

ACCESSORIES

Following accessories can be provided with pressure switches to make it suitable for any particular application.

Flameproof enclosures

Chemical seals (or diaphragm seals)

adaptors to suit customer's process connection

switch savers

impulse tubes

syphons

manifolds

pipe mounting brackets

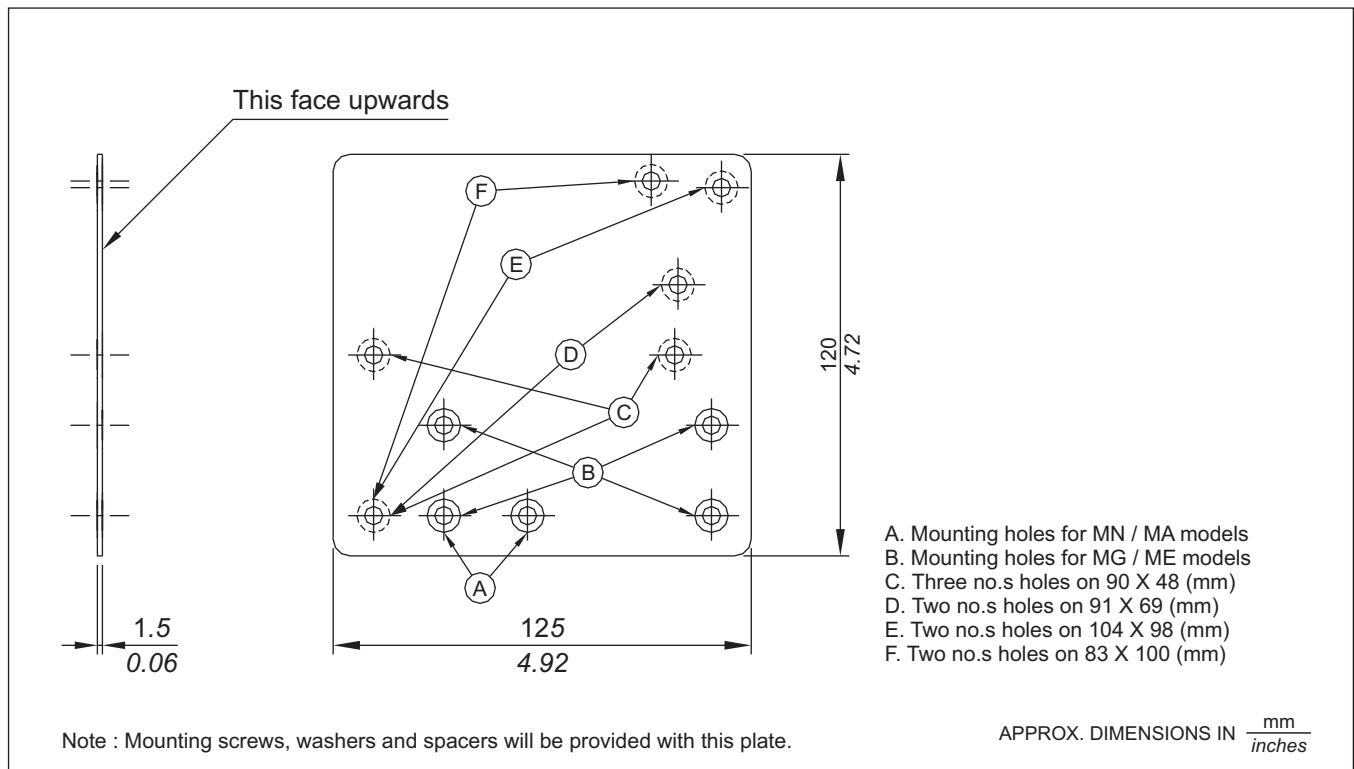
mounting plates to suit other makes on the market

snubbers

tag plates (to display tag no. and identify the instrument)

Installation drawings of most common and fast moving accessories are given. The wetted parts, wherever applicable, are not specified due to the extreme variety available.

