

## SPECIFIER'S GUIDE FOR

PRESSURE SWITCHES

PRESSURE DIFFERENCE SWITCHES

VACUUM SWITCHES

TEMPERATURE SWITCHES



OEM

COMPACT

PROCESS

INDUSTRIAL

FLAMEPROOF

CE

CE



CE



*Fit it...Set it...Forget it*





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## Using the catalogue

By taking a few minutes to familiarise yourself with how the catalogue is organized, you will find it very easy to use. See "How to use this catalogue" on pages 2 through 5.

### Catalogue Purpose :

The entire catalogue is a representative of the Kaustubha Udyog product line. It presents simplified ordering information on most products and references products not catalogued. This catalogue is intended to familiarize users with the broad product offering and provide ordering information for most popular listings, many available off the shelf from local authorized distributors.

This section on "How to use this catalogue" helps you make a logical choice in selecting the best product for a particular application. It allows a user familiar with our product line to locate the exact page the product is listed on. For those not familiar with our products, a logical sequence is given to help the user pick the best product for their need.

By taking a few minutes to familiarise yourself with the catalogue organisation, you will find it very easy to locate the product/information you need.

1. The sectional index broadly classifies the products into five categories, which are pictorially represented on page 3.
2. The contents page lists the broad outline in which the catalogue is organised, and will help the user familiar with products to select the page on which the product or other useful information is listed.
3. Need Product Selection help ?

Product selection help will start with the "Pictorial Index" of selected section, where the products are broadly classified. A brief description of each product group, a typical photo of the product within the group and the page number on which it is listed are given.

If the user is not familiar with the products, a product selection guide is provided in each individual section, where photos for each product and important specifications are given to help determine and select the best product for the application.

By evaluating and comparing these parameters, a logical selection can be made. Turn to the page on which the product information for the selected product is listed, for :

Capsule Construction details

Physical sizes

Special features

Ranges, hysteresis, electrical ratings etc.

Ordering information

Some applications

The organisation of each of these pages is demonstrated on pages following the "Pictorial Index" of each section in "Using the section".

In many cases, more than one product may work. For the most cost effective solution, compare prices and consider alternatives. Remember, the end cost includes initial product price, plus the installation, plus the service.

4. Need the terminology explained? (see page 330)

Turn to page 330 for the definitions and terminology. This will help you familiarise with the terms used throughout the catalogue.

5. Need information on Accessories? (see page 322)

Turn to page 322 for information on important accessories. These will give information on only important accessories, and information needed, when these are to be supplied with our products.

6. Need selection guidance? (see page 331)

A logical procedure on page 331 will help you to consider most of the important factors when selecting a pressure switch.

7. Need other products ? (see page 332)

Products other than those listed in this catalogue are referenced on these pages. Separate catalogues for these products are available.



### Flameproof switches :

These switches have been designed for use in hazardous areas and for severe applications in the Oil and Gas sectors like oil and gas pipelines, petrochemical plants, refineries and generally in atmospheres which are potentially explosive. All switches are designed for gas group IIC, the most severe of the explosive gases, and hence can be used in lower severity atmospheres, typically in IIA and IIB. With grey cast iron enclosures, these can also be used in mines.

SS enclosures can also be offered for highly corrosive atmospheres. Switches can be configured with a lot of options like electrical elements and sensing element configurations to suit the intended working media.

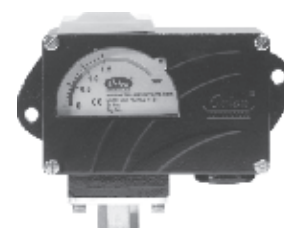
These switches have ATEX and IECEx approvals, which makes them usable almost throughout the world.



### Industrial switches :

These switches have been designed for heavy duty applications, where the products should withstand vibrations or should have an exceptionally long life and repeat accuracy. Sturdy electrical elements, in cast iron as a fulcrum to facilitate a smooth transition of bell crank lever for precise motion transfer, a wide scale (individually marked) with a specially designed rack and pinion system are its key features. Intended end uses can be large turbines, compressors, applications in thermal power plants, steel, cement and other such infrastructure industries.

These switches can be configured with a lot of options like electrical elements and sensing element configurations to suit the intended working media.



### Process Switches :

These switches have been designed for lighter applications requiring precise switching, for equipment mounted in the open air subject to rain, dust etc, where the internal operation of the switch needs to be visible. The access to setpoint is internal, and can be sealed, yet the operation of the switch is visible due to the tough transparent polycarbonate cover. Typical applications are in industries like jet dyeing machines, water treatment plants etc, where the atmosphere can be humid, dusty, slightly corrosive and generally detrimental to general purpose switches.



### Compact switches :

The initial of our product lines, these switches are meant for light duty applications for the OEM industry. Many of them need to be used in clean atmospheres, sometimes inside a panel. These are compact, low cost and built just for the intended use. Most of them can be configured for a particular purpose by selecting the wetted parts, but electrical ratings are restricted to 5 A, 250 VAC.



### OEM switches :

These are the items which are used in most general purpose applications. These switches cannot be configured and are generally intended for stock and sell.

As such, many of them are picked from all the above categories, and can be ordered by part numbers. These will generally have minimum order quantities, and would be available off the shelf.



## WHAT'S NEW!

### FLAMEPROOF SWITCHES

High Range Bellows Switches	Page No. 30
High Proof High Range Pressure Difference Switches	Page No. 50
High Range DP Switches	Page No. 54
Temperature Switches	Page No. 74
Some Applications added for each switch for better understanding of its use.	

### INDUSTRIAL SWITCHES

High Range Bellows Switches	Page No. 104
Large Bore High Range	Page No. 108
Dual Switches	Page No. 132
High Range DP Switches	Page No. 144
Ultra Low Range Pressure Difference Switches	Page No. 148
High Range Compound Switches	Page No. 162
Low Range Compound Switches	Page No. 166
Temperature Switches	Page No. 170
Some Applications added for each switch for better understanding of its use.	

### PROCESS SWITCHES

Large Bore High Range Switches	Page No. 194
Flanged Switches	Page No. 198
Hydraulic Diaphragm Switches	Page No. 206
High Range DP Switches	Page No. 214
Temperature Switches	Page No. 222
Some Applications added for each switch for better understanding of its use.	
Pressure Port Options Table	Page No. 226
Flange Code Table	Page No. 228
Microswitch Options Chart	Page No. 230

### COMPACT SWITCHES

MG/ME Triclover Switches	Page No. 256
Some Applications added for each switch for better understanding of its use.	

### OEM SWITCHES

SC Subminiature Switches	Page No. 300
EZ/EX__A Switches	Page No. 308
MZ__A	Page No. 312
MD OEM High Range Switches	Page No. 314
MD__A	Page No. 316
CF Ultra Low Range Pressure Difference Switches	Page No. 318
CS12 Compressor Switches	Page No. 320

## Sectional Index

### FLAMEPROOF SWITCHES



Pictorial Index : Page 11  
Product Selection Guide : Page 16



### INDUSTRIAL SWITCHES



Pictorial Index : Page 82  
Product Selection Guide : Page 88



### PROCESS SWITCHES



Pictorial Index : Page 177  
Product Selection Guide : Page 182



### COMPACT SWITCHES

Pictorial Index : Page 235  
Product Selection Guide : Page 238



### OEM SWITCHES

Pictorial Index : Page 291  
Product Selection Guide : Page 294



### UNLISTED PRODUCTS



## Introduction


FC pressure switches have been designed for use in areas which are potentially explosive. These can be used, by selecting an appropriate construction, for gas groups IIA, IIB and IIC. They can also be used in underground mines by selecting Grey CI flameproof heads.

Typical attributes are as follows.

### APPLICATIONS

- Oil & Gas
- Petrochemical
- Refineries
- Mines
- Bulk Drug & Pharma
- Chemical Industries

### PRODUCT SPECIFICATIONS:

- Storage Temp. : Atmospheric temperature
- Operating ambient Temp. : 0 to 60 degree C
- Media Temp.: - for non-metallic diaphragms 80°C max., higher with metal diaphragms
- Set point repeatability : +/- 1% over full range
- Enclosure details : Al grade LM6 / Grey Cast Iron / Stainless Steel Casing & Cover
- Enclosure Specifications :  
 II 2 GD Ex d IIC Gb Ex tb IIIC Db T85°C (-20°C ≤ Ta ≤ +60°C) IP66  
Protection : IP66 Standard  
Complies to :
  - ♦ IS/IEC 60079 - 1: 2007
  - ♦ EN 60079-0: 2009, EN 60079-1: 2007 and EN 60079-31: 2009.Grey CI enclosure for mines (Group I applications)
- Switch output 1 SPDT (2 SPDT on request).

### FEATURES

- Compact, rugged Design
- Enclosure protection : IP66 Standard
- Reliable, accurate micro switches used
- Customised Micro switch arrangement can be provided, on request
- Easy, safe wiring connections
- High/low pressure options available
- Accuracy\* : +/- 1% FSR / +/- 2 % FSR
- Warranty 2 Years

\*Accuracy changes with switch configuration



# FLAMEPROOF SWITCHES

## SPECIFIER'S GUIDE FOR

PRESSURE SWITCHES

PRESSURE DIFFERENCE SWITCHES

VACUUM SWITCHES

TEMPERATURE SWITCHES



APPROVED



with  
**IECEx**  
CoC

CCOE  
approved

KLPL  
approved

## Using the section

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If the user is not familiar with the products, a product selection guide is provided on pages 16 through 20, where photos for each product and important specifications are given to help determine and select the best product for the application.

By evaluating and comparing these parameters, a logical selection can be made. Turn to the page on which the product information for the selected product is listed, for :

Capsule Construction details

Physical sizes

Special features

Ranges, hysteresis, electrical ratings etc.

Ordering information

Some applications

The organisation of each of these pages is demonstrated on pages 12 & 13, of the section "How to use this section".

In many cases, more than one product may work. For the most cost effective solution, compare prices and consider alternatives. Remember, the end cost includes initial product price, plus the installation, plus the service.

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# International Certifications



APPROVED



## IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION  
IEC Certification Scheme for Explosive Atmospheres  
for rules and details of the IECEx Scheme visit [www.iecex.com](http://www.iecex.com)

Certificate No.: IECEx BAS 07.006X Issue No. 1 Certificate history:  
Issue No. 1 (2010-12-06)  
Issue No. 0 (2008-3-8)

Status: **Current**

Date of Issue: **2010-12-06** Page 1 of 4

Applicant: **Kaustubha Udyog**  
7, Parichaya Society  
100080,  
Navi Peth  
Pune 411 030  
India

Electrical Apparatus: **Flameproof Pressure Switch**  
Optional accessory:

Type of Protection: **Ex d, Ex tD**

Marking: **Ex d IIC Db Ex tb IIC Db T85°C (-20°C ≤ Ta ≤ +60°C) IP68**

Approved for issue on behalf of the IECEx Certification Body: **R S Sinclair**  
Position: **Managing Director**

Signature (for printed version): **[Signature]**  
Date: **6/12/10**

1. This certificate and schedule may only be reproduced in full.  
2. This certificate is not transferable and remains the property of the issuing body.  
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:  
Baseefa  
Rockhead Business Park,  
Staden Lane,  
Buxton  
Derbyshire  
SK17 9BZ  
United Kingdom



Certificate Number  
Baseefa07ATEX0268X/1



Issued 6 December 2010  
Page 1 of 2

- 1 **SUPPLEMENTARY EC - TYPE EXAMINATION CERTIFICATE**
- 2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres**  
Directive 94/9/EC
- 3 Supplementary EC - Type Examination Certificate Number: **Baseefa07ATEX0268X/1**
- 4 Equipment or Protective System: **Flameproof Pressure Switch**
- 5 Manufacturer: **Kaustubha Udyog**
- 6 Address: **7, Parichaya Society, 100080, Navi Peth, Pune 411 030, India**
- 7 This supplementary certificate extends EC - Type Examination Certificate No. Baseefa07ATEX0268X to apply to equipment or protective systems designed and constructed in accordance with the specification set out in the Schedule of the said certificate but having any variations specified in the Schedule attached to this certificate and the documents therein referred to.

This supplementary certificate shall be held with the original certificate.

This certificate may only be reproduced in its entirety, without any change, schedule included.

Baseefa Customer Reference No. 5756

Project File No. 10/0165

This certificate is granted subject to the general terms and conditions of Baseefa. It does not necessarily indicate that the equipment may be used in particular industries or circumstances.

**Baseefa**  
Rockhead Business Park, Staden Lane,  
Buxton, Derbyshire SK17 9BZ  
Telephone +44 (0) 1256 766000 Fax +44 (0) 1256 766001  
e-mail [info@baseefa.com](mailto:info@baseefa.com) web site [www.baseefa.com](http://www.baseefa.com)  
Baseefa is a trading name of Baseefa Ltd.  
Registered in England No. 4305678. Registered address as above.

**[Signature]**  
R S SINCLAIR  
DIRECTOR  
On behalf of  
Baseefa

Certificate Number  
Baseefa07ATEX0268X/1



Issued 6 December 2010  
Page 2 of 2

### Schedule

Certificate Number Baseefa07ATEX0268X/1

- 15 **Description of the variation to the Equipment or Protective System**  
Variation 1.1  
To permit the marking of a revised T85°C Temperature Classification.  
Variation 1.2  
To confirm that the equipment covered by this certificate now meets the requirements of EN 60079-0: 2009, EN 60079-1: 2007 and EN 60079-31: 2009.  
The marking is now modified as follows:-  
Ⓢ II 2 GD Ex d IIC Db Ex tb IIC Db T85°C (-20°C ≤ Ta ≤ +60°C) IP68  
Variation 1.3  
An alternative sensing capsule operating on temperature.  
Variation 1.4  
Mechanical changes to the external opening mechanism.
  - 16 **Report Number**  
Baseefa Certification Report GB/BAS/STR 10 036790
  - 17 **Special Conditions for Safe Use**  
None additional to those listed previously.
  - 18 **Essential Health and Safety Requirements**  
Compliance with the Essential Health and Safety Requirements is not affected by this variation.
  - 19 **Drawings and Documents**
- | Number                   | Issue | Date     | Description                                  |
|--------------------------|-------|----------|--|
| A24 BP 001 Sheets 1 to 4 | 01    | 07.04.10 | G.A. Flameproof Pressure Switch and Options. |
- These drawings are common to and held with IECEx BAS 07.006X.

# Indian Certifications

## KLPL Test Certificate

**Karandikar Laboratories** 

**TYPE EXAMINATION REPORT**  
Electrical Apparatus for Explosive Atmospheres

TC Report Number: **KLPL/ExR/10-006X** Date: **29<sup>th</sup> December 2010**

Electrical Apparatus: **Flameproof Pressure / Temperature Switch**  
**IBR/CM Brand - Model PC (P/A / TM)**

Manufacturer: **Kaustubha Udyog,**  
Address: **7, Panchsheel Society, 103/80,  
Nashik Road, Pune 411 005, India.**

This equipment and any acceptable variation therein are specified in the schedule to this TC Report and the documents therein referred to.

Karandikar Laboratories Pvt. Ltd. certifies that this equipment has been found to comply with requirements of the following standards relating to the design and construction of electrical apparatus for explosive gas atmospheres:

The equipment was taken up for recognition based on the compliance directly established by IEC/ISO for applications to IS 12366:2004 & IS 2148:2004, under their test report no. ERTG (J) / TCS / K065 / 0844 / 02-08 dated 25-02-2009 for gas groups I, IIA, IIB, IIC.

This TC Report was issued as verification that a suitable representation of production, was assessed and tested and found to comply with the IS / IEC standards listed below:

IS/IEC 60079-0:2004 **IS/IEC 60079-1:2007** **IS/IEC 60079-2:2007**

The Evaluation and Test results are recorded in KLPL's confidential report No. **KLPL / Ex / R / KU-18/041** Dated 29<sup>th</sup> December 2010.

The sign 'R' placed after the TC Report number, indicates that this equipment is subject to special conditions at site use specified in the schedule to this TC Report.

This TC Report does not indicate compliance with electrical safety and performance requirements other than those explicitly included in the above listed standards.

The marking of the Equipment shall include the following:  
**Exd I MC T6 IP66 On Ta (-20°C to +50°C)**

Page 1 of 4

**R.K. Paranjpe - Director**

**Karandikar Laboratories Pvt. Ltd.**  
Head Office: 3rd floor, 3rd cross, 2nd main road, opposite to, Marol Nagar, 103/80, Nashik Road, Pune 411 005, India.  
Branch Office: 2nd floor, 2nd cross, 2nd main road, opposite to, Marol Nagar, 103/80, Nashik Road, Pune 411 005, India.  
Email: karandikarlab@karandikarlab.com

**Bureau**  
helping to make the world safer

## CCOE Certificate

**GOVERNMENT OF INDIA**  
**MINISTRY OF COMMERCE & INDUSTRY**  
**PETROLEUM AND EXPLOSIVES SAFETY ORGANISATION (PESO)**  
(Formerly Department of Explosives)  
**CCO COMPLEX SUMMARY SHEET**  
**NAEPER 44008**  
**SPEED POST**

Letter No. A/P/HQ/SH/104/1755/224000  
Email: ccoep@peso.gov.in  
Phone/Fax No. 2312482315/231577  
Date: 24/8/2012

**24 AUG 2012**

To: **M/s. Kaustubha Udyog,**  
So. No. 78/11, Vajrapur Khurd,  
Sahyad Road,  
Pune - 411041  
PUNE (District)  
Maharashtra (State)

**Sub:** Approval of Flameproof Pressure/Temperature Switch, Model: PC/F/A/TM, under Petroleum Rules, 2010, in accordance with.

Dear Sir(s),

Please refer to your letter No. A/P/HQ/SH/104/1755/224000 dated 20/07/2012 on the above subject.

The following Flame Proof equipment(s) manufactured by you according to IS/IEC 60079-0:2004 & IEC 60079-1:2007 standards and covered under KLPL, Boisar (Thane) Test reports mentioned below is/are approved for use in **Zone I** of Gas Group IIA/IB/IC hazardous areas coming under the purview of the Petroleum Rules, 2010 administered by this Organization:

Sl. No.	Description	Safety Protection	CCOs Identification Number	Test House	Test Report No.	Draw Number
1.	Flameproof Pressure/Temperature Switch, Model: PC/F/A/TM	Exd I MC T6 IP66	P228266/1	KLPL, Boisar (Thane)	KLPL/ExR/10-006X, Dated 29/12/2010	As per Test Report

The approval issued for the subject equipment(s) vide this office letter No. even No. dated 06/07/2009 is hereby extended for a further period of five years i.e. upto **06/07/2014** subject to the following conditions:-

- The equipment is/are covered under a valid BIS licence.
- The equipment shall be used only with approved type of accessories and associated apparatus.
- Each equipment shall be marked either by raised lettering cast integrally or by plate attached to the main structure to indicate conspicuously:-  
(a) Name of the manufacturer;  
(b) Name and number by which the equipment is identified;  
(c) Number & date of the test report of the KLPL, Boisar (Thane) applicable to the equipment;  
(d) CCOs Identification Number of this letter by which use of apparatus is approved.
- A certificate to the effect that the equipment has been manufactured strictly in accordance with the drawing referred to in the KLPL, Boisar (Thane) Test report and is identical with the one tested and certified at KLPL, Boisar (Thane) shall be furnished with each equipment.

## BIS License

**भारतीय मानक ब्यूरो**  
**BUREAU OF INDIAN STANDARDS**

Address: Plot No. 3/7 Sector 10/50 MIDC Building,  
Market Yard, Ghatkopar,  
Pune  
411 027  
Phone: 020-24738811 & 567  
Fax: 020-24738816  
Email: petco@bis.org.in  
Web: http://www.bis.org.in

**Pune Branch Office**

**ATTACHMENT TO LICENCE NO. CML- 7759986**

CML NO.	NAME OF THE LICENSEE WITH ADDRESS	PRODUCT	IS NO.
7759986	<b>KAUSTUBHA UDYOG</b> SHED NO. 1 VINHAGAD ROAD VADGAON RD Pune Maharashtra 411041	Electrical equipment for use in explosive atmospheres - Part 1 - Equipment of protection type "d" (Flameproof enclosures) "d"	IS/IEC 60079-1:2007

**ENDORSEMENT NO. 7** **Dated 02 July 2012**

Consequent upon implementation of revised IS/IEC 60079-1:2007 Column (2) of the First Schedule and Column (1) of the Second Schedule of the Licence have been modified as under with effect from Eighteenth June Two Thousand and Twelve.

As per Annexure

Other terms and conditions of Licence remain the same.

**B.M. HANDETTI**  
SCIENTIST-F & HEAD



## Pictorial Index

### PRESSURE SWITCHES

**HIGH RANGE**



Page No. 22

**HIGH PROOF  
HIGH RANGE**



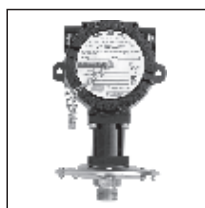
Page No. 26

**BELLOWS**



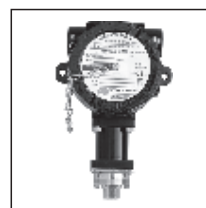
Page No. 30

**LOW RANGE**



Page No. 34

**HYDRAULIC  
RANGE\***



Page No. 38

**FLANGED**



Page No. 42

### PRESSURE DIFFERENCE SWITCHES

**HIGH RANGE**



Page No. 46

**HIGH PROOF  
HIGH RANGE**



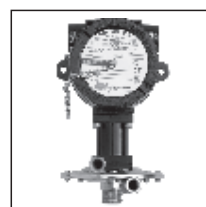
Page No. 50

**HIGH RANGE  
DP**



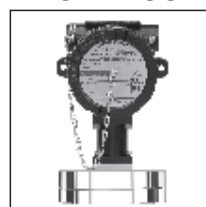
Page No. 54

**LOW RANGE**



Page No. 58

**LOW  $\Delta P$   
HIGH PROOF**



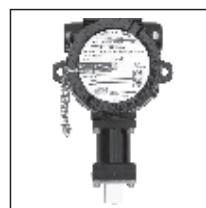
Page No. 62

### VACUUM SWITCHES



Page No. 66

### COMPOUND SWITCHES



Page No. 70

### TEMPERATURE SWITCHES



Page No. 74

\*Hydraulic ranges are ranges typically from 2 bar to 400 bar, used in oil applications. However, these switches can be used for other media depending on wetted parts compatibility.

# HOW TO USE this section

Due to the variety in product types and their salient features, catalogue page formats may vary. But generally the following format is adhered to.

Elements appearing on each page will be:

1. Product family / series - A product family / series will appear on the outside page corner, depending on the left / right hand page, and will be in large bold type.
2. Product section - will appear immediately following the product family / series at top of the page and will be in bold type.
3. Features - will appear next to product description & will enlist only the major attributes.
4. Pressure capsule details - will show the construction of the pressure capsule and all it's internal parts. If the process / working medium is variable, the wetted parts will

be mentioned in italics. If the wetted parts are unique, the material of construction (MOC) will be mentioned alongside in brackets. Where the material of construction is not specified, it will vary and the options are to be selected by the user considering the compatibility of the process / working medium. Modifications can be made to suit any particular medium, if the answer for your needs is not in the standard MOC listed. Products for which process / working medium is predefined, pressure capsule details are not provided (e.g as in case of comparison test pump). Pressure capsule details of accessories are not given.

5. Installation drawing - will show the typical installation dimensions of products as they exist in their standard forms. The dimensions are mentioned in millimetres and also in inches to facilitate the user. The dimensions of accessories will have to be added to these to arrive at any particular general arrangement (GA) drawings. The

**1 FC HIGH PRESSURE RANGES**

**2**

**3**

Large Flamepaths for better safety  
Internal ground screw  
Robust Snap action microswitches for reliable switching  
Lock Screw for stable set-points  
Large Sensing area for better sensitivity  
Nonmetallic diaphragms for minimal drift  
Large Springs for finer set-points  
Cover chained to main body  
Separate Terminal block for safe wiring

**Approximate Weight :**  
Pressure switches with Aluminium enclosure : 1.87 Kg.  
Pressure switches with Grey CI enclosure : 4.27 Kg.  
Pressure switches with SS enclosure : 4.42 Kg.

**Electrical Connection :**

**10 Some Applications :**  
Used in hazardous areas for applications like fire fighting systems, LPG bottling plants, etc. For any type of corrosive and non-corrosive gases and fluids.

Bulletin No. KA121024 **22**

**6 HIGH PRESSURE RANGES FC**

**7**

**4**

**5**

**Pressure Capsule Details**

No. Description  
1. High Pressure Port (SS316)  
2. Housing Plate (SS316)  
3. Teflon® O-Ring  
4. SS 316 Ring  
5. Diaphragm (Teflon®)  
6. Conical Plunger

Note : wetted parts are mentioned in italics.

**INSTALLATION DRAWING**

145.0 (5.71)  
125.0 (4.96)  
203.0 (8.02)  
145.0 (5.82)  
110.0 (4.33)  
26.0 (1.02)  
Cable Entry  
1/2" NPT(F) (Options Avail.)  
Ø7 (Ø 0.27) Mounting Holes, 2nos  
Pressure Port  
1/4" BSP(F) Std. (Options Avail.)  
APPROX. DIMENSIONS IN mm inches

Bulletin No. KA121024 **23**

## Bulletin No. KA121024

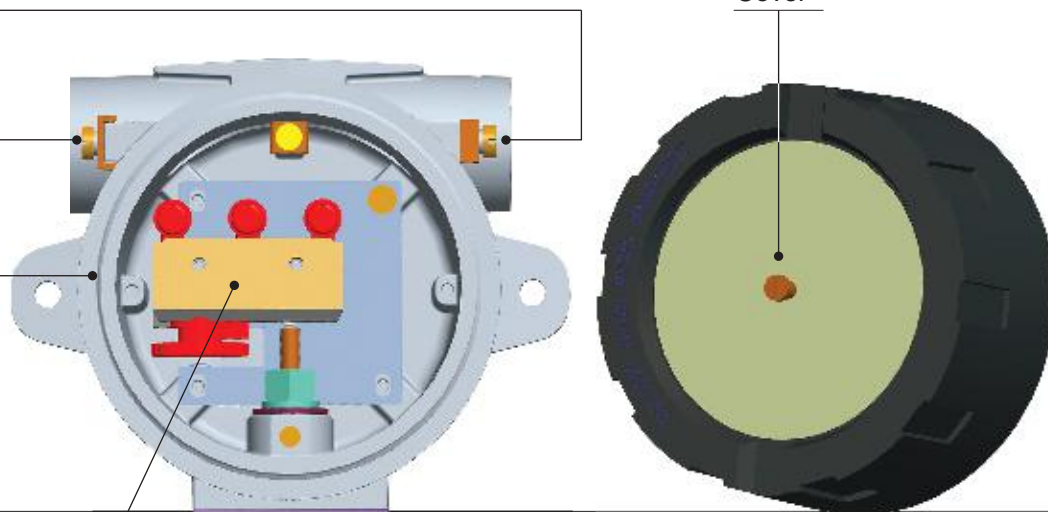
## Switch Construction

### a) Flameproof Head (Casing + Cover)

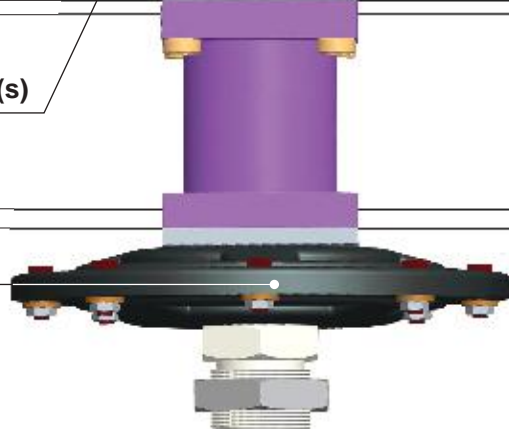
Cable Entry

Casing

Cover



### b) Electrical Element (s)



### c) Pressure Capsule





The versatile construction of FC series flameproof switches can be configured to suit applications, by selecting the following main subassemblies / components :

## a) The flameproof head

FC 1, 2, 3: Aluminium flameproof enclosure for Gas group IIA, IIB, IIC

FC 4, 5, 6: Grey Cast Iron enclosure for Gas group I for mines

FC 7, 8, 9: Stainless Steel enclosure for highly corrosive atmospheres (Gas group IIC).

The cable entries in these flameproof heads can be offered in one of the following thread sizes, to suit appropriate cable diameter :

- ½ " NPT F
- ¾ " NPT F
- M20 X 1.5

## b) The electrical element (s) :

Choice of electrical elements to suit end use are offered, like :

- A1 : General purpose applications
- A2 : Hermetically sealed for corrosive environments
- A3 : gold plated contacts for low voltage applications
- A4 : DPDT configuration
- A5 : for high DC ratings
- A6 : elements with adjustable deadband
- A7 : 2 SPDT switching elements

It is possible to have more options of electrical elements not published here, to suit individual end use.

The deadband (or hysteresis / on-off differential) of the switches will change with the change of the electrical element (s). The approximate values for each range (for standard microswitches offered) are published in this catalogue

## c) The pressure capsule :

To suit the setpoints , the working media and the function of the switch in the application:

High pressure ranges  
(typically from 0.067 barg to 25 barg)

Low pressure ranges  
(typically from 1.5 mbarg to 350 mbarg)

High range Pressure difference  
(typically from 0.1 barg to 25 barg)

Low range pressure difference  
(typically from 1.5 mbarg to 350 mbarg)

Vacuum  
(typically from 760 mm Hg to atmospheric pressure)

Hydraulic pressure ranges  
(typically from 0.5 barg to 400 barg)

The pressure capsule can be modified to take high proof pressures [typically 100 bar for high and low pressure switches, or pressure difference switches (from high pressure side)].

Several accessories like chemical seals, pipe mounting brackets etc can be supplied with these switches to suit the media to be sensed. All of these are not listed, though most popular ones can be found on pages 322 through 332.

Please do get in touch with us for any of your applications, not addressed in this catalogue. We would be glad to offer you a solution.

## Product Selection Guide

### High Range Pressure Switches

### High Proof High Range Pressure Switches

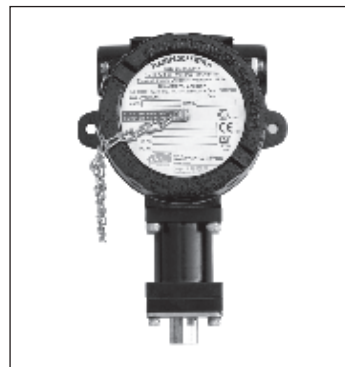
### High Range Bellows Pressure Switches



Page No. 22



Page No. 26



Page No. 30

Switch type	High range pressure	High proof high range	Bellows
Repeatability* (% FSR)	± 1	± 1	± 2
Range covered	0.067 bar to 25 bar	0.1 bar to 25 bar	0.1 bar to 100 bar
Enclosure Protection	IP 66		
Enclosure Material	FC 1, 2, 3 models (gas group IIC) : Diecast aluminium FC 4, 5, 6 models (gas group I) : Grey cast iron FC 7, 8, 9 models (gas group IIC) : Stainless Steel		
sensing element Standard Optional	Diaphragm nylon reinforced neoprene diaphragm Teflon, SS316L, Hastelloy C, Monel, Titanium, Tantalum, Inconel Teflon, SS316L		Bellows SS316L
Pressure housing Standard Optional	Hastelloy C, Monel SS 316		
Other Wetted Parts			
Optional wetted parts through chem. seal	SS316, Hastelloy B2, Hastelloy C4, Hastelloy C22, Hastelloy C276, Inconel Alloy 600, Monel Alloy 400, Monel Alloy K500, Nickel, Platinum, Tantalum, Titanium, Zirconium, Silver, PTFE		
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum. For higher temperature, please use impulse tubing/chemical seals.		
Switching element	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. Other microswitches with gold plated contacts, hermetically sealed etc. also available.		

Accessories can be supplied with most of the switches. Please consult sales office.

\*Repeatability changes with switch configuration.

## Product Selection Guide

### Low Range Pressure Switches Hydraulic Pressure Switches Flanged Pressure Switches



Page No. 34



Page No. 38



Page No. 42

Low range pressure	Hydraulic	Flanged
± 2	± 2	± 1
1.5 mbar to 350 mbar	0.5 bar to 400 bar	0.1 bar to 200 bar
IP 66		
FC 1, 2, 3 models (gas group IIC) : Diecast aluminium FC 4, 5, 6 models (gas group I) : Grey cast iron FC 7, 8, 9 models (gas group IIC) : Stainless Steel		
Diaphragm nylon reinforced neoprene diaphragm Teflon, SS316L	Diaphragm SS316L Teflon, Neoprene, Hastelloy C, Monel, Titanium, Tantalum, Inconel	Diaphragm SS316L Teflon, Neoprene, Hastelloy C, Monel, Titanium, Tantalum
SS 316		Flange SS316L Hastelloy C, Titanium, Monel, Tantalum
Al, Neoprene, SS, Nitrile	Viton / Teflon	Teflon
For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum. For higher temperature, please use impulse tubing/chemical seals.		
SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. Other microswitches with gold plated contacts, hermetically sealed etc. also available.		

