

## Data Sheet

# B-Series Switches – Pressure, Differential Pressure & Hydraulic

### FEATURES

- Adjustable setpoints 15-100% of range
- Fixed or limited adjustable deadband
- Wide selection of switch elements
- Explosion proof enclosure provides uncompromising protection
- Special designs for NACE & fire applications
- SIL 3 Capable (B and D series only)

### TYPICAL USES

- Offshore oil rigs
- Chemical and petrochemical plants
- Pulp and papermills
- Steel mills
- Power plants
- Water and sewage-treatment plants
- Other corrosive environments



### SPECIFICATIONS


Setpoint:	Factory set or field adjustable
Setpoint Repeatability:	±1% of full range (Additional setpoint shift of ±1% of range per 50 °F from initial setpoint set at 70 °F typical)
Enclosure Rating:	B4/Hydraulic: NEMA 4X, IP66 B7: NEMA 7/9, IP66
Enclosure Material:	Epoxy coated aluminum (standard) Optional: 316 stainless steel (NEMA 7/9 only)
Diaphragm Material:	Buna N, Viton, Teflon, SS, Monel
Pressure Connection:	¼ NPT Female (standard) Optional: ½ NPT Female , ¼ NPT Female & ½ NPT Male combo
Electrical Output:	SPDT or DPDT
Electrical Termination:	¾ NPT Female (standard) Optional: ½ NPT Female
Ambient Temperature Range:	-20°F to 150°F (-19 °C to 65 °C) All units calibrated at 70 °F
Process Temperature:	0 °F to 150 °F (Buna N or Teflon diaphragm) 20 °F to 300 °F (Viton diaphragm) 0°F to 300°F (SS or Monel diaphragm)
Pressure Ranges:	Pressure: Vac-3000# Differential: 0-600#D Hydraulic: 1000-7500#
Approvals:	UL E34743 (B4/D4) E38812 (B7/D7) CSA: 55541 ATEX: Sira 02ATEX1391X (B7/D7 with XCN) IECEX SIR 14.0077X FM: Limit Control and Steam Limit Control



SIL 3 CAPABLE

- Highly reliable
- Designed for use in wide range of applications
- Pressure ranges from vacuum to 7500 psi

 FACTORY SEALED  LISTED  
CLASS I DIV 1 GROUPS B, C, & D  
CLASS II DIV 1 GROUPS E, F, & G

 Sira 02ATEX1391X  SIR 14.0077X  
II 2GD  
Ex d IIC T6 Gb  
Ex tb IIIC T85°C Db  
Ta = -20 °C to +60°C

