

Data Sheet

A-Series Miniature Explosion Proof Pressure Switches

FEATURES

- Compact size
- 316 stainless steel construction
- Pressure ranges from vacuum to 15,000 psi
- Field adjustable setpoint or factory set only
- Wide operating temperature range (-40° to 89°C) max.
- Hermetically sealed micro-switch
- Precision snap-acting micro switch element
- SPDT or DPDT switching
- CSA listed
- UL listed
- FM approved
- ATEX & IECEx
- SIL 3 capable
- CRN
- Dual seal rated
- CE and ROHS compliant



SPECIFICATIONS

| | |
|-----------------------------------|---|
| Setpoint: | Factory set or field adjustable |
| Setpoint repeatability: | ±2% of range (Additional setpoint shift of ±2% of range per 40°F from initial setpoint set at 70°F typical) |
| Vibration: | Passed MIL-STD-202G |
| Shock: | 75G's 10 milliseconds 3 axis |
| Piston: | Stainless steel w/Viton or Buna-N O-ring |
| Mechanical life piston design: | >1,000,000 operations typical |
| Diaphragm: | 316L Stainless steel |
| Mechanical life diaphragm design: | >400,000 operations typical |
| Enclosure material: | 316L Stainless steel |
| Enclosure rating: | NEMA 4X, 7, 9, IP 67 |
| Pressure Connection: | 1/8" NPTF, 1/4" NPTF, 1/4" NPTM, 1/2" NPTM, 1/2" MNPT, 1/2" FNPT, 7/16"-20 SAE M, VCR, VCO, 3/4" Tri-Clamp®, 1.5" Tri-Clover®, 2.0" Tri-Clover G 1/4" B, G 1/4" A Type E Stub end |
| Electrical output: | SPDT, or DPDT 5A or 3A 120VAC, 2A @ 30 VDC, 5A @ 28 VAC, gold contacts available |
| Electrical termination: | 18 AWG wire leads, with 1/2" NPT male conduit connection, 18 AWG wire leads, with M20 x 1.5 male conduit connection |
| Approvals: | CRN: OF 14836.5C, CSA: 2454057 (LR55528), UL: E38812, CE, ROHS |



- High performance
- Small size
- Good for hazardous and corrosive applications
- Easily configurable to meet your application requirements
- SIL 3 capable

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A-Series Miniature Explosion Proof Pressure Switches

CHARACTERISTICS AND RATINGS

| A SERIES SWITCH PERFORMANCE CHARACTERISTICS | | | | | | | | | | | | |
|---|--------|------------------------|----------|------------------------|-------------------------|-------|------------------------|-------------------------|--------------|---------------|-------------------------|------------|
| | RANGE | | | SETPOINT REPEATABILITY | | | SETPOINT ADJUSTABILITY | | | DEADBAND (DB) | | |
| | psi | bar kg/cm ² | kPa | psi | bar, kg/cm ² | kPa | psi | bar, kg/cm ² | kpa | psi | bar, kg/cm ² | kPa |
| DIAPHRAGM | -15/15 | -1/1 | -100/100 | ±0.6 | ±.04 | ±4 | -15/15 | -1/1 | -100/100 | 1-5 | .07-.35 | 7-35 |
| | 30 | 2 | 200 | ±0.6 | ±.04 | ±4 | 6-30 | .4-2 | 6-200 | 1-5 | .07-.35 | 7-35 |
| | 60 | 4 | 400 | ±1.2 | ±.08 | ±8 | 8-60 | .6-4 | 60-400 | 2-10 | .14-.70 | 14-70 |
| | 100 | 7 | 700 | ±2 | ±.14 | ±14 | 10-100 | .7-7 | 70-700 | 3-15 | .2-1.0 | 20-100 |
| | 200 | 14 | 1400 | ±4 | ±.28 | ±28 | 20-200 | 1.4-1.4 | 140-1400 | 3-30 | .2-2.0 | 20-200 |
| PISTON | 100 | 7 | 700 | ±2 | ±.14 | ±14 | 20-100 | 1.4-7 | 140-700 | 3-15 | .2-1.0 | 20-100 |
| | 200 | 14 | 1400 | ±4 | ±.28 | ±28 | 40-200 | 2.8-1.4 | 280-1400 | 3-30 | .2-2.0 | 20-200 |
| | 500 | 35 | 3500 | ±10 | ±.70 | ±70 | 50-500 | 3.5-35 | 350-3500 | 20-100 | 1.4-7.0 | 140-700 |
| | 1000 | 70 | 7000 | ±20 | ±1.40 | ±140 | 100-1000 | 7-70 | 700-7000 | 25-150 | 1.7-10 | 170-1000 |
| | 2000 | 140 | 14000 | ±40 | ±2.8 | ±280 | 200-2000 | 14-140 | 1400-1400 | 30-300 | 2-20 | 200-2000 |
| | 5000 | 350 | 35000 | ±100 | ±7.0 | ±700 | 500-5000 | 35-350 | 3500-35000 | 75-750 | 5-50 | 500-5000 |
| | 7500 | 500 | 50000 | ±150 | ±10 | ±1000 | 750-7500 | 50-500 | 5000-50000 | 110-1100 | 7.5-75 | 750-7500 |
| | 10000 | 700 | 70000 | ±200 | ±14.0 | ±1400 | 1000-10000 | 70-700 | 7000-70000 | 250-2500 | 17-170 | 1700-17000 |
| | 15000 | 1000 | 100000 | ±300 | ±20 | ±2000 | 1500-15000 | 100-1000 | 10000-100000 | 300-3000 | 20-200 | 2000-20000 |

