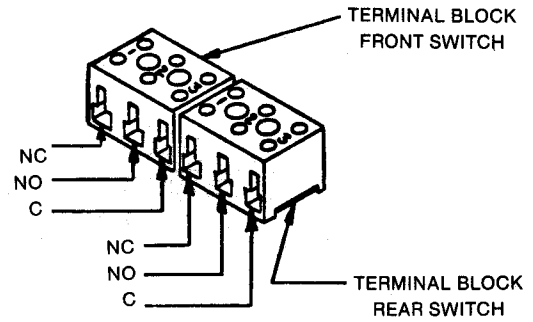
When hermetically sealed switch elements (s) are supplied, the lead color coding is as follows:

Common	— White
Normally Closed	— Red
Normally Open	— Blue

B700 SERIES

SPDT — Wire directly to the switch according to circuit requirements.

2-SPDT — Wire to front switch terminal block (left) and rear switch terminal block (right) as marked. Strip insulation 3/16", insert in proper terminal connector and tighten clamping screw to secure.



ADJUSTMENT OF SET POINT

B400 & B700 Series — A single set point adjustment nut (1/8") is located centrally at the bottom on the inside of the enclosure.

For accurate set point calibration, mount the switch on a calibration stand, a pump or catalog No. 1305 deadweight gauge tester. A suitable reference standard such as an Ashcroft Duragauge or Test Gauge is necessary to observe convenient changes in pressure.

As received, the pressure switch will normally be set to approximately 90% of the indicated range. Pressurize the system to required set point and turn the adjustment nut until switch changes mode. Direction of turning is indicated on a label affixed to the inside of the control enclosure. When set point has been achieved raise and lower pressure to insure that set point is correct.

After installation of the control replace cover to insure electrical safety and to protect internal parts from the environment.

B450 and B750 VARIABLE DEADBAND SWITCHES

Deadband is varied by rotating the wheel on the precision switch. When viewed from the front of the enclosure, rotation to the left increases deadband—rotation to the right decreases deadband. Letters on the wheel may be used as a reference. Deadbands obtainable will vary from 0.5% to 9% of pressure range depending on range segment and type of diaphragm.

ADJUSTMENT OF SET POINT

As received, the pressure switch will normally be set to approximately 90% of range. Rotate the wheel on the MICRO SWITCH all the way to the right; this will provide smallest deadband. Pressurize the system to the required set point and turn the adjustment nut until the switch changes mode. Lower the pressure to reset the switch. Rotate the wheel on the MICRO SWITCH until the desired deadband is obtained. The upper set point will be changing upward with this adjustment. Lower the pressure to reset the switch. Then increase the pressure to the desired set point and turn the adjusting nut until the switch changes mode. Lower the pressure and check reset point and deadband.

NOTE—As indicated above, adjustment of set point is made by use of 1/8" nut. Precision switch element mounting screws and bracket adjusting screw are factory sealed and should not be tampered with.



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