## Data Sheet

# B-Series Switches – Pressure, Differential Pressure & Hydraulic

### PRESSURE, DIFFERENTIAL PRESSURE & HYDRAULIC RANGES

PRESSURE/VACUUM RANGES <sup>(1)</sup>			Overpressure Ratings		Approximate Deadband Switch Element <sup>(2) (4)</sup> Buna-N Diaphragm				
Nominal Pressure			Proof psi	Burst psi	20, 26, 27	21, 24, 31	50	22	32, 42
<b>Vacuum</b>									
30IMV	-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
<b>Compound</b>									
15IWV/15IW	-375mm H <sub>2</sub> O/375mm H <sub>2</sub> 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
30IWV/30IW	-760mm H <sub>2</sub> O/760mm H <sub>2</sub> 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
30IMV/15#	-760mm Hg/ 1.0 kg/cm <sup>2</sup>	-100 kPa/100 kPa	250	400	0.5-1.0/0.3-0.7	2.0-3.0/0.3-0.7	0.75-2.5/0.5-1.0	0.7-1.8/0.7-1.4	2.8-4.2/0.7-2.1
30IMV/30#	-760mm Hg/1.0 kg/cm <sup>2</sup>	-100 kPa/ 200 kPa	250	400	1.0-1.5/0.3-0.8	3.0-6.0/0.3-0.8	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 IMV/60#	-760mm Hg/4.0 kg/cm <sup>2</sup>	-100 kPa/ 400 kPa	250	400	2.0-3.0/0.7-1.5	5.0-9.0/3.0-5.0	2.5-7.0/3.0-5.0	2.8-4.5/3.0-5.0	7.0-12.0/4.2-7.0
<b>Pressure</b>									
10IW	250mm H <sub>2</sub> 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
30IW	750mm H <sub>2</sub> 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
60IW	1500mm H <sub>2</sub> 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
100IW	2500mm H <sub>2</sub> 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
15IW	3750mm H <sub>2</sub> 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#	1.0 kg/cm <sup>2</sup>	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#	2.0 kg/cm <sup>2</sup>	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#	4.0 kg/cm <sup>2</sup>	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#	7.0 kg/cm <sup>2</sup>	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#	14 kg/cm <sup>2</sup>	1400 kPa	1000	3000	1-3	5-13	2-9	3.0-7.5	7.0-18.2
400#	28 kg/cm <sup>2</sup>	2800 kPa	2400	3000	4-7.5	5-24	5.5-15	4.0-11.0	7.0-33.6
600#	42 kg/cm <sup>2</sup>	4200 kPa	2400	3000	4-11	9-30	7-20	5.0-23.0	12.6-42
1000# <sup>(5)</sup>	70 kg/cm <sup>2</sup>	7000 kPa	12000 <sup>(5)</sup>	18000	7-30	30-110	18-70	15-80	42-154
3000#	210 kg/cm <sup>2</sup>	21000 kPa	12000	18000	15-60	80-235	37-160	30.0-230	112-329
<b>DIFFERENTIAL PRESSURE RANGES</b>			<b>Pressure Ratings</b>		<b>Approximate Deadband Switch Element<sup>(2) (3) (4)</sup> Buna-N Diaphragm</b>				
Nominal Pressure			Static Working Pressure	Proof psi	20, 26, 27	21, 24, 31	50	22	32, 42
30IWD	750mm H <sub>2</sub> 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
60IWD	1500mm H <sub>2</sub> 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
100IWD	2500mm H <sub>2</sub> 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
150IWD	3750mm H <sub>2</sub> 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#D	1.0 kg/cm <sup>2</sup>	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#D	2.0 kg/cm <sup>2</sup>	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#D	4.0 kg/cm <sup>2</sup>	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#D	7.0 kg/cm <sup>2</sup>	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#D	14.0 kg/cm <sup>2</sup>	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#D	28.0 kg/cm <sup>2</sup>	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#D	42.0 kg/cm <sup>2</sup>	4200 kPa	1000	8000	20.0-40.0	80.0-150.0	30.0-115.0	30.0-56.0	12.0-210.0

#### NOTES:

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

- Deadbands given are for zero static working pressure.
- For approximate deadbands for dual switch elements, multiply the single switch element by 1.6.
- Proof pressure is 4000 psi with stainless steel and monel welded diaphragms.

## B-Series Switches – Pressure, Differential Pressure

**ORDERING CODE**

 Example: **B4 20 B XPK 600#**
**Enclosure**

- B4** - Pressure switch, Type 400, watertight enclosure meets NEMA 3, 4, 4X, 13 and IP66 requirements.
- B7** - Pressure switch, Type 700, explosion-proof enclosure meets Div. 1 & 2, NEMA 7, 9 and IP66 requirements. Standard housing epoxy coated aluminum. Use variation code XYW for 316SS housing.
- D4** - Differential pressure switch, Type 400, water-tight enclosure meets NEMA 3, 4, 4X, 13 and IP66 requirements.
- D7** - Differential pressure switch, Type 700, explosion-proof enclosure meets Div. 1 & 2, NEMA 7, 9 and IP66 requirements. Standard housing epoxy coated aluminum. Use variation code XYW for 316SS housing.