| ELECTRIC | |
|-------------|--------------------------|
| Switch Code | Electric on Label |
| 1P | 3A 125Vac; 2A, 30Vdc |
| 1H, 2H | 5A 125/250Vac; 5A, 28Vdc |
| 1G | 0.1A 125Vac; 0.1A 30Vdc |
| 1L, 2L | 1A 125Vac; 1A 28Vdc |

| MATERIAL AND TEMPERATURE RATINGS (based on mat'l and switch code) | | | | | | | |
|---|-------------------------------|---------------|-----------|-----------|-----------|-----------|-----------|
| Switch CODE | with MAT'L CODE | MATERIAL | TEMP. MIN | T5 Ta MAX | T5 Tp MAX | T6 Ta MAX | T6 Tp MAX |
| 1H, 2H, 1L, 2L | S | 316 ST.SL. | -40°C | 89°C | 89°C | 74°C | 74°C |
| 1H, 2H, 1L, 2L | B (Ranges 500-7500#) | 316 SS, BUNA | -40°C | 89°C | 89°C | 74°C | 74°C |
| 1H, 2H, 1L, 2L | B (Ranges 100, 200, 10k, 15k) | 316 SS, BUNA | -20°C | 89°C | 89°C | 74°C | 74°C |
| 1H, 2H, 1L, 2L | V | 316 SS, VITON | -20°C | 89°C | 89°C | 74°C | 74°C |
| 1H, 2H, 1L, 2L | N (Ranges 500-7500#) | 316 SS, HNBR | -40°C | 89°C | 89°C | 74°C | 74°C |
| 1H, 2H, 1L, 2L | N (Ranges 10k, 15k) | 316 SS, HNBR | -20°C | 89°C | 89°C | 74°C | 74°C |
| 1P, 1G | S | 316 ST.SL. | -20°C | 74°C | 74°C | 74°C | 74°C |
| 1P, 1G | B | 316 SS, BUNA | -20°C | 74°C | 74°C | 74°C | 74°C |
| 1P, 1G | V | 316 SS, VITON | -20°C | 74°C | 74°C | 74°C | 74°C |
| 1P, 1G | N | 316 SS, HNBR | -20°C | 74°C | 74°C | 74°C | 74°C |

