

Cover

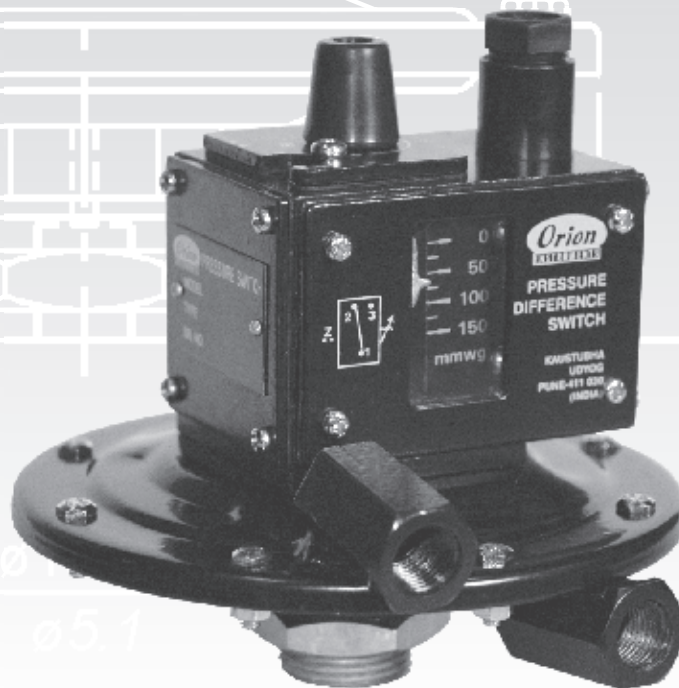
Screw



**PRESSURE SWITCHES  
PRESSURE DIFFERENCE SWITCHES  
VACUUM SWITCHES**  
From 1.5 mbar to 600 bar

## PD/PA Low Range Pressure Difference Switch

# INSTALLATION AND OPERATING INSTRUCTIONS



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# INSTALLATION AND OPERATING INSTRUCTIONS FOR PRESSURE DIFFERENCE LOW RANGE SWITCHES

## Construction

The pressure difference switch is housed in a die-cast aluminium enclosure which conforms to IP54 protection factor. Rubber gaskets can be provided optionally to provide an IP65 enclosure. For calibrated models a scale, visible through a window, is provided. The pressure capsule, comprises a housing (MS or SS 316), Support plate (Al or SS 316), nylon reinforced Neoprene diaphragm, Transfer Pin (Al or SS 316) junction plate (Aluminum), Teflon 'O' ring and Sealing Diaphragm (Teflon). The electrical changeover is through a snap action microswitch. The electrical wiring terminates at a terminal strip having screwed ends. A 3/8" cable gland has been provided for cable entry.

## Principle of Operation

The pressure in the pressure capsule is converted into force by means of a reinforced neoprene diaphragm, lower spring and a calibrated piston, which is balanced by a compression spring from above. When the effective force generated by the pressure difference in the lower and upper chamber of the pressure capsule exceeds/falls beyond the balancing spring forces, an electrical element is actuated.

## Mounting

Please refer Fig. 1.1

1. Pressure difference switches can be mounted directly in case the mounting is rigid.
2. For panel mounting, use the the 3/4" nut provided along with the pressure difference switch, to clamp the switch onto the panel. A hole of diameter 28 mm should be sufficient for the mounting boss to pass through. The panel thickness should not exceed 6 mm.
3. Connect the pressure tubing to the pressure port. The high pressure port size is generally 1/4" BSP Female unless specifically ordered otherwise and low pressure port size is 1/4" BSP Female. Other sizes can be obtained via adaptor.

## Electrical Connections

Pressure difference switches will generally have only one SPDT microswitch.