**Switch Element Selection - UL/CSA Listed SPDT**

- 20** - Narrow deadband ac, 15A - 125/250 Vac. Estimated dc rating, 0.4A, 120 Vdc (not UL listed).
  - 21** - Ammonia service, 5A - 125/250 Vac
  - 22** - Hermetically sealed switch, narrow deadband, 5A - 125/250 Vac. Estimated dc. rating, 2.5A, 28 Vdc (not UL listed).
  - 23** - Heavy duty ac, 22A - 125/250 Vac
  - 24** - General purpose, 15A - 125/250/480 Vac, ½A - 125 Vdc, ¼A - 250 Vdc; 6A, 30 Vdc. (Standard switch)
  - 25** - Heavy duty dc, 10A - 125 Vac or dc, ¼ HP - 125 Vac or dc. Not available with psid ranges.
  - 26** - Sealed environment proof, 15A - 125/250 Vac. Estimated dc rating, 0.4A, 120 Vdc (not UL listed).
  - 27** - High temperature 300°F, 15A - 125/250 Vac
  - 28** - Manual reset trip on, increasing 15A - 125/250 Vac. Not available with type 700 enclosure.
  - 29** - Manual reset trip on decreasing, 15A - 125/250 Vac. Not available with type 700 enclosure.
  - 31** - Low level (gold) contacts, 1A - 125 Vac
  - 32** - Hermetically sealed switch, general purpose, 11A - 125/250 Vac, 5A - 30 Vdc
  - 42** - Hermetically sealed switch, gold contacts, 1A - 125 Vac
  - 50** - Variable deadband, 15A - 125/250 Vac
- Switch Element Selection - UL/CSA Listed Dual (2 SPDT)**
- 61** - Dual narrow deadband, 15A - 125/250 Vac. Estimated dc rating, 0.4A, 120 Vdc (not UL listed).
  - 62** - Dual sealed environment proof, 15A - 125/250 Vac. Estimated dc rating, 0.4A, 120 Vdc (not UL listed).
  - 63** - Dual high temp. 300°F, 15A - 125/250 Vac
  - 64** - Dual general purpose, 15A - 125/250/480 Vac, ½A- 125 Vdc, ¼A - 250 Vdc
  - 65** - Dual ammonia service, 5A - 125/250 Vac
  - 67** - Dual hermetically sealed switch, narrow deadband, 5A - 125/250 Vac. Wires cannot be terminated inside B400 switch enclosure. Estimated dc. rating, 2.5A, 28 Vdc (not UL listed).
  - 68** - Dual hermetically sealed switch, general purpose, 11A - 125/250 Vac 5A, 30 Vdc. Wires cannot be terminated inside B400 switch enclosure.
  - 70** - Dual low level gold contacts, 1A - 125 Vac
  - 71** - Dual hermetically sealed switch, gold contacts, 1A - 125 Vac. Wires cannot be terminated inside B400 switch enclosure.

Actuator Seal	Process Temp.	Range				Ambient operating temperature limits -20 to 150 °F, all styles, setpoint shift of ±1% of range per 50 °F temperature change is normal. Switches are calibrated at 70 °F reference
		Vac. H <sub>2</sub> O	0-600 psi	0-1000 psi	0-3000 psi	
B - Buna N	0 to 150	•	•	•	•	
V - Viton	20 to 300	•	•	•	•	
T - Teflon	0 to 150	•	•	•	•	
S - 316L	0 to 300		•	•	Available on pressure only.	
P - Monel	0 to 300		•	•	Available on pressure only.	