| CONFIGURATION | | MAX. WORKING PRESSURE "MWP" | | | PROOF PRESSURE "PROOF" | | | BURST PRESSURE | | |
|---------------|-----------|-----------------------------|-------------------------|--------|------------------------|------------------------|--------|----------------|-------------------------|---------|
| RANGES (psi) | w/SEAL | psi | bar, kg/cm ² | kPa | psi | bar kg/cm ² | kPa | psi | bar, kg/cm ² | kPa |
| up to 200 | S | 800 | 55 | 5500 | 1000 | 70 | 7000 | >9500 | >655 | >65500 |
| 100-200 | B, V or N | 2000 | 140 | 14000 | 2000 | 140 | 14000 | >10000 | >700 | >70000 |
| 500-2000 | B, V or N | 5000 | 350 | 35000 | 8000 | 550 | 55000 | >30000 | >2100 | >210000 |
| 5000-7500 | B, V or N | 10000 | 700 | 70000 | 15000 | 1000 | 100000 | >50000 | >3500 | >350000 |
| 10000-15000 | B, V or N | 15000 | 1000 | 100000 | 20000 | 1400 | 140000 | >45000 | >31000 | >310000 |

| OPTIONS | |
|---------|---|
| Code | Description |
| XC4 | Individual certified calibration chart |
| XFP | Fungus proofing |
| XMQ | Positive Material Identification (75, 15 & 20 process conn. only) |
| XNC | 2 wire leads w/ground wire – wired for normally closed operation |
| XNO | 2 wire leads w/ground wire – wired for normally open operation |
| XNH | Stainless Steel tag |
| XNN | Paper tag |
| X6B | Cleaned for oxygen service |

| PRESSURE RANGE | | | | |
|----------------|---------|--------|------------|--------------------|
| Actuator | psi | Bar | kPa | Kg/cm ² |
| S | -15/15# | -1/1BR | -100/100KP | -1/1KSC |
| S | 30# | 2BR | 200KP | 2KSC |
| S | 60# | 4BR | 400KP | 4KSC |
| B, S, V | 100# | 7BR | 700KP | 7KSC |
| B, S, V | 200# | 14BR | 1400KP | 14KSC |
| B, V | 500# | 35BR | 3500KP | 35KSC |
| B, V | 1000# | 70BR | 7000KP | 70KSC |
| B, V | 2000# | 140BR | 14000KP | 140KSC |
| B, V | 5000# | 350BR | 35000KP | 350KSC |
| B, V | 7500# | 500BR | 50000KP | 500KSC |
| B, V | 10000# | 690BR | 70000KP | 700KSC |
| B, V | 15000# | 1000BR | 100000KP | 1000KSC |

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A-Series Miniature Explosion Proof Pressure Switches

ORDERING CODE

Example: **APS N7 1H 012C S 02 30# - 15 R - X6B**

Function

| | |
|------------|---|
| APS | Pressure switch, single setpoint, fixed deadband, factory set, not field adjustable |
| APA | Pressure switch, single setpoint, fixed deadband, field adjustable |

Enclosure (Body)

N7 Explosion Proof 316 SS body

Micro Switch, First Character

| | |
|----------|--|
| 1 | Single Switch – SPDT |
| 2 | Dual Switch – DPDT (not available with “S” actuator or P&G micro switch) |

Micro Switch, Second Character

| | | |
|----------|--------------------------------|---|
| G | Gold Contact – | 0.1 A @ 125 Vac, 0.1 A @ 30 Vdc |
| H | Higher Current – | 5A @ 125/250 Vac, 5A @ 28 Vdc resistive, 3A @ 28 Vdc inductive. |
| L | Higher Current Gold Contacts – | 1A @125 Vac, 1A @ 28 Vdc resistive, 0.5A @ 28 Vdc Inductive |
| P | General Purpose – | 3A @ 125 Vac, 2A @ 30 Vdc |

Electrical Connection

--**C** ½ NPT male conduit connection with 18 AWG wires
 --**G** M20 x 1.5 male conduit connection with 18 AWG wire

NOTE: --- (e.g. 012C = 12” lead wires. Specify wire length in inches.)