## Product Selection Guide

### High Range Pressure Difference Switches

### High Proof High Range Pressure Difference Switches

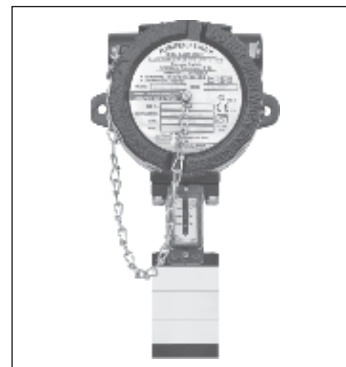
### High Range DP Pressure Difference Switches



Page No. 46



Page No. 50



Page No. 54

Switch type	High range ? p	High proof high range ? p	High range DP
Repeatability* (% FSR)	± 1	± 1	± 1
Range covered	0.1 bar to 3.6 bar	0.1 bar to 3.6 bar	0.1 bar to 25 bar
Enclosure Protection	IP 66		
Enclosure Material	FC 1, 2, 3 models (gas group IIC) : Diecast aluminium FC 4, 5, 6 models (gas group I) : Grey cast iron FC 7, 8, 9 models (gas group IIC) : Stainless Steel		
sensing element Standard Optional	Diaphragm nylon reinforced neoprene diaphragm Teflon, SS316LTeflonTeflon, SS316L, Monel		
Pressure housing Standard Optional	Aluminium SS 316	SS 316	Aluminium SS 316, Monel
Other Wetted Parts	Teflon, SS 316	Teflon, SS 316	Teflon, SS 316
Optional wetted parts through chem. seal			
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum. For higher temperature, please use impulse tubing/chemical seals.		
Switching element	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. Other microswitches with gold plated contacts, hermetically sealed etc. also available.		

Accessories can be supplied with most of the switches. Please consult sales office.

\*Repeatability changes with switch configuration.



## Product Selection Guide

### Low Range Pressure Difference Switches High Proof Low Range Pressure Difference Switches Vacuum Switches



Page No. 58



Page No. 62

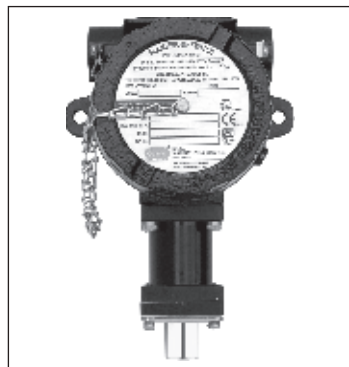


Page No. 66

Low range ?p	High proof low ?p	Vacuum
± 2	± 2	± 2
1.5 mbar to 350 mbar	5 mbar to 350 mbar	760 mmHg to 100 mmHg
IP 66		
FC 1, 2, 3 models (gas group IIC) : Diecast aluminium FC 4, 5, 6 models (gas group I) : Grey cast iron FC 7, 8, 9 models (gas group IIC) : Stainless Steel		
Diaphragm nylon reinforced neoprene diaphragm Teflon		
SS 316	SS 316	Aluminium SS 316
Al, Neoprene, SS, Nitrile, M.S.	Teflon / SS 316 / Neoprene	SS 316, Teflon
For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum. For higher temperature, please use impulse tubing/chemical seals.		
SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. Other microswitches with gold plated contacts, hermetically sealed etc. also available.		

## Product Selection Guide

### Compound Switches Temperature Switches



Page No. 70



Page No. 74

Switch type	Compound	Temperature
Repeatability* (% FSR)	± 2	± 1
Range covered	-1 bar to 3.6 bar	25°C to 215°C
Enclosure Protection	IP 66	
Enclosure Material	FC 1, 2, 3 models (gas group IIC) : Diecast aluminium FC 4, 5, 6 models (gas group I) : Grey cast iron FC 7, 8, 9 models (gas group IIC) : Stainless Steel	
sensing element Standard Optional	Diaphragm nylon reinforced neoprene diaphragm teflon	Bulb/probe Brass
Pressure housing Standard Optional	SS 316	
Other Wetted Parts	SS, Teflon	
Optional wetted parts through chem. seal		
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum. For higher temperature, please use impulse tubing/chemical seals.	
Switching element	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. Other microswitches with gold plated contacts, hermetically sealed etc. also available.	

Accessories can be supplied with most of the switches. Please consult sales office.

\*Repeatability changes with switch configuration.

# Flameproof Temperature Switch



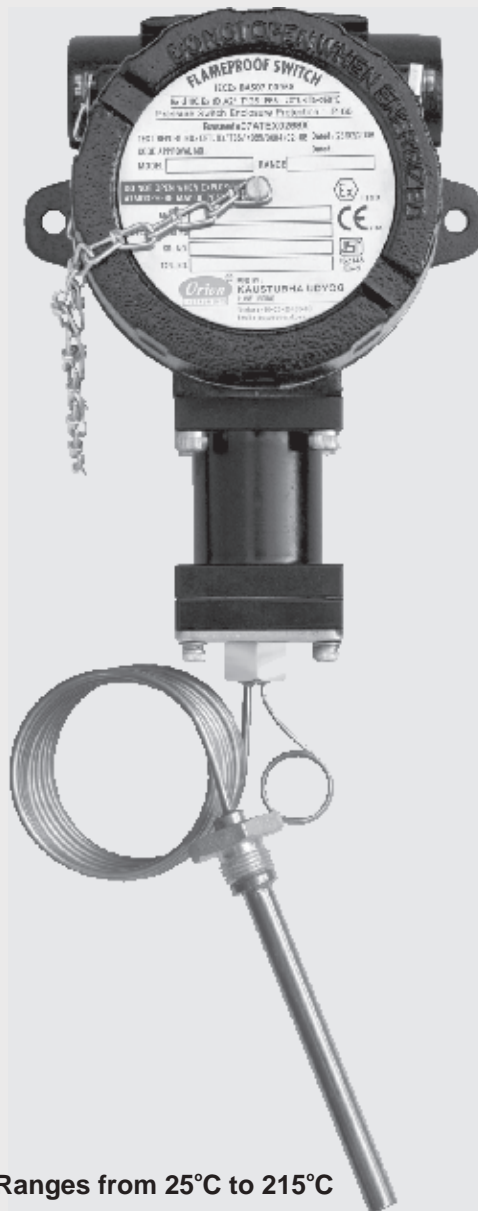
APPROVED



with  
**IECEX**  
CoC

CCOE  
approved

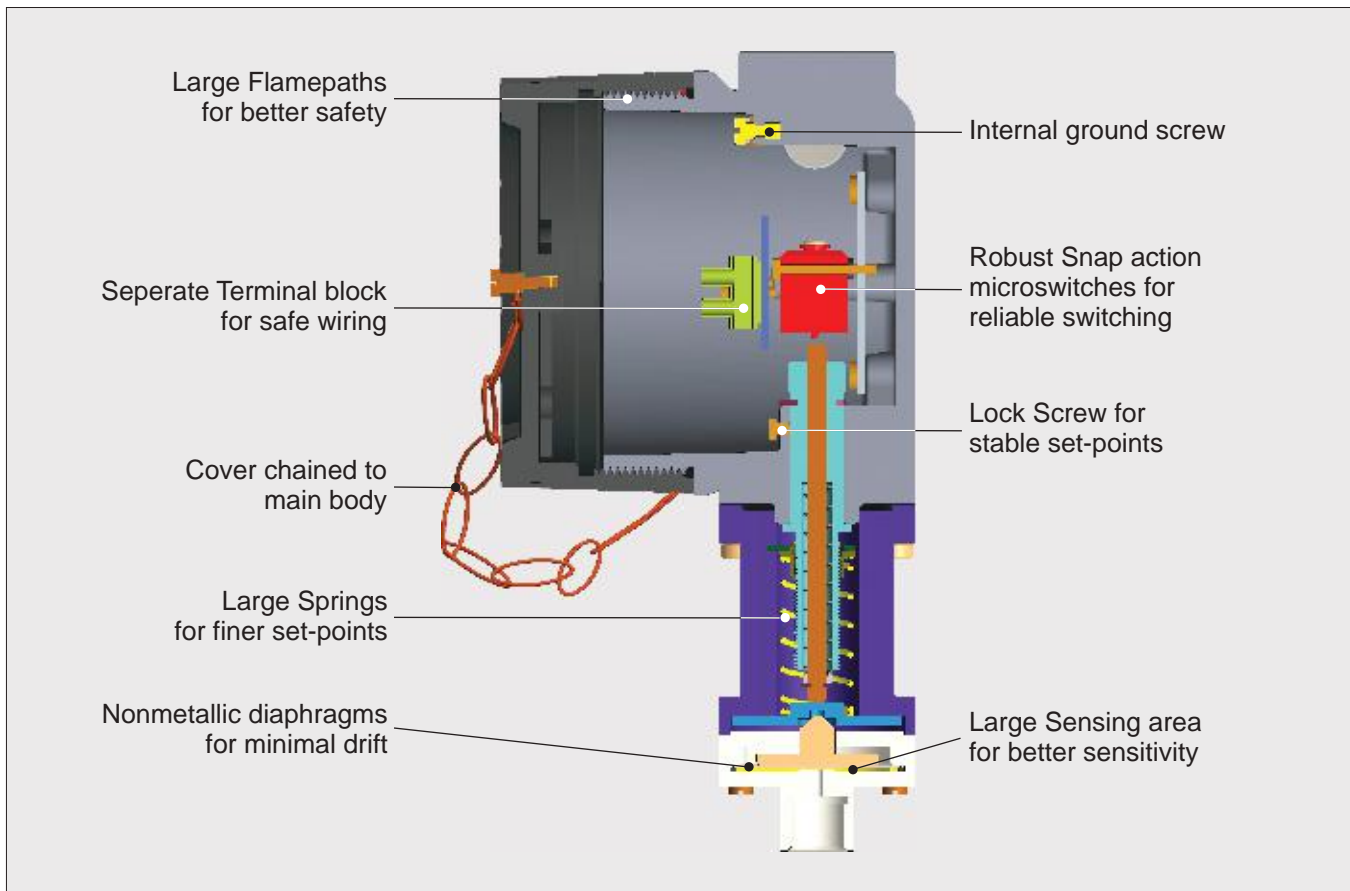
KLPL  
approved



Temperature Ranges from 25°C to 215°C

Please refer page no. 74 for Temperature Switch details

# FC HIGH PRESSURE RANGES



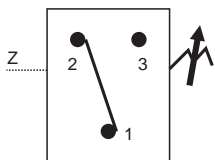
## Approximate Weight :

Pressure switches with Aluminium enclosure : 1.87 Kg.

Pressure switches with Grey CI enclosure : 4.27 Kg.

Pressure switches with SS enclosure : 4.42 Kg.

## Electrical Connection :

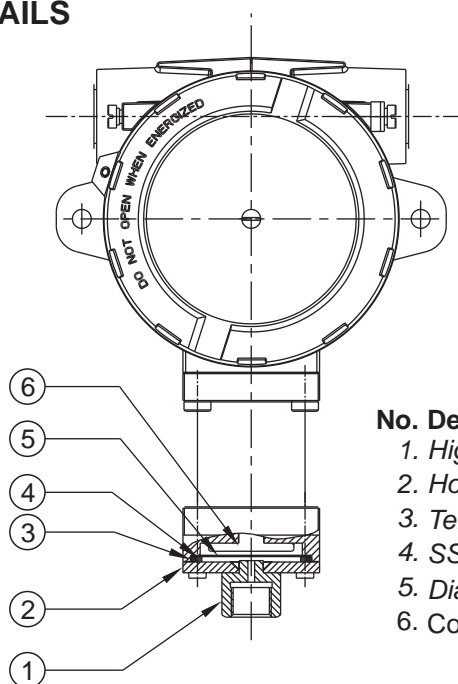


## Some Applications :

Used in hazardous areas for applications like fire fighting systems, LPG bottling plants, etc. For any type of corrosive and non-corrosive gases and fluids.



## PRESSURE CAPSULE DETAILS

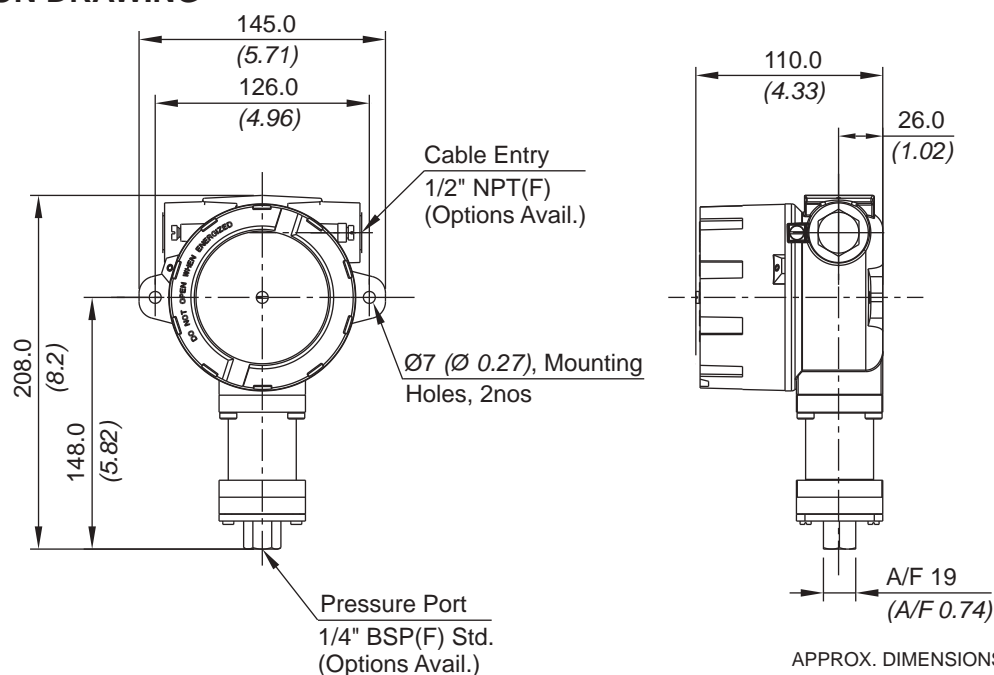


### No. Description

1. High Pressure Port (SS316)
2. Housing Plate (SS316)
3. Teflon® O-Ring
4. SS 316 Ring
5. Diaphragm (Teflon®)
6. Conical Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING





# FC HIGH PRESSURE RANGES

RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
LP	0.067 - 0.213 (0.97 - 3.09)	0.02 (0.29)	5 (72.52)
LP5	0.1 - 0.5 (1.45 - 7.25)	0.08 (1.16)	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.15 (2.17)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.20 (2.90)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.037)	0.40 (5.80)	25 (362.6)
H15	1.0 - 15.0 (14.5 - 217.56)	0.50 (7.25)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	1.0 (14.5)	35 (507.63)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF HIGH RANGE PRESSURE SWITCHES

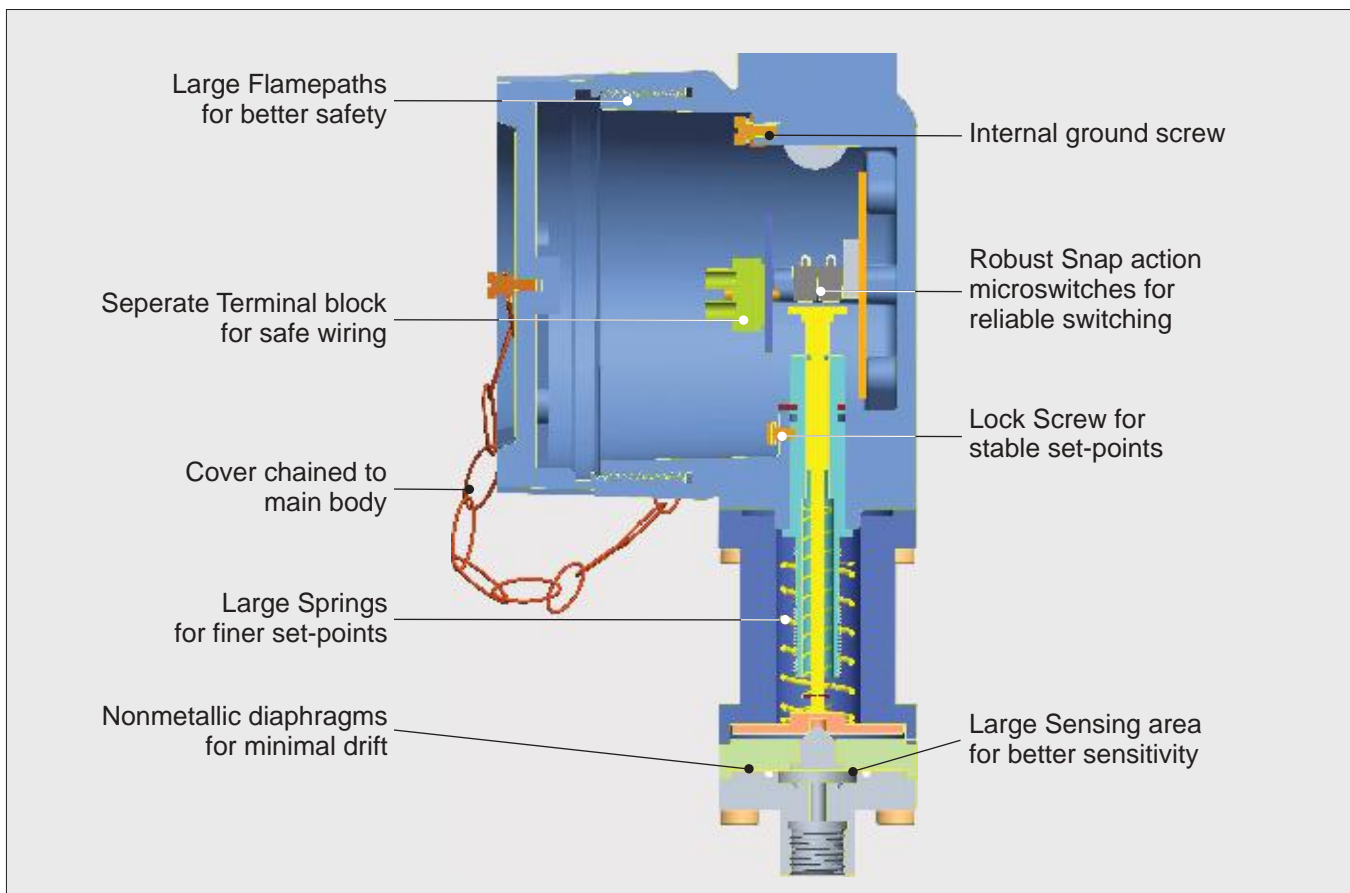
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>P1</b> = pressure switch, fixed differential without scale <b>P2</b> = pressure switch, fixed differential with scale in bar <b>P3</b> = pressure switch, fixed differential with scale in psi	<b>LP</b> = (0.067 - 0.213) <b>LP5</b> = (0.1 - 0.5) <b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F) <b>H1</b> = Hastelloy C / ¼" BSP(F) <b>H2</b> = Hastelloy C / ¼" NPT(F) <b>N1</b> = Monel / ¼" BSP(F) <b>N2</b> = Monel / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L <b>3</b> = Hastelloy C <b>4</b> = Monel <b>5</b> = Titanium <b>6</b> = Tantalum <b>7</b> = Inconel

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	P1	H01	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# FC HIGH PROOF HIGH RANGE SWITCHES



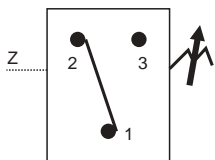
## Approximate Weight :

Pressure switches with Aluminium enclosure : 1.87 Kg.

Pressure switches with Grey CI enclosure : 4.27 Kg.

Pressure switches with SS enclosure : 4.42 Kg.

## Electrical Connection :



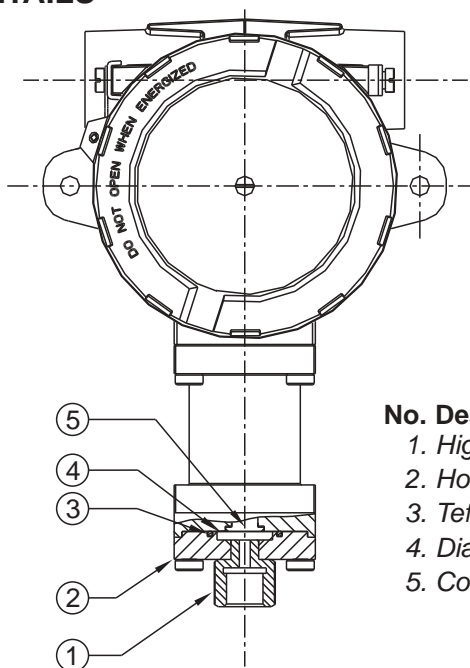
## Some Applications :

High pressure gas handling systems, fire fighting systems where the maximum pressure is high and the tripping value is low.

# HIGH PROOF HIGH RANGE SWITCHES FC



## PRESSURE CAPSULE DETAILS

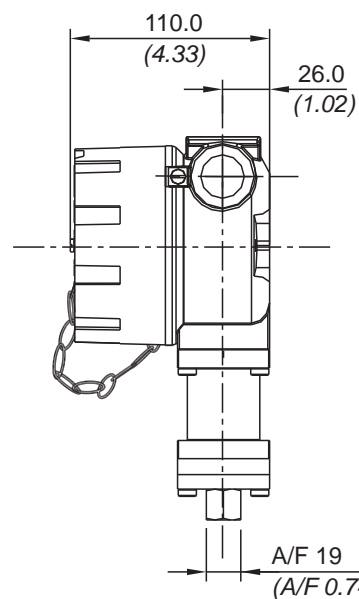
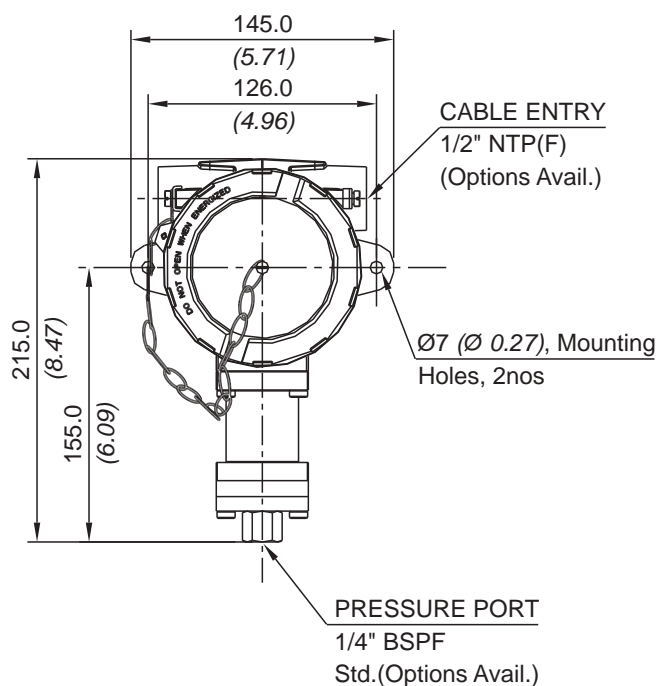


### No. Description

1. High Pressure Port
2. Housing Plate
3. Teflon® O-Ring
4. Diaphragm
5. Conical Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# FC HIGH PROOF HIGH RANGE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
P01	0.1 - 1.0 (1.45 - 14.50)	0.20 (2.9)	70 (1015.26)
P02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.9)	70 (1015.26)
P03	0.2 - 2.6 (2.90 - 37.71)	0.30 (4.35)	70 (1015.26)
P04	0.2 - 3.6 (2.90 - 52.21)	0.40 (5.80)	70 (1015.26)
P07	0.5 - 7.0 (7.25 - 101.50)	0.50 (7.25)	70 (1015.26)
P10	0.5 - 10.0 (7.14 - 142.86)	0.80 (11.6)	70 (1015.26)
P15	1.0 - 15.0 (14.29 - 214.29)	1.50 (23.2)	70 (1015.26)
P30	5.0 - 25.0 (71.43 - 357.14)	1.50 (23.2)	70 (1015.26)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF HIGH PROOF HIGH RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>P 1</b> = pressure switch, fixed differential without scale <b>P 2</b> = pressure switch, fixed differential with scale in bar <b>P 3</b> = pressure switch, fixed differential with scale in psi	<b>P01</b> = (0.1 - 1.0) <b>P02</b> = (0.1 - 1.5) <b>P03</b> = (0.2 - 2.6) <b>P04</b> = (0.2 - 3.6) <b>P07</b> = (0.5 - 7.0) <b>P10</b> = (0.5 - 10.0) <b>P15</b> = (1.0 - 15.0) <b>P30</b> = (5.0 - 25.0)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  * Some microswitches may not be available for particular ranges. Please check with sales office. Please refer page no. 230 for more microswitch options	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L

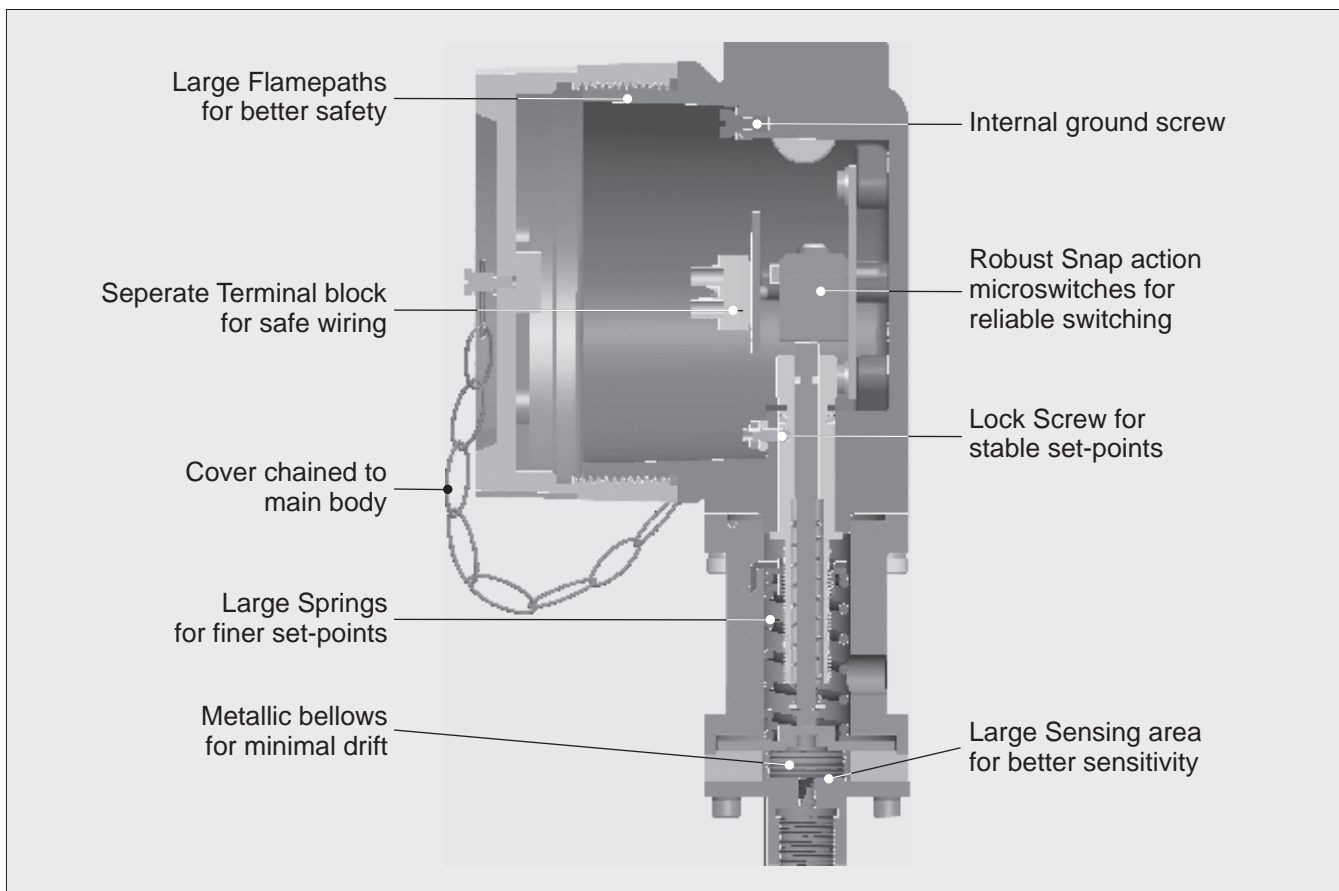
eg. A high proof high range flameproof switch with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & SS316L diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	P1	P01	A1	S1	2

Please specify full model number to avoid ambiguity.



# FC HIGH RANGE BELLOWS SWITCHES



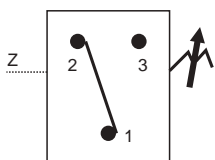
## Approximate Weight :

Pressure switches with Aluminium enclosure : 1.92 Kg.

Pressure switches with Grey CI enclosure : 4.32 Kg.

Pressure switches with SS enclosure : 4.45 Kg.

## Electrical Connection :



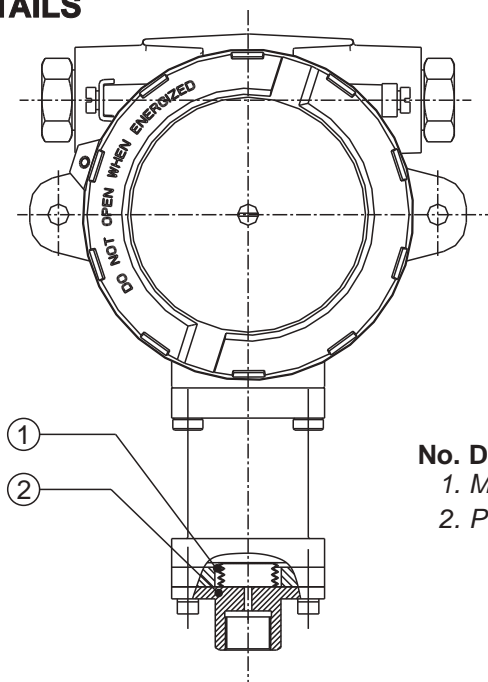
## Some Applications :

For cryogenic applications.

# HIGH RANGE BELLOWS SWITCHES FC



## PRESSURE CAPSULE DETAILS

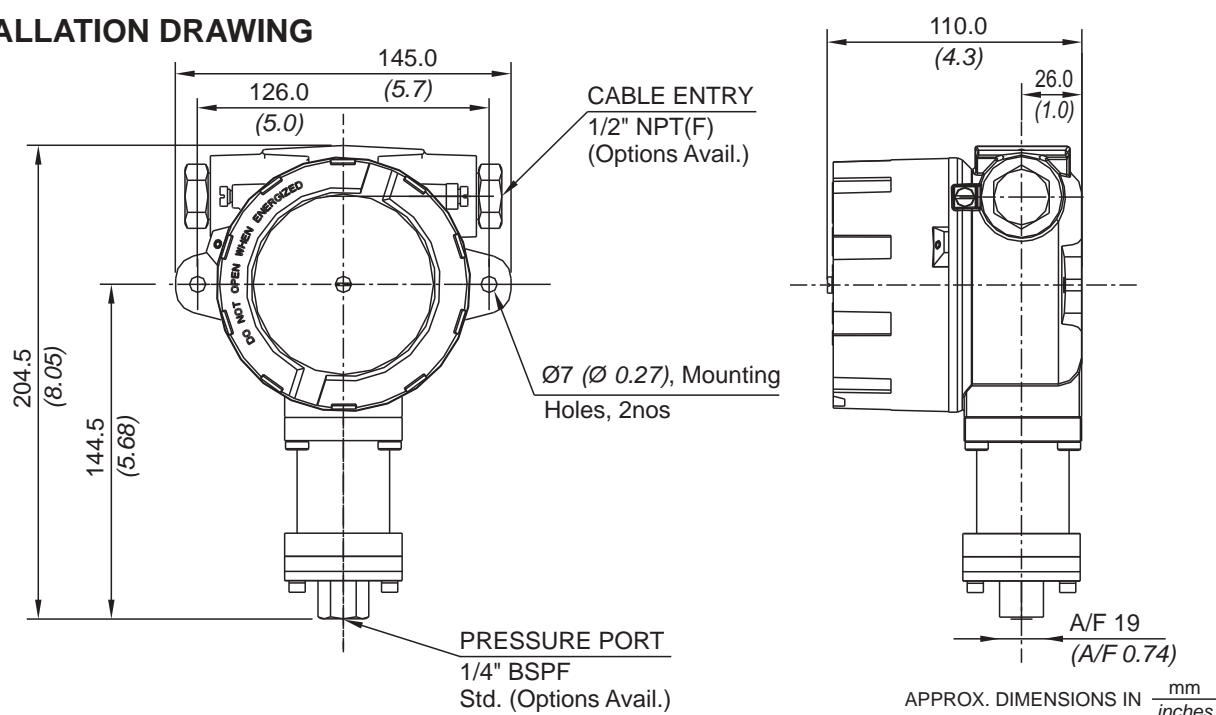


### No. Description

1. Metallic Bellow
2. Pressure Housing

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# FC HIGH RANGE BELLOWS SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.17 (2.46)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.10 (1.45)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.20 (2.9)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.037)	0.20 (2.9)	25 (362.6)
H15	1.0 - 15.0 (14.5 - 217.55)	0.50 (7.25)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	0.50 (7.25)	35 (507.63)
H4T	5 - 40 (72.52 - 580.15)	5 (72.52)	100 (1450.37)
H1H	10 - 100 (145.037 - 1450.37)	12 (174.05)	200 (2900.75)

\*Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF HIGH RANGE BELLOWS PRESSURE SWITCHES

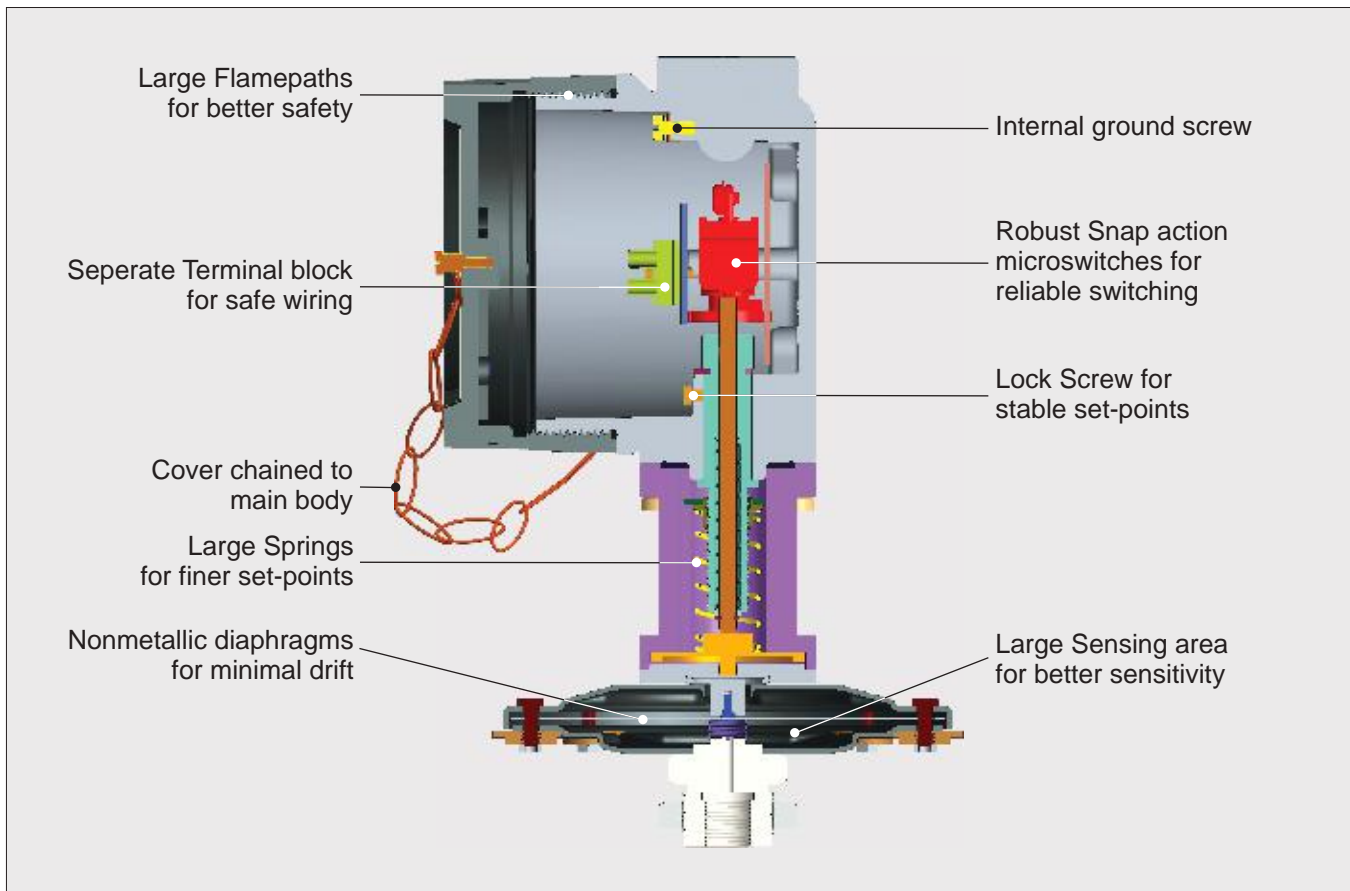
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material Size	Bellows Material
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>P1</b> = pressure switch, fixed differential without scale <b>P2</b> = pressure switch, fixed differential with scale in bar <b>P3</b> = pressure switch, fixed differential with scale in psi	<b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0) <b>H4T</b> = (5 - 40) <b>H1H</b> = (10 - 100)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>B1</b> = SS316L / ¼" BSP(F) <b>B2</b> = SS316L / ¼" NPT(F)	<b>2</b> = SS 316L

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, having 0.1 bar to 1 bar pressure range, with 15 Amp. microswitch, Bellows pressure housing with ¼" BSP port size & SS316L Bellows shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	P1	H01	A1	B1	2

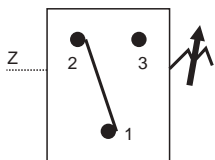
Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# FC LOW PRESSURE RANGES



## Approximate Weight :

Pressure switches with Aluminium enclosure : 2.2 Kg.  
 Pressure switches with Grey CI enclosure : 4.6 Kg.  
 Pressure switches with SS enclosure : 4.7 Kg.