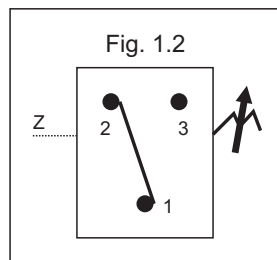


Fig 1.1

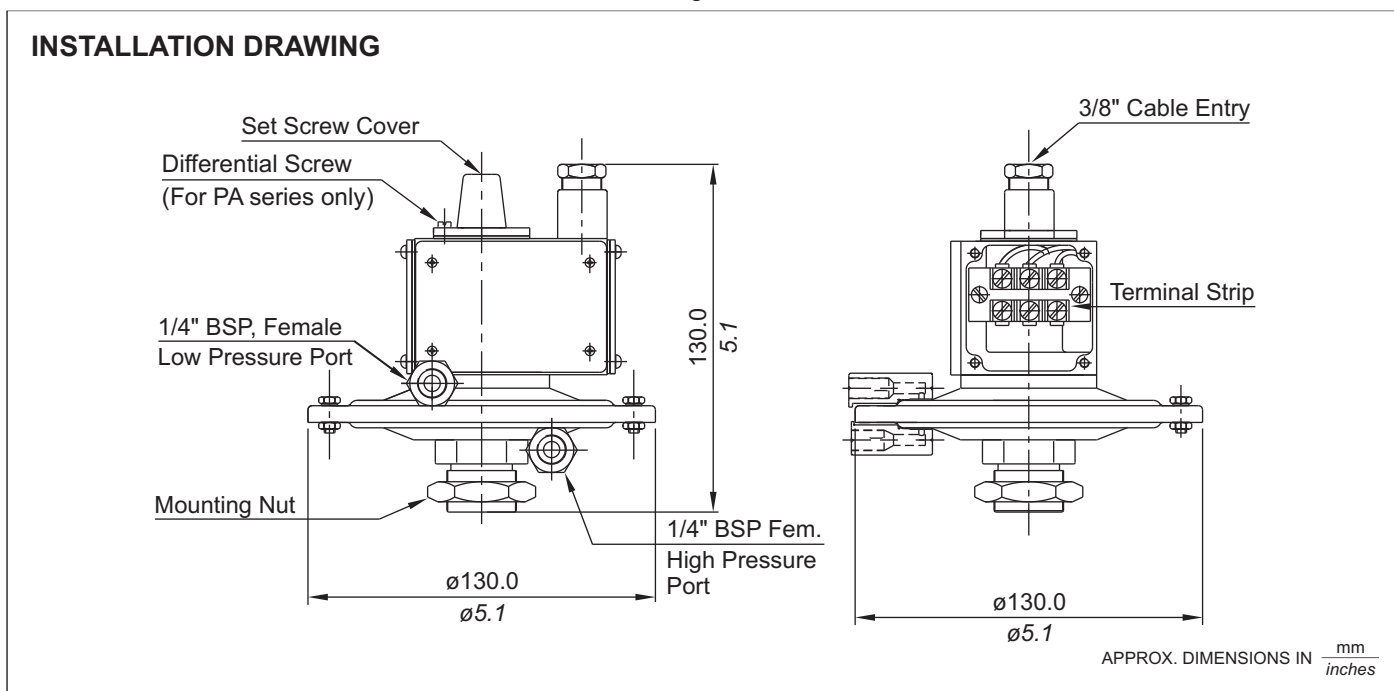
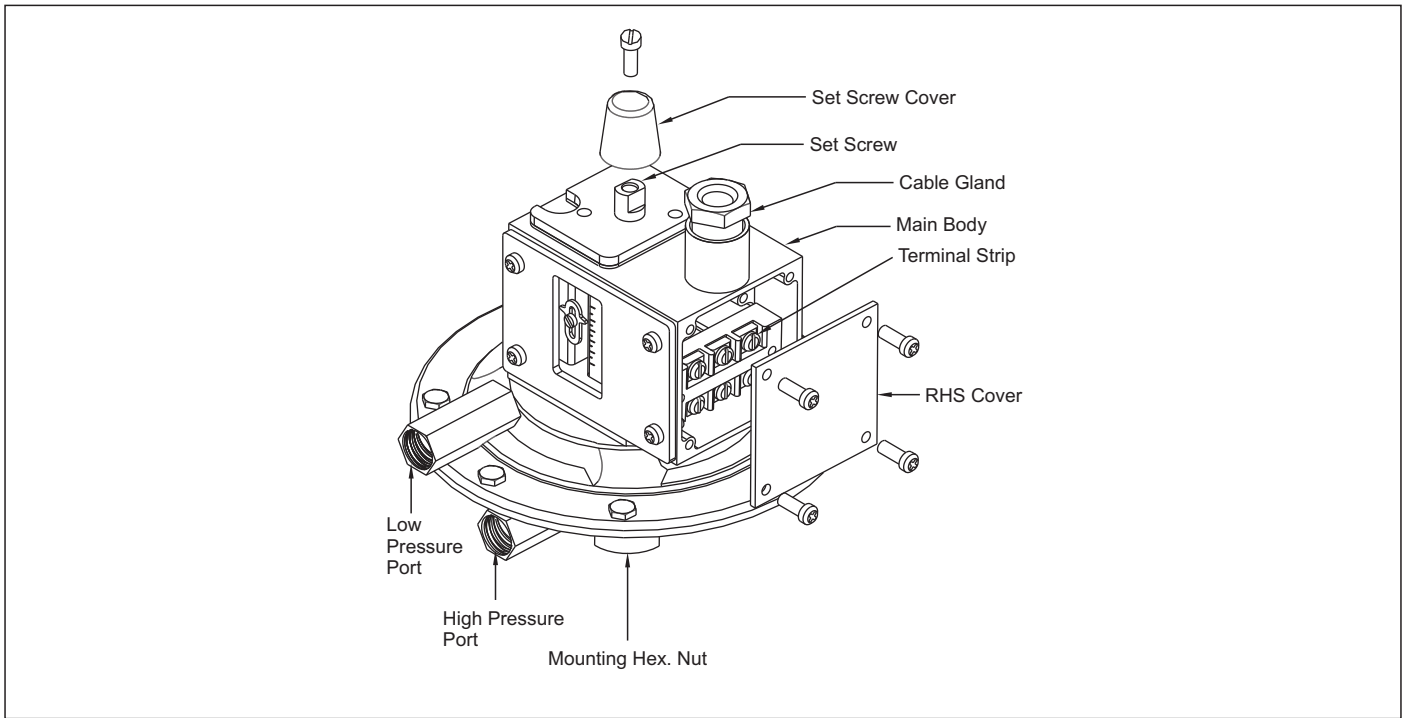