Actuator Seal (see page six for more information)

| | |
|----------|---|
| B | 316 SS piston & Buna O-ring, ranges ≥100 psi |
| V | 316 SS piston & Viton O-ring, ranges ≥100 psi |
| S | 316 SS welded Diaphragm, ranges ≤200 psi |
| N | 316 SS piston & HNBR O-ring, ranges ≥100 psi |

Pressure Connection

| | |
|-----------|---|
| 01 | 1/8 NPT Male |
| 02 | 1/4 NPT Male |
| 03 | 1/8 NPT Female (Available with “S” actuator only) |
| 04 | 1/2 NPT Male |
| 50 | 1/2 NPT Female |
| 12 | G 1/4 A (Type E Stud End) |
| 13 | G 1/4 B |
| 25 | 1/4 NPT Female (Available with “S” actuator only) |
| 05 | 7/16-20 SAE Male |
| 06 | VCR Fixed (Available with “S” actuator only) |
| 07 | VCO Fixed (Available with “S” actuator only) |
| 08 | 7/16-20 SAE Female |
| 46 | 9/16-18 SAE Female |
| 76 | 7/16-20 SAE w/37° Flare End |
| 75 | 0.75” Tri-Clamp [®] connection (Range ≤ 500 psi)‡ |
| 15 | 1.5” Tri-Clover [®] connection (includes 3A Approval) (Range ≤ 500 psi)† |
| 20 | 2.0” Tri-Clover [®] connection (includes 3A Approval) (Range ≤ 500 psi)† |

Ranges

Select from table page 2

Setpoint

5 characters maximum representing setpoint of the switch in the same units as the range of the switch. For setpoints in Vacuum specify as “-”pressure. If no setpoint is required on an APA switch use either “NSR” or “NSD.” If direction is not known use “NSR” as the default.

Setpoint Direction

| | |
|----------|--|
| R | Rising Pressure (Increasing Pressure, Decreasing Vacuum) |
| D | Decreasing Pressure, (Increasing Vacuum) |

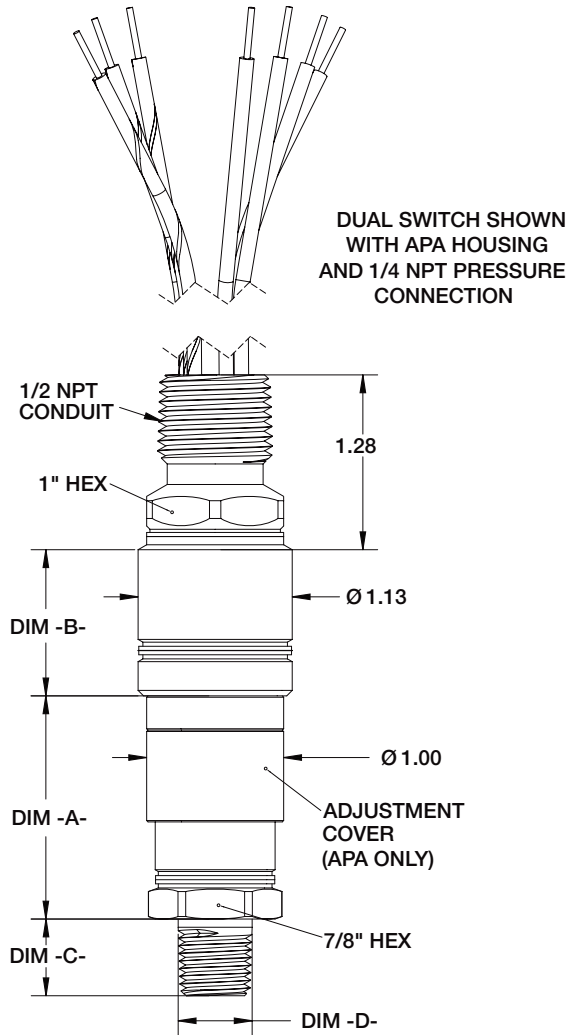
Options

Select from table page 2

† Tri-Clover is a registered trademark of Alfa Laval
 ‡ Tri-Clamp is a registered trademark of Ladish Co.