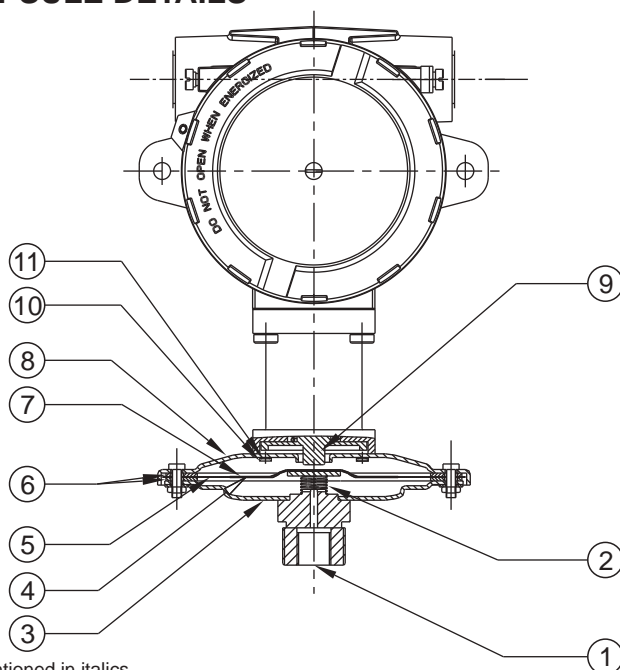
## Electrical Connection :

## Some Applications :

For loading & unloading of diesel tanks, clean rooms, air duct systems, ventilation systems, etc.



## PRESSURE CAPSULE DETAILS



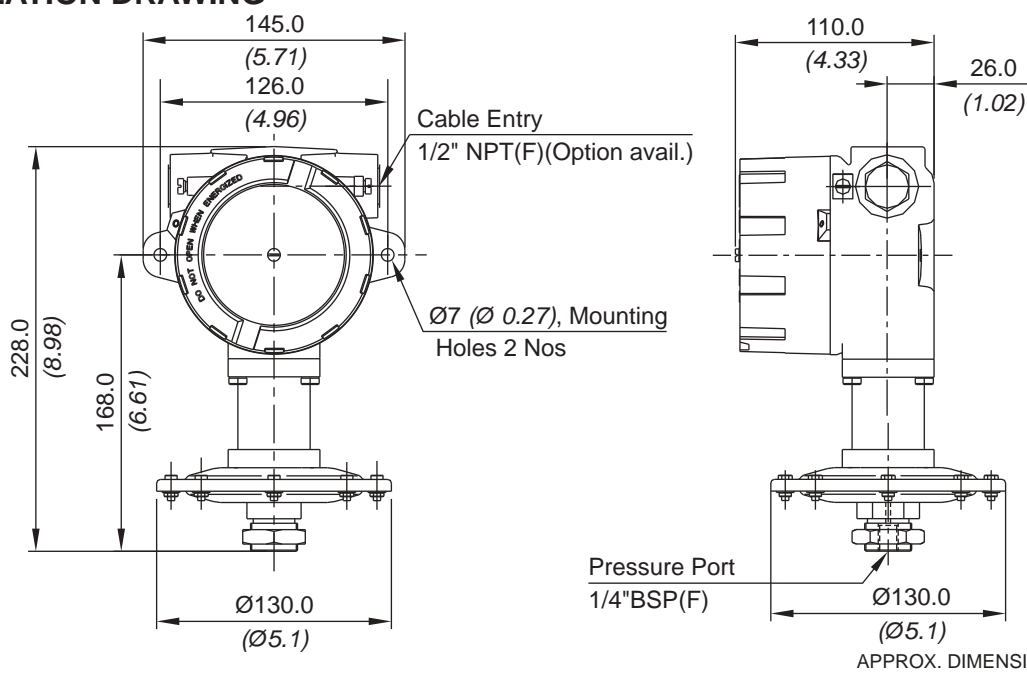
### No. Description

1. Pressure port (S.S.)\*
2. Support spring (S.S.)
3. Bottom flange (S.S.)
4. Support plate (Aluminium)
5. Diaphragm (Neoprene)
6. Gasket (Nitrile)
7. Top plate (Aluminium)
8. Top flange (S.S.)
9. Plunger (Aluminium)
10. Top flange screw (S.S.)
11. Sealing 'O' ring (Nitrile)

\*Pressure port is brazed with flange

Note : wetted parts are mentioned in *italics*.

## INSTALLATION DRAWING



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



# FC LOW PRESSURE RANGES

## RANGE SELECTION TABLE

Range Code	Range mbar ("wc)	Differential* mbar ("wc)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
L02	1.5 - 15 (0.602 - 6.021)	3 (1.204)	2 (29.00)
L03	5 - 25 (2.007 - 10.037)	5 (2.007)	2 (29.00)
L05	10 - 50 (4.015 - 20.073)	5 (2.007)	2 (29.00)
L10	10 - 100 (4.015 - 40.150)	5 (2.007)	2 (29.00)
L15	10 - 150 (4.015 - 60.22)	5 (2.007)	2 (29.00)
L25	20 - 250 (8.029 - 100.36)	10 (4.015)	2 (29.00)
L35	50 - 350 (20.073 - 140.52)	25 (10.04)	2 (29.00)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF LOW RANGE PRESSURE SWITCHES

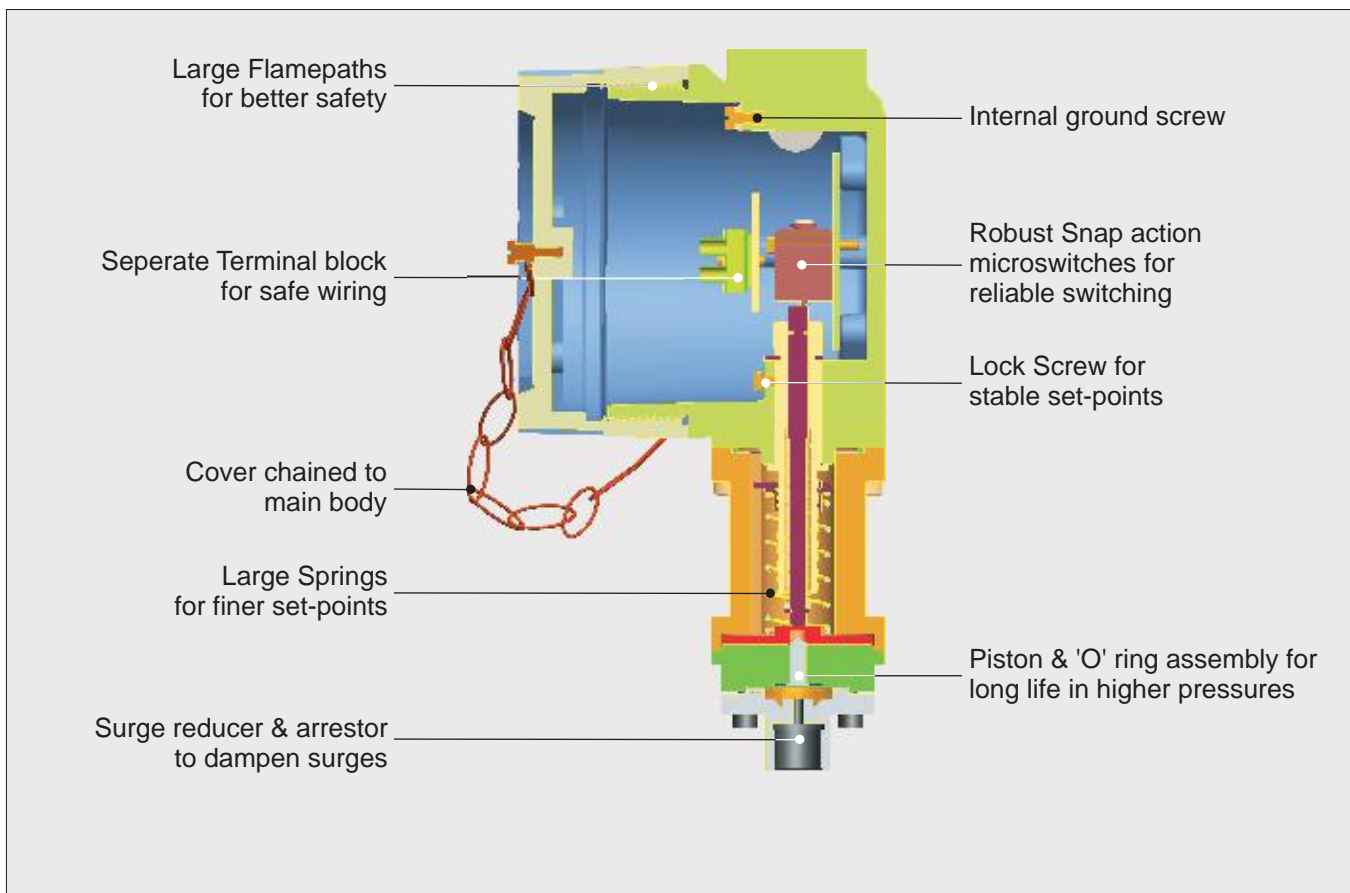
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in mbar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>P1</b> = pressure switch, fixed differential without scale <b>P2</b> = pressure switch, fixed differential with scale in mbar <b>P3</b> = pressure switch, fixed differential with scale in "wc	<b>L02</b> = (1.5 - 15) <b>L03</b> = (5 - 25) <b>L05</b> = (10 - 50) <b>L10</b> = (10 - 100) <b>L15</b> = (10 - 150) <b>L25</b> = (20 - 250) <b>L35</b> = (50 - 350)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  * Some microswitches may not be available for particular ranges. Please check with sales office.  Please refer page no. 230 for more microswitch options	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS316L

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, having 5 mbar to 25 mbar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	P1	L03	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

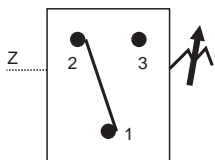
# FC HYDRAULIC RANGES



## Approximate Weight :

Pressure switches with Aluminium enclosure : 1.95 Kg.  
 Pressure switches with Grey CI enclosure : 4.35 Kg.  
 Pressure switches with SS enclosure : 4.45 Kg.

## Electrical Connection :

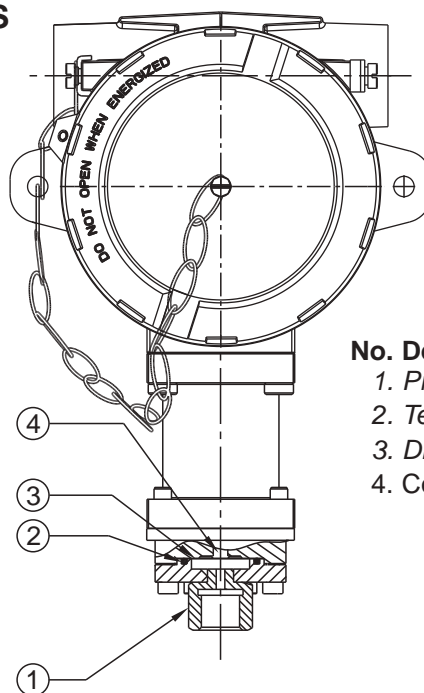


## Some Applications :

For high pressure cylinder testing jigs, CNG/LPG gas skids, high pressure compressors, etc.



## PRESSURE CAPSULE DETAILS

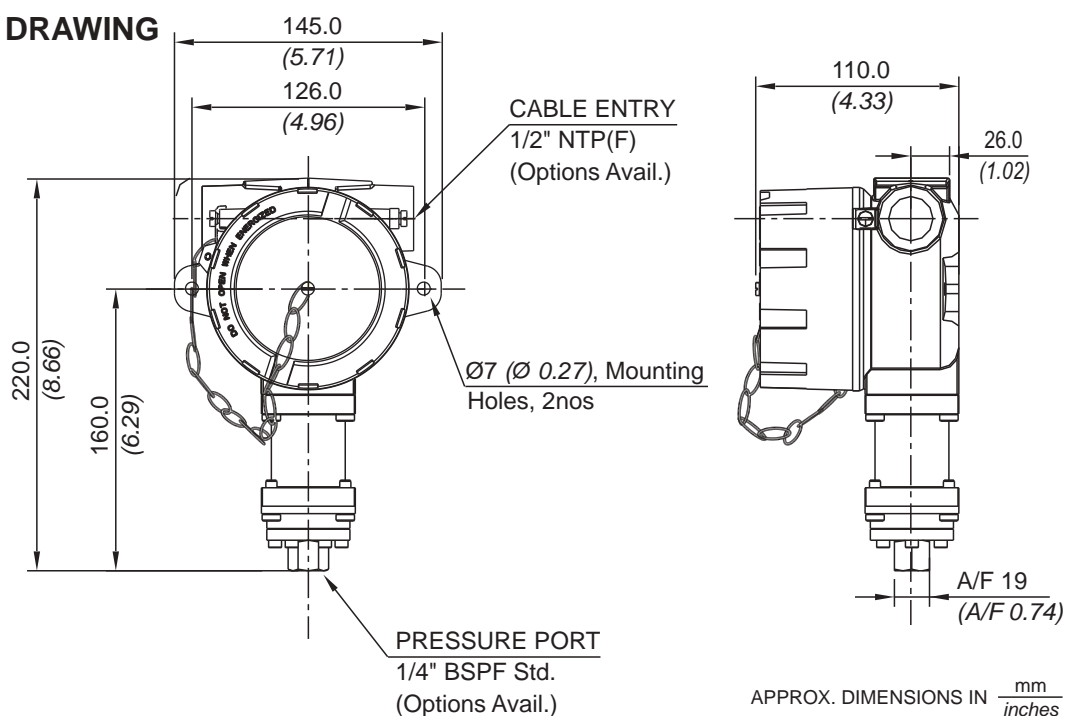


### No. Description

1. Pressure Port
2. Teflon® O-Ring
3. Diaphragm
4. Conical Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# FC HYDRAULIC RANGES

## RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
H1T	0.5 - 10 (7.25 - 145.04)	0.5 (7.25)	150 (2175.00)
H2T	2 - 20 (29.00 - 290.08)	2 (29.00)	200 (2900.76)
H4T	5 - 40 (72.52 - 580.15)	5 (72.52)	200 (2900.76)
H1H	10 - 100 (145.04 - 1450.38)	12 (174.045)	200 (2900.76)
H2H	7 - 200 (101.53 - 2900.76)	24 (348.09)	400 (5801.52)
H4H	40 - 400 (580.15 - 5801.52)	70 (1015.27)	500 (7251.90)

\* Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF HYDRAULIC RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head 1/2" NPT threads <b>2</b> = Al. head 3/4" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head 1/2" NPT threads <b>5</b> = Grey CI head 3/4" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head 1/2" NPT threads <b>8</b> = SS head 3/4" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>P 1</b> = pressure switch, fixed differential without scale <b>P 2</b> = pressure switch, fixed differential with scale in bar <b>P 3</b> = pressure switch, fixed differential with scale in psi	<b>H1T</b> = (0.5 - 10) <b>H2T</b> = (2 - 20) <b>H4T</b> = (5 - 40) <b>H1H</b> = (10 - 100) <b>H2H</b> = (7 - 200) <b>H4H</b> = (40 - 400)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L <b>3</b> = Hastelloy C <b>4</b> = Monel <b>5</b> = Titanium <b>6</b> = Tantalum <b>7</b> = Inconel

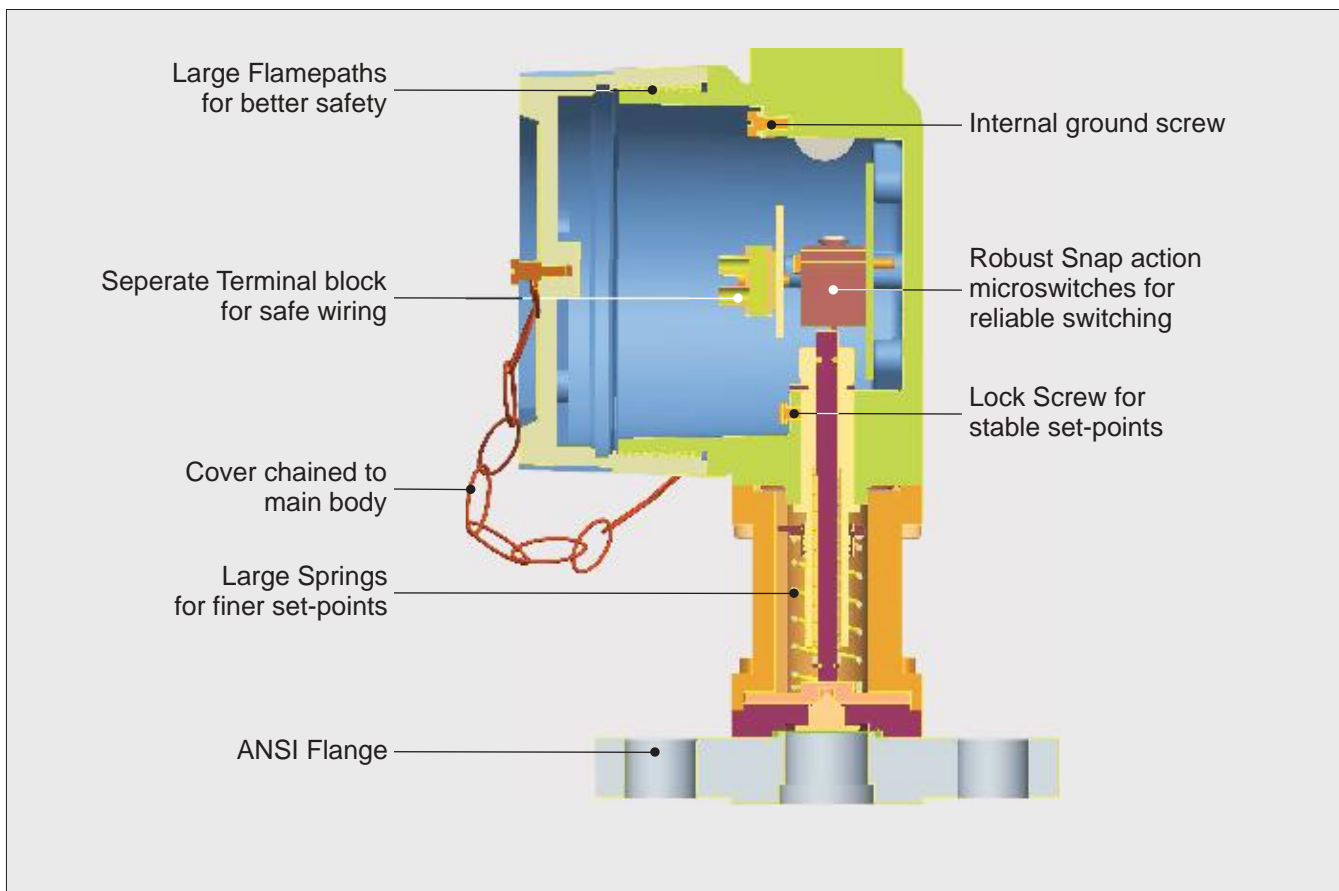
eg. A flameproof switch for gas group IIC, with 1/2" NPT cable entry in aluminium housing as 1 SPDT pressure switch, having 5 bar to 40 bar pressure range, with 15 Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & SS316L diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	P1	H4T	A1	S1	2

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.



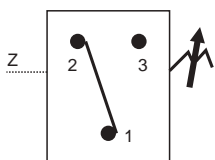
# FC FLANGED PRESSURE SWITCHES



## Approximate Weight :

Pressure switches with Aluminium enclosure : Varies with flange, please consult sales office  
 Pressure switches with Grey CI enclosure : Varies with flange, please consult sales office  
 Pressure switches with SS enclosure : Varies with flange, please consult sales office

## Electrical Connection :



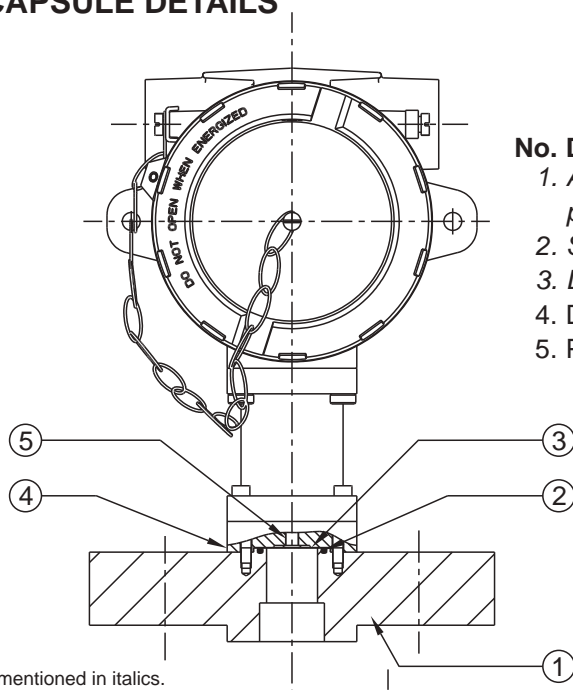
## Some Applications :

For slurry, colloidal solutions, corrosive & non-corrosive working media (unclean working media), etc.

# FLANGED PRESSURE SWITCHES FC



## PRESSURE CAPSULE DETAILS

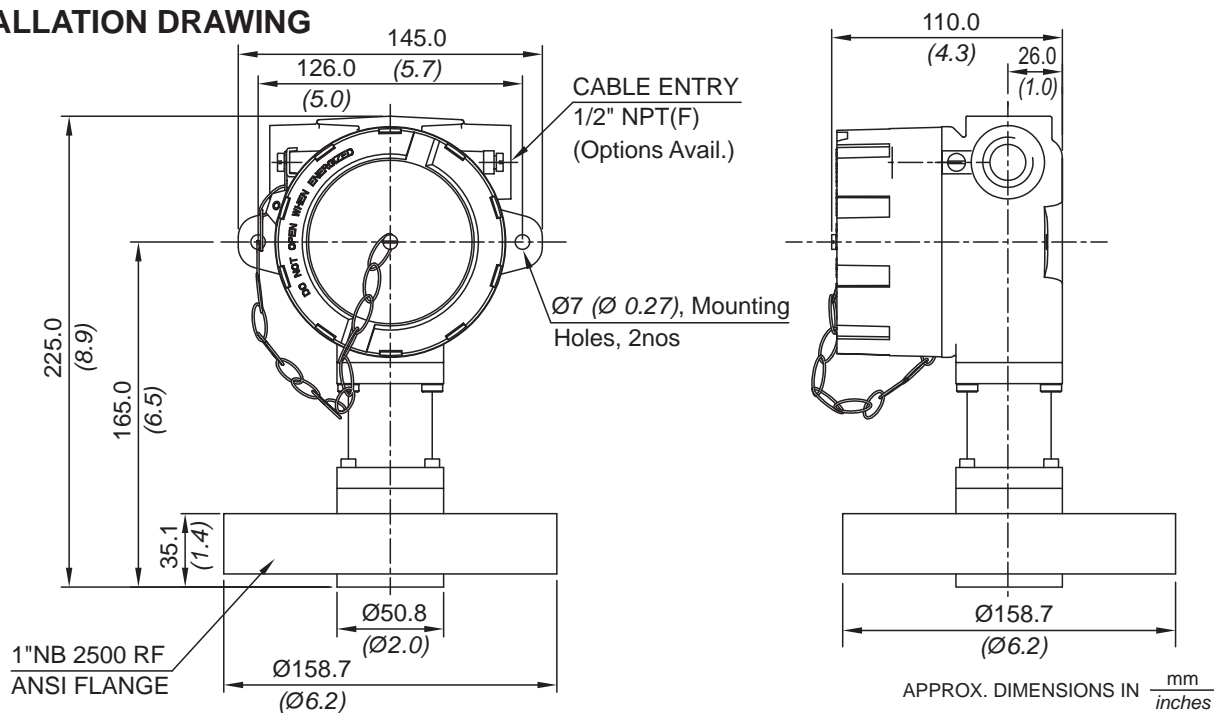


### No. Description

1. ANSI FLANGE to your specifications  
please refer table for possible combinations
2. Sealing Ring
3. Diaphragm
4. Disc
5. Plunger

Note : wetted parts are mentioned in italics.

## INSTALLATION DRAWING



# FC FLANGED PRESSURE SWITCHES

**RANGE SELECTION TABLE**

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	As per the class of flange  Please consult Sales Office in case you need clarification on availability of maximum working pressure for a particular range.
H02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	
H03	0.2 - 2.6 (2.90 - 37.71)	0.15 (2.17)	
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	
H07	0.5 - 7.0 (7.25 - 101.50)	0.20 (2.90)	
H10	0.5 - 10.0 (7.25 - 145.04)	0.40 (5.80)	
H15	1.0 - 15.0 (14.50 - 217.56)	0.50 (7.25)	
H30	5.0 - 25.0 (72.51 - 362.56)	1 (14.50)	
H4T	5 - 40 (72.51 - 580.15)	5 (72.51)	
H1H	10 - 100 (145.04 - 1450.38)	12 (174.05)	
H2H	7 - 200 (101.53 - 2900.76)	24 (348.09)	

\* Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

**FLANGE CODE TABLE** (Please refer page no. 228 & 229 for more options)

	SS316L		Hastelloy C276		Monel		Titanium		Tantalum	
	RF*	FF*	RF*	FF*	RF*	FF*	RF*	FF*	RF*	FF*
<b>150 #</b>										
1" NB	AC	BS	DI	EY	GO	IE	JU	LK	NA	OQ
2" NB	AF	BV	DL	FB	GR	IH	JX	LN	ND	OT
<b>300#</b>										
1" NB	AI	BY	DO	FE	GU	IK	KA	LQ	NG	OW
2" NB	AL	CB	DR	FH	GX	IN	KD	LT	NJ	OZ
<b>2500#</b>										
1" NB	BM	DC	ES	GI	HY	JO	LE	MU	OK	QA
2" NB	BP	DF	EV	GL	IB	JR	LH	MX	ON	QD

\*RF = Raised Face

\*FF = Flat Face

**RANGE AVAILABILITY AS PER BORE SIZES**

	H01 to H04	H07	H10	H15	H30	H2T to H2H
1" NB	NA	Yes	Yes	Yes	Yes	Yes
2" NB	Yes	Yes	Yes	Yes	Yes	Yes

## HOW TO ORDER FLAMEPROOF FLANGED PRESSURE SWITCHES

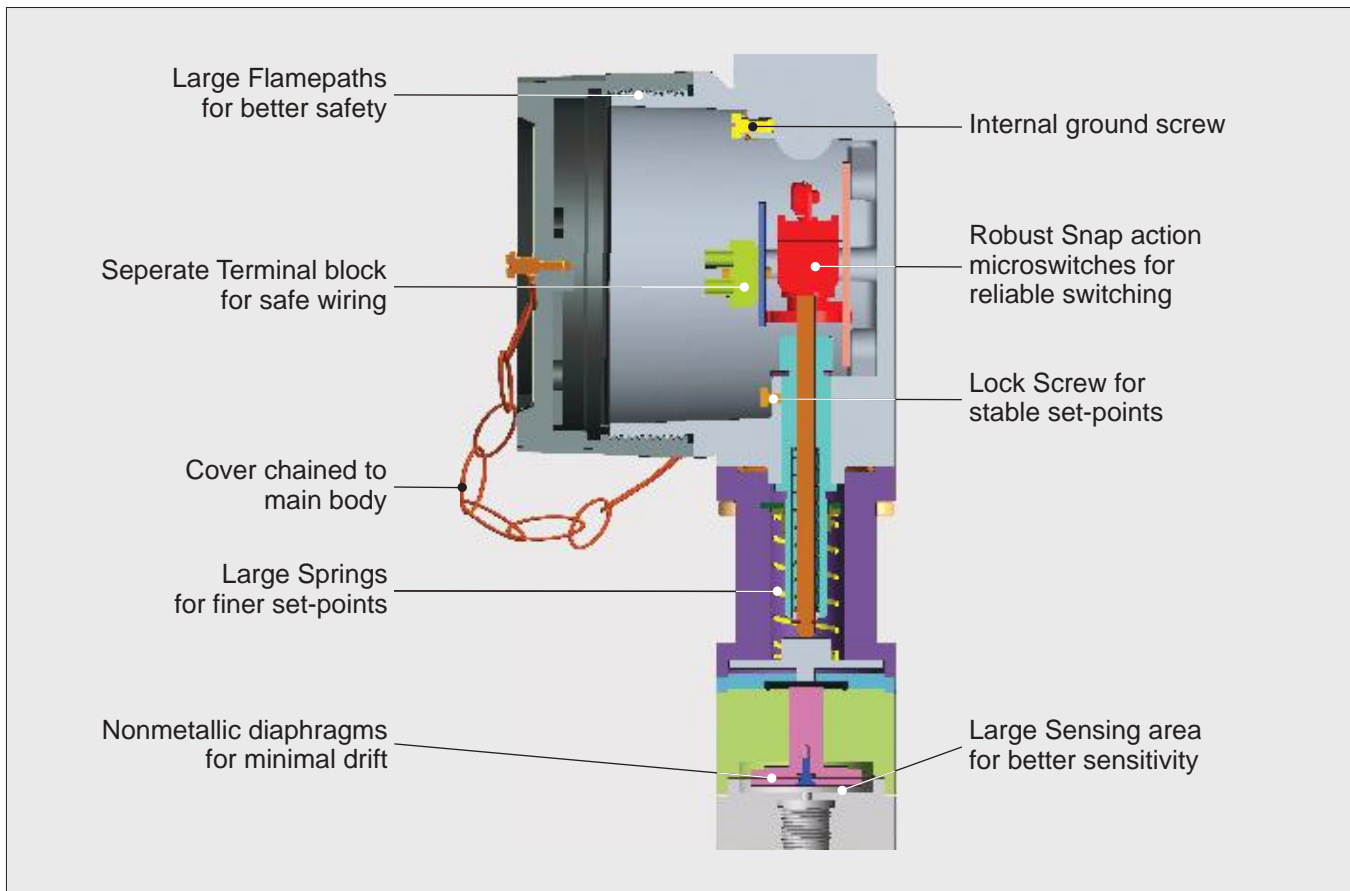
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Flange Size and Material	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>A1</b> = ANSI Flanged pressure switch, fixed differential without scale <b>A2</b> = ANSI Flanged pressure switch, fixed differential with scale in bar <b>A3</b> = ANSI Flanged pressure switch, fixed differential with scale in psi	<b>H01</b> = 0.1 - 1.0 <b>H02</b> = 0.1 - 1.5 <b>H03</b> = 0.2 - 2.6 <b>H04</b> = 0.2 - 3.6 <b>H07</b> = 0.5 - 7.0 <b>H10</b> = 0.5 - 10.0 <b>H15</b> = 1.0 - 15.0 <b>H30</b> = 5.0 - 25.0 <b>H4T</b> = 5 - 40 <b>H1H</b> = 10 - 100 <b>H2H</b> = 7 - 200	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	Please select as per Flange Code Table  For other classes and sizes please refer page no. 228 & 229	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS316L <b>3</b> = Hastelloy C <b>4</b> = Monel 400 <b>5</b> = Titanium <b>6</b> = Tantalum

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing with an ANSI flange, having 0.5 bar to 7 bar pressure range, with 15 Amp. microswitch, 1" NB 150# RF SS316L flange & SS316L diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	A1	H07	A1	AC	2

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

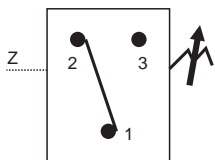
# FC HIGH RANGE PRESSURE DIFFERENCE SWITCHES



## Approximate Weight :

Pressure difference switches with Aluminium enclosure : 2.03 Kg.  
 Pressure difference switches with Grey CI enclosure : 4.43 Kg.  
 Pressure difference switches with SS enclosure : 4.56 Kg.