Fig 1.3



## Wiring

Please refer Fig. 1.3

- a) Remove the right hand side (RHS) over.
- b) Pass the cable through the cable gland and connect the wiring as per the wiring diagram.

The colour code is as per the details given below. (Refer fig. 1.2)

Terminal 1 (Common) : Red

Terminal 2 (Normally closed) : Black

Terminal 3 (Normally open) : Yellow

## Set Point Adjustment

Please refer fig. 1.3

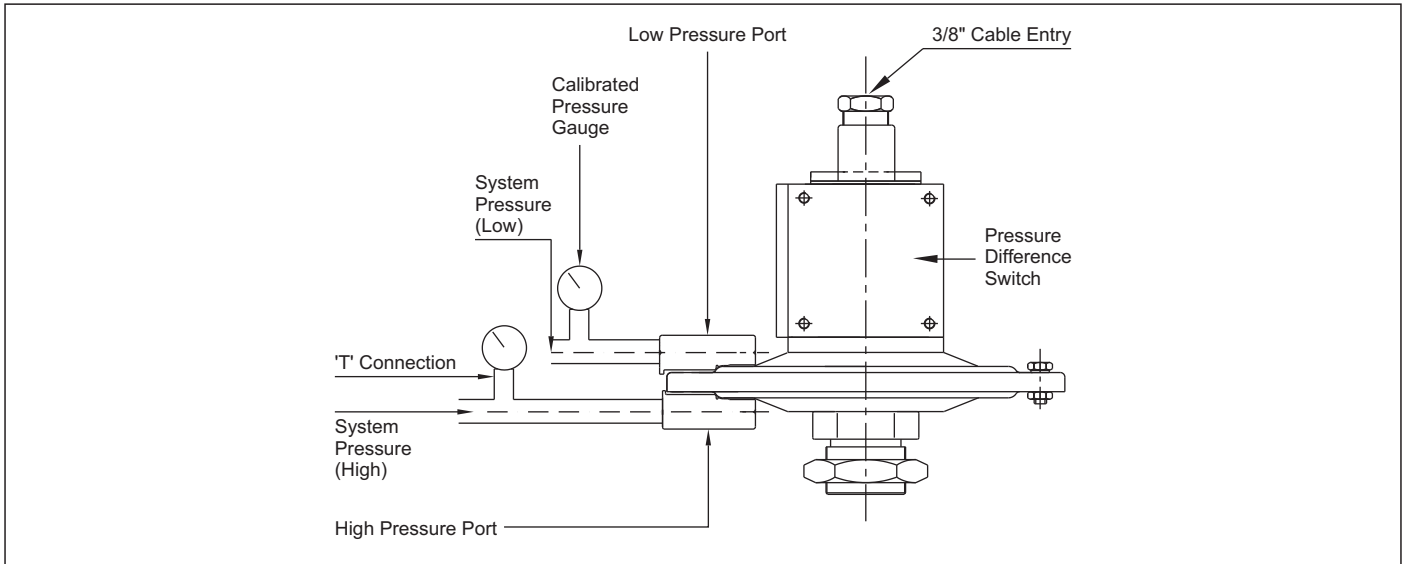
1. Remove the setscrew cover.
2.
  - i. PD UN-CALIBRATED Models : Turn the setscrew to the extreme negative end.
  - ii. PD CALIBRATED Models : Adjust the desired setpoint on the scale.
3. Apply the desired HP (high pressure) / LP (lower pressure) pressure to the high and low pressure capsules of the pressure difference switch.
4.
  - i. PD UNCALIBRATED Models : Increase the present setting by turning the setscrew till contacts changeover.
  - ii. PD CALIBRATED Models : Proceed to Step 5.
5. Some minor adjustment will be required to achieve the exact cutin (lower) / cutout (higher) point, which can be checked with the help of a proper pressure measurement device.
6. Replace the setscrew cover.