MOUNTING PLATE

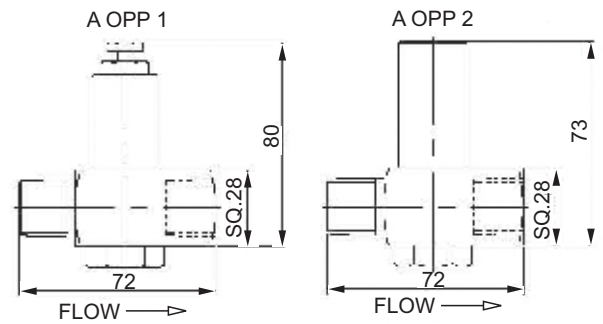


ACCESSORIES

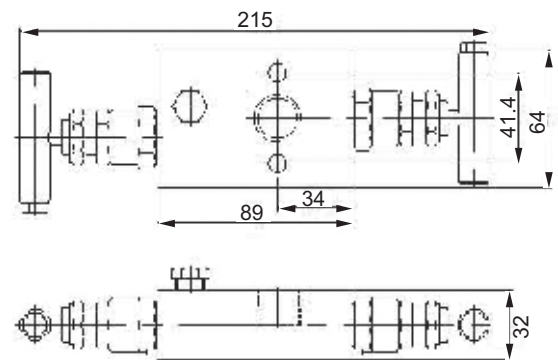
Gauge Saver



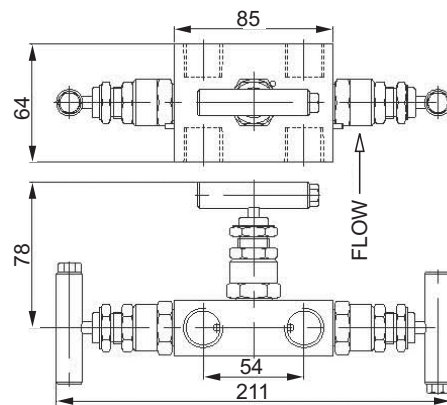
A OPP 1 = Set Pressure: 0.6 to 2.0 bar
A OPP 2 = Set Pressure: 2.5 to 200 bar



2 Valve Manifold



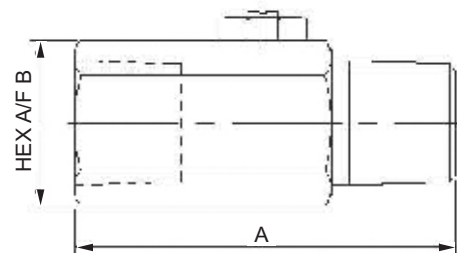
3 Valve Manifold



Snubber



SIZE	A	B
1/4"NPT	55	25
3/8"NPT	55	25
1/2"NPT	63	28
G1/2"	63	28



ACCESSORIES

CHEMICAL SEALS (DIAPHRAGM SEALS):

General description:

Diaphragm seals are partitions used with pressure switches which prevent the measured medium from entering the pressure capsule of the pressure switch. Diaphragm seals solve many problems encountered in sensing, which are otherwise impossible to solve with only pressure switches. Some of the examples are:

- protection of pressure switch from aggressive, highly viscous solidifying or crystallizing measured media
- protection from high measured medium temperatures or fluctuations in temperature
- protection from vibrations by coupling via capillaries
- dead zone free sensing arrangements for particular hygienic applications
- use of special materials or surface coatings of the wetted parts for special applications.

CAUTION: Pressure switch and diaphragm seal are always a closed system and should not be separated by unauthorised persons.

When the pressure switch is to be kept away from undesirable temperatures or vibrations, a capillary can be used to connect the pressure switch and the diaphragm seal. Capillaries also have a throttling effect which is often desirable in pulsating process pressures. During setpoint adjustment, the weight of the liquid column between the diaphragm seal and the pressure switch needs to be taken into consideration, if they are mounted at different elevations.

Depending on the application, a variety of media with different properties are used as transmission liquids. For most of the general applications, silicon oil can be used. For food industries, a transmission liquid compatible with the process needs to be used.

A variety of chemical seals can be supplied with pressure switches and only the most commonly used arrangements / assemblies are shown here.