## Electrical Connection :

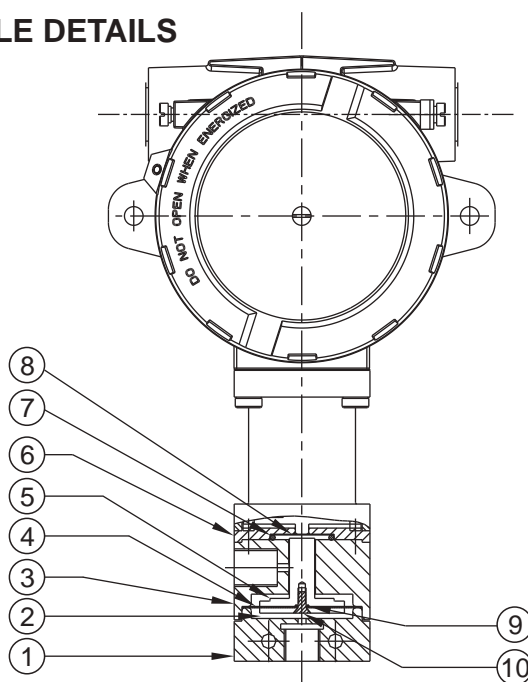


## Some Applications :

For sensing clogged filters / strainers, sense low flow in cooling systems



## PRESSURE CAPSULE DETAILS

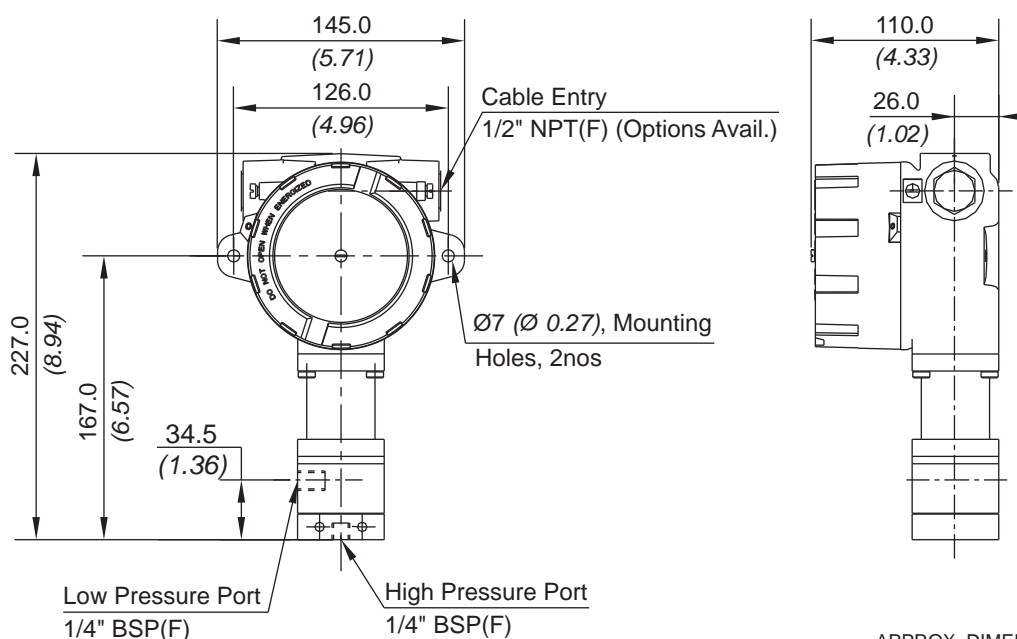


### No. Description

1. Pressure Housing
2. HP Plunger (SS316)
3. Disc
4. Diaphragm
5. LP Plunger (SS316)
6. Junction Plate
7. Sealing 'O' Ring (Teflon)
8. Sealing diaphragms (Teflon)
9. 'O' ring (Teflon)
10. CSK screw (SS)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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



# FC HIGH RANGE PRESSURE DIFFERENCE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.12 (1.74)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.30 (4.35)	12 (174.05)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>D1</b> = pressure difference switch, fixed differential without scale <b>D2</b> = pressure difference switch, fixed differential with scale in bar <b>D3</b> = pressure difference switch, fixed differential with scale in psi	<b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6)	<b>A1</b> = General purpose microswitch rated at 15A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5A; 250 VAC	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)  Please refer page no. 230 & 231 for more pressure port options	<b>0</b> = Neoprene <b>1</b> = Teflon  For additional wetted parts please refer Pressure Capsule Details on Page 47

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure difference switch, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

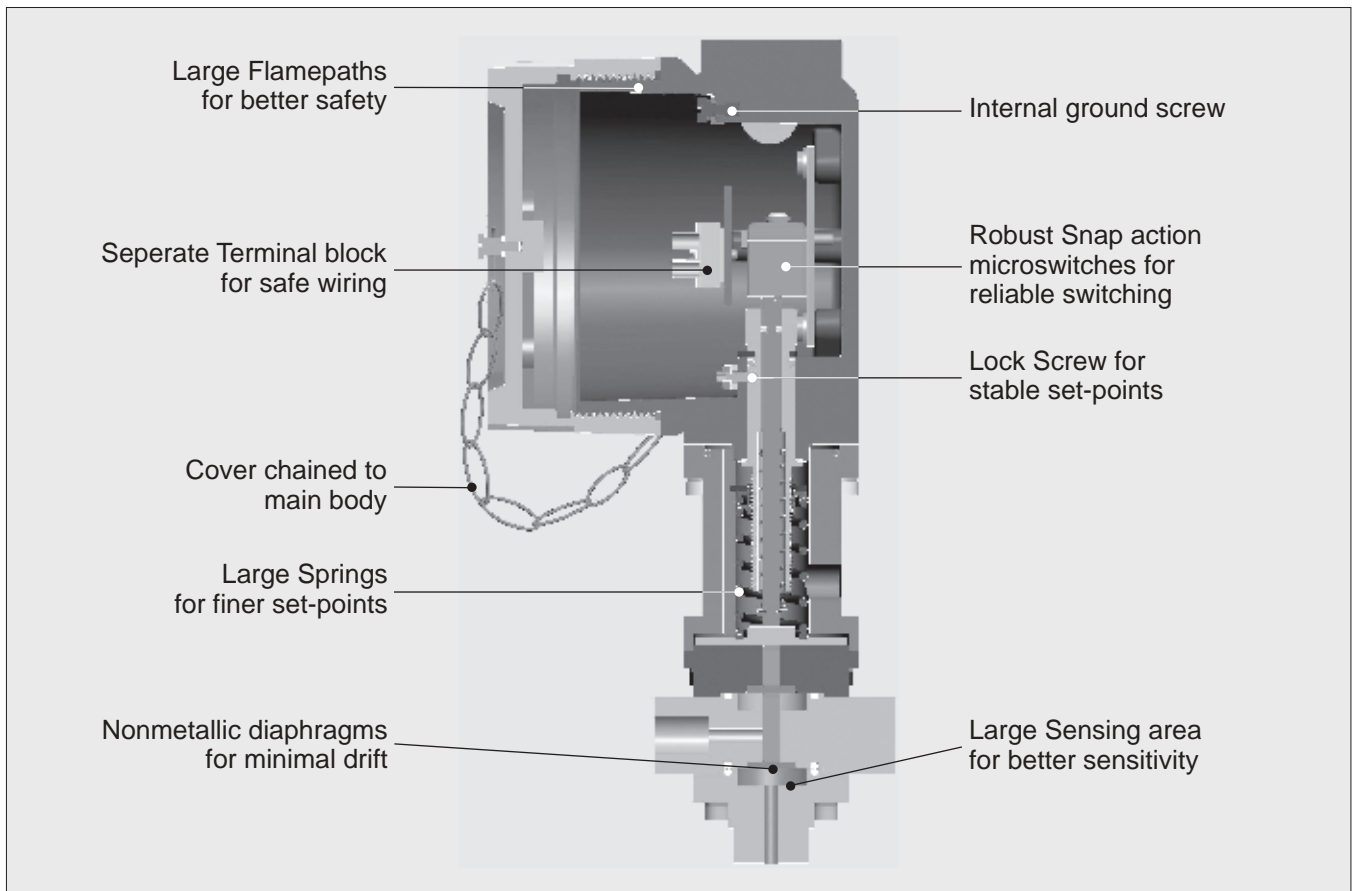
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	D1	H01	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

## HIGH RANGE PRESSURE DIFFERENCE SWITCHES

FC

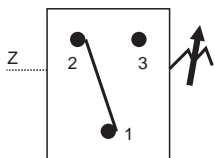
# FC HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES



## Approximate Weight :

Pressure difference switches with Aluminium enclosure : 2.43 Kg.  
 Pressure difference switches with Grey CI enclosure : 4.93 Kg.  
 Pressure difference switches with SS enclosure : 5.13 Kg.

## Electrical Connection :

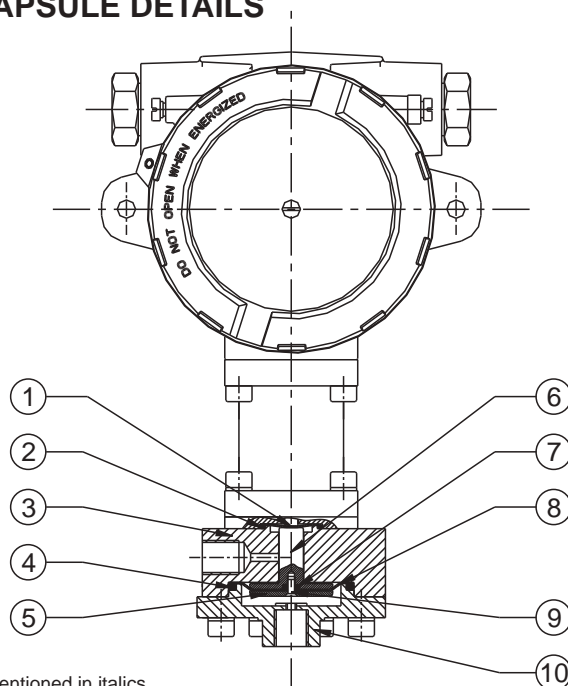


## Some Applications :

Applications requiring high static/system pressure but low pressure difference.



## PRESSURE CAPSULE DETAILS

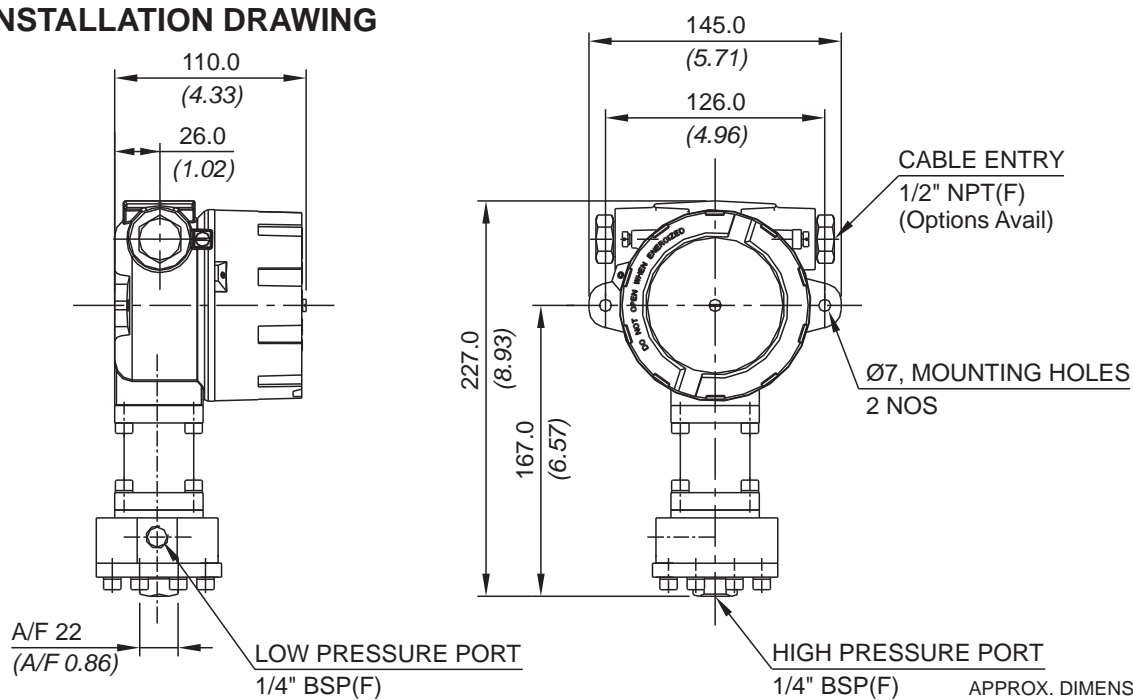


### No. Description

1. *Sealing Diaphragm (Teflon)*
2. *Sealing O Ring (Teflon)*
3. *Disc*
4. *Sealing O Ring*
5. *HP Plunger*
6. *LP Plunger*
7. *O Ring*
8. *Diaphragm*
9. *Csk. Screw (S.S.)*
10. *Pressure Housing*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# FC HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
P01	0.1 - 1.0 (1.45 - 14.50)	0.24 (3.48)	200 (2900.76)
P02	0.1 - 1.5 (1.45 - 21.76)	0.40 (5.80)	200 (2900.76)
P03	0.2 - 2.6 (2.90 - 37.71)	0.40 (5.80)	200 (2900.76)
P04	0.2 - 3.6 (2.90 - 52.21)	0.60 (8.70)	200 (2900.76)

\*Minimum differential increases with setpoint (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.

## HOW TO ORDER FLAMEPROOF HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>D1</b> = pressure difference switch, fixed differential without scale <b>D2</b> = pressure difference switch, fixed differential with scale in bar <b>D3</b> = pressure difference switch, fixed differential with scale in psi	<b>P01</b> = (0.1 - 1.0) <b>P02</b> = (0.1 - 1.5) <b>P03</b> = (0.2 - 2.6) <b>P04</b> = (0.2 - 3.6)	<b>A1</b> = General purpose microswitch rated at 15A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5A; 250 VAC	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)  Please refer page no. 226 & 227 for more pressure port options	<b>0</b> = Neoprene <b>1</b> = Teflon  For additional wetted parts please refer Pressure Capsule Details on Page 51

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure difference switch, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

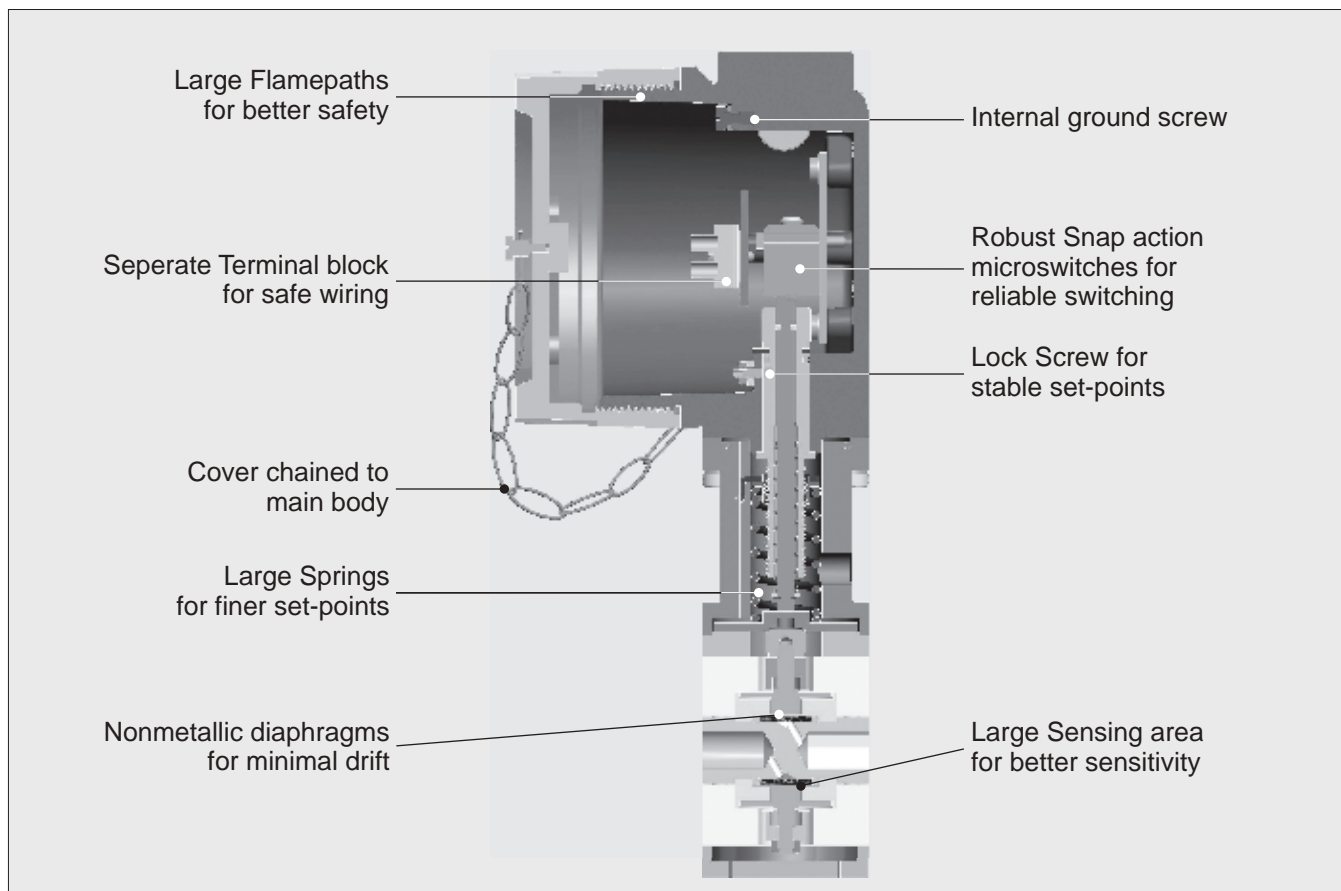
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	D1	P01	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES

FC

# FC HIGH RANGE DP



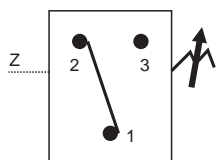
## Approximate Weight :

Pressure difference switches with Aluminium enclosure : 2.70 Kg.

Pressure difference switches with Grey CI enclosure : 5.10 Kg.

Pressure difference switches with SS enclosure : 5.25 Kg.

## Electrical Connection :



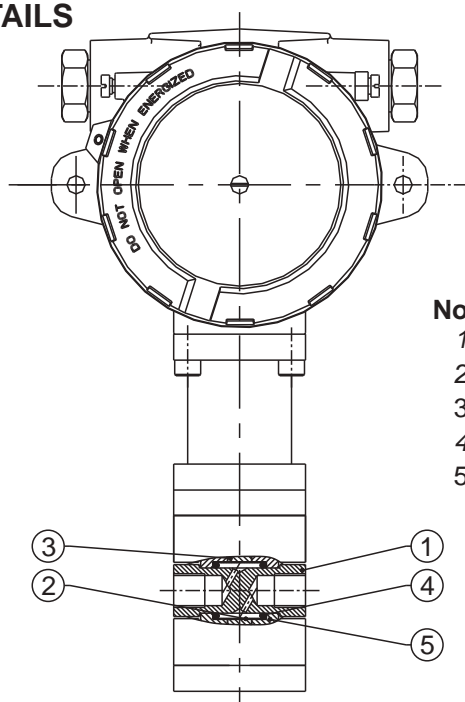
## Some Applications :

Applications requiring high static/system pressure but low pressure difference.





## PRESSURE CAPSULE DETAILS

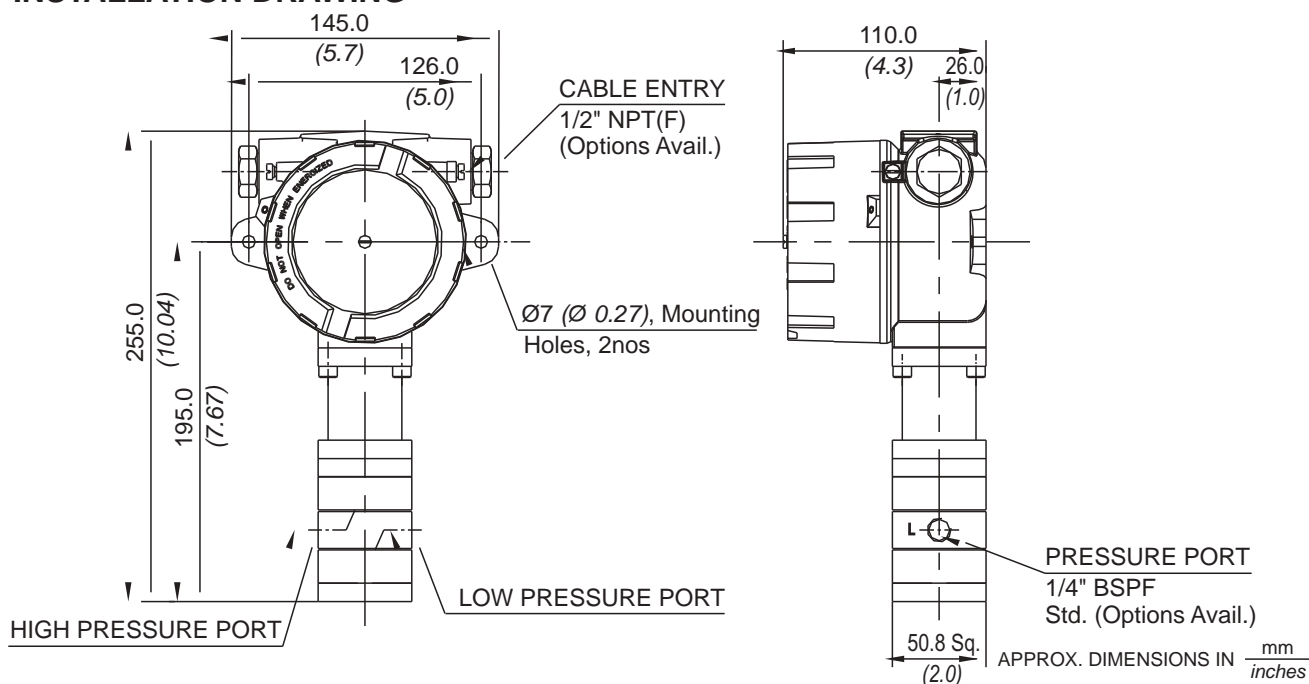


### No. Description

1. Pressure Housing
2. Diaphragm
3. Plunger
4. O-Ring
5. Disc

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# FC HIGH RANGE DP

## RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
D01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	70 (1015.26)
D02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	70 (1015.26)
D03	0.2 - 2.6 (2.90 - 37.71)	0.17 (2.46)	70 (1015.26)
D04	0.2 - 3.6 (2.90 - 52.21)	0.10 (1.45)	70 (1015.26)
D07	0.5 - 7.0 (7.25 - 101.50)	0.20 (2.9)	70 (1015.26)
D10	0.5 - 10.0 (7.25 - 145.037)	0.20 (2.9)	70 (1015.26)
D15	1.0 - 15.0 (14.50 - 217.56)	0.50 (7.25)	70 (1015.26)
D30	5.0 - 25.0 (72.52 - 362.59)	0.50 (7.25)	70 (1015.26)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF HIGH RANGE DP SWITCHES

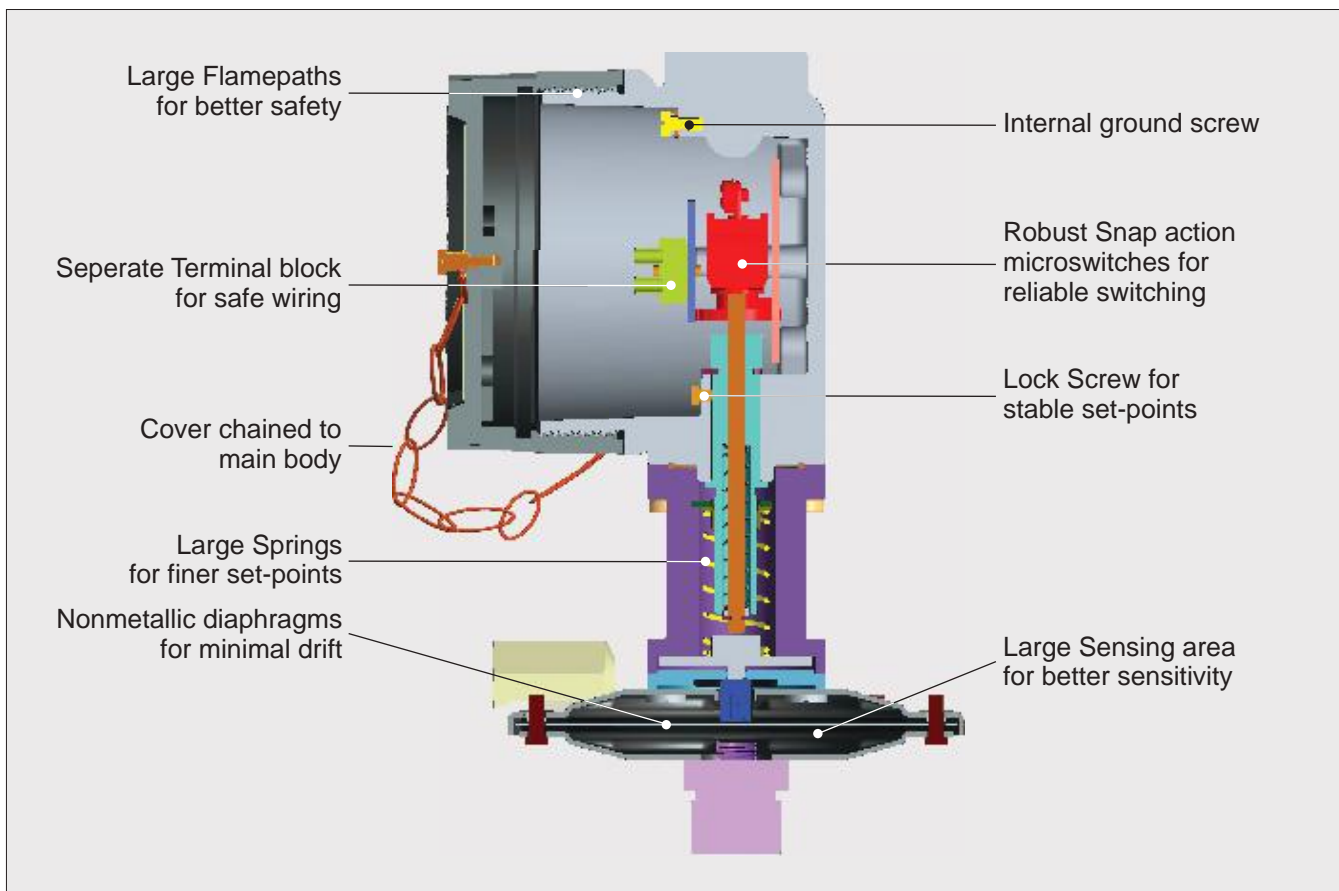
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head 1/2" NPT threads <b>2</b> = Al. head 3/4" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head 1/2" NPT threads <b>5</b> = Grey CI head 3/4" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head 1/2" NPT threads <b>8</b> = SS head 3/4" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>D1</b> = pressure difference switch, fixed differential without scale <b>D2</b> = pressure difference switch, fixed differential with scale in bar <b>D3</b> = pressure difference switch, fixed differential with scale in psi	<b>D01</b> = (0.1 - 1.0) <b>D02</b> = (0.1 - 1.5) <b>D03</b> = (0.2 - 2.6) <b>D04</b> = (0.2 - 3.6) <b>D07</b> = (0.5 - 7.0) <b>D10</b> = (0.5 - 10.0) <b>D15</b> = (1.0 - 15.0) <b>D30</b> = (5.0 - 25.0)	<b>A1</b> = General purpose microswitch rated at 15A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5A; 250 VAC	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F) <b>N1</b> = Monel / 1/4" BSP(F) <b>N2</b> = Monel / 1/4" NPT(F) <b>I1</b> = Inconel / 1/4" BSP(F) <b>I2</b> = Inconel / 1/4" NPT(F)  Please refer page no. 226 & 227 for more pressure port options	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS316L <b>4</b> = Monel <b>7</b> = Inconel
Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table						For additional wetted parts please refer Pressure Capsule Details on Page 55	

eg. A flameproof switch for gas group IIC, with 1/2" NPT cable entry in aluminium housing as 1SPDT pressure difference switch, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	D1	D01	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

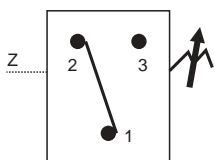
# FC LOW RANGE PRESSURE DIFFERENCE SWITCHES



## Approximate Weight :

Pressure difference switches with Aluminium enclosure : 2.25 Kg.  
 Pressure difference switches with Grey CI enclosure : 4.65 Kg.  
 Pressure difference switches with SS enclosure : 4.95 Kg.

## Electrical Connection :

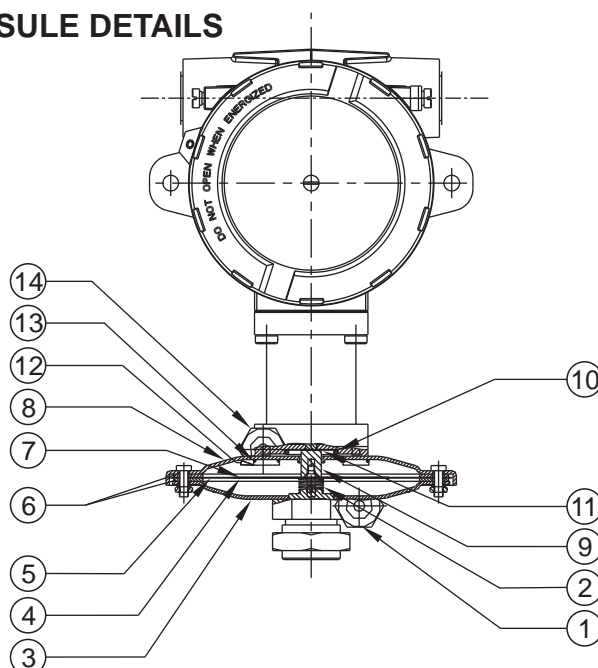


## Some Applications :

Used in ventilation systems, clean rooms, clogged filters, etc.



## PRESSURE CAPSULE DETAILS



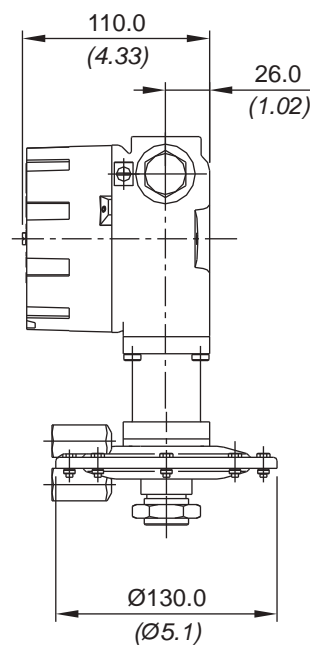
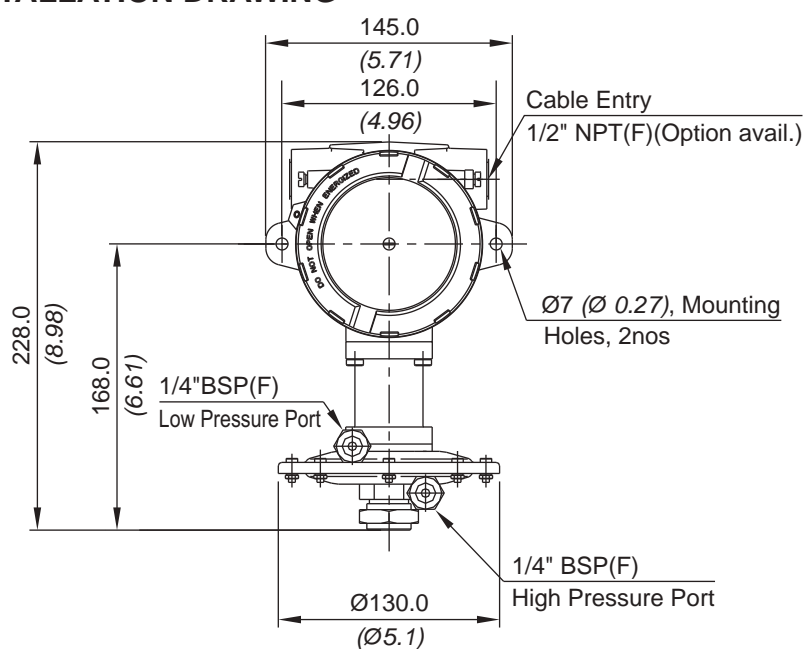
### No. Description

1. High pressure port (S.S.)\*
2. Support spring (S.S.)
3. Bottom flange (S.S.)
4. Support plate (Aluminium)
5. Diaphragm (Neoprene)
6. Gasket (Nitrile)
7. Top plate (Aluminium)
8. Top flange (M.S.)\*
9. Transfer pin (Aluminium)
10. 'O' ring (Nitrile)
11. Sealing diaphragm (Nitrile)
12. Top flange screw (M.S.)
13. Sealing 'O' ring (Nitrile)
14. Low pressure port (M.S.)\*

\* Pressure ports are brazed with flange

Note : wetted parts are mentioned in italics.