*Tip: The pressure difference switches are generally factory set at half the setpoint range (unless otherwise specified in a Purchase Order). Step 2 can be omitted if the desired set point is more than the factory setting, for PD Uncalibrated models.*

## FOR PA MODELS

1. Decide the cut-in (lower) pressure P1 & the cut-out (upper) pressure P2. The differential will be  $(P2 - P1)$ .
2. Remove the set screw cover.
3.
  - a) For PA UNCALIBRATED models
    - i) Turn the setscrew to the extreme negative end.
    - ii) Turn the differential screw to the extreme negative end.
    - iii) Apply the desired cutin (lower) pressure to the pressure switch.
    - iv) Increase the pressure setting by turning the setscrew till contacts changeover.
  - b) For PACALIBRATED models
    - i) set the cut-in point on the main-scale with the help of the set-screw.
4. Turn the differential screw to the extreme positive end.
5. Apply the desired cutout (higher) pressure to the pressure switch
6. Decrease the differential pressure setting by turning the differential screw till contacts changeover.
7. Some minor adjustment will be required to achieve the exact cutin (lower) / cutout (higher) point, which can be checked with the help of a proper pressure measurement device.
8. Replace the setscrew cover.

Fig 1.4



### Trouble Shooting Tips

Generally no problems are observed if the pressure difference switch selection, wiring and the setpoint is proper. For a pressure difference switch selection procedure, please consult our sales office. For properly selected pressure difference switches, if following symptoms are observed, the likely causes and remedies are as stated below.

#### Symptom 1: Switch does not operate

1. Wiring may not be correct. Check electrical connections to the pressure difference switch, if they are as per the wiring diagram.
2. Pressure does not reach the pressure port.
  - a. Check if the entry to the pressure capsule is not blocked by frozen process or scales or impurities in the process.
    - i. If this is the case, try freeing the blocked path by a blunt tool in case of scales and impurities.
    - ii. Check if the high-pressure side is connected to the high-pressure port and low pressure side is connected to the low-pressure port.  
If the cause is none of the above mentioned probabilities, proceed as per the following steps.
  - b) Check the system pressure & set point of pressure switch. For use of pressure switch for falling setpoints, system pressure has to be greater than cutin point. For use of pressure switch for rising setpoints, the system pressure may not be reaching / exceeding the cutout point.
    - (i) For PA models turn the differential screw to the extreme negative end.
    - (ii) Use 'T' connection & connect calibrated pressure gauge to the 'T' connection as shown in the figure 4.
    - (iii) Adjust the setpoint such that the system pressure is greater than the cut-out point of the pressure switch.
    - (iv) If the switch still does not operate, remove the pressure switch physically from the system. There should be continuity between terminals 1 & 2. If no continuity is observed, the pressure switch should be returned to the factory.

#### Symptom 2: Short Wiring

Isolate the switch electrically. Check the continuity between terminals and the screws fitted to the body. If no continuity is observed between any of the terminals and the screws fitted to the body, check the short connection elsewhere in the circuit. If continuity observed, the wires of the pressure difference switch have internally touched the body, and the switch should be returned to the factory.

#### Symptom 3: Leakage

In case leakage is observed, the pressure difference switch has to be returned to the factory without opening the pressure capsule.

Check for the following likely causes and use a new switch taking proper precautions.

- a. System pressure is greater than specified maximum working pressure. Use switch with appropriate maximum working pressure.
- b. Incompatible wetted parts : The working medium may not be compatible with wetted parts, which affects the sealing of the process from working parts. Use proper compatible wetted parts.
- c. Excessive process temperature: Process temperature may exceed maximum allowable temperature, which in turn damages the diaphragms.

Use an impulse tubing of proper length for cooling the process temperature. There may be a pressure drop depending on the length of the impulse tube used. Adjust the setpoint of the pressure difference switch accordingly.

#### Symptom 4: Chattering

1. Check the system pressure for surges. Chattering is observed where the system pressure is close to the cutin / cutout point and the surge pressure exceeds the on - off differential. Use a pressure difference switch with adjustable differential or use surge dampers in your system. An impulse tube may also be of help if the surges are not very large.
2. If there is a relay in the circuit, check if the relay is properly plugged in. Chattering may be due to loose contacts. ■