**Options** - Use table from page 5

**Range** - Select from table page 2

# Data Sheet

## B-Series Switches – Hydraulic\*

### ORDERING CODE

 Example: **H4 24 V XPK 3000#**

<b>Enclosure</b>		
H4 - Hydraulic pressure switch, Type 400, watertight enclosure meets NEMA 3, 4, 4X, 13 and IP66 requirements.		
<b>Switch Element Selection</b>		
20 - Narrow deadband ac, 15A - 125/250 Vac. Estimated dc rating, 0.4A, 120 Vdc (not UL listed)		
22 - Hermetically sealed switch, narrow deadband, 5A - 125/250 Vac. Estimated dc rating, 2.5A, 28 Vdc (not UL listed).		
23 - Heavy duty ac, 22A - 125/250 Vac		
24 - General purpose, 15A - 125/250/480 Vac, ½A - 125 Vdc, ¼A - 250 Vdc; 6A, 30 Vdc. Standard switch.		
25 - Heavy duty dc, 10A - 125 Vac or dc, 1/8 HP - 125 Vac or dc		
26 - Sealed environment proof, 15A - 125/250 Vac. Estimated dc rating, 0.4A, 120 Vdc (not UL listed)		
27 - High temperature 300°F, 15A - 125/250 Vac		
28 - Manual reset trip on increasing, 15A - 125/250		
29 - Manual reset trip on decreasing, 15A - 125/250 Vac		
32 - Hermetically sealed switch, general purpose, 11A - 125/250 Vac, 5A - 30 Vdc		
<b>Switch Element Selection</b>		
61 - Dual narrow deadband, 15A - 125/250 Vac. Estimated dc rating, 0.4A, 120 Vdc (not UL listed)		
62 - Dual sealed environment proof, 15A - 125/250 Vac. Estimated dc rating, 0.4A, 120 Vdc (not UL listed)		
63 - Dual high temp. 300°F, 15A - 125/250 Vac		
64 - Dual general purpose, 15A - 125/250/480 Vac, ½A- 125 Vdc, ¼A - 250 Vdc		
65 - Dual ammonia service, 5A - 125/250 Vac		
70 - Dual low level gold contacts, 1A - 125 Vac		
<b>Actuator Seal</b>		
Material	Process Temp. Limits°F	Ambient operating temperature limits -20 to 150 °F, all styles, setpoint shift of ±1% of range per 50 °F temperature change is normal. Switches are calibrated at 70 ° F reference.
V - Viton	20 to 300	Viton O-ring, stainless steel pressure connection
<b>Options</b> Use table from page 6		
<b>Range</b>		
Range psi	Adjustable Setpoint Limits psi	Proof Pressure psi
1000	150 – 1000	12,000
2000	300 – 2000	12,000
3000	450 – 3000	12,000
5000	750 – 5000	10,000
7500	1125 – 7500	10,000

\*Not all B-series hydraulic version (H4) switches are CE compliant. Consult factory for further information