## INSTALLATION DRAWING



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

# FC LOW RANGE PRESSURE DIFFERENCE SWITCHES

RANGE SELECTION TABLE

Range Code	Range mbar ("wc)	Differential* mbar (" wc)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
L02	1.5 - 15 (0.60 - 6.02)	3 (1.204)	2 (29.00)
L03	5 - 25 (2.007 - 10.037)	5 (2.007)	2 (29.00)
L05	10 - 50 (4.015 - 20.073)	5 (2.007)	2 (29.00)
L10	10 - 100 (4.015 - 40.15)	5 (2.007)	2 (29.00)
L15	10 - 150 (4.015 - 60.22)	5 (2.007)	2 (29.00)
L25	20 - 250 (8.029 - 100.365)	10 (4.015)	2 (29.00)
L35	50 - 350 (20.073 - 140.51)	35 (14.05)	2 (29.00)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF LOW RANGE PRESSURE DIFFERENCE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in mbar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head 1/2" NPT threads <b>2</b> = Al. head 3/4" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head 1/2" NPT threads <b>5</b> = Grey CI head 3/4" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head 1/2" NPT threads <b>8</b> = SS head 3/4" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>D1</b> = pressure difference switch, fixed differential without scale <b>D2</b> = pressure difference switch, fixed differential with scale in mbar <b>D3</b> = pressure difference switch, fixed differential with scale in "wc	<b>L02</b> = (1.5 - 15) <b>L03</b> = (5 - 25) <b>L05</b> = (10 - 50) <b>L10</b> = (10 - 100) <b>L15</b> = (10 - 150) <b>L25</b> = (20 - 250) <b>L35</b> = (50 - 350)	<b>A1</b> = General purpose microswitch rated at 15A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5A; 250 VAC  * Some microswitches may not be available for particular ranges. Please check with sales office. Please refer page no. 230 for more microswitch options	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)  Please refer page no. 226 & 227 for more pressure port options	<b>0</b> = Neoprene <b>1</b> = Teflon  For additional wetted parts please refer Pressure Capsule Details on Page 59

eg. A flameproof switch for gas group IIC, with 1/2" NPT cable entry in aluminium housing as 1SPDT pressure switch, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	D1	L03	A1	S1	0

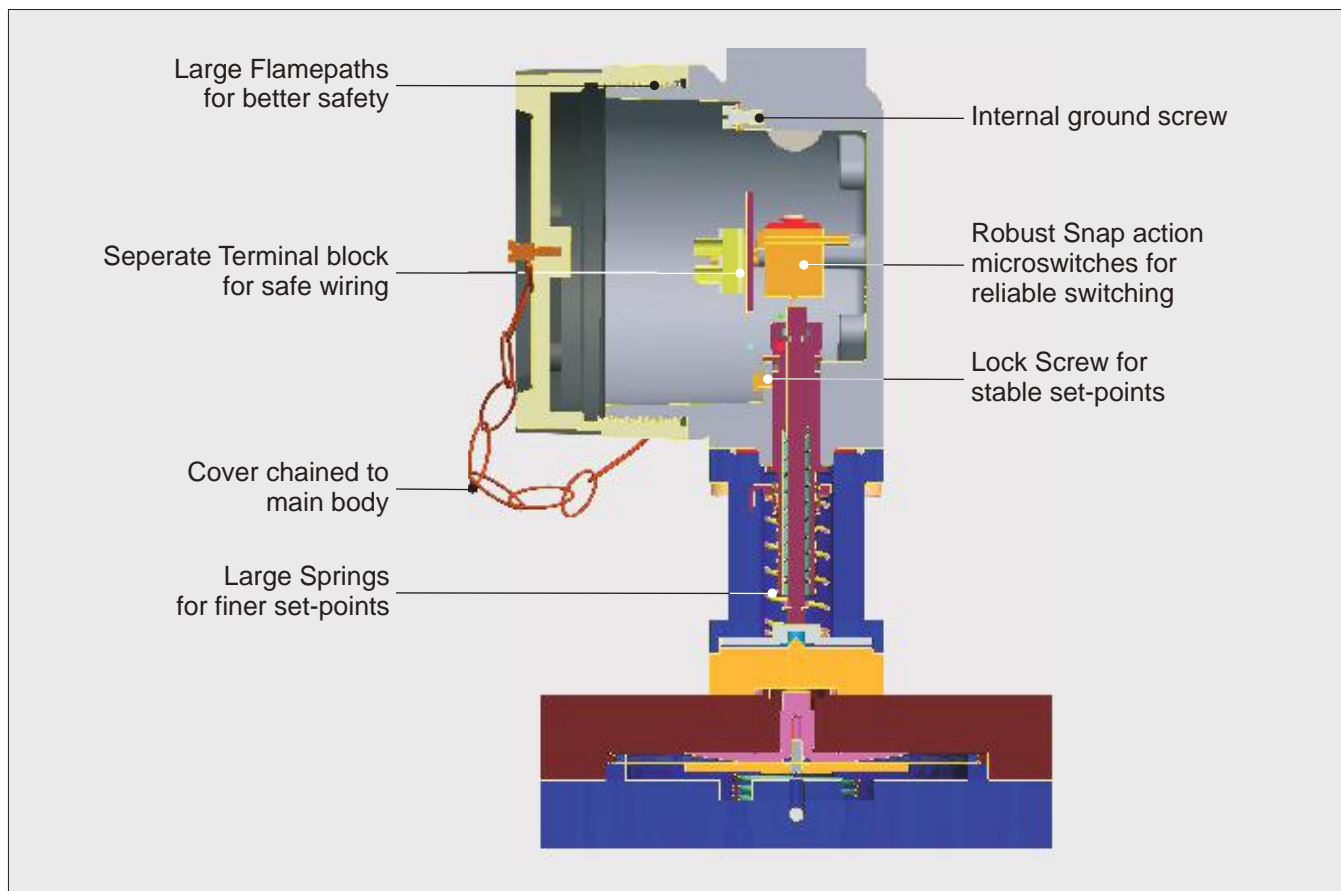
Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

## LOW RANGE PRESSURE DIFFERENCE SWITCHES

FC



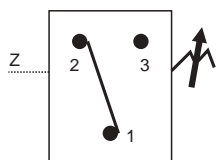
# FC LOW $\Delta P$ HIGH PROOF PRESSURE DIFFERENCE SWITCHES



## Approximate Weight :

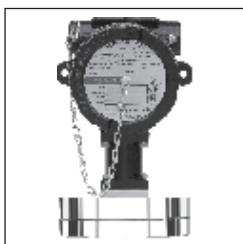
Pressure switches with Aluminium enclosure : 7.87 Kg.  
 Pressure switches with Grey CI enclosure : 10.27 Kg.  
 Pressure switches with SS enclosure : 10.42 Kg.

## Electrical Connection :

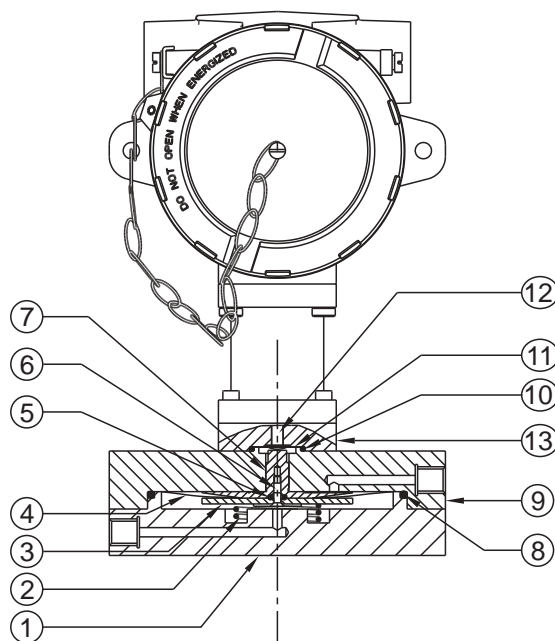


## Some Applications :

Used in gas skids, cooling systems, applications requiring very low pressure difference but high system/proof pressure like pressurization in cross country pipelines, etc.



## PRESSURE CAPSULE DETAILS

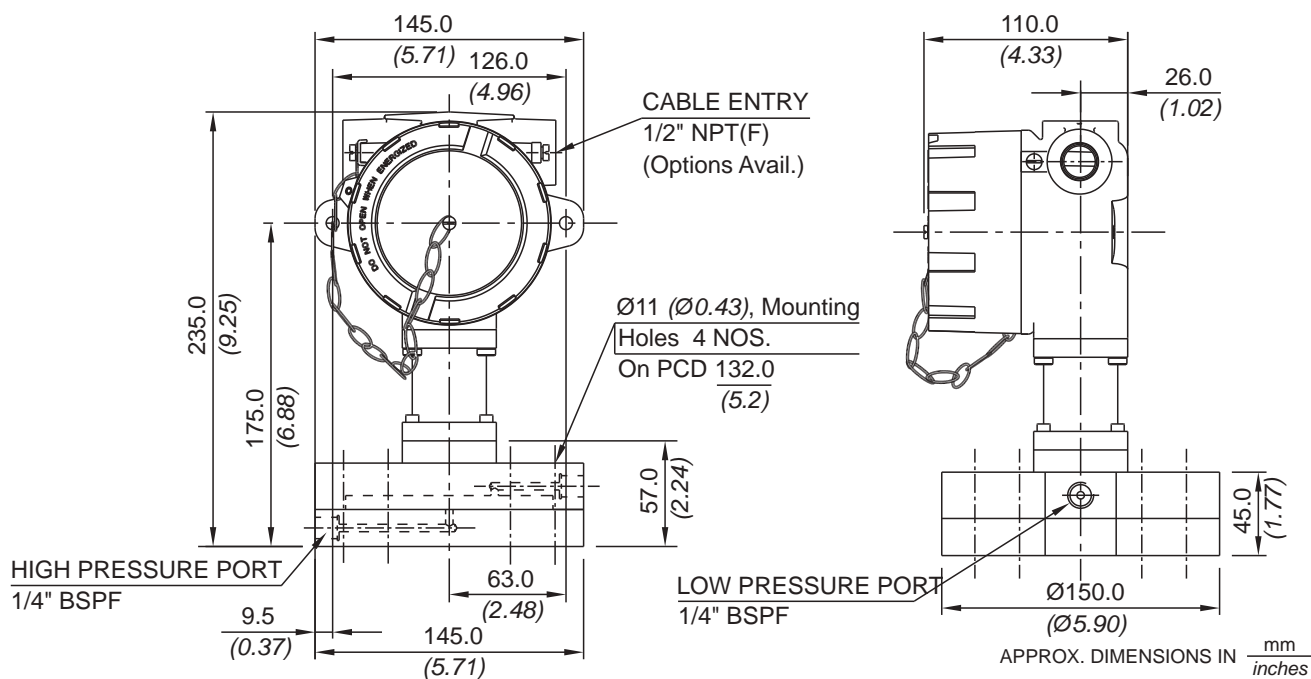


### No. Description

1. High Pressure Housing
2. Spring
3. H P Plunger
4. Diaphragm
5. Plunger 'O' ring
6. Plunger Screw
7. L P Plunger
8. Main Sealing 'O' ring
9. Low Pressure Housing
10. Sealing 'O' ring
11. Diaphragm
12. Small Plunger

Note : wetted parts are mentioned in italics.

## INSTALLATION DRAWING



# FC LOW $\Delta P$ HIGH PROOF PRESSURE DIFFERENCE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range mbar ("wc)	Differential* mbar ("wc)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
M03	5 - 25 (2.007 - 10.037)	5 (2.007)	100 (1450.38)
M05	10 - 50 (4.015 - 20.073)	5 (2.007)	100 (1450.38)
M10	10 - 100 (4.015 - 40.150)	10 (4.015)	100 (1450.38)
M15	10 - 150 (4.015 - 60.22)	10 (4.015)	100 (1450.38)
M25	20 - 250 (8.029 - 100.366)	15 (6.022)	100 (1450.38)
M35	50 - 350 (20.073 - 140.52)	35 (14.05)	110 (1595.00)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF LOW ΔP HIGH PROOF RANGE PRESSURE DIFFERENCE SWITCHES

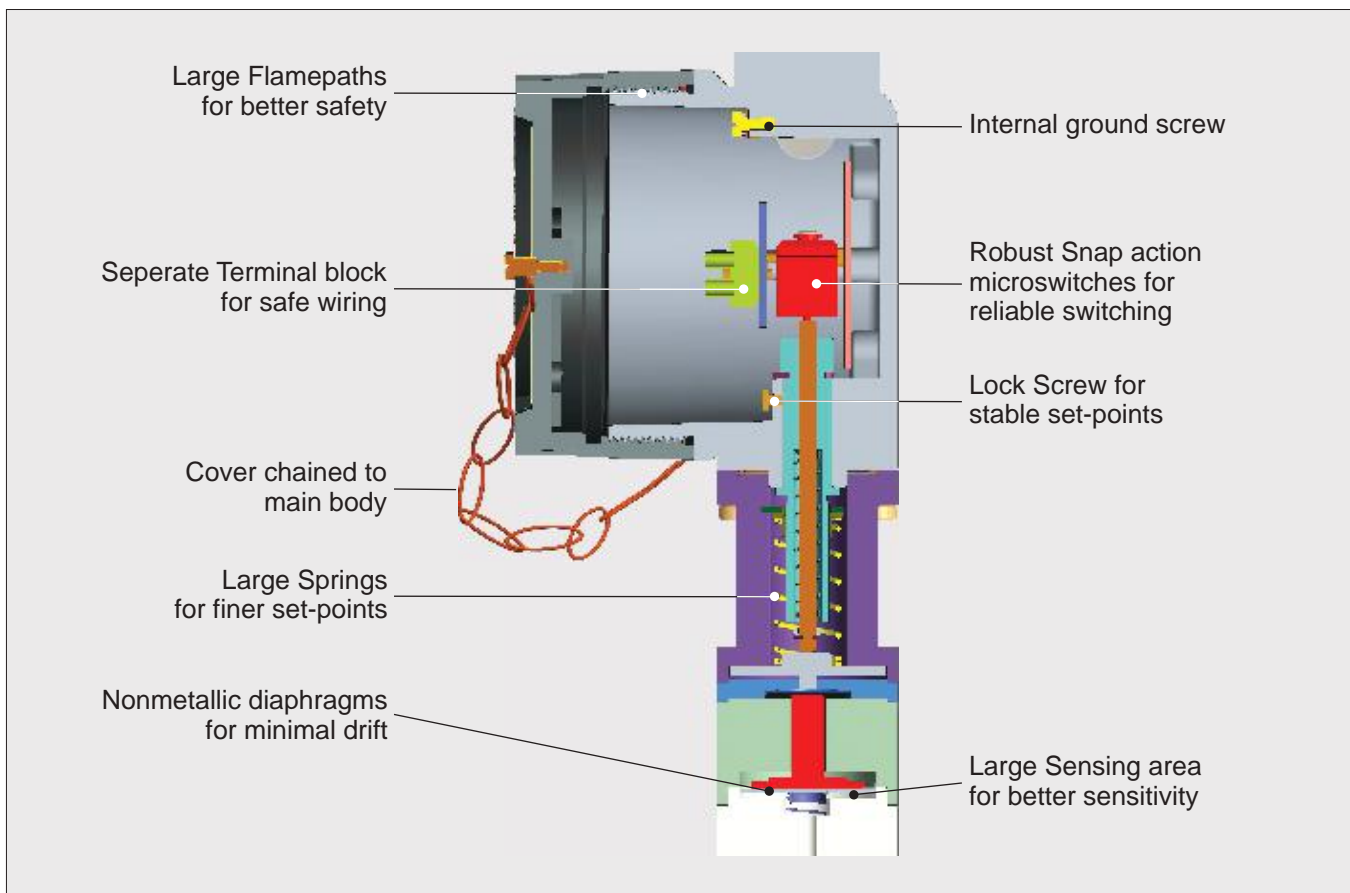
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in mbar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head 1/2" NPT threads <b>2</b> = Al. head 3/4" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head 1/2" NPT threads <b>5</b> = Grey CI head 3/4" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head 1/2" NPT threads <b>8</b> = SS head 3/4" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>D1</b> = pressure difference switch, fixed differential without scale <b>D2</b> = pressure difference switch, fixed differential with scale in mbar <b>D3</b> = pressure difference switch, fixed differential with scale in "wc	<b>M03</b> = (5 - 25) <b>M05</b> = (10 - 50) <b>M10</b> = (10 - 100) <b>M15</b> = (10 - 150) <b>M25</b> = (20 - 250) <b>M35</b> = (50 - 350)	<b>A1</b> = General purpose microswitch rated at 15A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5A; 250 VAC	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon
						Please refer page no. 226 & 227 for more pressure port options	For additional wetted parts please refer Pressure Capsule Details on Page 63
						Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	

eg. A flameproof switch for gas group IIC, with 1/2" NPT cable entry in aluminium housing as 1SPDT pressure switch, having 20 mbar to 250 mbar pressure range, with 15Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	P1	M25	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

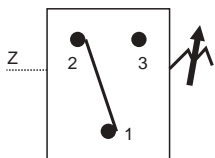
# FC VACUUM SWITCHES



## Approximate Weight :

Vacuum switches with Aluminium enclosure	: 2.03 Kg.
Vacuum switches with Grey CI enclosure	: 4.43 Kg.
Vacuum switches with SS enclosure	: 4.56 Kg.

## Electrical Connection :

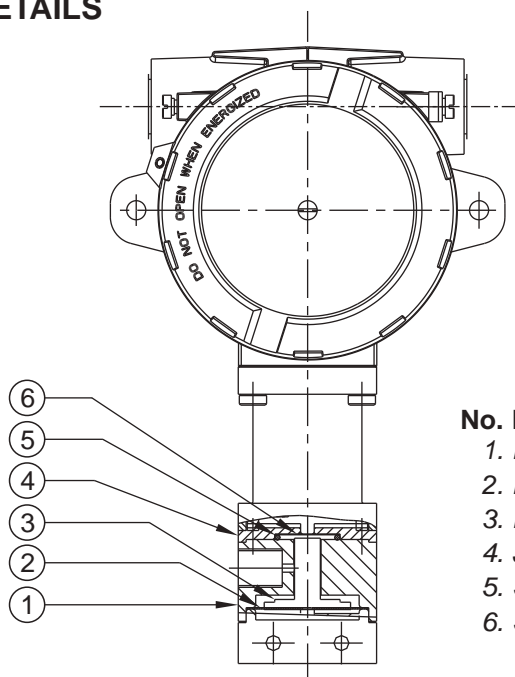


## Some Applications :

Used in filters, vacuum pumps, blower systems, etc.



## PRESSURE CAPSULE DETAILS

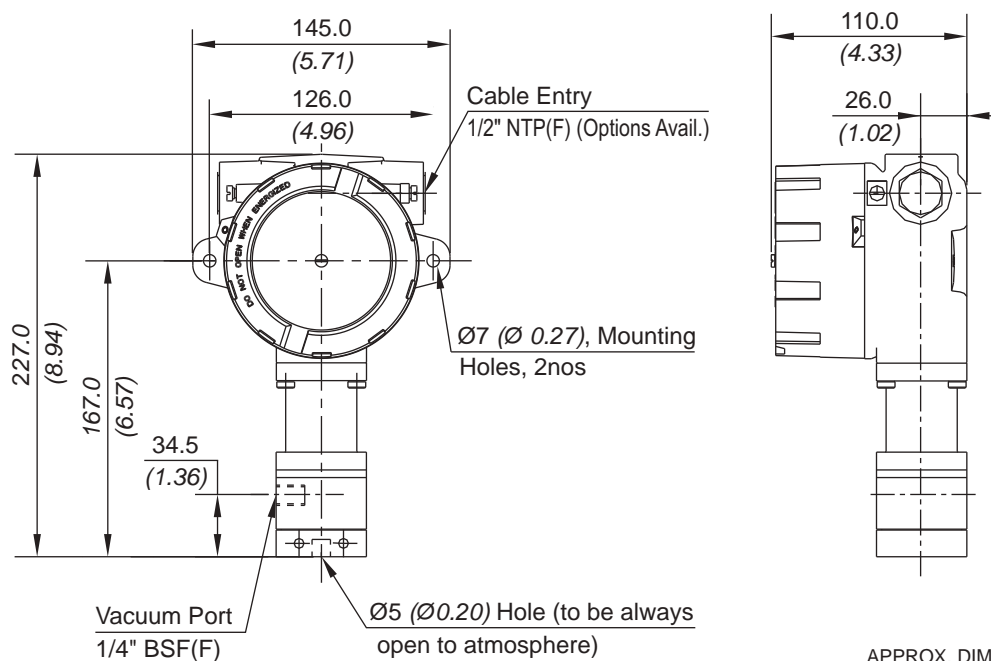


### No. Description

1. *Disc*
2. *Diaphragm*
3. *Plunger (SS316)*
4. *Junction Plate*
5. *Sealing O-Ring (Teflon®)*
6. *Sealing diaphragms (Teflon®)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# FC VACUUM SWITCHES

## RANGE SELECTION TABLE

Range Code	Range mm Hg ("Hg)	Differential* mm Hg ("Hg)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
V00	† 760 - 100 (29.92 - 3.94)	10 (0.39)	12 (174.05)

\*Minimum differential increases with set point (Graphs available on request)

† Typical values achieved at sea level, total vacuum that can be achieved varies mainly with altitude.

\*Please indicate specifically the differential value in enquiry/order, when it is critical in your application.



## HOW TO ORDER FLAMEPROOF VACUUM RANGE SWITCHES

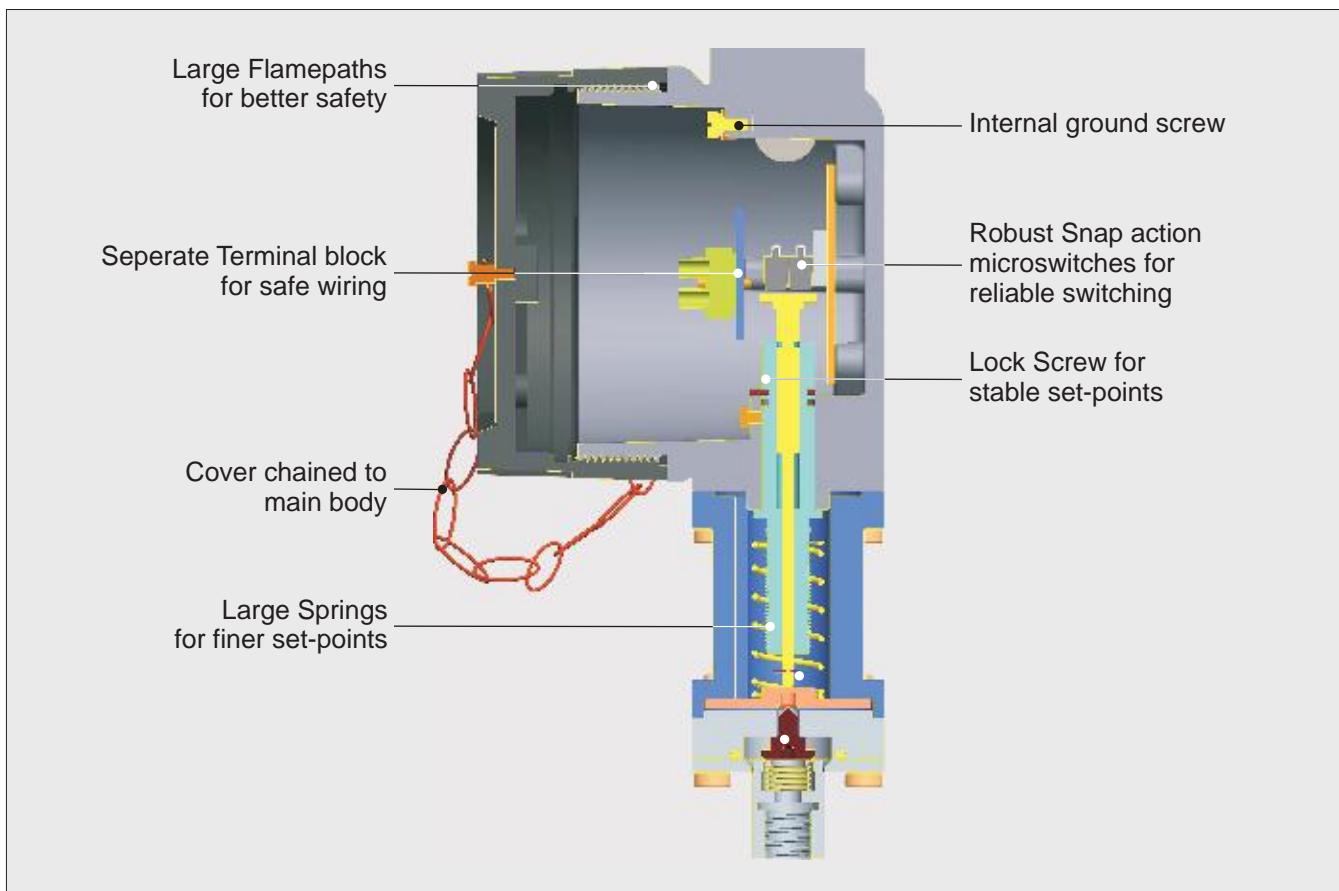
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in mmHg)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>V1</b> = vacuum switch, fixed differential without scale	<b>V00</b> = († 760 - 100)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F) <b>0</b> = Neoprene <b>1</b> = Teflon	For additional wetted parts please refer Pressure Capsule Details on Page 67  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT vacuum switch, having 760 mm Hg to 100 mm Hg vacuum range, with 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	V1	V00	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

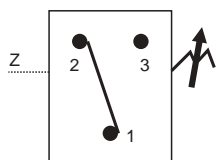
# FC COMPOUND RANGE SWITCHES



## Approximate Weight :

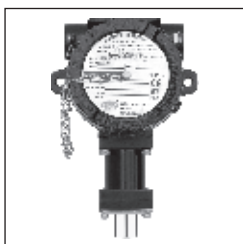
Pressure switches with Aluminium enclosure : 2.0 Kg.  
 Pressure switches with Grey CI enclosure : 4.5 Kg.  
 Pressure switches with SS enclosure : 4.6 Kg.

## Electrical Connection :

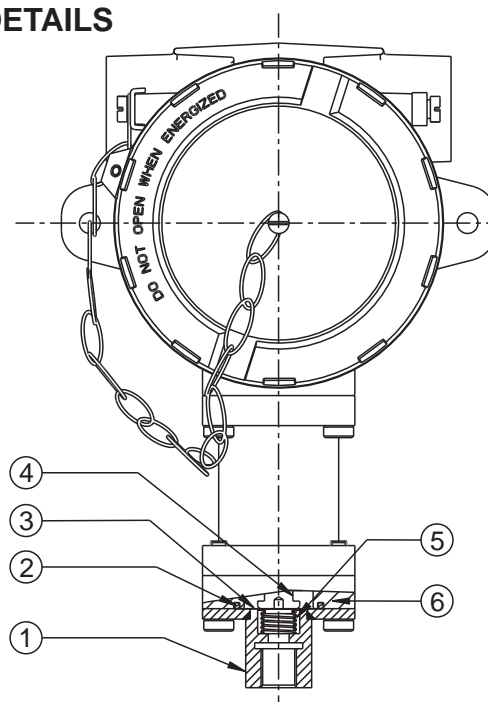


## Some Applications :

Where the set point can vary from vacuum(-ve) pressure to +ve pressure.



## PRESSURE CAPSULE DETAILS

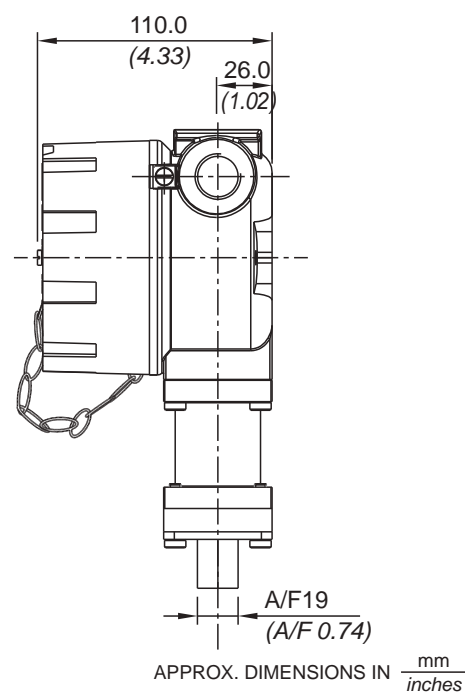
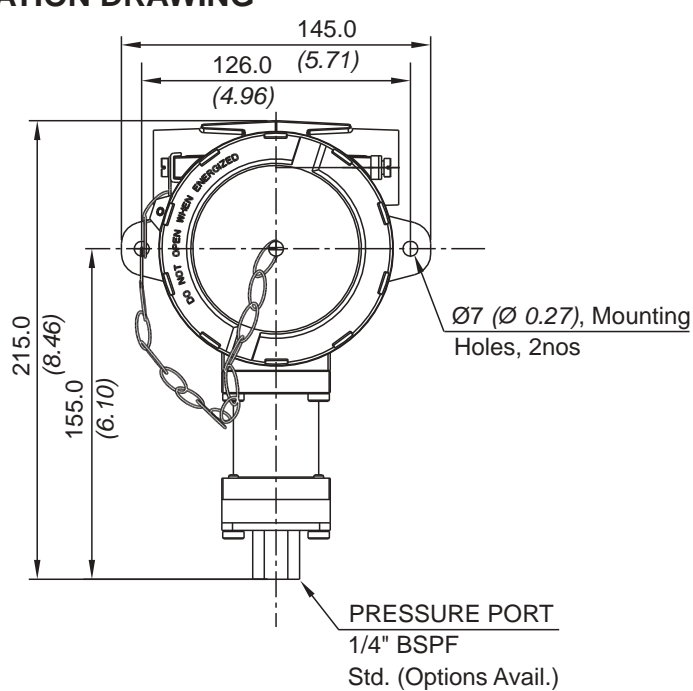


### No. Description

1. Pressure Housing
2. Teflon® O-Ring
3. Diaphragm
4. Conical Plunger
5. Bottom Spring
6. Support Plate

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# FC COMPOUND RANGE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
C01	-1 to 1.0 (-14.50 - 14.50)	0.2 (2.90)	12 (174.05)
C03	-1 to 2.6 (-14.50 - 37.71)	0.6 (8.702)	12 (174.05)
C04	-1 to 3.6 (-14.50 - 52.21)	0.8 (11.603)	12 (174.05)

\* Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER FLAMEPROOF COMPOUND RANGE SWITCHES

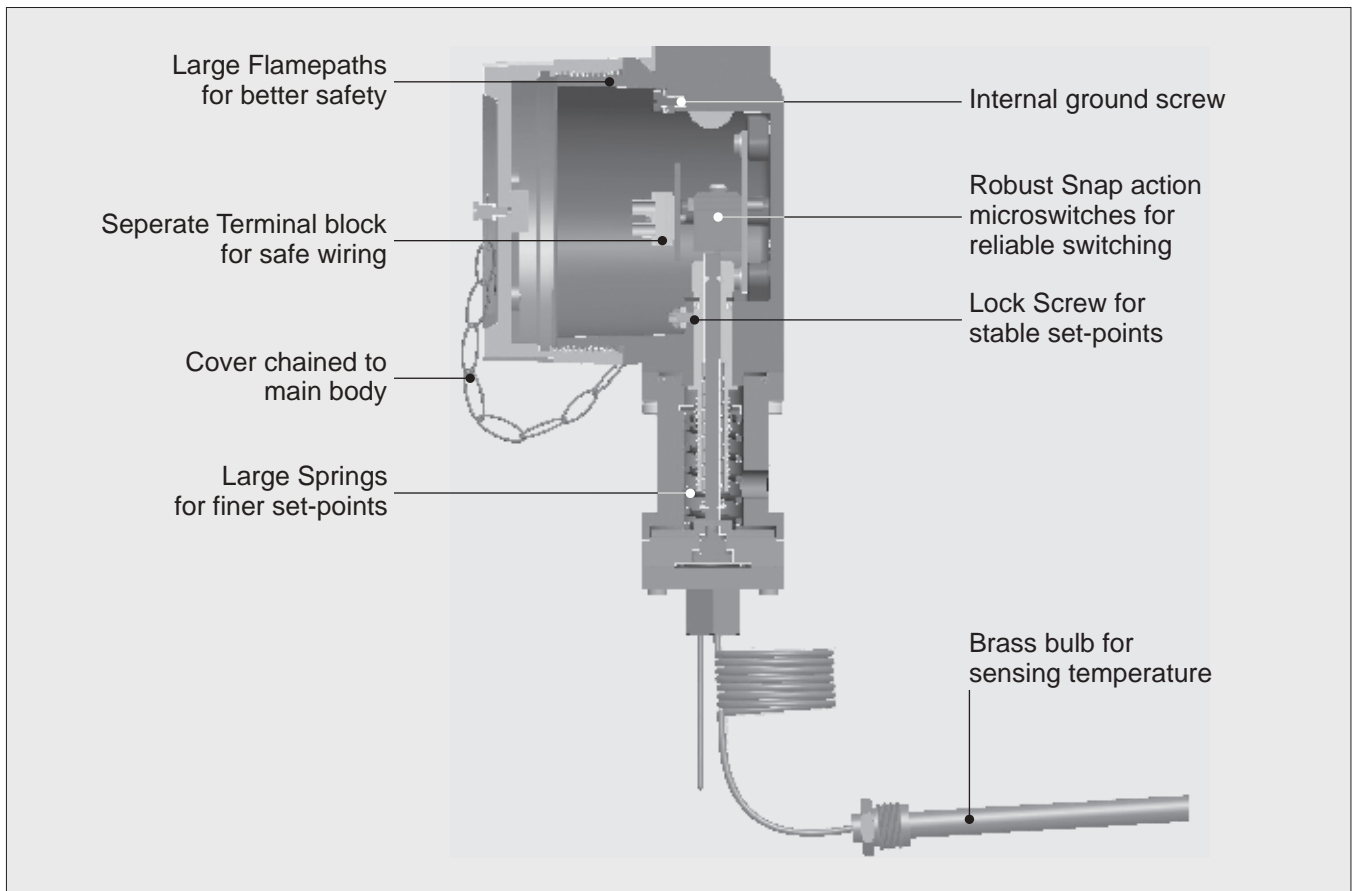
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>FC</b> = Flameproof pressure switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head ½" NPT threads <b>2</b> = Al. head ¾" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>4</b> = Grey CI head ½" NPT threads <b>5</b> = Grey CI head ¾" NPT threads <b>6</b> = Grey CI head M20 x 1.5 threads <b>7</b> = SS head ½" NPT threads <b>8</b> = SS head ¾" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>C1</b> = compound switch, fixed differential without scale	<b>C01</b> = (-1 to 1.0) <b>C03</b> = (-1 to 2.6) <b>C04</b> = (-1 to 3.6)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, having -1 bar to +1 bar pressure range, with 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & Neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	C1	C01	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# FC TEMPERATURE SWITCHES

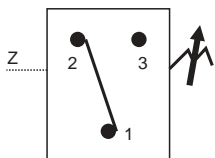


## Approximate Weight :

Pressure switches with Aluminium enclosure : 2.5 Kg.