In most of the cases, the common wetted parts and diaphragms are of SS316. Alternate wetted materials that can be provided are:

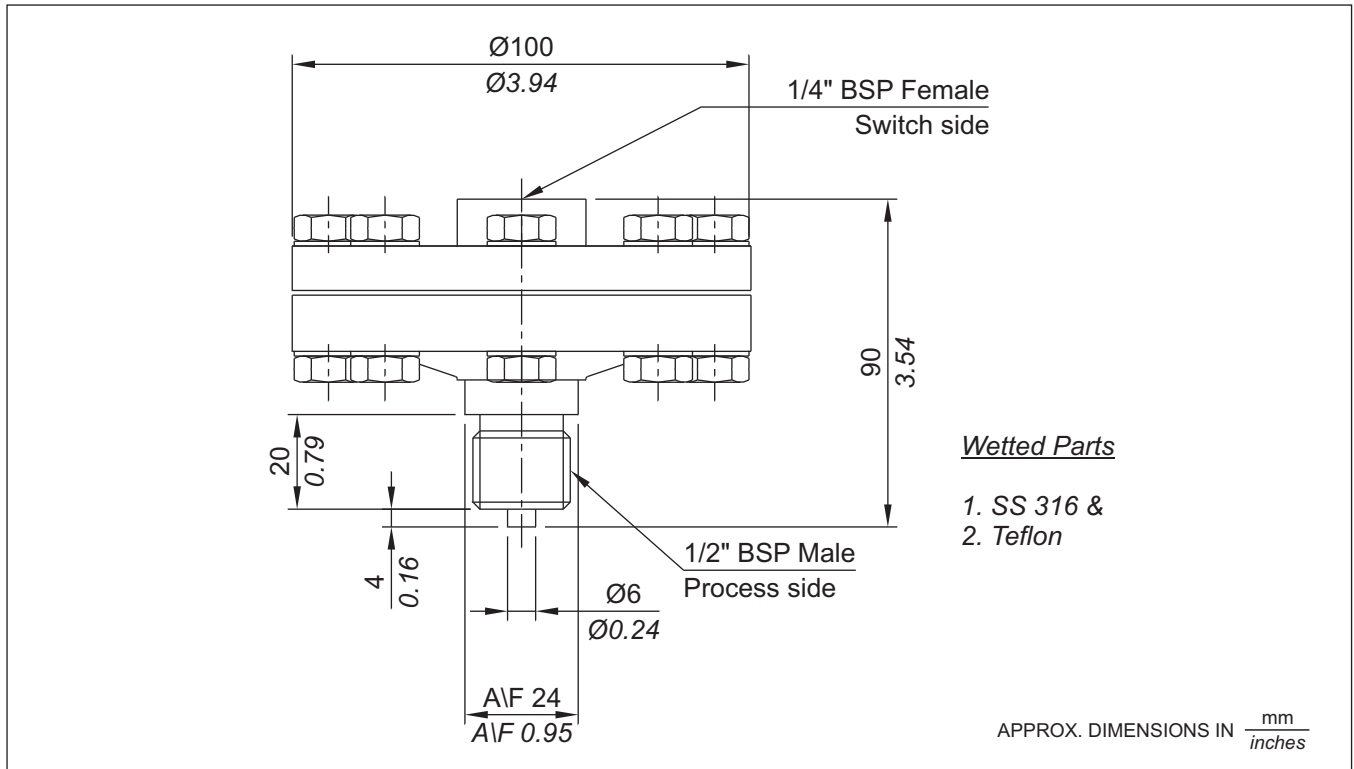
- | | | |
|---------------------|-------------------|-------------|
| • HASTELLOY B2 | • MONELALLOY 400 | • TITANIUM |
| • HASTELLOY C4 | • MONELALLOY K500 | • ZIRCONIUM |
| • HASTELLOY C22 | • NICKEL | • SILVER |
| • HASTELLOY C276 | • PLATINUM | • PTFE |
| • INCONEL ALLOY 600 | • TANTALUM | |

The on - off differentials of pressure switches fitted with chemical seals are likely to be higher than those mentioned in the catalogue. There is also a possibility of time lag (for sensing) being introduced, depending on the length of the tubing between the pressure switch and the seal.