## B-Series Switches – Pressure, Differential Pressure & Hydraulic

### OPTIONAL FEATURES AND ACCESSORIES

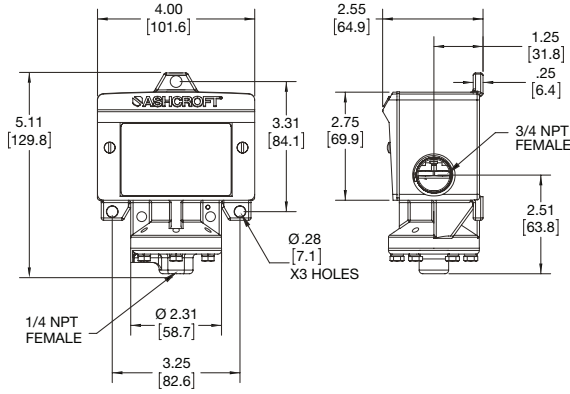
B-SERIES SWITCH OPTIONS							
Applicable Switch Series							
Code	Description	Pressure		Differential Pressure		H	
		(psi)	(in. H <sub>2</sub> O)	(psi)	(in. H <sub>2</sub> O)		
						Notes	
XBP	Wall Mounting Bracket in. H <sub>2</sub> O		•		•		
XCH	Chained Cover	•	•	•	•	•	
XC8	CSA Approval	•	•	•	•	Standard on 400 Series	
XCN	ATEX Directive 94/9/EC/IECEx Rating	•	•	•	•	700 Series only.	
XD2	Dual Seal Rating (700 Series only)	•			•		
XFM	FM Approval – Single Element	•	•	•	•	N/A on all combinations.	
	FM Approval – Dual Element	•	•	•	•	N/A on all combinations.	
XFP	Fungus Proofing	•	•	•	•	•	
XFS	Factory Adjusted Setpoint	•	•	•	•	•	Advise static or working pressure for differential pressure switches.
XG3	Belleville Actuator	•					64 or 68 element only. N/A on all combinations.
XG5	UL Limit Control to 150" H <sub>2</sub> O				•		Buna N and Viton diaphragm. N/A on all combinations.
XG6	UL Limit Control to 600 psi	•					Buna N and Viton diaphragm. N/A on all combinations.
XG7	Secondary Chamber with Vent	•					SS diaphragm required. Teflon diaphragm is the backup. NEMA 7 only.
XG8	Steam Limit Control to 300 psi	•					
XG9	Fire Safe Welded Actuator	•					Stainless steel diaphragm only.
XHS	High Static Differential Pressure			•			12 Buna N and Viton diaphragm – 15#D & 30#D only.
XHX	High Pressure, 40 psi, (static) d/p only		•		•		
	160 psi (proof) d/p only						
	100 psi (proof) pressure only ( H <sub>2</sub> O)						
XJK	Left Conduit Connection	•	•	•	•	•	Standard on 700 Series. N/A with DPDT element on 400 Series.
XJL	¾" to ½" Reducing Bushing	•	•	•	•	•	
XJM	Metric Electrical Conduit Conn. M20 x 1.5	•	•	•	•	•	
XK3	Terminal Block (700 Series only)	•	•	•	•		Terminal Blocks standard with 700 dual switches.
XLE	6 foot Leads on the Micro Switch	•	•	•	•	•	
XNH	Tagging Stainless Steel	•	•	•	•	•	
XNN	Paper Tag	•	•	•	•	•	
XPK	Pilot Light(s) Top Mounted	•	•	•	•	•	N/A on 700 Series.
XPM	¾" Sealed Conduit Connection w/16" Lead Wires	•	•	•	•	•	
XTA	316 Stainless Steel Pressure Connection for in. H <sub>2</sub> O Range		•		•		
XTM	2" Pipe Mounting Bracket	•	•	•	•		
XUD	316 Stainless Steel Pressure Conn.			•			
X06	Pressure Connection:						
	½ NPT Male, ¼ NPT Female 316 Stainless Steel (Combination)	•	•	•	•		Standard with 1000 and 3000 psi ranges. Bottom connection only on DP in H <sub>2</sub> O ranges.
X07	½ NPTF Press. Conn., 316 SS	•	•	•	•		N/A with Monel diaphragm.
X6B	Cleaned for Oxygen Service	•	•				Buna N cannot be cleaned for oxygen service.
X9F	Inches of Water Housing for Outdoor Use		•				
XYW	316SS Housing	•	•	•	•		
XMD	Metric Range on Label	•	•	•	•	•	

# Data Sheet

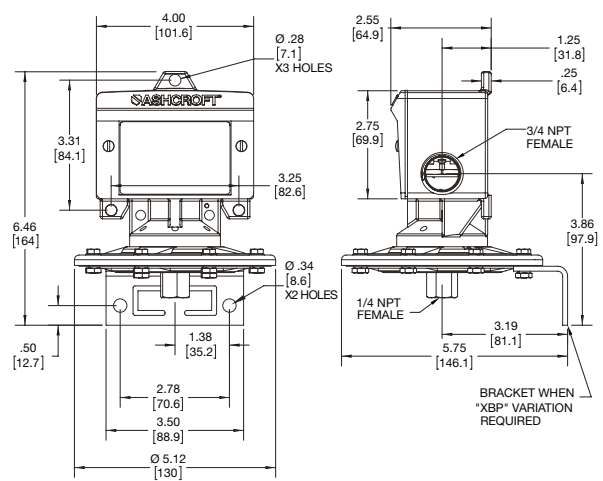
## B-Series Switches – Pressure, Differential Pressure & Hydraulic