A-Series Miniature Explosion Proof Pressure Switches

DIMENSIONS



| FUNCTION CODE | |
|------------------------|--------|
| Description | Dim. A |
| APS (Factory Set) | 1.06 |
| APA (Field Adjustable) | 1.64 |

| MICRO SWITCH | |
|----------------|--------|
| Description | Dim. B |
| 1H, 2H, 1L, 2L | 1.03 |
| 1P, 1G | 0.90 |

| PRESSURE CONNECTION GENERAL DIMENSION | | | |
|---------------------------------------|-----------------------------|--------|--------|
| Code | Description | Dim. C | Dim. D |
| 01 | 1/8 NPT Male | 0.45 | 0.44 |
| 02 | 1/4 NPT Female | 0.56 | 0.54 |
| 03 | 1/8 NPT Female | 0.75 | 0.65 |
| 04 | 1/2 NPT Male | 0.92 | 0.75 |
| 25 | 1/4 NPT Female | 1.10 | 0.75 |
| 50 | 1/2 NPT Female | 1.25 | 1.04 |
| 05 | 7/16-20 SAE Male | 0.56 | 0.44 |
| 08 | 7/16-20 SAE Female | 1.10 | 0.84 |
| 06 | VCR Fixed | 0.58 | 0.56 |
| 07 | VCO Fixed | 0.47 | 0.56 |
| 12 | G 1/4A | 0.47 | 0.44 |
| 13 | G 1/4B | 0.59 | 0.37 |
| 46 | 9/16-18 SAE Female | 0.39 | 0.47 |
| 76 | 7/16-20 SAE w/37° Flare End | 0.55 | 0.36 |
| 75 | 0.75" Tri-Clamp Seal | 1.10 | 0.96 |
| 15 | 1.5" Tri-Clover Seal | 1.23 | 1.99 |
| 20 | 2.0" Tri-Clover Seal | 1.23 | 2.49 |



CRN: OF 14836.5C,



CSA: 2454057 (LR55528)



UL: E38812



CE



ROHS

SIL 3 CAPABLE LOOK FOR THESE MARKS ON OUR PRODUCTS

Data Sheet

A-Series Miniature Explosion Proof Pressure Switches

AVAILABLE CONNECTIONS

PRESSURE CONNECTIONS

1/8, 1/4 or 1/2 MALE NPT



1/8 or 1/4 FEMALE NPT,
7/16-20 SAE FEMALE



VCR or VCO



7/16-20 SAE MALE (OPTIONAL
37° FLARE END)



3/4", 1.5" or 2.0" SANITARY



G 1/4 A TYPE-E STUD END



1/2 FEMALE NPT



G 1/4 B



ELECTRICAL CONNECTIONS

1/2 NPT CONDUIT CONNECTOR
WITH 18 AWG WIRE LEADS



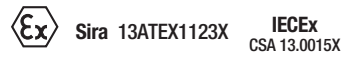
M20 X 1.5 MALE CONDUIT WITH
18 AWG WIRES



APPROVALS:



CLASS I DIV 1 GROUPS A, B, C, & D
CLASS II DIV 1 GROUPS E, F, & G
T5 or T6 – see Material and Temperature Range Table



II 2GD
Ex d IIC T6/T5 Gb
Ex tb IIIC T85°C/100°C Db
T5 or T6 – see Material and Temperature Range Table

Dual Seal

The A-series explosion proof pressure switch is designed to meet the requirements of ANSI/ISA-12.27.01-2003 for process sealing between electrical systems and flammable or combustible material.

Tri-Clover is a registered trademark of Alfa Laval

Tri-Clamp is a registered trademark of Ladish Co.

A-Series Miniature Explosion Proof Pressure Switches

SELECTION GUIDE

Before selecting a switch the following should be considered:

Actuator:

The actuator responds to changes in pressure and operates the micro switch element in response to these changes. The actuator is normally exposed to the process media and must be chemically compatible with it. There are three types of actuators available for the A-Series switches – all welded 316 SS diaphragm sealed piston; 316 SS piston with Viton O-ring seal; and 316 SS piston with Buna-N O-ring seal. The 316 SS diaphragm is available in ranges from -15/15 psi to 200 psi. The 316 SS piston is available in ranges from 100 psi to 15,000 psi. Switches offered in 100 psi and 200 psi can be ordered with either the piston or diaphragm design. The piston design will have a longer mechanical life, while the diaphragm design has a better operating temperature.