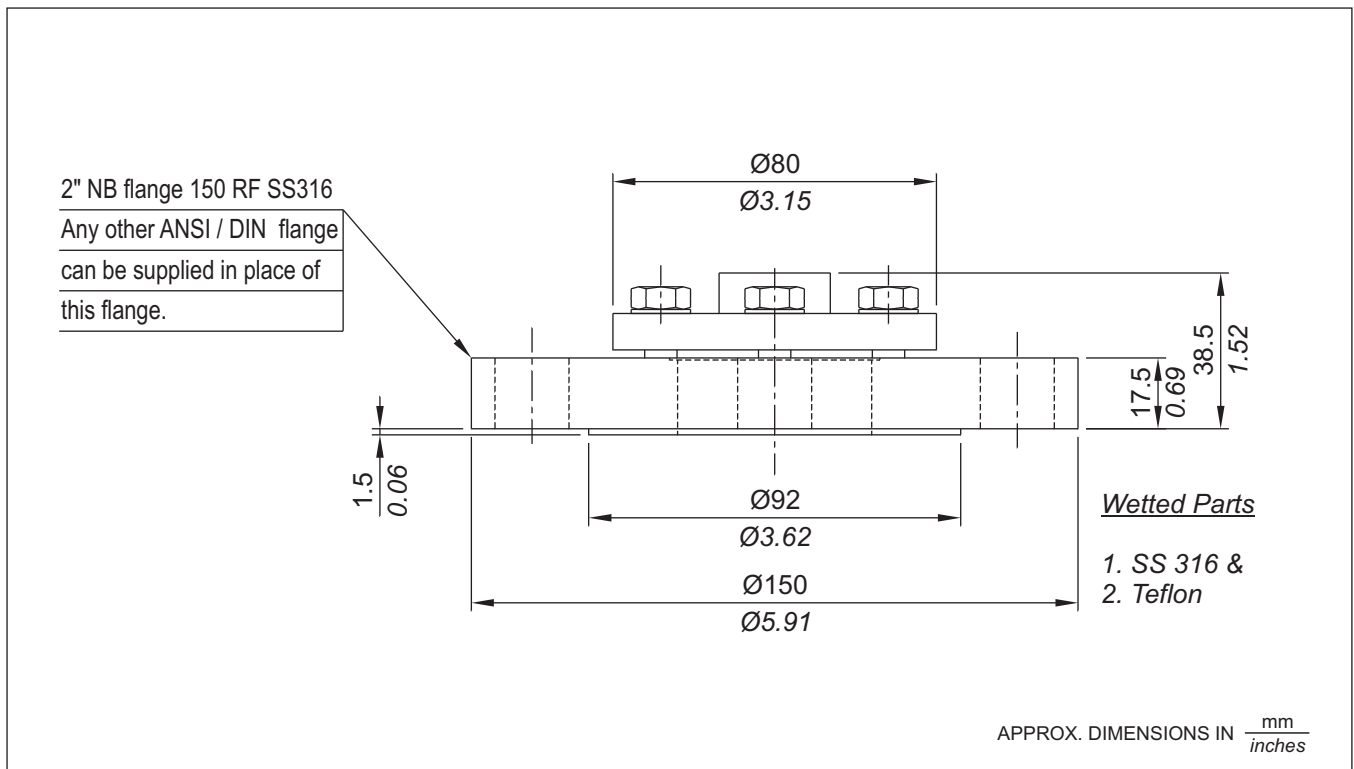
While ordering, customer's are requested to specify all the process parameters including ambient conditions, operating conditions, the process to be sensed and response times allowable, temperature of the seal under sensing conditions and temperature outside the measuring / sensing sequences (e.g as in rinsing sequences) so that a proper sealing system can be suggested.

ACCESSORIES

STANDARD CHEMICAL SEAL SUITABLE FOR THREADED CONNECTION : (Type A)



CHEMICAL SEAL SUITABLE FOR VARIABLE FLANGED CONNECTION : (Type B)



Technical drawing of a stainless steel vessel with the following dimensions and specifications:

- Vessel Dimensions:**
 - Top Diameter: $\varnothing 90$
 - Top Flange Thickness: $\varnothing 3.54$
 - Height: 100 mm (3.94 inches)
 - Bottom Diameter: $\varnothing 8$
 - Bottom Flange Thickness: $\varnothing 0.31$
 - Bottom Flange Width: A/F 24
 - Bottom Flange Height: A/F 0.94
 - Overall Width: 105 mm (4.13 inches)
- Connections:**
 - Flush connection: 1/4" BSP Male
 - Process connection: 1/2" BSP Male
- Wetted Parts:**
 - SS 316
 - Teflon
- Other Dimensions:**
 - Approx. 55 (2.17 inches) - Vertical dimension from top flange to process connection
 - $\varnothing 6$ - Internal diameter of process connection
 - $\varnothing 0.24$ - Internal diameter of flush connection
 - 20 (0.79 inches) - Vertical dimension from bottom flange to process connection