Pressure switches with SS enclosure : 5.1 Kg.

## Electrical Connection :

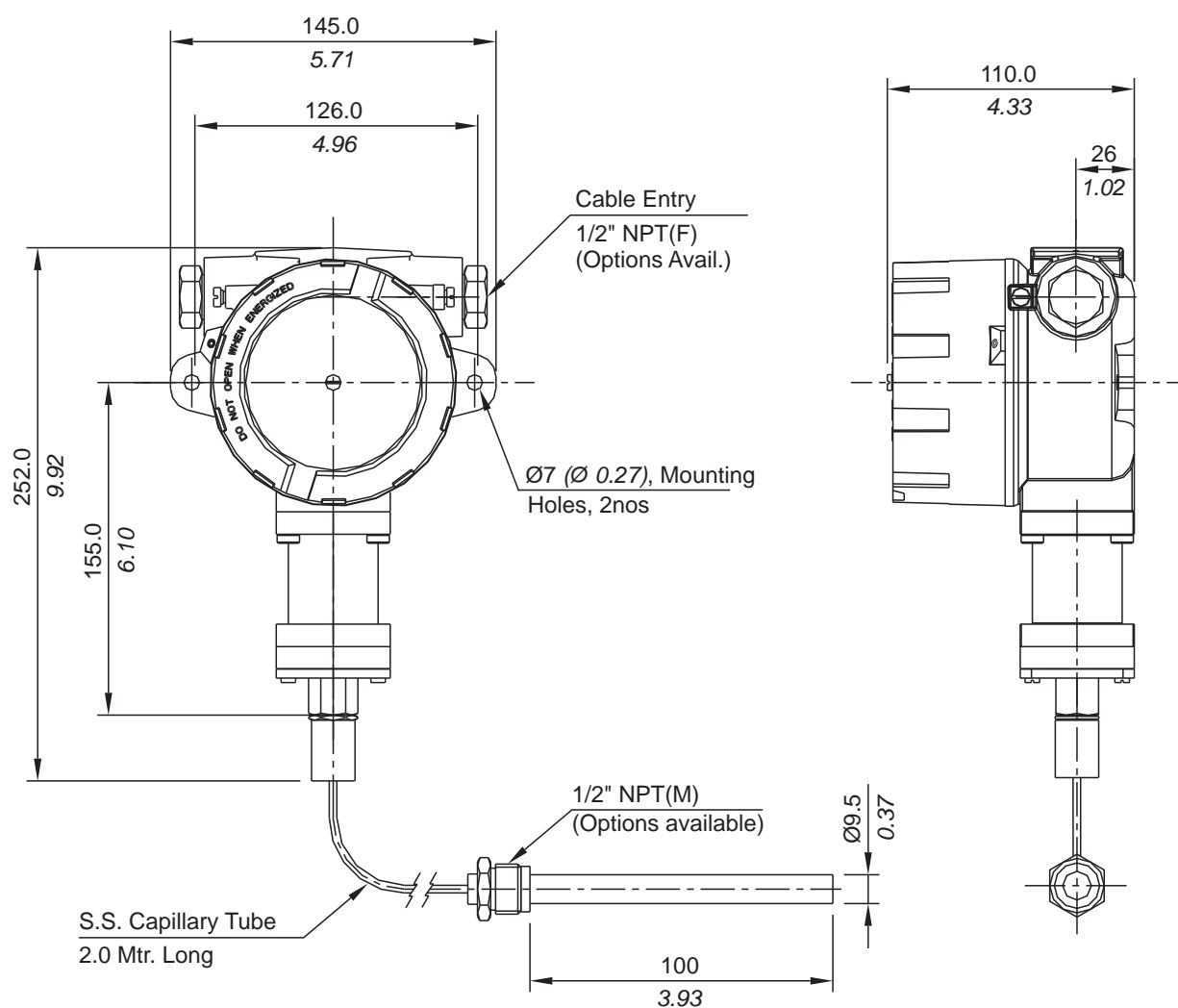


## Some Applications :

To detect limiting temperature levels in hazardous areas.



## INSTALLATION DRAWING



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



# FC TEMPERATURE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range °C (°F)	Differential* °C (°F)	Maximum Working Temperature °C (°F)
		Approximate Maximum for "A1" microswitch	
T1H	25 - 90 (77 - 194)	15 (59)	150 (302)
T2H	70 - 150 (158 - 302)	20 (68)	200 (392)
T3H	120 - 215 (248 - 419)	30 (86)	300 (572)

\* Approximate differential at midrange for A1 microswitch. Differentials increase with setpoint. Differentials vary with microswitch combinations. Please consult sales office for details

## HOW TO ORDER FLAMEPROOF TEMPERATURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in Deg. Cen.)	Microswitch Type	Temp. Bulb Material / Size	Capillary Material / Size
<input type="checkbox"/> Reserved for Non-standard Options not covered in Catalogue. Will Be given by Manufacturer, Only after Agreement of Supply details With customer.	<b>FC</b> = Flameproof temperature switch, ATEX & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC	<b>1</b> = Al. head 1/2" NPT threads <b>2</b> = Al. head 3/4" NPT threads <b>3</b> = Al. head M20 x 1.5 threads <b>7</b> = SS head 1/2" NPT threads <b>8</b> = SS head 3/4" NPT threads <b>9</b> = SS head M20 x 1.5 threads	<b>T1</b> = Temperature Switch, fixed differential without scale <b>T2</b> = Temperature Switch, fixed differential with scale in °C	<b>T1H</b> = 25 - 90 <b>T2H</b> = 70 - 150 <b>T3H</b> = 120 - 215	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A6</b> = Elements with adjustable differential <b>A7</b> = 2SPDT switching elements <b>B6</b> = Hermetically Sealed Gold Plated contact 2SPDT	<b>B1</b> = Brass / Dia. 9.5 mm, 123 mm length, with 3/8" BSP (M) thermowell connection <b>B2</b> = Brass / Dia. 9.5 mm, 123 mm length, with 3/8" NPT (M) thermowell connection <b>B3</b> = Brass / Dia. 9.5 mm, 123 mm length, with 1/2" NPT (M) thermowell connection	<b>2</b> = SS316 / 2.0 meter

E.g. A Flameproof Temperature switch, with 1/2"NPT cable entry in aluminum housing as 1 SPDT, fixed differential without scale, having 25°C to 90°C temperature range, with 15 Amp. microswitch, with Brass 9.5 mm diameter bulb, having length 123 mm with 3/8"BSP(M), with 2.0 meter SS316 capillary length shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	FC	1	T1	T1H	A1	B1	2

Please specify full model number to avoid ambiguity.

## Introduction

MD series pressure switches have been designed for applications that require robust, long lasting switches, coupled with a high accuracy and repeatability, in adverse conditions. By using appropriate capsules and wetted parts, MD series pressure switches can be used for thousands of applications. A wide choice of electrical elements including SPDT, DPDT, gold plated contacts make these switches ideal for a variety of critical applications. A wide scale, when opted for, offers ease of setting, given the smaller least counts.

### APPLICATIONS

- Power Generation
- Burners and Furnaces
- Glass and Metal Industries
- Chemical Industries
- Steel Industry
- Hydraulic, Steam and Gas Turbines
- Boilers & Compressors
- Machine tools
- Railway braking systems
- Water treatment
- Sugar and Paper Mills
- Fire protection
- Surgical gas, Breweries, Milk industries
- Tyre Industry
- Natural Gas, LPG storage and transportation

### PRODUCT SPECIFICATIONS:

- Storage temperature : Atmospheric temperature
- Operating ambient temperature : - 20° C to + 60° C
- Media Temp.: - for rubber diaphragms 80 degree C max., higher with metal diaphragms
- Can be offered for higher temperatures with other capsule combinations
- Setpoint repeatability :  $\pm 1$  % of FSR
- Enclosure : Die cast aluminium to IP 66
- Switch output : SPDT, DPDT, hermetically sealed, gold plated contacts
- Process connection :  $\frac{1}{4}$  "BSP standard, other options like flanges, triclave clamps, diaphragm seals available.

### FEATURES

- Robust
- Wide scale for easier setpoint (optional)
- Enclosure protection : IP 66 standard
- Reliable accurate microswitches for long life switching
- Customized arrangements for switching values on request
- Easy safe wiring options
- Field adjustable
- Accuracy  $\pm 1$  % FSR
- Warranty : 2 years

\*Accuracy changes with switch configuration

# INDUSTRIAL SWITCHES

## SPECIFIER'S GUIDE FOR

PRESSURE SWITCHES

PRESSURE DIFFERENCE SWITCHES

VACUUM SWITCHES

TEMPERATURE SWITCHES



## Using the section

This section helps you make a logical choice in selecting the best product for a particular application. It allows a user familiar with our product line to locate the exact page the product is listed on. For those not familiar with our products, a logical sequence is given to help the user pick the best product for their need.

By taking a few minutes to familiarise yourself with the catalogue organisation, you will find it very easy to locate the product / information you need.

1. The contents page lists the broad outline in which the catalogue is organised, and will help the user familiar with products to select the page on which the product or other useful information is listed.

2. Need Product Selection help ?

Product selection help will start with the "Pictorial Index" on Page 82 & 83, where the products are broadly classified. A brief description of each product group, a typical photo of the product within the group and the page number on which it is listed are given.

If the user is not familiar with the products, a product selection guide is provided on pages 88 through 94, where photos for each product and important specifications are given to help determine and select the best product for the application.

By evaluating and comparing these parameters, a logical selection can be made. Turn to the page on which the product information for the selected product is listed, for :

Capsule Construction details

Physical sizes

Special features

Ranges, hysteresis, electrical ratings etc.

Ordering information

Some applications

The organisation of each of these pages is demonstrated on pages 84 and 85, of this section "How to use this catalogue".

In many cases, more than one product may work. For the most cost effective solution, compare prices and consider alternatives. Remember, the end cost includes initial product price, plus the installation, plus the service.

3. Need the terminology explained? (see page 330)

Turn to page 330 for the definitions and terminology. This will help you familiarize with the terms used throughout the catalogue.

4. Need information on Accessories? (see page 322)

Turn to page 322 for information on important accessories. These will give information on only important accessories, and information needed, when these are to be supplied with our products.

5. Need selection guidance? (see page 331)

A logical procedure on page 331 will help you to consider most of the important factors when selecting a pressure switch.

6. Need other products ? (see page 332)

Products other than those listed in this catalogue are referenced on these pages. Separate catalogues for these products are available.

# Air Relay Switches

CE

Pneumatic  
output



Pressure,  $\Delta$ P, Vacuum Ranges from 1.5 mbar to 200 bar

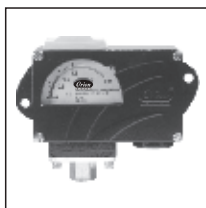
Please refer page no. 112 for Air Relay Switch details

## Pictorial Index

### PRESSURE SWITCHES

#### HIGH RANGE

**HIGH RANGE**



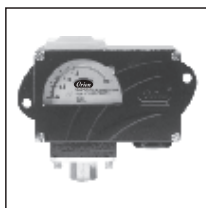
Page No. 96

**HIGH PROOF  
HIGH RANGE**



Page No. 100

**BELLOWS**



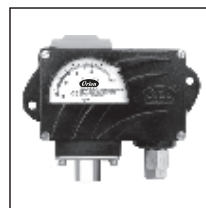
Page No. 104

**LARGE BORE  
HIGH RANGE**



Page No. 108

**AIR RELAY  
RANGE**



Page No. 112

**FLANGED  
RANGE**



Page No. 116

#### LOW RANGE

**LOW  
RANGE**



Page No. 120

#### HYDRAULIC RANGE\*

**HYDRAULIC  
RANGE**



Page No. 124

**HYDRAULIC  
DIAPHRAGM RANGE**



Page No. 128

### DUAL SWITCHES



Page No. 132

### PRESSURE DIFFERENCE SWITCHES

#### HIGH RANGE

**HIGH RANGE**



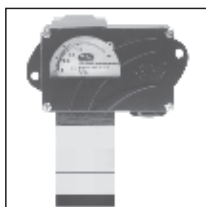
Page No. 136

**HIGH PROOF  
HIGH RANGE**



Page No. 140

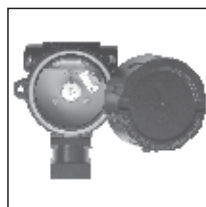
**HIGH RANGE  
DP**



Page No. 144

#### LOW RANGE

**ULTRA LOW  
RANGE**



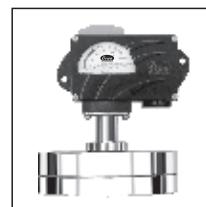
Page No. 148

**LOW  
RANGE**



Page No. 150

**LOW ÄP  
HIGH PROOF  
RANGE**



Page No. 154

\*Hydraulic ranges are ranges typically from 2 bar to 600 bar, used in oil applications. However, these switches can be used for other media depending on wetted parts compatibility.



## Pictorial Index

### VACUUM SWITCHES

#### VACUUM

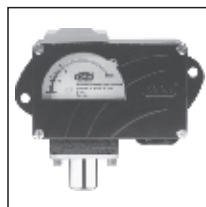


Page No. 158

### COMPOUND SWITCHES

#### HIGH RANGE

##### HIGH RANGE



Page No. 162

#### LOW RANGE

##### LOW RANGE



Page No. 166

### TEMPERATURE SWITCHES

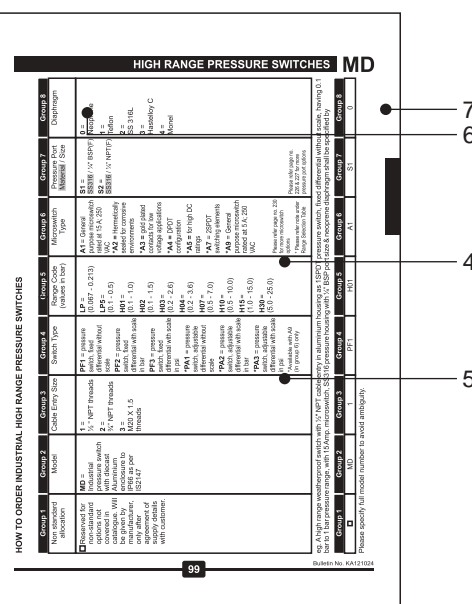
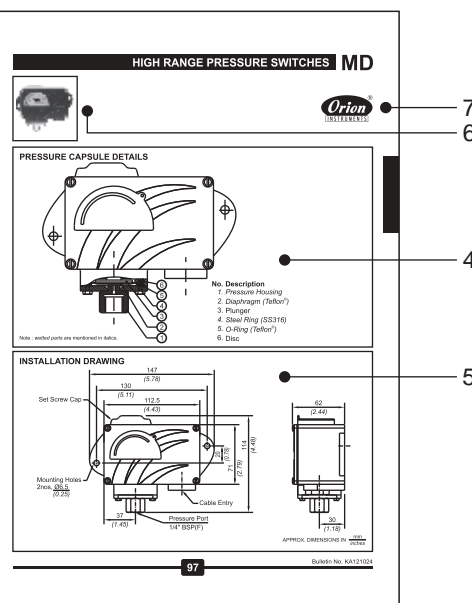


Page No. 170

\*Hydraulic ranges are ranges typically from 2 bar to 600 bar, used in oil applications.  
However, these switches can be used for other media depending on wetted parts compatibility.

4. Pressure capsule details - will show the construction of the pressure capsule and all its internal parts. If the process / working medium is variable, the wetted parts will be mentioned in *italics*. If the wetted parts are unique, the material of construction (MOC) will be mentioned

5. Installation drawing - will show the typical installation dimensions of products as they exist in their standard forms. The dimensions are mentioned in millimetres and also in inches to facilitate the user. The dimensions of accessories will have to be added to these to arrive at any particular general arrangement (GA) drawings. The dimensions are approximate and for precise dimensions, where mounting space is restricted, the user may contact the nearest sales office. Installation drawings of only fast moving accessories are given.



## HOW TO USE this section

6. Photos - will appear on the relevant top of the page for products. If there are mounting variations / styles, all the styles for standard products will appear for easy identification. Options, if included in the photograph, are for demonstration only, and are not a part of the standard equipment. For accessories, the photos are not given due to the sheer variety and range available.

7. Logo - will appear on right hand top of page to identify the manufacturer.

8. Characteristics - Range tables and their relevant data, e.g the range covered, the differentials and maximum working pressures will generally appear on the right hand page. Additional technical details will also be mentioned, wherever required, on the right hand side of the page.

9. Ordering guide - A guide as to how to order the particular series' variations will appear on right hand bottom of the page. Only the variations available within a particular product family / series will appear here. Any additional accessories or modifications required for the product need to be mentioned in text by the user.

10. Some applications - will appear at the bottom left of the page. This is for easy understanding of the specific use of the switch.

11. Installation and operating instructions - This will include the principle of operation and mounting instructions and will appear on the right hand page

12. Numerous combinations are possible when pressure switches are provided with accessories like chemical seals, snubbers, remote seals, pipe mounting brackets, combination of switches mounted in a panel etc. Users are requested to provide the details of accessories required in text / drawings, as separate identification codes are provided for pressure switches fitted and supplied with accessories.

2

6

7

1 ● **FP ULTRA LOW RANGE PRESSURE DIFFERENCE SWITCHES**

3 ● **Salient Features**

**Ultra Low Range Pressure Difference Switches with User Adjustable Knob**

**Easy to See, Easy to Use!**  
Set Point easily user adjustable with visible scale in Pascal. (no need of pressure gauge)

**Enclosure**  
Robust Gravity Die Cast Aluminium

**Long Lasting!**  
10' switching operations

**Trusted all over!**  
Tested and Proven

**Technical Specifications**  
Media: Air, non-flammable gases and non-aggressive gases  
Housing Material: IP 66 Gravity Die Cast Aluminium  
Protection Category: IP66 with cover.  
Ranges: 20 Pa to 4000 Pa  
Maximum Working Pressure: 0.1 bar  
Electrical Rating: Maximum 1.0A (4 A) / 250VAC  
Electrical Connection: Standard Terminal Strip provided  
Cable Entry: 1/2" NPT  
High Pressure and Low Pressure Port: 1/8" BSP(F)  
Media Temperature: 80°C max.  
Ambient Temperature: -5°C to 60°C

**Range Selection Table**

Range Code (Orion)	Adjustment Range for Upper Switching Pressure Pa (mm wg)	Switching Differential Set to Pa (mm wg)
FP80	20-200 (2.039-20.395)	10 (1.020)
FP81	40 - 100 (4.079 - 10.197)	20 (2.039)
FP82	40 - 200 (4.0479 - 20.395)	20 (2.039)
FP83	50 - 500 (5.099 - 50.987)	20 (2.039)
FP85	200 - 1000 (20.395 - 101.974)	100 (10.197)
FP86	500 - 2500 (50.987 - 254.935)	150 (15.296)
FP87	1000 - 4000 (101.974 - 407.896)	250 (25.494)

9 ● **How to order FP series Low Range Pressure Difference Switches**  
Please specify the Range Code e.g., FP82 or FP85 as per range selection table.

Bulletin No. KA121024

148

**ULTRA LOW RANGE PRESSURE DIFFERENCE SWITCHES FP**

**INSTALLATION AND OPERATING INSTRUCTIONS**

**Principle of Operation**  
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**  
The detailed mounting dimensions are shown in Fig. 1.

1) Pressure Switches can be mounted on a plate/inside a panel using Ø7 mounting holes provided.  
2) For any other process connection, please use an adaptor.

Fig. 1

**INSTALLATION DRAWING**

P1 = High Pressure Port  
P2 = Low Pressure Port

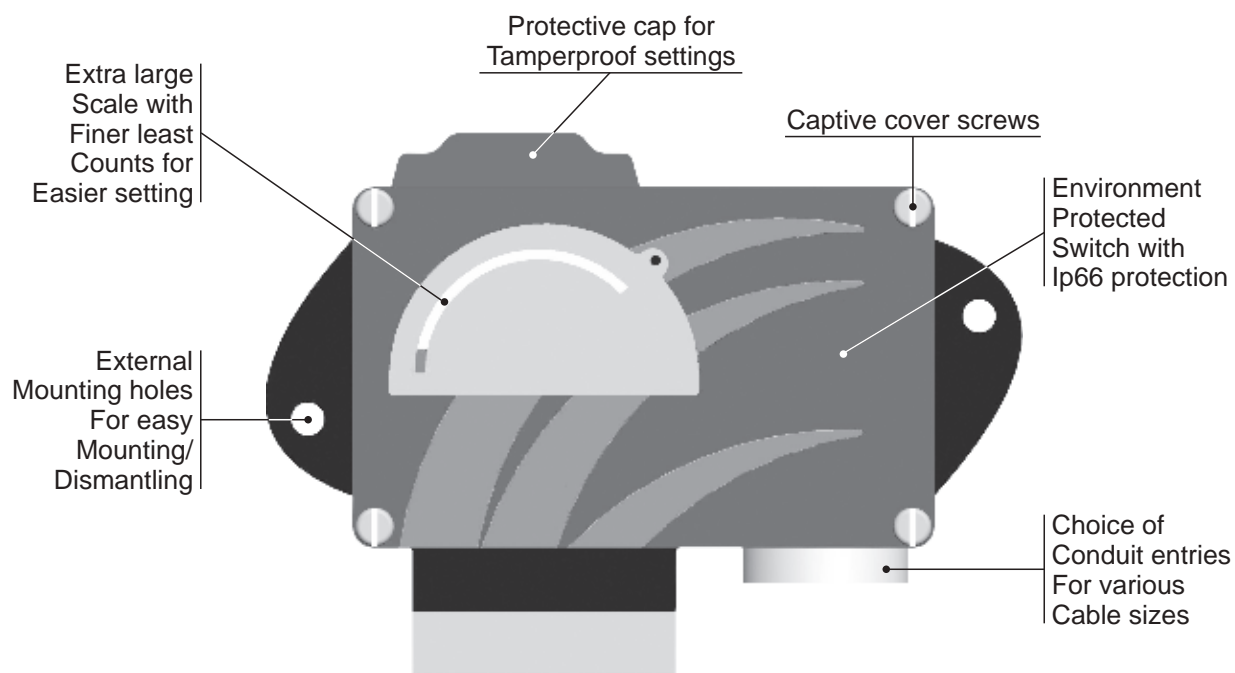
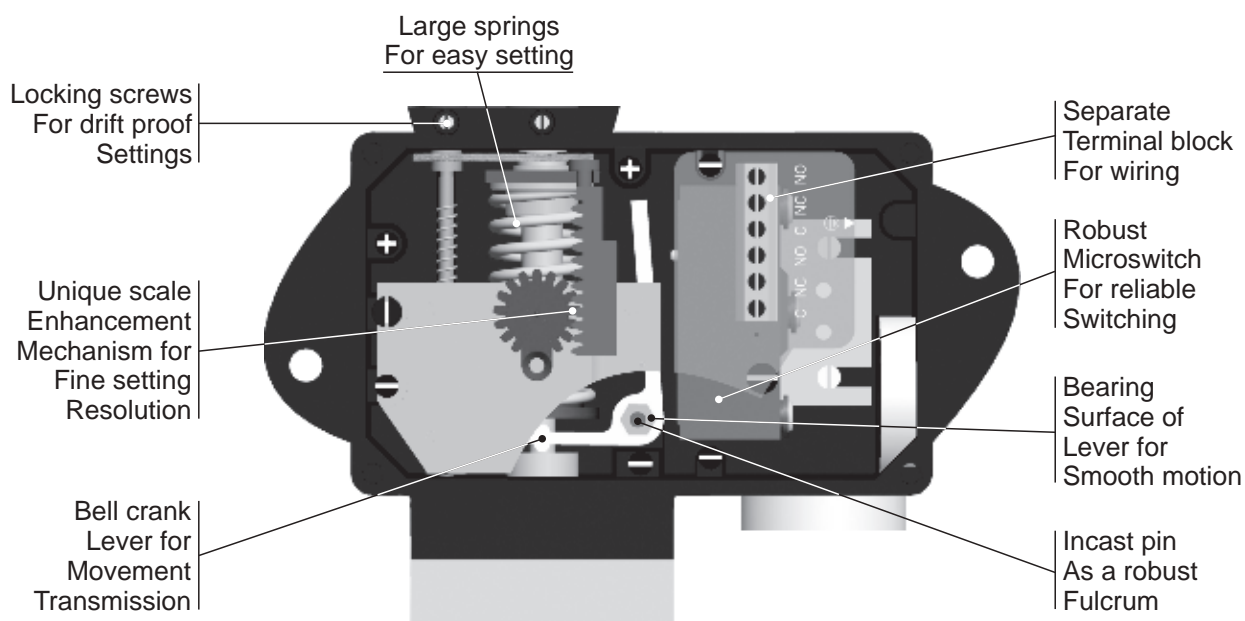
Note : 1. Use two screws only, for mounting  
2. Remove transport protection from P1 and P2

**CAUTION :**  
Install pressure switch vertically. Installing it at an angle more than 30° to vertical may result in malfunction.

Bulletin No. KA121024

149

## Switch Construction



## Switch Construction

The versatile construction of MD switches allows configuration by selecting the following main subassemblies/components:

### a) Main body casing :

This is aluminium pressure die cast, and has an IP 66 protection factor. This houses a lever mechanism , as also a scale enhancement mechanism, which is displayed on the page alongside. The cover has captive screws, and the scale, when provided, is clearly visible through a transparent window.

The cable entries in this casing can be of the following types :

- ½ "NPT
- ¾ "NPT
- M20 X 1.5

Other cable glands to MIL standards can be fitted optionally on request.

### b) The electrical element (s) :

Choice of electrical elements to suit end use are offered, like :

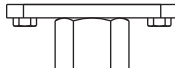

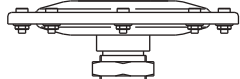

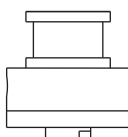
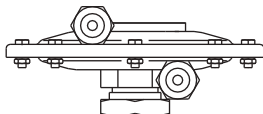
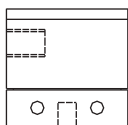
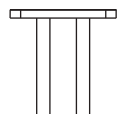
- A1 : General purpose applications
- A2 : Hermetically sealed for corrosive environments
- A3 : gold plated contacts for low voltage applications
- A4 : DPDT configuration
- A5 : for high DC ratings
- A7 : 2SPDT switching elements

It is possible to have more options of electrical elements not published here, to suit individual end use.

The deadband (or hysteresis / on-off differential) of the switches will change with the change of the electrical element (s). The approximate values for each range (for standard microswitches offered) are published in this catalogue

### c) The pressure capsule :

To suit the setpoints , the working media and the function of the switch in the application:

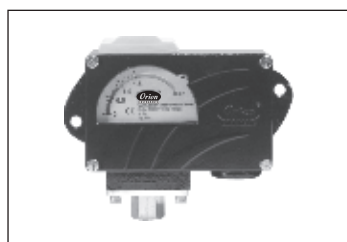
<b>High Pressure Ranges</b> (typically from 0.067 barg to 25 barg) 	<b>High Proof High Pressure Ranges</b> (typically from 0.067 barg to 25 barg, Pmax = 70 bar) 	<b>Low Pressure Ranges</b> (typically from 1.5 mbarg to 350 mbarg) 	<b>High Range Pressure Difference Switches</b> (typically from 0.1 barg to 25 barg) 
<b>High Proof High Range PD Switches</b> (typically from 0.1 barg to 25 barg, Pmax = 200 bar) 	<b>Low Range Pressure* Difference Switches</b> (typically from 1.5 mbarg to 350 mbarg) 	<b>Vacuum Switches</b> (typically from 760 mm Hg to atmospheric pressure) 	<b>Hydraulic Pressure Ranges</b> (typically from 0.5 barg to 400 barg) 

\*The pressure capsule can be modified to take high proof pressures [typically 100 bar for high and low pressure switches, or pressure difference switches (from high pressure side)].

Several accessories like chemical seals, pipe mounting brackets etc can be supplied with these switches to suit the media to be sensed. All of these are not listed, though most popular ones can be found on pages 322 through 328.

Please do get in touch with us for any of your applications, not addressed in this catalogue. We would be glad to offer you a solution.

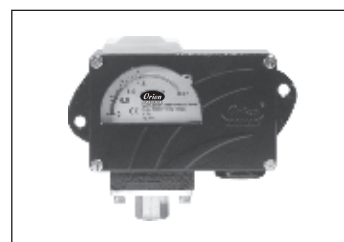
## Product Selection Guide



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Page No. 100



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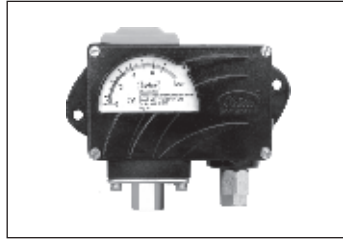
Switch type	High Pressure Ranges	High Proof High Pressure Ranges	High Range Bellows
Repeatability (% FSR)	± 1	± 2	± 2
Range covered	0.067 bar to 25 bar	0.067 bar to 25 bar	0.1 bar to 25 bar
Enclosure Protection	IP 66		
Enclosure Material	Pressure die-cast aluminium		
Sensing element	Diaphragm		Bellows
	Nylon reinforced neoprene diaphragm protected by Teflon		
Standard	Teflon, SS316L, Hastelloy C, Monel		SS 316
Optional	SS 316L / Teflon		
Pressure housing	SS 316 Hastelloy C, Monel		SS 316
Standard			
Optional			
Other Wetted Parts	SS316, Teflon		
Optional wetted parts through chem. seal	SS316, Hastelloy, Inconel Alloy, Monel, Nickel, Platinum, Tantalum, Titanium, Zirconium, Silver, PTFE		
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.		
Switching element	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office.		

Accessories can be supplied with most of the switches. Please consult sales office.

