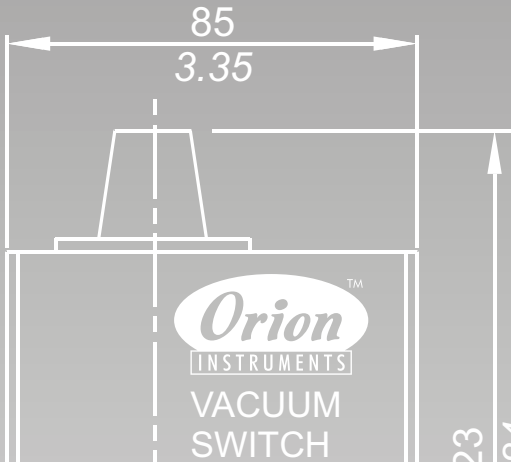




**PRESSURE SWITCHES**  
**PRESSURE DIFFERENCE SWITCHES**  
**VACUUM SWITCHES**  
From 1.5 mbar to 600 bar



# MN/MA/VS1 Vacuum Switches

## INSTALLATION AND OPERATING INSTRUCTIONS



Certificate No.: **FM 72815**

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# INSTALLATION AND OPERATING INSTRUCTIONS FOR MN/MA/VST VACUUM SWITCHES

## Construction

The vacuum 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 (aluminum), a disc (either Aluminium or Brass), nylon reinforced rubber diaphragm, junction plate (Aluminum), Teflon diaphragm, Teflon 'O' ring and a plunger (SS316). 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 negative pressure in the pressure capsule is converted into force by means of a reinforced rubber diaphragm and plunger which is balanced by a compression spring. When the force generated by the vacuum in the pressure capsule exceeds/falls beyond the balancing spring force, an electrical element is actuated.

## Mounting

Please refer Fig. 1.1

The vacuum switches can be mounted in any direction.

- Vacuum switches can be mounted directly in case the mounting is rigid.
- For panel mounting, use M5 bolts of appropriate length through the mounting holes. If the equipment is subject to vibration, please use rubber washers / pads between the panel and the switch.

## Electrical Connections

Vacuum switches will generally have only one SPDT microswitch.

## Wiring

Please refer Fig. 1.3

- Remove the right hand side (RHS) cover.
- 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.

Terminal 1 (common): Red

Terminal 2 (Normally closed): Black

Terminal 3 (Normally open): Yellow

Fig. 1.1

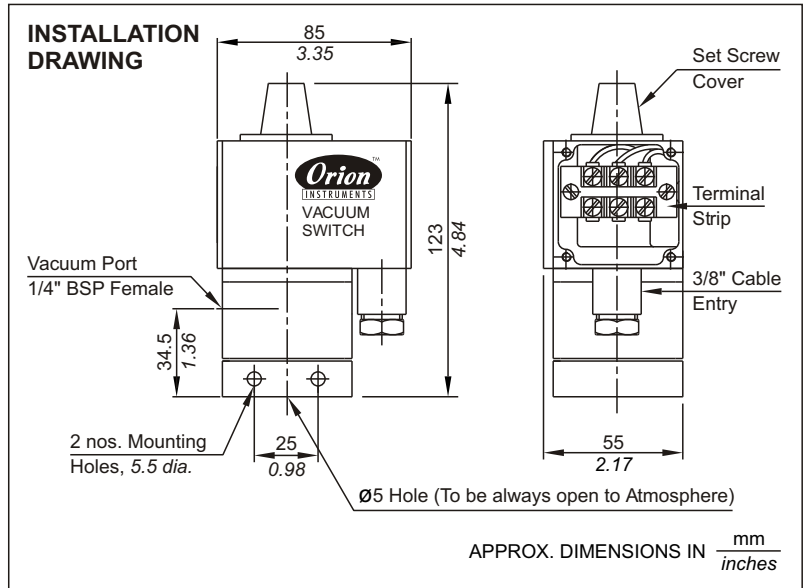
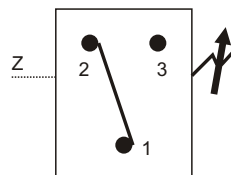


Fig. 1.2



## Set Point Adjustment

For **MN/VS1 Models**:

Please refer Fig. 1.3

- 1) Remove the setscrew cover .
- 2) i) For **MN/VS1 uncalibrated Models**
  - 2.1 Turn the setscrew to the extreme negative end.
- ii) For **MN calibrated Models**
  - 2.1 Adjust the desired setpoint on the scale.
- 3) Apply the desired cutin (lower) / cutout (higher) vacuum to the vacuum switch.
- 4) i) For **MN/VS1 uncalibrated Models**
  - 4.1 Increase the vacuum setting by turning the setscrew till contacts changeover.
- ii) For **MN calibrated Models**
  - 4.1 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 vacuum measurement device.
- 6) Replace the setscrew cover.

*Tip. : The vacuum switches are 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.*

## **SET POINT ADJUSTMENT FOR MA MODEL**

- 1) Decide the cut-in (lower) vacuum  $V_1$  & the cut-out (upper) vacuum  $V_2$ . The differential will be  $(V_2 - V_1)$ .
- 2) Remove the set screw cover.
- 3) a) For **MA uncalibrated models**
  - i) Turn the setscrew to the extreme positive end.
  - ii) Turn the differential screw to the extreme negative end.
  - iii) Apply the desired cutin (lower) vacuum to the vacuum switch.
  - iv) Increase the vacuum setting by turning the setscrew till contacts changeover.
- b) For **MA calibrated 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) vacuum to the vacuum switch.
- 6) Decrease the differential vacuum 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 proper vacuum measurement device.
- 8) Replace the setscrew cover.