APPROX. DIMENSIONS IN $\frac{\text{mm}}{\text{inches}}$

INSTALLATION DRAWING

Technical drawing of a 1/2 inch BSP Female Process side. The drawing shows a cross-section of the component with dimensions in millimeters and inches. The main body has an outer diameter of 65 mm (2.56 inches) and an inner diameter of 30 mm (1.18 inches). The top flange has a thickness of 7.5 mm (0.29 inches). The bottom flange has a thickness of 10 mm (0.39 inches). The material is specified as 1. SS 316. The drawing also includes the text "Wetted Parts" and "APPROX. DIMENSIONS IN mm inches".

Dimensions:

- Top flange thickness: 7.5 mm (0.29 inches)
- Bottom flange thickness: 10 mm (0.39 inches)
- Main body outer diameter: 65 mm (2.56 inches)
- Main body inner diameter: 30 mm (1.18 inches)

Material: 1. SS 316

Wetted Parts

1/2" BSP Female Process side

APPROX. DIMENSIONS IN $\frac{\text{mm}}{\text{inches}}$

GENERAL SPECIFICATIONS AND APPLICATION NOTES

1. All the pressure switches contained in this catalogue are gauge pressure switches.
2. Pressure switches are switching instruments and not measuring ones. As such, the word "calibration" is used for the markings made on the scale to indicate the approximate setpoint of the pressure switch. No "calibration certificate" for this indication can be given in the proper sense of the word. However, the pressure switches can be supplied preset at user specified setpoints, provided the setpoints are indicated during the ordering stage itself.
3. Process temperature : can be 80 deg. C maximum. A pressure switch being a dead end, is not subjected to continuous process temperature(as in case of flow). As such, a proper length of impulse tubing of proper material (or chemical seals with adequate tubing) will substantially bring down the temperature, well within the specified limits. Normal pressure switches (without any modifications) have been used with working media having a temperature of upto 350 deg. C, only by employing an additional impulse tube.
4. Ambient temperature: can be from -10 deg. C to 60 deg. C for most of the standard pressure switches. Care should be taken that no icing occurs inside the enclosure where the atmospheres are humid, when pressure switches are used in subzero ambient temperature areas. Pressure switches for use in wider ambient temperatures can be developed should your application fall in such areas. If the process is likely to freeze / crystallize / solidify within this ambient range, chemical seals should be used alongwith the pressure switches.
5. All the pressure switches are tested on kerosene / air prior to despatch. For applications involving food grade material / oxygen service or processes not compatible with kerosene, such a note should be specifically made while ordering, so that pressure switches are tested accordingly.
6. All data published is under standard test conditions. Following conditions generally apply for Laboratory Evaluation tests:

Temperature	: Ambient room temperature (21 °C)
Humidity	: Ambient (50%)
Proof pressure	: 1.5 times maximum working pressure
Cycling rate	: 30 cycles/minute
Pressure rise	: compatible with above cycling rate (maximum)
Life in no. of cycles	: 100,000 minimum

The life and characteristics of pressure switches can be affected by temperature, humidity, airborne contamination, vibration and frequency of operation of the pressure switches. For specific switch selection, customers are requested to evaluate switch performance under actual application conditions or by simulating all the extreme application conditions and requirements. Laboratory Evaluation test data can never substitute customer's own product evaluation.

The life of the pressure switches can be increased by incorporating changes in design or by substituting certain components. Customers are requested to contact our sales office for any such specific requirements.

DEFINITIONS & TERMINOLOGY FOR PRESSURE ACTUATED SWITCHES

Pressure Switch:- A pressure switch is an instrument that automatically senses a change in pressure and opens or closes an electrical switching element when a pre-determined pressure point is reached.

Pressure sensing element:- A pressure sensing element is the portion of the pressure switch that transmits motion due to change in pressure.