### B 400 DIMENSIONS

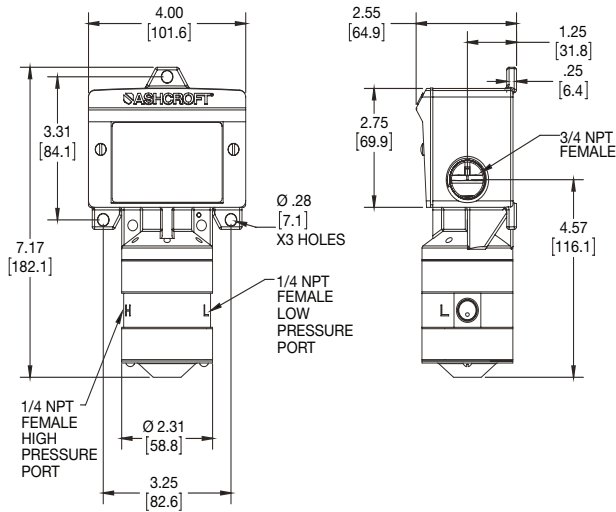
#### Pressure switch – psi ranges



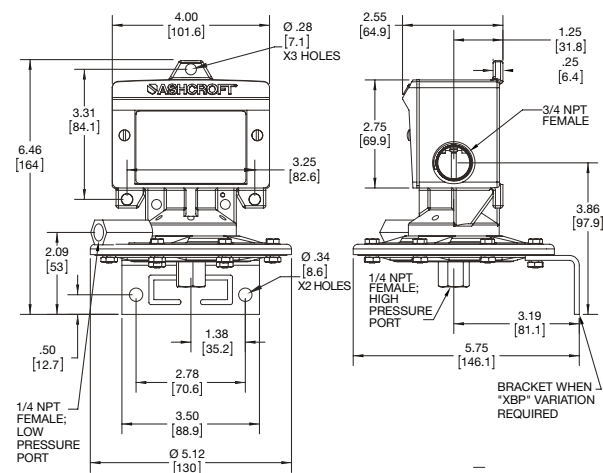
#### Pressure switch – inches of water ranges



#### Differential pressure switch – psi differential ranges



#### Differential pressure switch – inches of water ranges

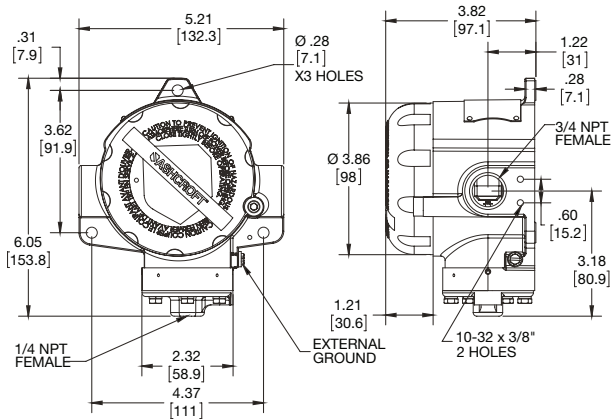


**Data Sheet**

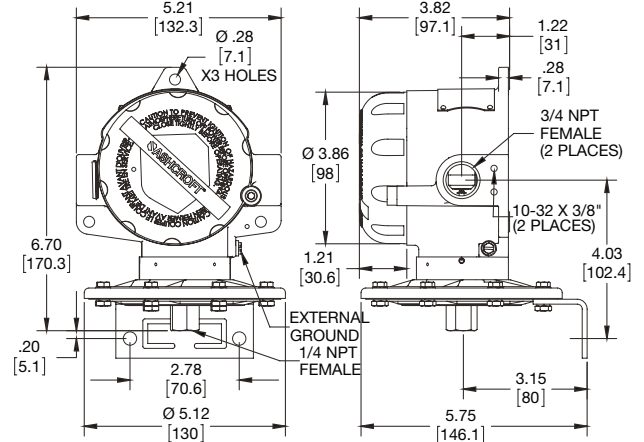
**B-Series Switches –  
Pressure, Differential Pressure & Hydraulic**