The piston design is more reliable than a diaphragm design when subjected to frequent large pressure excursions, pressure surges and spikes associated with typical hydraulic applications. Piston designs are typically used when the switch is used as low pressure alarm or cutoff where the normal working pressure is above the nominal range of the switch.

The Switching Function:

Most applications for alarm, shutdown and interlock are satisfied by the standard A-Series switches which feature single setpoint fixed deadband. For pump, compressor and other control applications, the dead-band becomes a very important consideration and may require increasing the range of the switch to increase the deadband. Please consult your Ashcroft representative for assistance with special applications.

The Micro Switch Element:

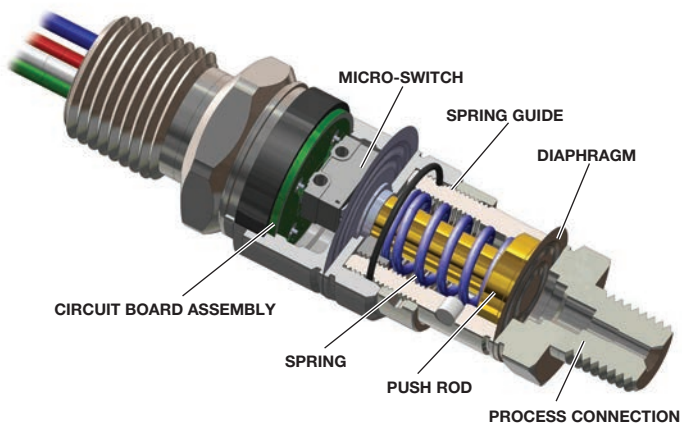
The micro switch element must be chosen to meet the electrical load requirement to be switched. The switches are offered as either SPDT (single pole double throw) or DPDT (double pole double throw). The DPDT switch is made up of two SPDT switches which are adjusted to work together by Ashcroft's patent pending Circuit Board Rotation Design. DPDT switching is not available on diaphragm designs below 100 psi, with Spade terminals or the Micro DIN connector.

Understanding Setpoints and Reset Points:

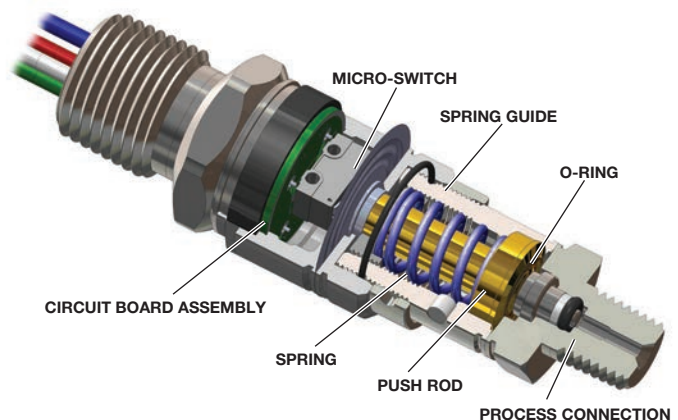
Pressure switches can be set to switch on either increasing (rising) or decreasing pressures. Since the switches have both Normally Open (NO) contacts and Normally Closed (NC) contacts you can wire the switch to open or close for either an increasing or decreasing pressure. To be consistent in setting the switches Ashcroft defines the setpoints as follows. For an increasing setpoint, the pressure is increased from 0 psi to the set point and then decreased to the reset point. For a decreasing setpoint, the pressure is increased to full range and then decreased to the setpoint and then increased to the resetpoint.

Custom Applications:

The A-series switch is designed to allow custom process connections and electrical terminations. Please consult your Ashcroft representative for assistance with custom applications.



Cutaway view of switch assembly with welded SS diaphragm



Cutaway view of switch assembly with SS piston

A-Series Miniature Explosion Proof Pressure Switches

ADDITIONAL SWITCH TERMINOLOGY

Accuracy – (See repeatability) Accuracy normally refers to conformity of an indicated value to an accepted standard value. There is no indication in switch products; thus, instead, the term repeatability is used as the key performance measure. Ashcroft A-Series switch accuracy is 2% of nominal range.