Electrical switching element:- The electrical switching element in a pressure switch opens or closes an electrical circuit in response to the actuating force it receives from the pressure sensing element. Orion pressure switches are fitted with single pole double throw (SPDT) snap action switch(es) as electrical switching element (s) for maximum reliability.

Normally open switching element:- No current can flow through the switching element until the switch is actuated.

Normally closed switching element:- Current flows through the switching element until the switch is actuated.

Set Point:- The set point is expressed in terms of exact pressure at which the snap-action switch is actuated to either open or close the electrical circuit (depending on how the switch is wired).

Differential (Dead band, Hysteresis):- Differential is the difference between the actuation point and the deactuation point, e.g. if a pressure switch is set to operate at 5 bar on increasing pressure, the switch will close when the pressure rises to that point. As the pressure drops to, say, 4.8 bar the switch may open (this is the deactuation point). The differential of this switch is then 0.2 bar, the difference between the set point of 5 bar and deactuation point of 4.8 bar. Differential is sometimes referred to as "deadband" or "hysteresis".

Set Point in relation to increasing pressure & decreasing pressure:- A pressure switch may be set to actuate at any desired point on rising pressure or falling pressure. The former is described as "set to actuate on increasing (or rising) pressure" & the latter as "set to actuate on decreasing (or falling) pressure". The preferred actuation must be specified clearly on orders for pressure switches that are to be factory set.

Range :- The span within which the set point of a pressure-actuated switch may be adjusted.

Proof Pressure :- Proof pressure is the highest pressure to which a switch may be subjected without permanent damage.

Maximum working pressure (MWP) :- The nominal pressure level that a system will operate at, including workload.

Differential pressure :- The difference between a reference pressure and a variable pressure.

Wetted parts :- The parts which come in contact with the working medium.

HOW TO SELECT A PRESSURE SWITCH FOR YOUR APPLICATION

Following are the general guidelines which should help you arrive at a proper selection of 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 sensitivity or pressure desired. A second consideration in choosing a pressure switch is the speed of cycling, regardless of the service life. A sensing element made of metal sheets is likely to fatigue at cycling speeds above 20 cycles per minute and is not recommended for service life of more than 1 million cycles. Orion and Parus pressure switches use nylon reinforced rubber or piston as a sensing element and have been tested at a cycling frequency of 30 cycles / minute for more than a million cycles. The working medium to be controlled must be considered and to simplify selection, wetted parts are indicated on the catalogue pages.

Step 2.

Proof pressure - Choice of type of pressure switch must also be governed by the highest pressure to which it will ever be subjected. The highest pressure in the system including surges, should not be more than the proof pressure of the switch. It must be remembered that, though there are surges in the system, a pressure gauge may register a constant reading, the surges being dampened out by the orifice in the gauge.

Step 3.

Function of the switch. Three types of Orion pressure switches, based on function, are described below, a) Single setting pressure switches : They sense a single pressure source and open or close a single electrical circuit by means of a snap action electrical switch. b) Pressure difference switches : They sense a change in relationship between two pressures and open or close a single electrical circuit by means of a snap action electrical switch. c) Adjustable differential pressure switches: They sense two pressure limits, within a desired adjustable range, from a single pressure source and open or close a single electrical circuit by means of a snap action electrical switch.

Step 4.

Selection of adjustable range. The range should be selected such that the setpoint lies as close as possible to the middle of the total adjustable range. This will ensure the most favourable combination of accuracy and life.

Step 5.

Working medium. The working medium should be compatible with the wetted parts. For easier selection, the wetted parts are given in the catalogue pages. The maximum temperature of the working medium is also important. A pressure switch, being a dead end, is not subjected to continuous temperature. If the temperature of the working medium exceeds 80 deg. C, an impulse tubing of appropriate length should be used between the process connection and pressure port of the switch. Where the working medium is likely to freeze at the sensing element, a diaphragm seal (chemical seal) with appropriate wetted parts should be used. In case of excessive temperature or mounting the pressure switch remotely, pressure switches can also be supplied with remote seals. The filling medium has to be compatible with the working medium, and needs to be specified while ordering. (Specially in case of food related industries / processes)

Step 6.

Environment. The environment in which the pressure switch will operate is very important. Orion pressure switches can be supplied in weatherproof enclosures for outdoor service. For use of pressure switches in hazardous areas Orion pressure switches can be supplied in flameproof enclosures.