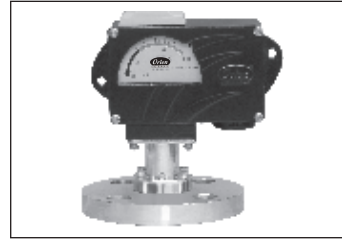
## Product Selection Guide



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Page No. 112



Page No. 116

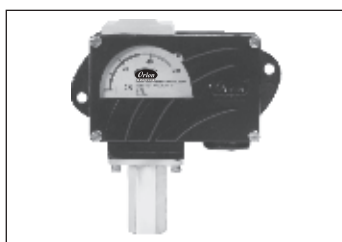
Large Bore High Range	Air Relay	Flanged	Switch type
± 2	± 2	± 2	Repeatability (% FSR)
0.1 bar to 25 bar	0.067 bar to 25 bar	0.1 bar to 200 bar	Range covered
IP66			Enclosure Protection
Pressure die-cast aluminium			Enclosure Material
Diaphragm Nylon reinforced neoprene diaphragm protected by Teflon SS316L, Teflon, Monel	Diaphragm Nylon reinforced neoprene diaphragm protected by Teflon Teflon, SS316L	Diaphragm Nylon reinforced neoprene diaphragm protected by Teflon SS316L, Hastelloy C, Titanium, Monel, Tantalum	Sensing element Standard Optional
SS316 Monel	SS 316	Flange SS316L Hastelloy C, Titanium, Monel, Tantalum	Pressure housing Standard Optional
Teflon, SS316		Teflon	Other Wetted Parts
			Optional wetted parts through chem. seal
For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.			Temp. of working medium
SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office.			Switching element

WETTED PARTS

## Product Selection Guide



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Switch type	Low Pressure Ranges		Hydraulic Ranges	Hydraulic Diaphragm
Repeatability (% FSR)	± 2		± 1	± 2
Range covered	1.5 mbar to 350 mbar		5 bar to 400 bar	0.5 bar to 400 bar
Enclosure Protection	IP 66			
Enclosure Material	Pressure die-cast aluminium			
WETTED PARTS	Sensing element Standard	Diaphragm Nylon reinforced neoprene diaphragm protected by Teflon	Piston SS	Diaphragm SS316L
	Optional	Teflon	SS 316L / Teflon	
	Pressure housing Standard	SS 316	SS 316	SS 316
	Optional	M.S.		
Other Wetted Parts	M.S., SS, Nitrile, Al., Neoprene		Viton, Teflon, SS	Teflon
Optional wetted parts through chem. seal				
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.			
Switching element	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office.			

Accessories can be supplied with most of the switches. Please consult sales office.

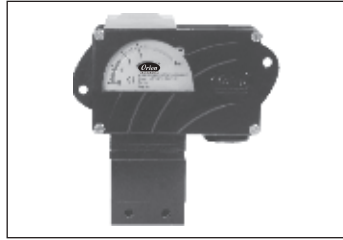
\* Higher ranges available on request



## Product Selection Guide



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Page No. 136



Page No. 140

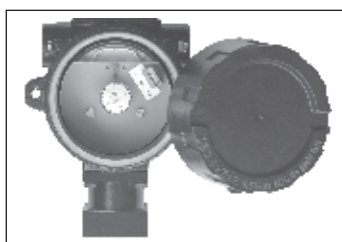
Dual High Range	High Range Pressure Difference Switches	High Proof High Range Pressure Difference Switches	Switch type
± 2	± 1	± 2	Repeatability (% FSR)
0.067 bar to 200 bar	0.1 bar to 3.6 bar*	0.1 bar to 3.6 bar*	Range covered
IP 66			Enclosure Protection
Pressure die-cast aluminium			Enclosure Material
Diaphragm Nylon reinforced neoprene Teflon, SS316L			Sensing element Standard Optional
SS 316	Aluminium SS 316, Hastelloy C, Monel	SS 316 Hastelloy C, Monel	Pressure housing Standard Optional
Teflon	Teflon, SS316		Other Wetted Parts
			Optional wetted parts through chem. seal
For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.			Temp. of working medium
SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC,	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office.		Switching element

WETTED  
PARTS

## Product Selection Guide



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Page No. 150

Switch type	High Range DP		Ultra Low Range	Low Range Pressure Difference Switches
Repeatability (% FSR)	± 1		± 1	± 2
Range covered	0.1 bar to 25 bar		20 Pa to 4000 Pa	1.5 mbar to 350 mbar
Enclosure Protection	IP 66			
Enclosure Material	Pressure die-cast aluminium		Gravity die-cast aluminium	Pressure die-cast aluminium
WETTED PARTS	Sensing element	Diaphragm	Diaphragm	Diaphragm
	Standard	Nylon reinforced neoprene diaphragm protected by Teflon	Silicone	Nylon reinforced neoprene
	Optional	Teflon, SS316L		Teflon
	Pressure housing			
	Standard	SS 316 Aluminium	Aluminium	M.S. SS 316
	Optional			
Other Wetted Parts	Teflon, SS316			M.S., SS, Nitrile, Al., Neoprene
Optional wetted parts through chem. seal				
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.			
Switching element	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office.		Maximum 1 A(0.4A)/250VAC	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office.

Accessories can be supplied with most of the switches. Please consult sales office.

\* Higher ranges available on request

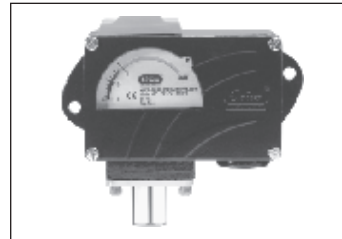
## Product Selection Guide



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Low ΔP High Proof Pressure Difference Switches		Vacuum Switches		High Range Compound Switches		Switch type
± 2		± 1		± 2		Repeatability (% FSR)
5 mbar to 350 mbar		760 mmHg to 100 mmHg		-1 bar to 3.6 bar		Range covered
IP 66						Enclosure Protection
Pressure die-cast aluminium						Enclosure Material
Diaphragm Nylon reinforced neoprene Teflon						Sensing element Standard Optional
SS 316		Aluminium SS 316		SS 316		Pressure housing Standard Optional
Teflon, SS		Teflon, SS316				Other Wetted Parts
						Optional wetted parts through chem. seal
For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.						Temp. of working medium
SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office.						Switching element

WETTED PARTS

## Product Selection Guide



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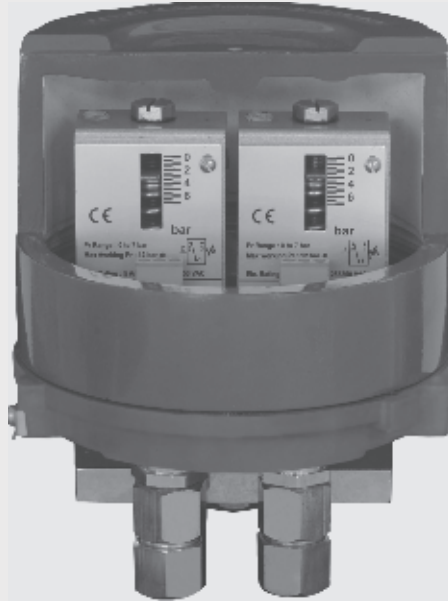
Page No. 170

Switch type	Low Range Compound Switches	Temperature Switches
Repeatability (% FSR)	± 2	± 1
Range covered	-150 mm wc to 250 mm wc	25 °C to 215 °C
Enclosure Protection	IP 66	
Enclosure Material	Pressure die-cast aluminium	
Sensing element Standard Optional	Diaphragm Nylon reinforced neoprene diaphragm protected by Teflon	Bulb/Probe Brass
	Teflon	
	SS 316	
	SS, Nitrile, Al., M.S.	
Pressure housing Standard Optional		
Other Wetted Parts		
Optional wetted parts through chem. seal		
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.	
Switching element	SPDT Snap action switch A1 : General purpose rated at 15A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office.	

Accessories can be supplied with most of the switches. Please consult sales office.

\* Higher ranges available on request

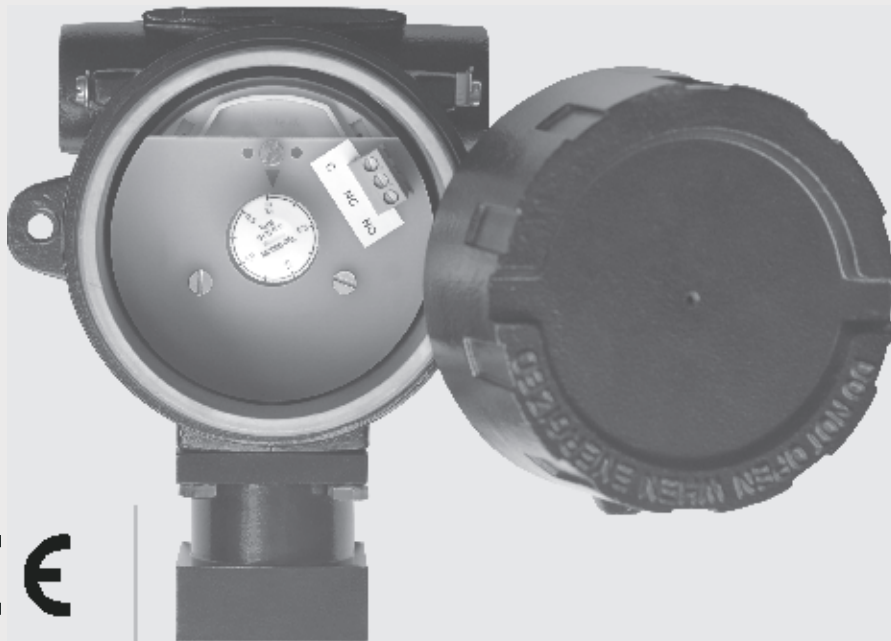
# Dual Switch



CE

Pressure Ranges from 0.067 bar to 200 bar  
Please refer page no. 132 for Dual Switch details

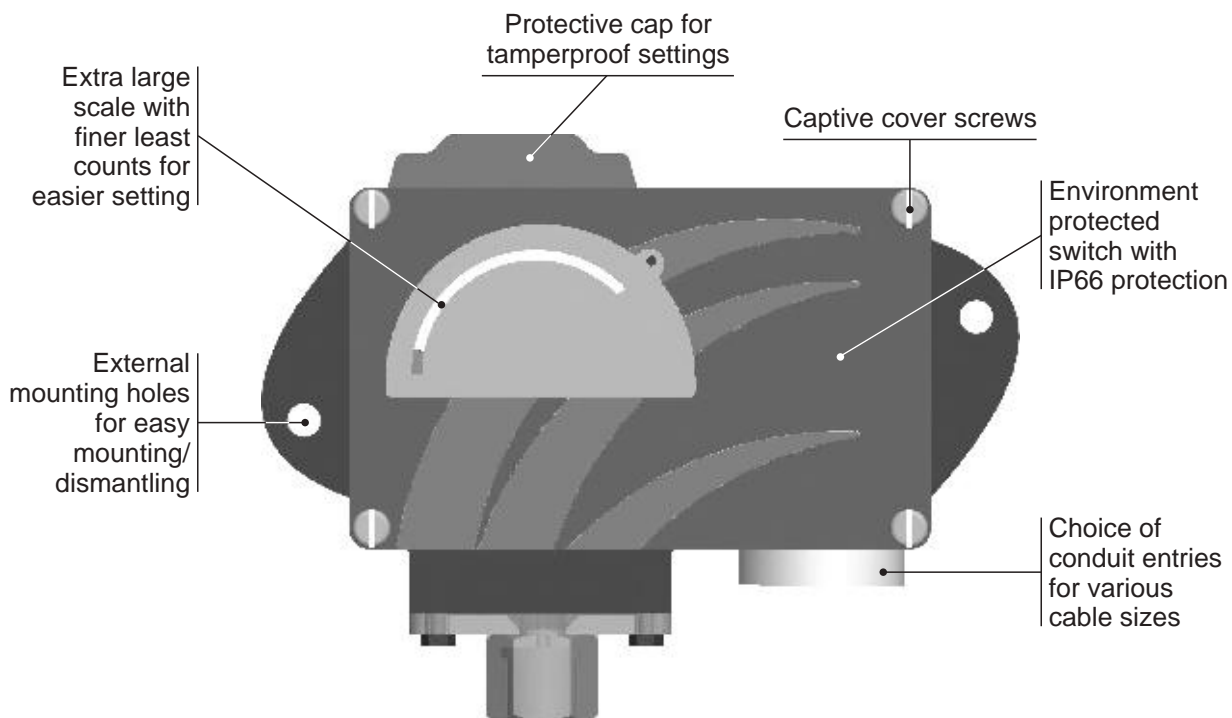
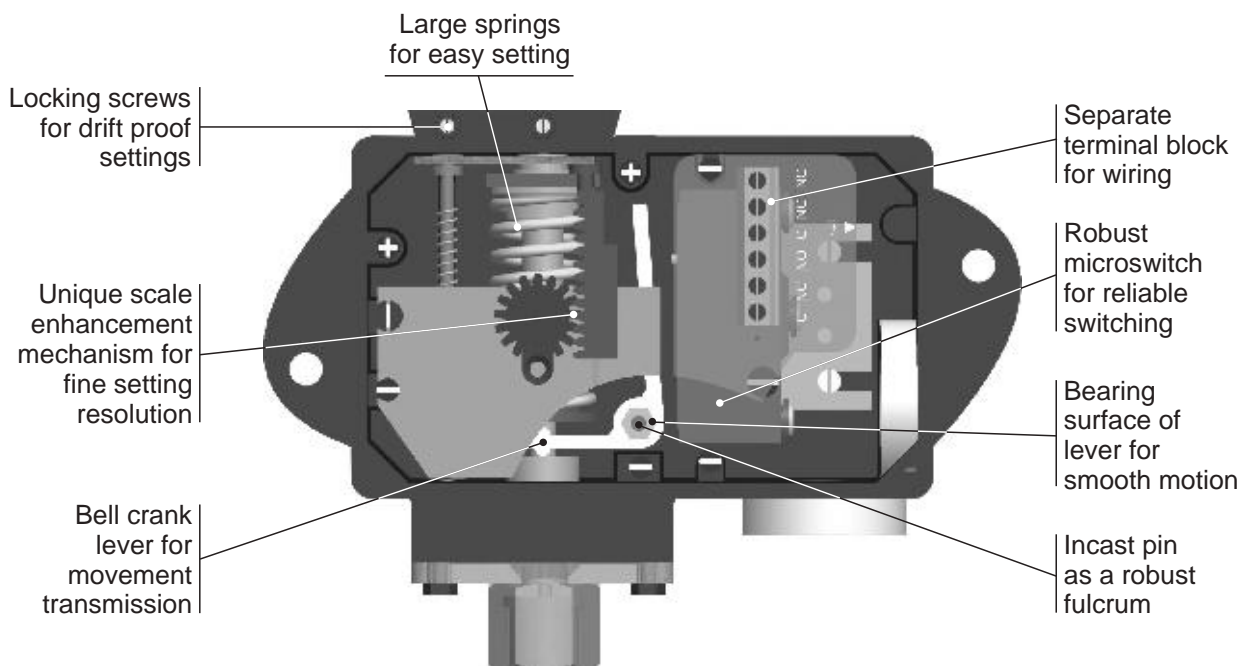
# FP Ultra Low Range



CE

ÄP Ranges from 20 KPa to 400 KPa  
Please refer page no. 148 for FP Switch details

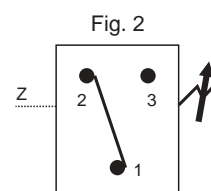
# MD HIGH RANGE PRESSURE SWITCHES

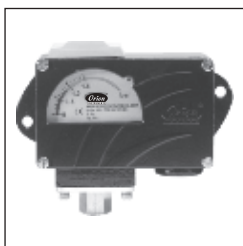


**Approximate Weight :** 0.700 Kg.

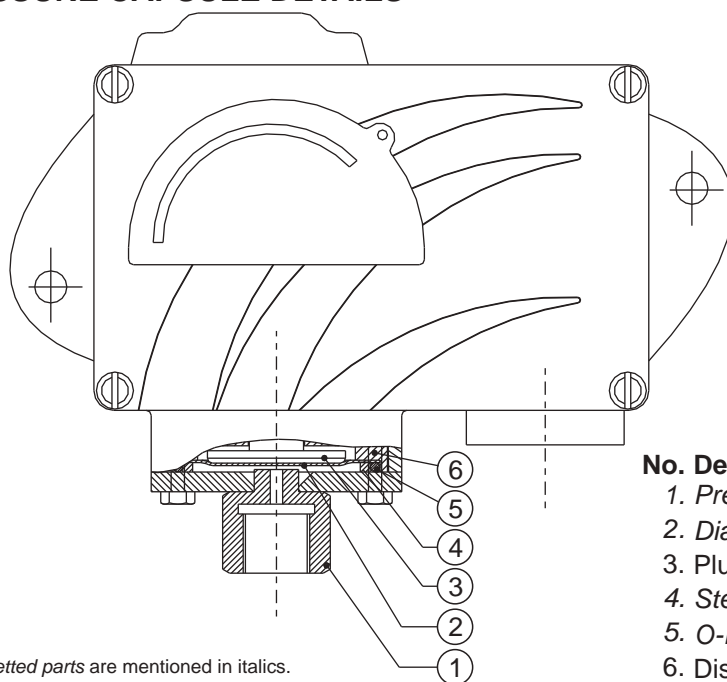
**Some Applications :** Used in non-hazardous areas.  
For any type of corrosive and non-corrosive gases and fluids.

**Electrical Connection :**





## PRESSURE CAPSULE DETAILS

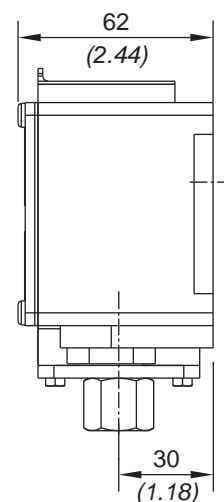
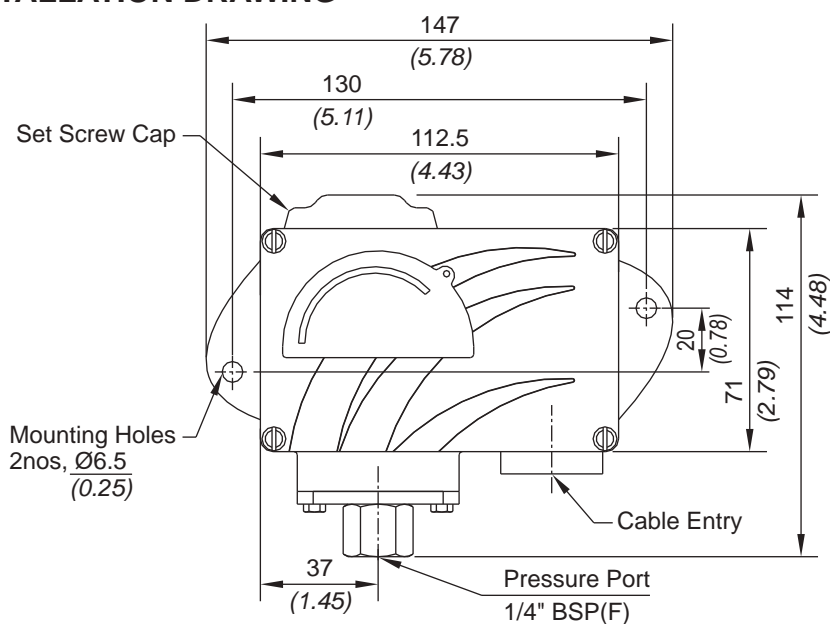


Note : *wetted parts* are mentioned in italics.

### No. Description

1. Pressure Housing
2. Diaphragm (Teflon®)
3. Plunger
4. Steel Ring (SS316)
5. O-Ring (Teflon®)
6. Disc

## INSTALLATION DRAWING



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

# MD HIGH RANGE PRESSURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar (psi)	†Differential bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
LP	0.067 - 0.213 (0.97 - 3.09)	0.02 (0.29)	5 (72.52)
LP5	0.1 - 0.5 (1.45 - 7.25)	0.08 (1.16)	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.38)	0.40 (5.80)	25 (362.6)
H15	1.0 - 15.0 (14.5 - 217.56)	0.80 (11.60)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	35 (507.63)

† Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.



## HOW TO ORDER INDUSTRIAL HIGH RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>PF1</b> = pressure switch, fixed differential without scale <b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA1</b> = pressure switch, adjustable differential without scale <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi *Available with A9 (in group 6) only	<b>LP</b> = (0.067 - 0.213) <b>LP5</b> = (0.1 - 0.5) <b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L <b>3</b> = Hastelloy C <b>4</b> = Monel

eg. A high range weatherproof switch with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

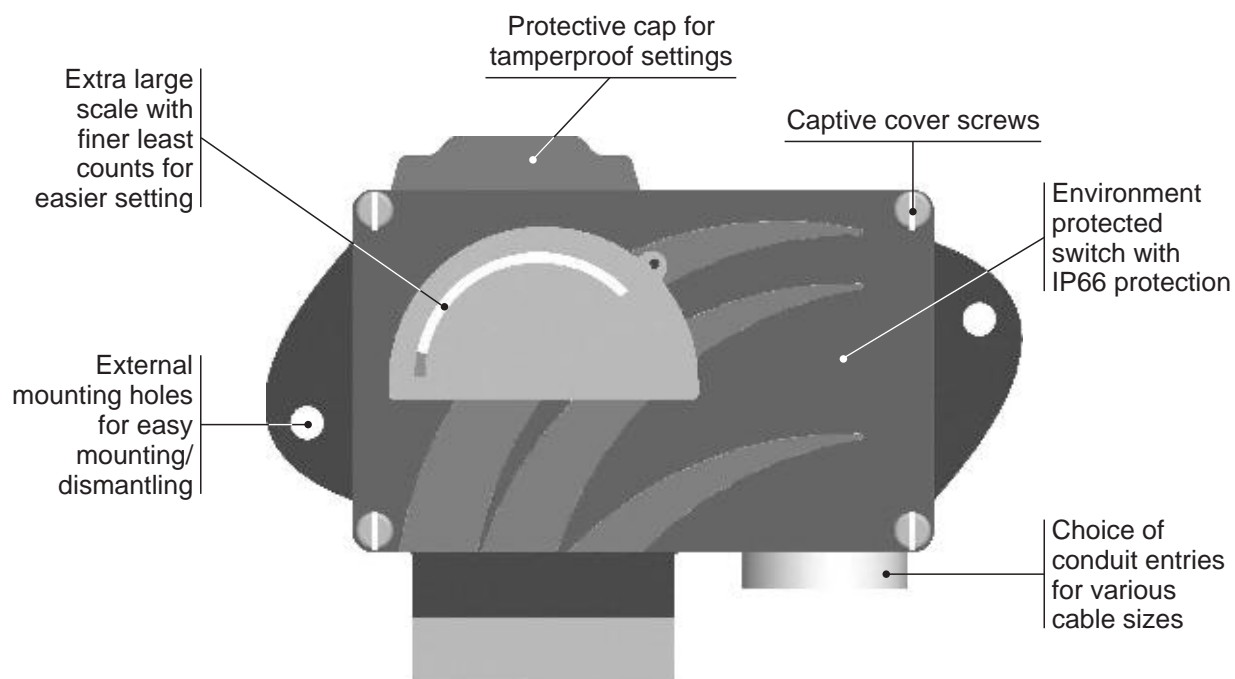
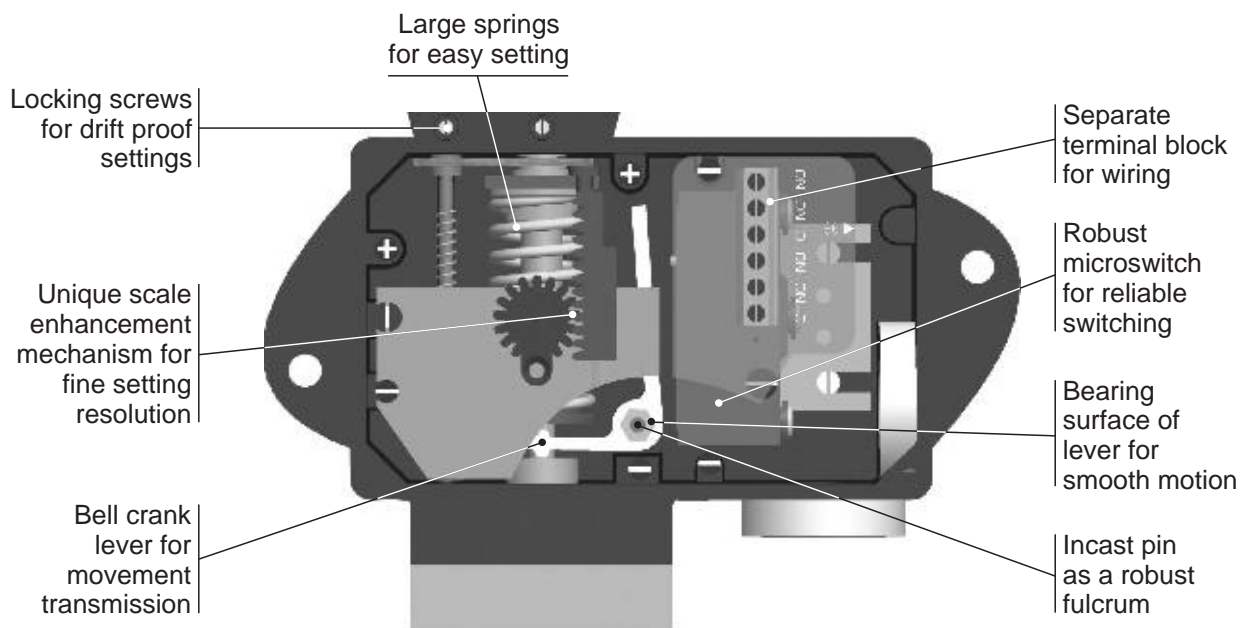
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	PF1	H01	A1	S1	0

Please specify full model number to avoid ambiguity.

## HIGH RANGE PRESSURE SWITCHES

# MD

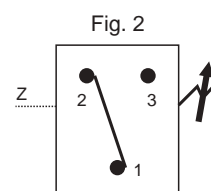
# MD HIGH PROOF HIGH RANGE PRESSURE SWITCHES



**Approximate Weight :** 1.200 Kg.

**Some Applications :** High pressure gas handling systems, in non-hazardous areas where the maximum pressure is high and tripping value is low.

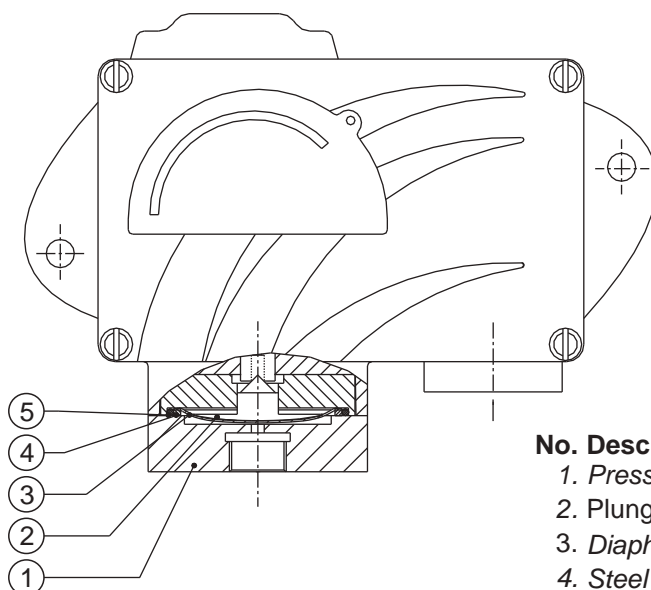
**Electrical Connection :**



# HIGH PROOF HIGH RANGE PRESSURE SWITCHES MD



## PRESSURE CAPSULE DETAILS

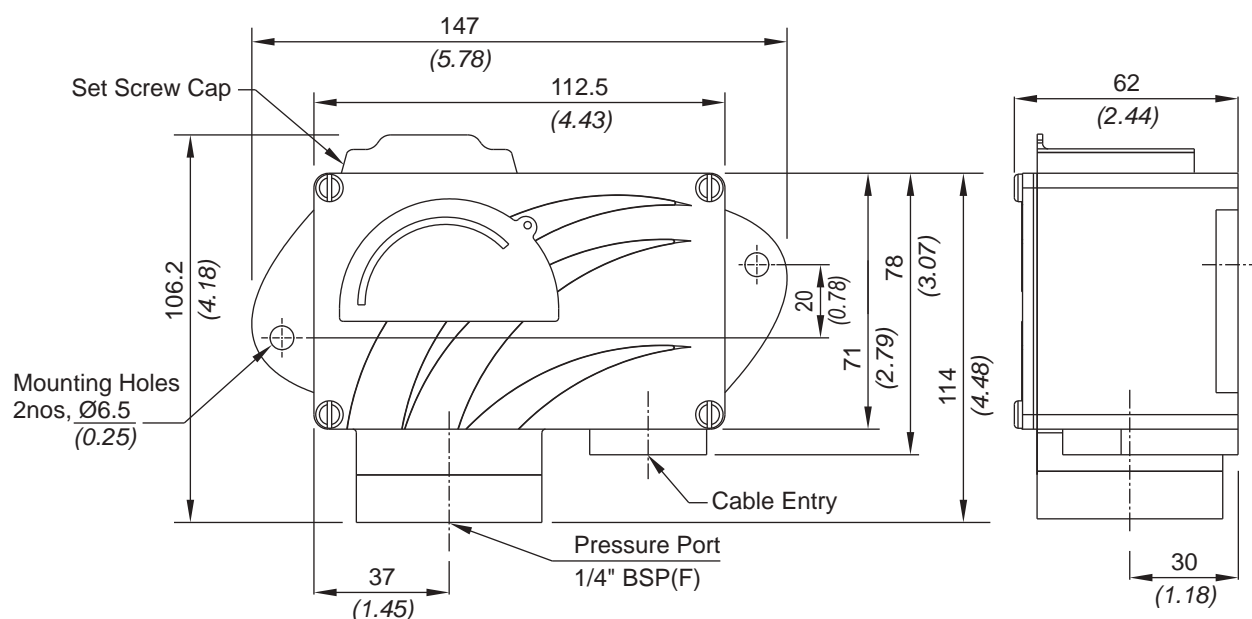


### No. Description

1. Pressure Housing
2. Plunger
3. Diaphragm (*Teflon®*)
4. Steel Ring (*SS316 as per pr. hsg. material*)
5. O-Ring (*Teflon®*)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# MD HIGH PROOF HIGH RANGE PRESSURE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
PP	0.067 - 0.213 (0.97 - 3.09)	0.04 (0.58)	70 (1015.27)
PP5	0.1 - 0.5 (1.45 - 7.25)	0.15 (2.176)	70 (1015.27)
P01	0.1 - 1.0 (1.45 - 14.50)	0.20 (2.90)	70 (1015.27)
P02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	70 (1015.27)
P03	0.2 - 2.6 (2.90 - 37.71)	0.30 (4.35)	70 (1015.27)
P04	0.2 - 3.6 (2.90 - 52.21)	0.40 (5.80)	70 (1015.27)
P07	0.5 - 7.0 (7.25 - 101.50)	0.60 (8.70)	70 (1015.27)
P10	0.5 - 10.0 (7.25 - 145.04)	0.80 (11.60)	70 (1015.27)
P15	1.0 - 15.0 (14.5 - 217.6)	1.50 (23.21)	70 (1015.27)
P30	5.0 - 25.0 (72.52 - 362.5)	2.00 (29.00)	70 (1015.27)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.

## HOW TO ORDER INDUSTRIAL HIGH PROOF HIGH RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>PF1</b> = pressure switch, fixed differential without scale <b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA1</b> = pressure switch, adjustable differential without scale <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi *Available with A9 (in group 6) only	<b>PP</b> = (0.067 - 0.213) <b>PP5</b> = (0.1 - 0.5) <b>P01</b> = (0.1 - 1.0) <b>P02</b> = (0.1 - 1.5) <b>P03</b> = (0.2 - 2.6) <b>P04</b> = (0.2 - 3.6) <b>P07</b> = (0.5 - 7.0) <b>P10</b> = (0.5 - 10.0) <b>P15</b> = (1.0 - 15.0) <b>P30</b> = (5.0 - 25.0)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L

eg. A high proof high range weatherproof switch with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

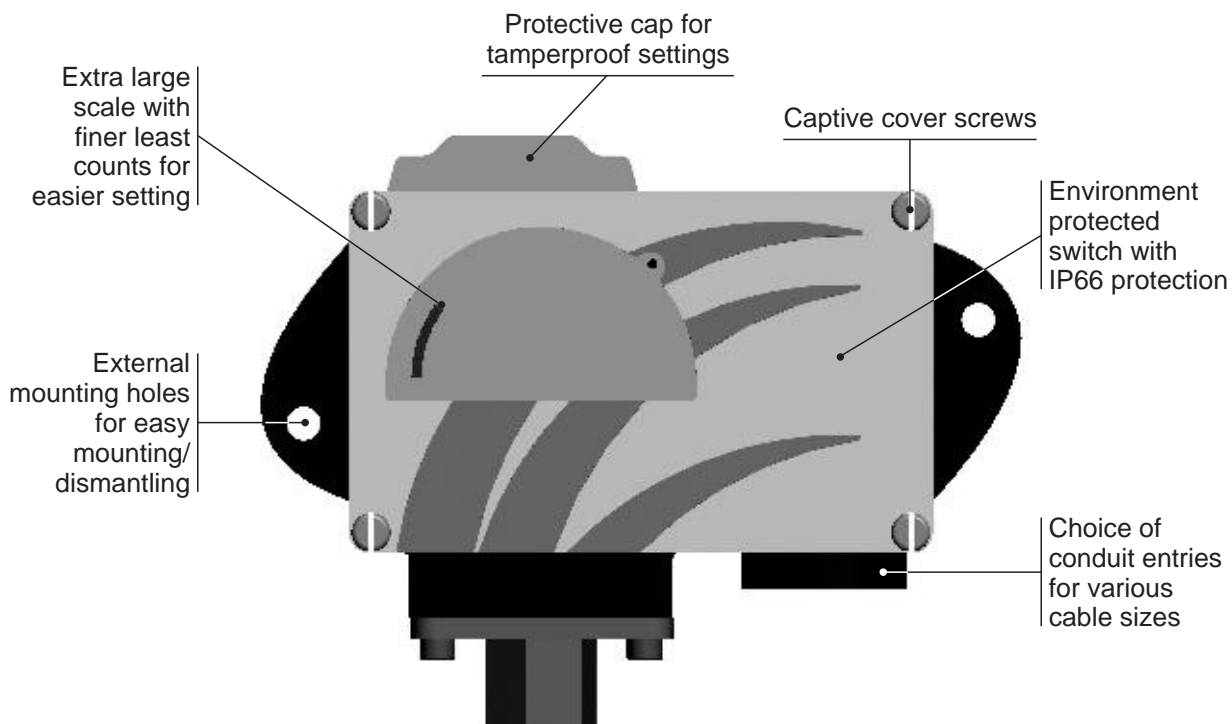
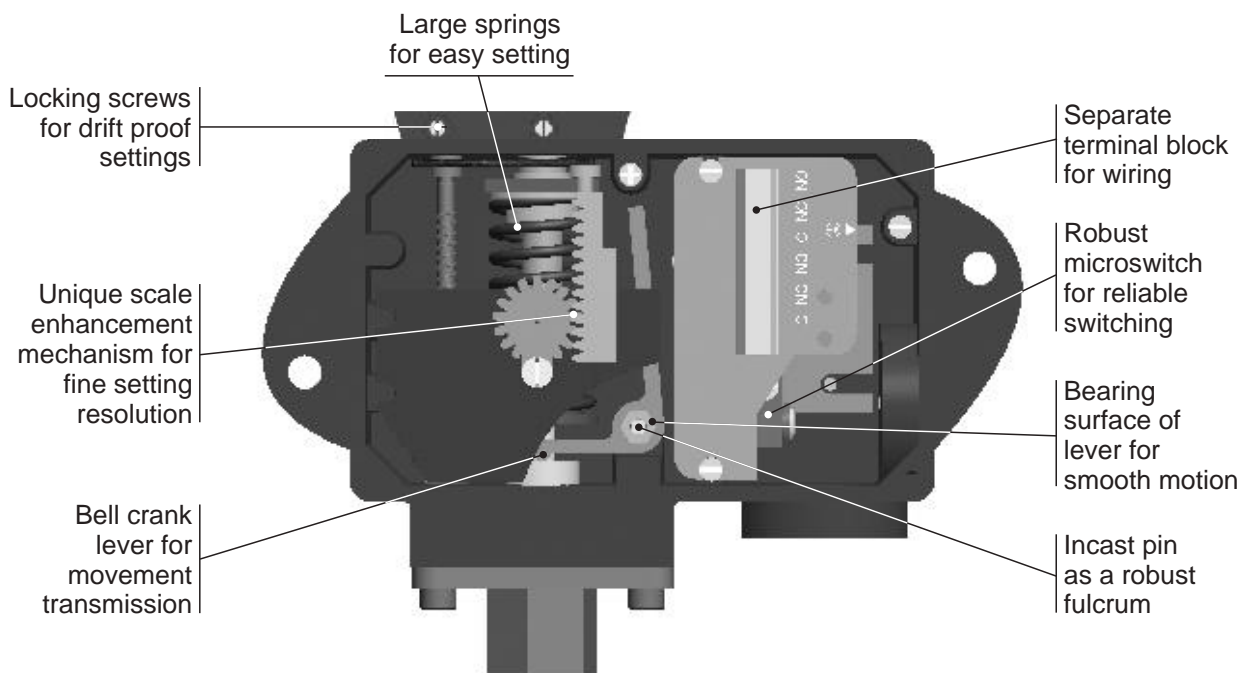
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	PF1	P01	A1	S1	0

Please specify full model number to avoid ambiguity.