Fig 1.3

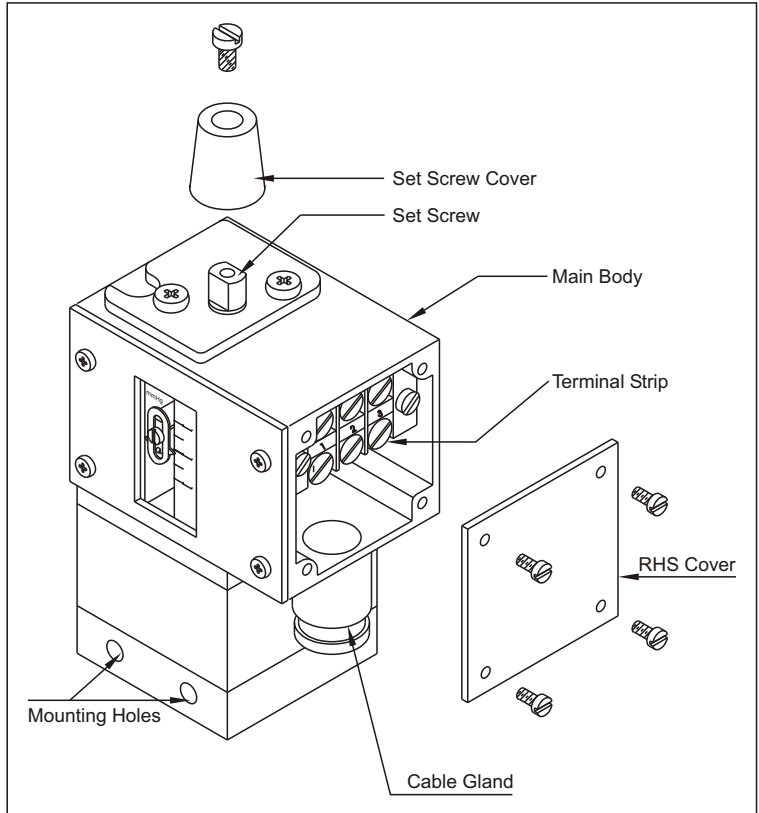
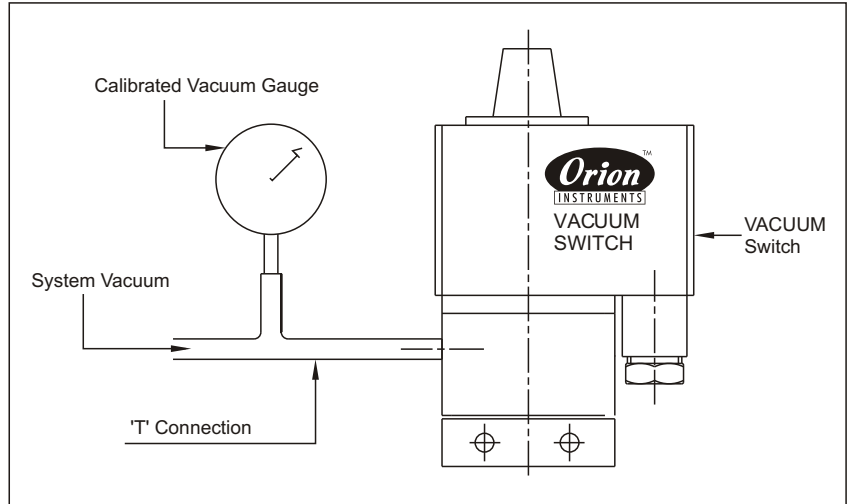


Fig. 1.4



## Trouble Shooting Tips

Generally no problems are observed if the vacuum switch selection, wiring and the setpoint is proper. For a vacuum switch selection procedure, please consult our sales office. For properly selected vacuum 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 vacuum switch, if they are as per the wiring diagram.
  - 2) Vacuum does not reach the vacuum 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.
- If the cause is none of the above mentioned probabilities, proceed as per the following steps.

- b) Check the system vacuum & set point of vacuum switch.
  - i) For use of vacuum switch for falling setpoints, system vacuum has to be greater than the cutout point.
  - ii) For use of vacuum switch for rising setpoints, the system vacuum may not be reaching / exceeding the cutout point.
- c) For MA model turn the differential screw to the extreme negative end.
- d) Use 'T' connection & connect calibrated vacuum gauge to the 'T' connection as shown in the figure.
- e) Adjust the setpoints such that the system vacuum is greater than the cut-out point of the vacuum switch.

If the switch still does not operate, remove the vacuum switch physically from the system. There should be continuity between terminals 1&2. If no continuity is observed, the vacuum 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 is observed, the wires of the vacuum switch have internally touched the body, and the switch should be returned to the factory.

### Symptom 3: Leakage

In case leakage is observed, the vacuum 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.
- b) Incompatible wetted parts: The working medium may not be compatible with wetted parts, which damages the sealing of the process from working 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 vacuum drop depending on length of the impulse tube used. Adjust the setpoint of the pressure switch accordingly.

### Symptom 4: Chattering

- 1) Chattering is observed where the system vacuum is close to the cutin / cutout point and the surge vacuum exceeds the on-off differential. Use a vacuum switch with an adjustable differential. ■