**B 700 DIMENSIONS**

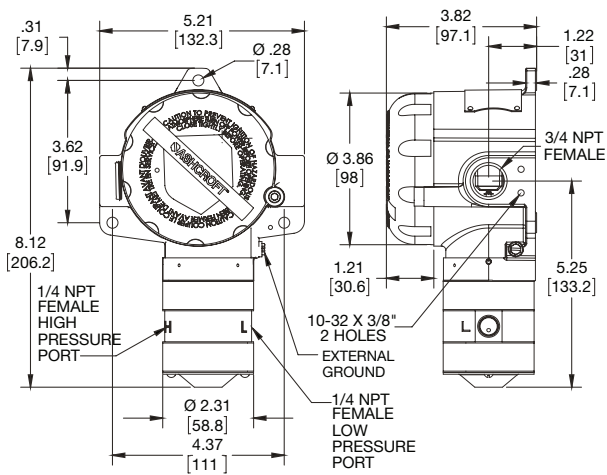
**Pressure switch – psi ranges**



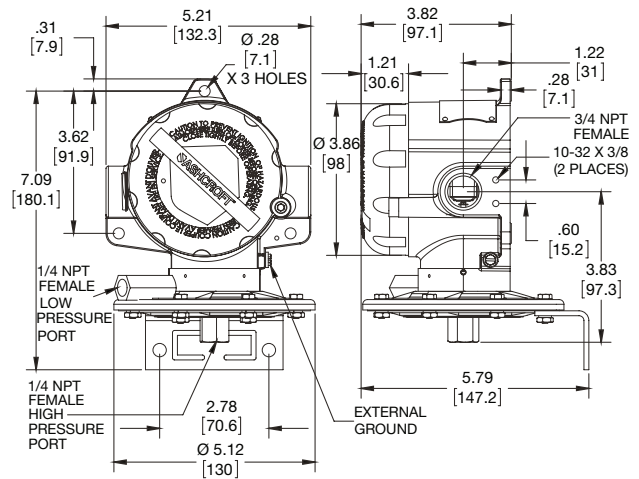
**Pressure switch – inches of water ranges**



**Differential pressure switch – psi differential ranges**



**Differential pressure switch – inches of water ranges**

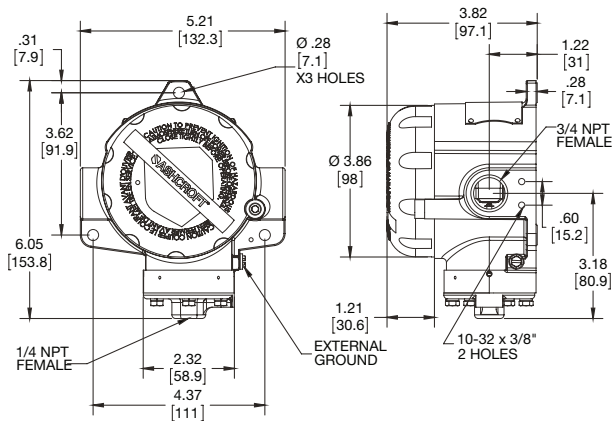


**Data Sheet**

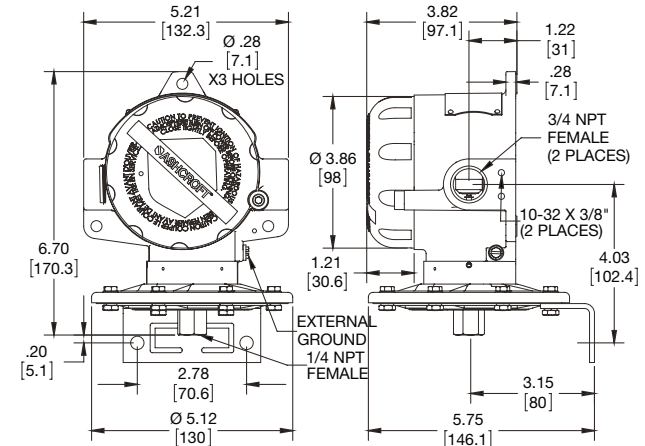
**B-Series Switches –  
Pressure, Differential Pressure - Explosion Proof**