Automatic Reset Switch – Switch which returns to normal state when actuating variable Pressure is reduced.

Adjustable or Operating Range – That part of the nominal range over which the switch setpoint may be adjusted. Normally about 10% to 100% of the nominal range for A-Series pressure switches.

Burst Pressure – The maximum pressure that may be applied to a pressure switch without causing leakage or rupture. This is approximately 16X of nominal range for A-Series switches. Diaphragm switches subjected to pressures above the nominal range can be permanently damaged.

Deadband – The difference between the setpoint and the resetpoint, normally expressed in units of the actuating variable. Sometimes referred to as differential.

Fixed Deadband – The difference between the setpoint and the resetpoint of a pressure switch. It further signifies that this deadband is a fixed function of the pressure switch and not adjustable.

National Electrical Manufacturers Association (NEMA) – This group has defined several categories of enclosures, usually referred to as “types.” Further, they designate certain features and capabilities each type must include.

NEMA 4X – Type 4X enclosures are intended for indoor and outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose directed water; and to be undamaged by the formation of ice on the enclosure.

NEMA 7 – Type 7 enclosures are for indoor use in locations classified as Class I, Groups A, B, C, or D, as defined in the National Electrical Code. Type 7 enclosures shall be capable of withstanding the pressures resulting from an internal explosion of specified gases, and contain such an explosion sufficiently that an explosive gas-air mixture existing in the atmosphere surrounding the enclosure will not be ignited. Enclosed heat generating devices shall not cause external surfaces to reach temperatures capable of igniting explosive gas-air mixtures in the surrounding atmosphere.

NEMA 9 – Type 9 enclosures are intended for indoor use in locations classified as Class II, Groups E, F, or G, as defined in the National Electrical Code. Type 9 enclosures shall be capable of preventing the entrance of dust. Enclosed heat generating devices shall not cause external surfaces to reach temperatures capable of igniting or discoloring dust on the enclosure or igniting dust-air mixtures in the surrounding atmosphere.

Normal Switch Position – Contact position before actuating pressure (or variable) is applied. Normally closed contacts open when the switch is actuated. Normally open contacts close when the switch is actuated.

Normally Closed – Refers to switch contacts that are closed in the normal switch state or position (unactuated). A pressure change opens the contacts.

Normally Open Switch – Refers to the contacts that are open in the normal switch state or position (unactuated). A pressure change closes the contacts.

Overpressure Rating(s) – A nonspecific term that could refer to either burst or proof pressure, or both.

Proof Pressure – The maximum pressure which may be applied without causing damage. This is determined under strict laboratory conditions including controlled rate of change and temperature: This value is for reference only. Consult factory for applications where switch must operate at pressures above nominal range or reference temperature (70°F).

Repeatability (Accuracy) – The closeness of agreement among a number of consecutive measurements of the output setpoint for the same value of the input under the same operating conditions, approaching from the same direction, for full-range traverses. Ashcroft A-series switch repeatability is 2% of nominal range.

Note: It is usually measured as non-repeatability and expressed as repeatability in percent of span or nominal range. It does not include hysteresis or deadband.

Resetpoint – The resetpoint is the Pressure value where the electrical switch contacts will return to their original or normal position after the switch has activated.

Setpoint – The setpoint is the Pressure value at which the electrical circuit of a switch will change state or actuate. It should be specified either on increase or decrease of that variable.

Single Pole Double Throw (SPDT) Switching Element – A SPDT switching element has one normally open, one normally closed, and one common terminal. The switch can be wired with the circuit either normally open (N/O) or normally closed (N/C). SPDT is standard with A-series switches.

Double Pole Double Throw (DPDT) Switching Element – Two SPDT switching elements both set to actuate or de-actuate at the same set or resetpoint. Each switch one has one normally open, one normally closed, and one common terminal. The switches are independent of each other and can be wired to two independent circuits. The two circuits can either normally open (N/O) or normally closed (N/C).

Snap Action – In switch terminology, snap action generally refers to the action of contacts in the switch element. These contacts open and close quickly and snap closed with sufficient pressure to firmly establish an electrical circuit. The term distinguishes products from mercury bottle types that were subject to vibration problems.