**B 700 DIMENSIONS**

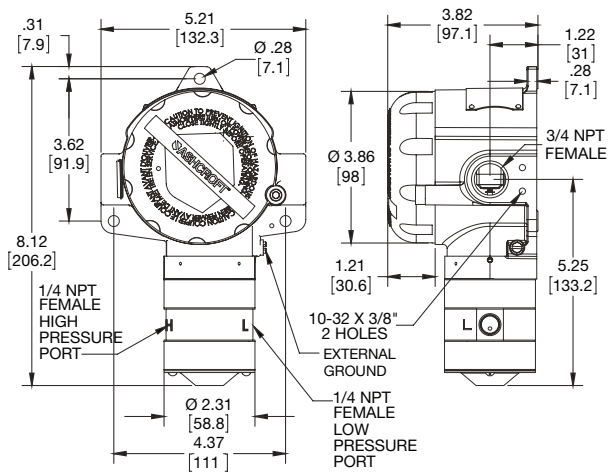
**Pressure switch – psi ranges**



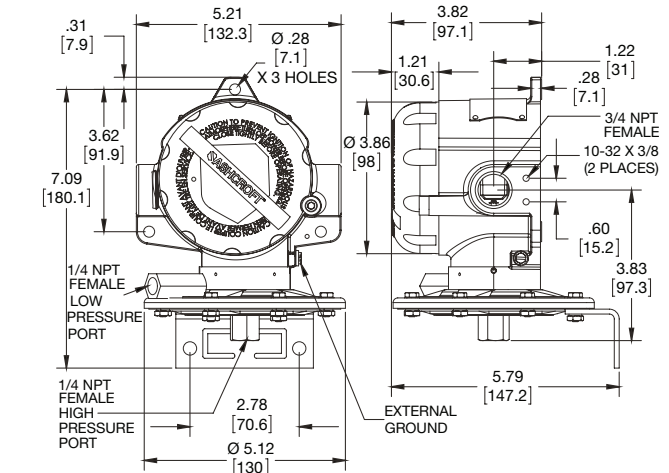
**Pressure switch – inches of water ranges**



**Differential pressure switch – psi differential ranges**



**Differential pressure switch – inches of water ranges**





## **B-Series Switches – Pressure, Differential Pressure & Hydraulic**

Ashcroft Inc. supplies highly reliable Ashcroft<sup>®</sup> switches and controls for industrial and process applications. We begin with rock-solid designs, matching the most appropriate technology with the safety and reliability requirements of the applications. The materials of construction are specified to Ashcroft's exacting standards, and product is built to last in the toughest applications. Our modern, responsive manufacturing facility is supported by an extensive network of stocking distributors and factory sales offices located in virtually every part of the world. Special application assistance is always just a telephone call away.

The Ashcroft B-Series switch line is designed to satisfy most switch requirements. Materials of construction have been selected for long life. A wide variety of precision switch elements are available to meet every application requirement, including hermetically sealed contacts for added reliability and safety. The actuators we use have been proven in more than 20 years of service in the world's plants and mills. Special designs are available for fire safety, NACE, limit control and other more stringent requirements. Simplicity and ease of use are stressed to improve reliability of the installation.

Applications include: pumps, compressors, washers, filters, degreasers, evaporators, recovery systems, food processing, ground support equipment, reverse osmosis systems, heat exchangers, hydraulic systems, lubrication systems, marine equipment, textile machinery, heating and air conditioning equipment.

### **Pressure & 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 H<sub>2</sub>O, 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  $\pm 1$  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.