## HIGH PROOF HIGH RANGE PRESSURE SWITCHES

MD

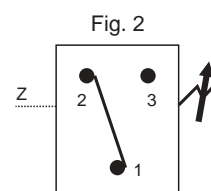
# MD HIGH RANGE BELLOWS SWITCHES



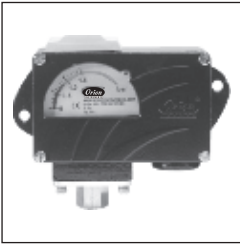
**Approximate Weight :** 0.700 Kg.

**Some Applications :** For cryogenic applications.

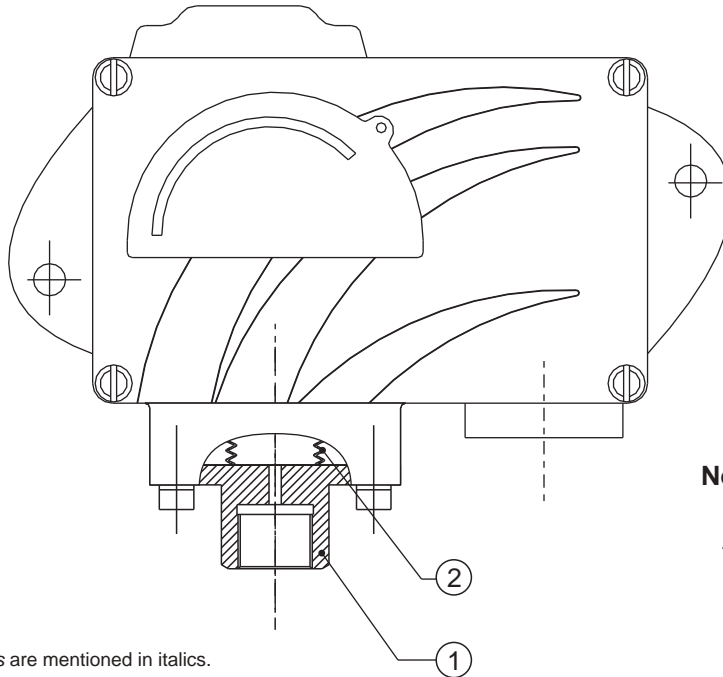
**Electrical Connection :**



# HIGH RANGE BELLOWS SWITCHES MD



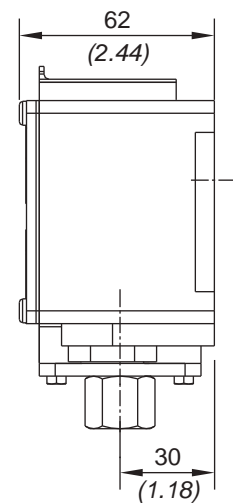
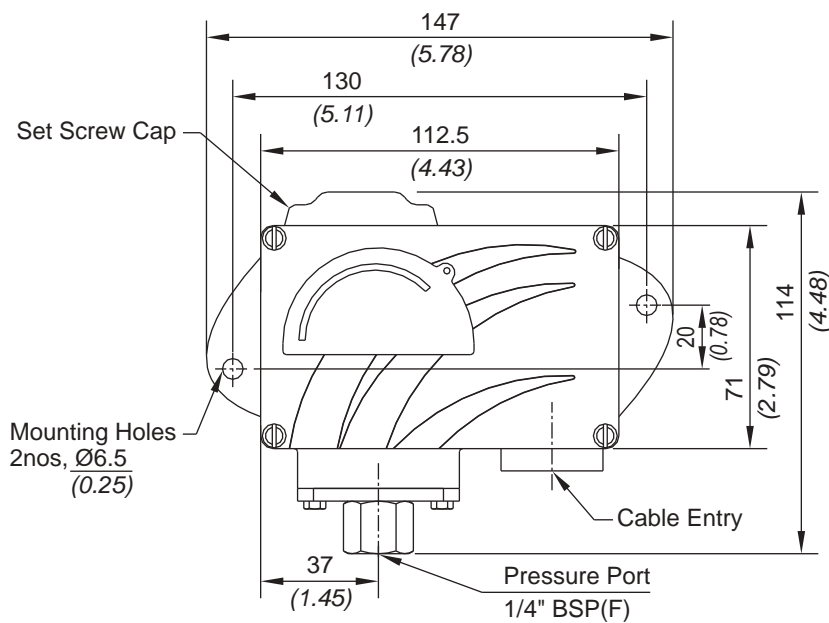
## PRESSURE CAPSULE DETAILS



- No. Description**  
 1. Pressure Port  
 2. Metallic Bellow

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# MD HIGH RANGE BELLOWS SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar (psi)	†Differential bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.17 (2.46)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.03)	0.40 (5.80)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.56)	0.80 (11.60)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.59)	0.80 (11.60)	35 (507.63)
H4T	5.0 - 40.0 (72.52 - 580.15)	5.0 (72.52)	100 (1450.37)
H1H	10.0 - 100.0 (145.03 - 1450.37)	12 (174.05)	200 (2900.76)

† Minimum differential increases with setpoint, (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.



## HOW TO ORDER INDUSTRIAL HIGH RANGE BELLOWS PRESSURE SWITCHES

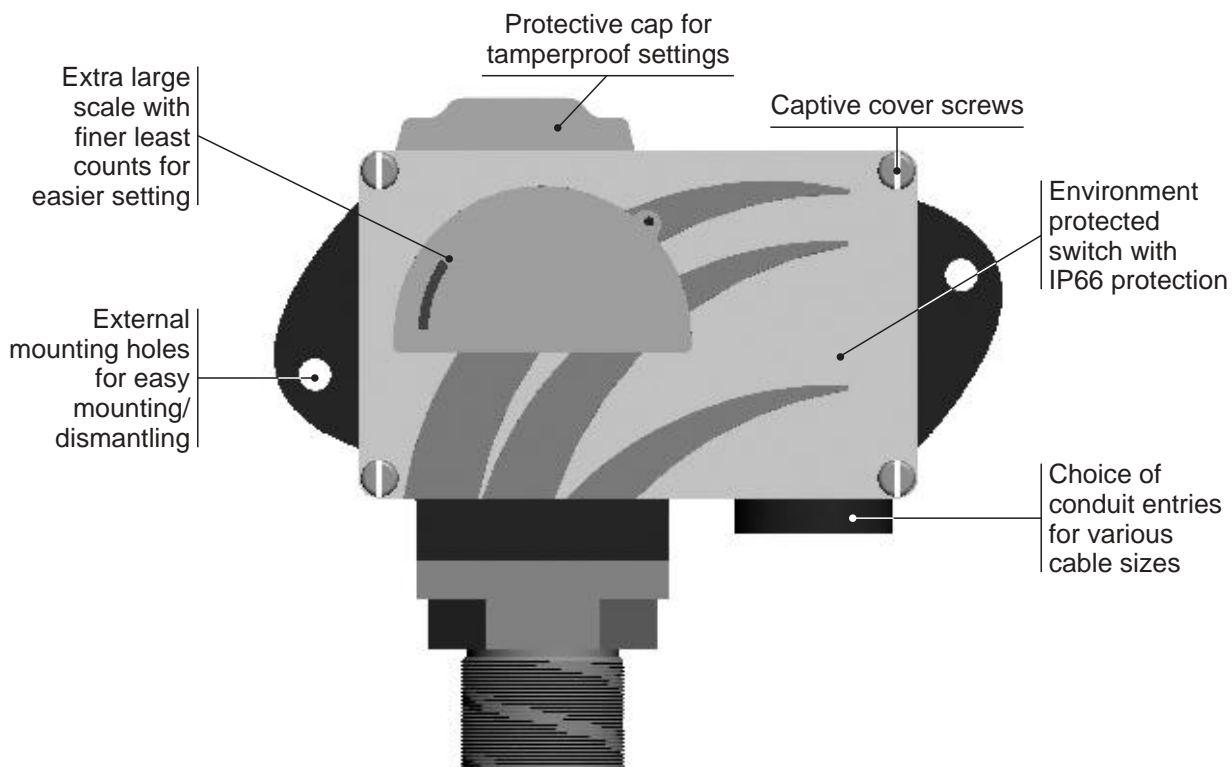
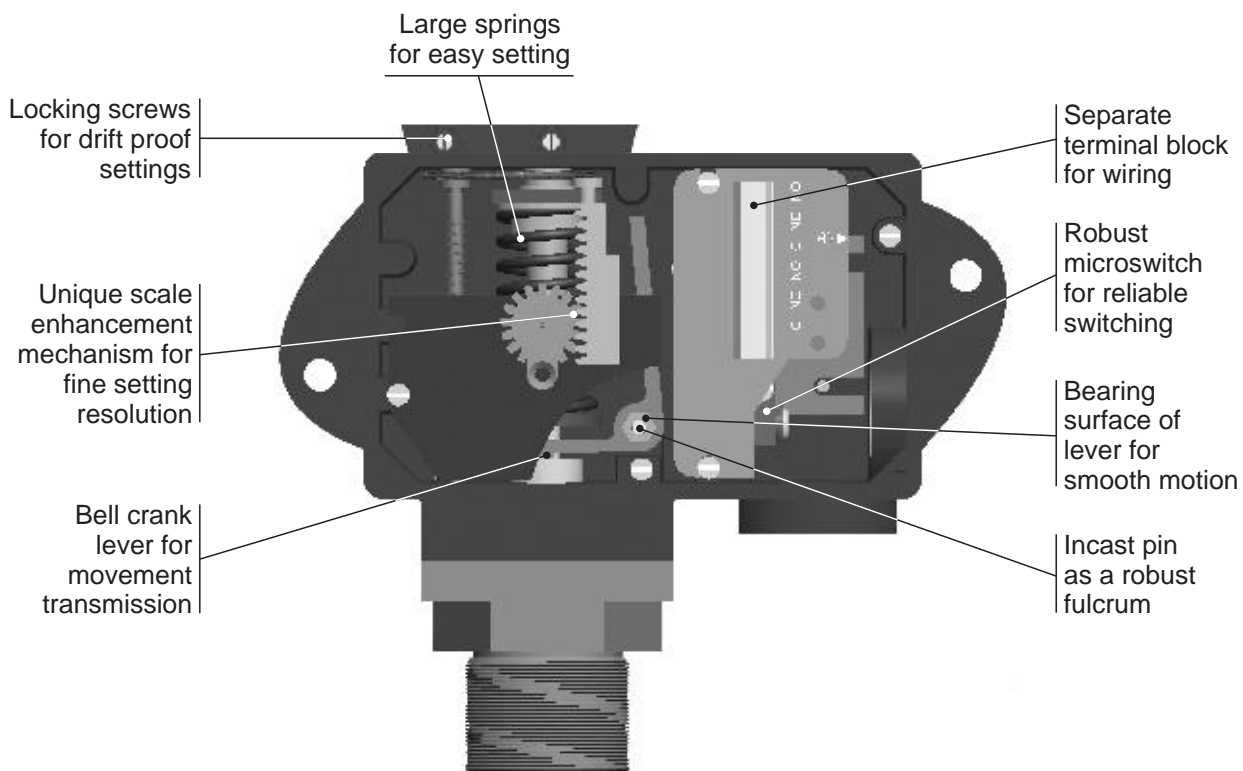
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Bellows
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>PF1</b> = pressure switch, fixed differential without scale <b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA1</b> = pressure switch, adjustable differential without scale <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi * Available with A9 (in group 6) only	<b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0) <b>H4T</b> = (5.0 - 40.0) <b>H1H</b> = (10.0 - 100.0)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>B1</b> = Bellows / ¼" BSP(F) <b>B2</b> = Bellows / ¼" NPT(F)	<b>2</b> = SS 316L

eg. A high range weatherproof bellows switch with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & SS316L bellows shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	PF1	H01	A1	B1	2

Please specify full model number to avoid ambiguity.

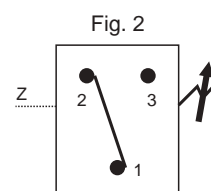
# MD LARGE BORE HIGH RANGE PRESSURE SWITCHES



**Approximate Weight :** 1.500 Kg.

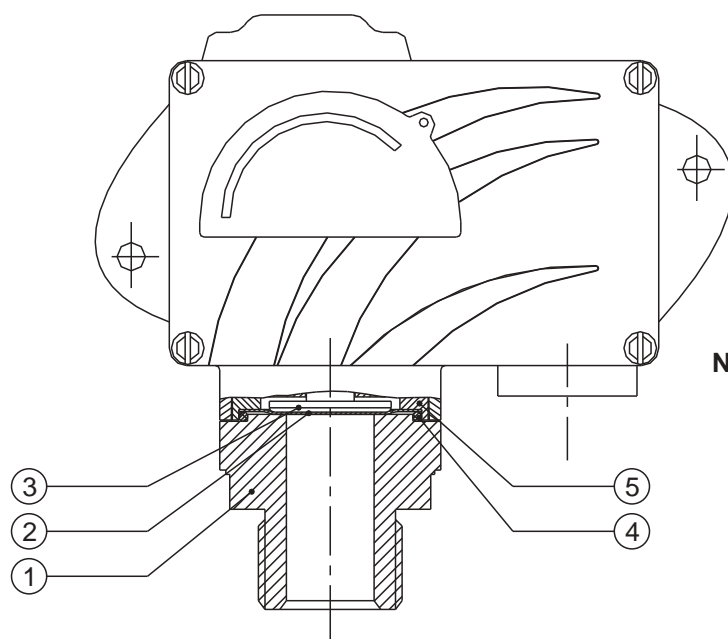
**Some Applications :** Water treatment plants, reverse osmosis plants, etc.

**Electrical Connection :**





## PRESSURE CAPSULE DETAILS

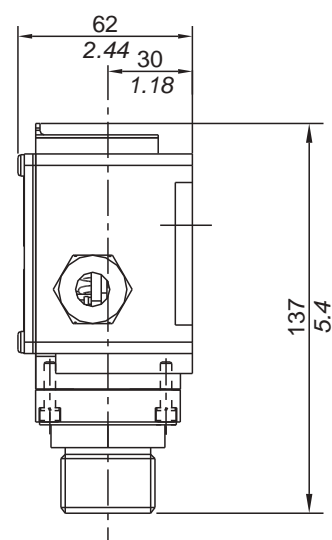
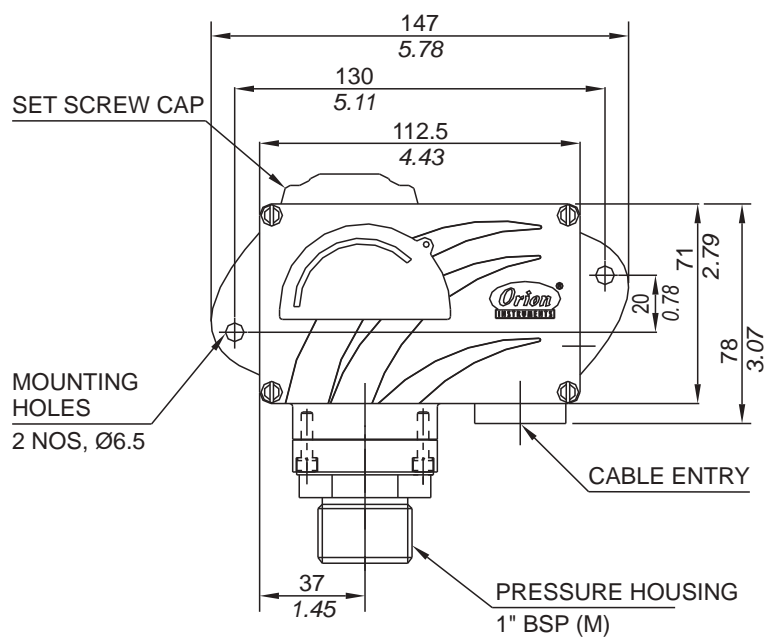


### No. Description

1. *Pressure Housing (SS316)*
2. *Diaphragm (Teflon®)*
3. *Plunger*
4. *Steel Ring (SS316)*
5. *O-Ring (Teflon®)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# MD LARGE BORE HIGH RANGE PRESSURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.03)	0.60 (8.70)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.56)	0.60 (8.70)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request), results for neoprene diaphragm.



Note: Welded diaphragm also available as shown

## HOW TO ORDER INDUSTRIAL LARGE BORE HIGH RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>PF1</b> = pressure switch, fixed differential without scale <b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA1</b> = pressure switch, adjustable differential without scale <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi *Available with A9 (in group 6) only	<b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S3</b> = SS316 / 1" BSP(M) <b>N3</b> = Monel / 1" BSP(M)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L <b>4</b> = Monel

eg. An Industrial large bore pressure switch with fixed differential having 0.1 bar to 1 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with 1" BSPM port size & neoprene diaphragm shall be specified by

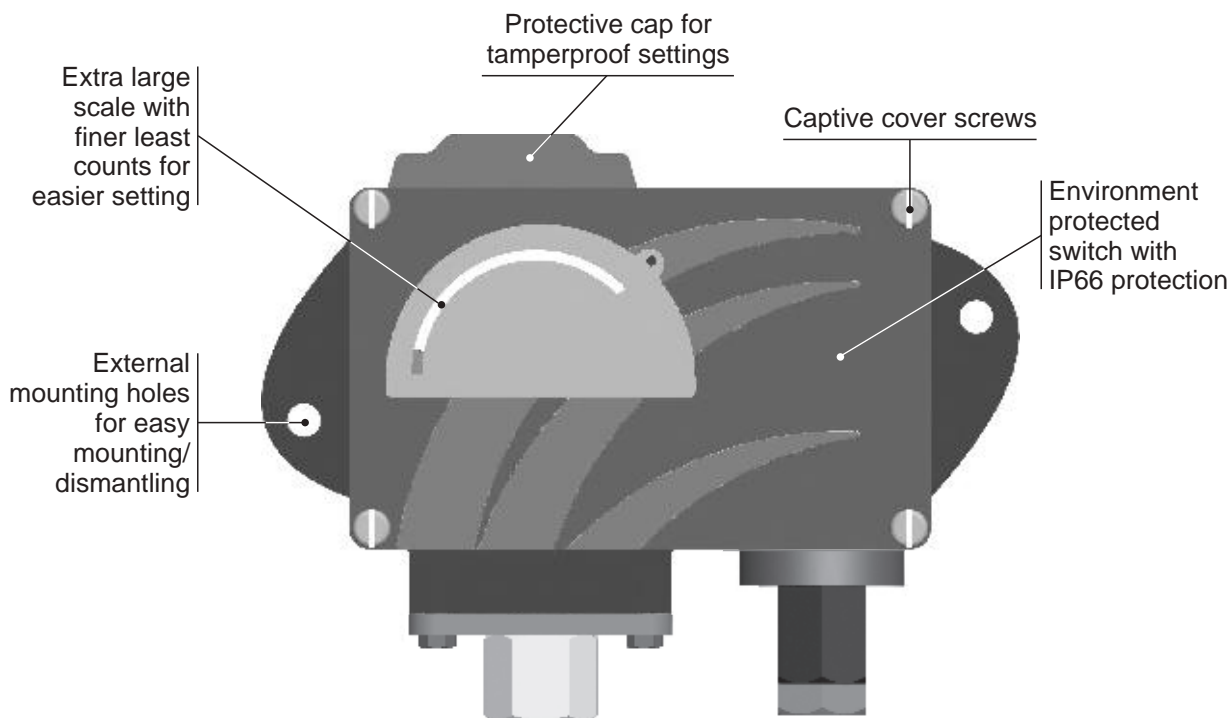
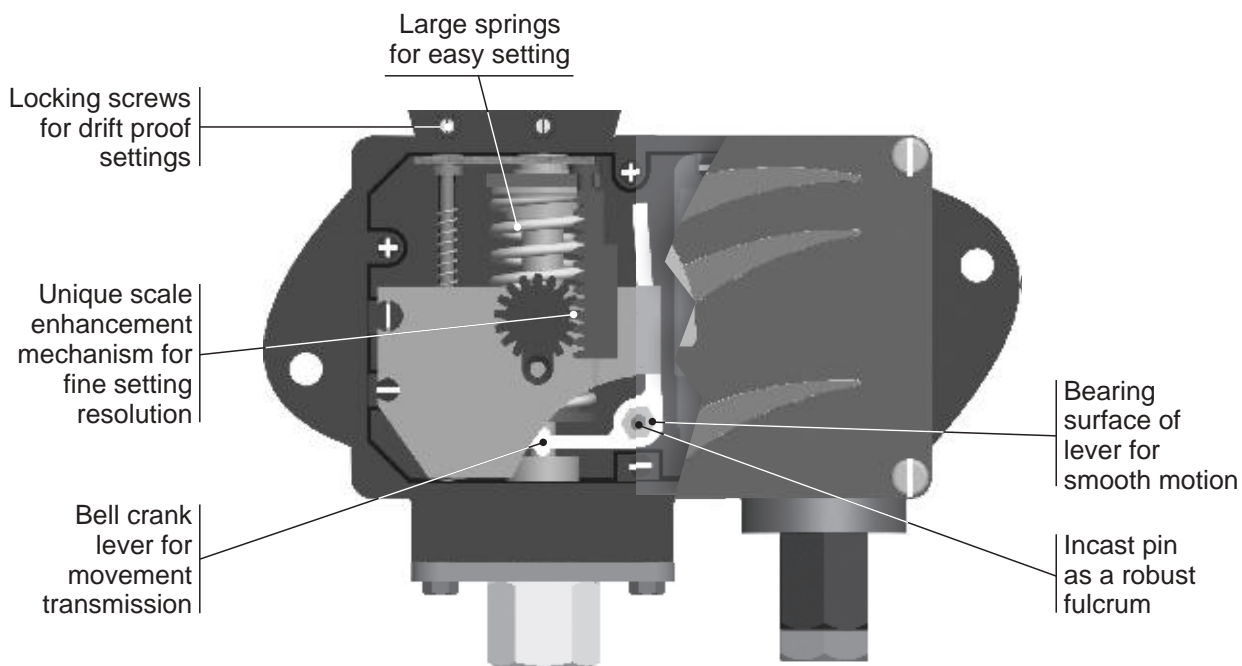
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	3	PF2	H01	A8	S3	0

Please specify full model number to avoid ambiguity.

## LARGE BORE HIGH RANGE PRESSURE SWITCHES

MD

# MD AIR RELAY SWITCHES



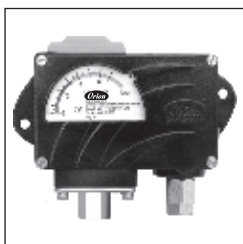
## Approximate Weight :

Varies with capsule size. Please consult sales office.

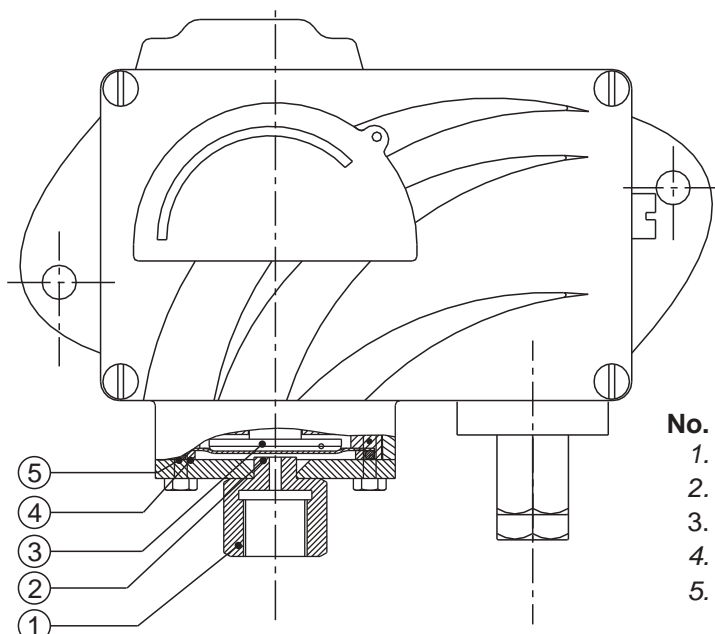
**Some Applications :** For operating pneumatic circuits in coal mines, oil mines & pneumatic systems.

## Valve Schematic :





## PRESSURE CAPSULE DETAILS

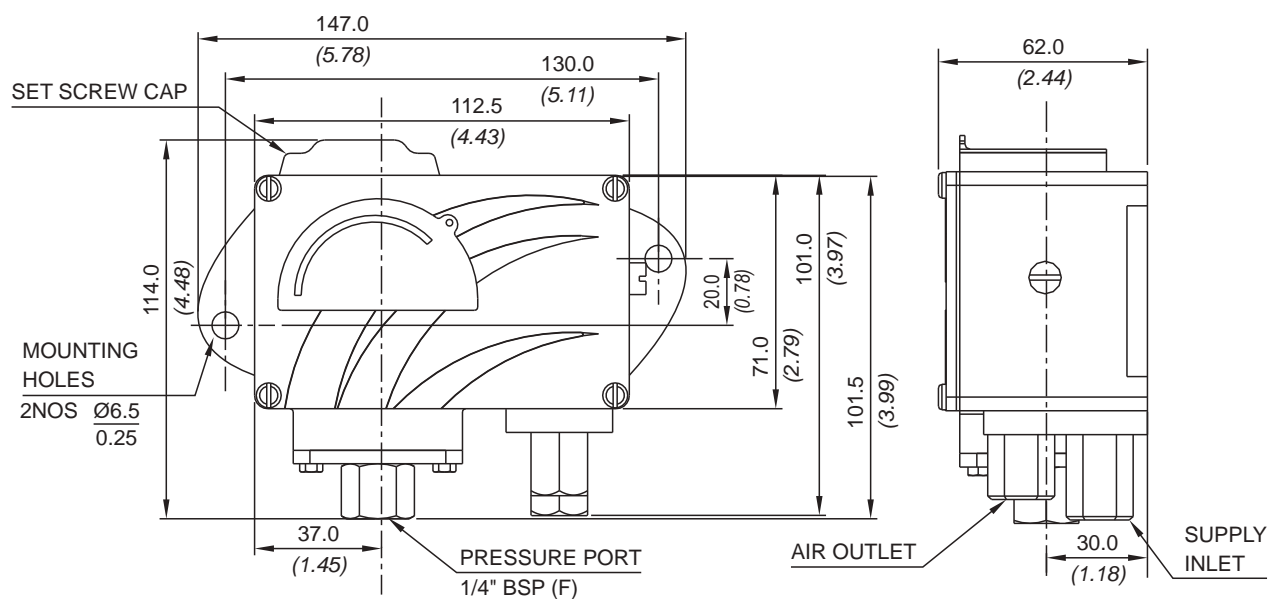


### No. Description

1. Pressure Housing (SS316)
2. Diaphragm (Teflon®)
3. Plunger
4. Steel Ring (SS316)
5. O-Ring (Teflon®)

Note : wetted parts are mentioned in italics.

## INSTALLATION DRAWING



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

# MD AIR RELAY SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar (psi)	†Differential bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
LP	0.067 - 0.213 (0.97 - 3.09)	0.02 (0.29)	5 (72.52)
LP5	0.1 - 0.5 (1.45 - 7.25)	0.08 (1.16)	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.17 (2.46)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.40 (5.80)	25 (362.6)
H15	1.0 - 15.0 (14.5 - 217.56)	0.80 (11.60)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	35 (507.63)

Pneumatic valve specifications



NO valve (P2) = air flows when process pressure < set point  
 NC valve (P1) = air flows when process pressure > set point

Supply pressure of air/inert gas = 7 bar max

\*Other ranges from 1.5 mbar upto 400 bar too available. Also various pressure capsules for vacuum, pressure difference in a variety of wetted parts too can be supplied. Please contact sales office.



## HOW TO ORDER INDUSTRIAL AIR RELAY PRESSURE SWITCHES

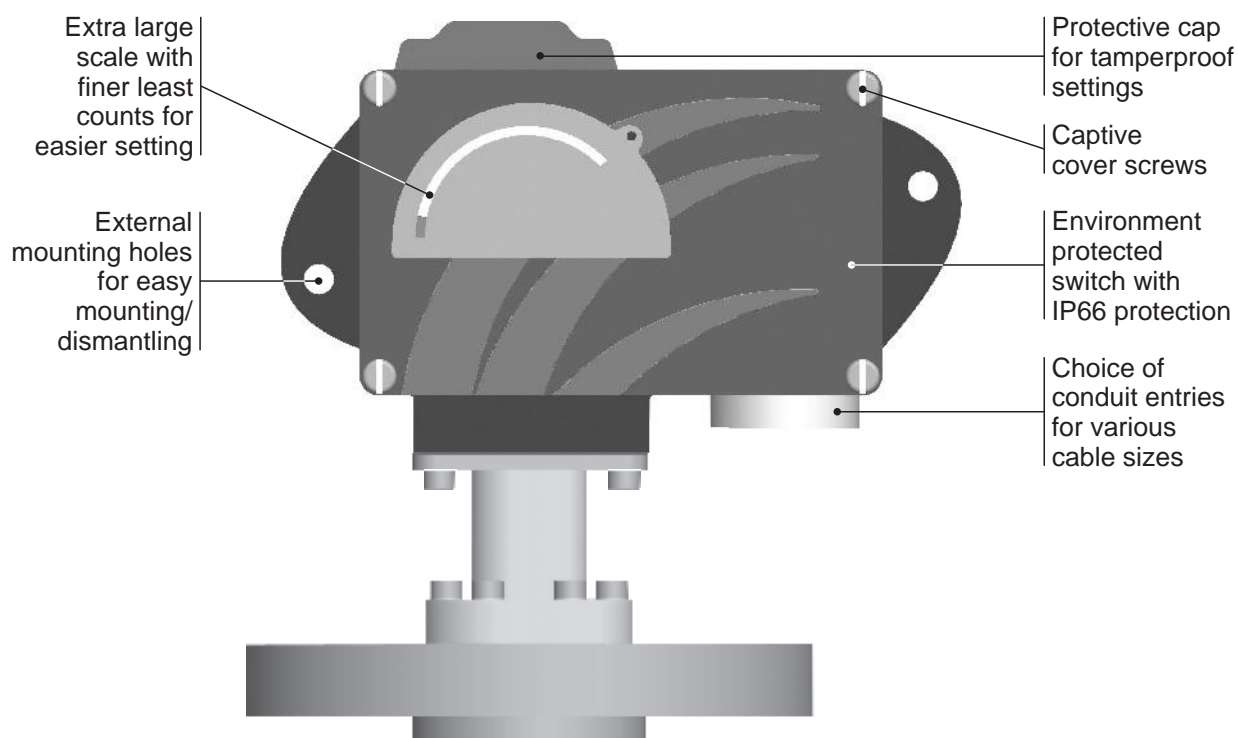
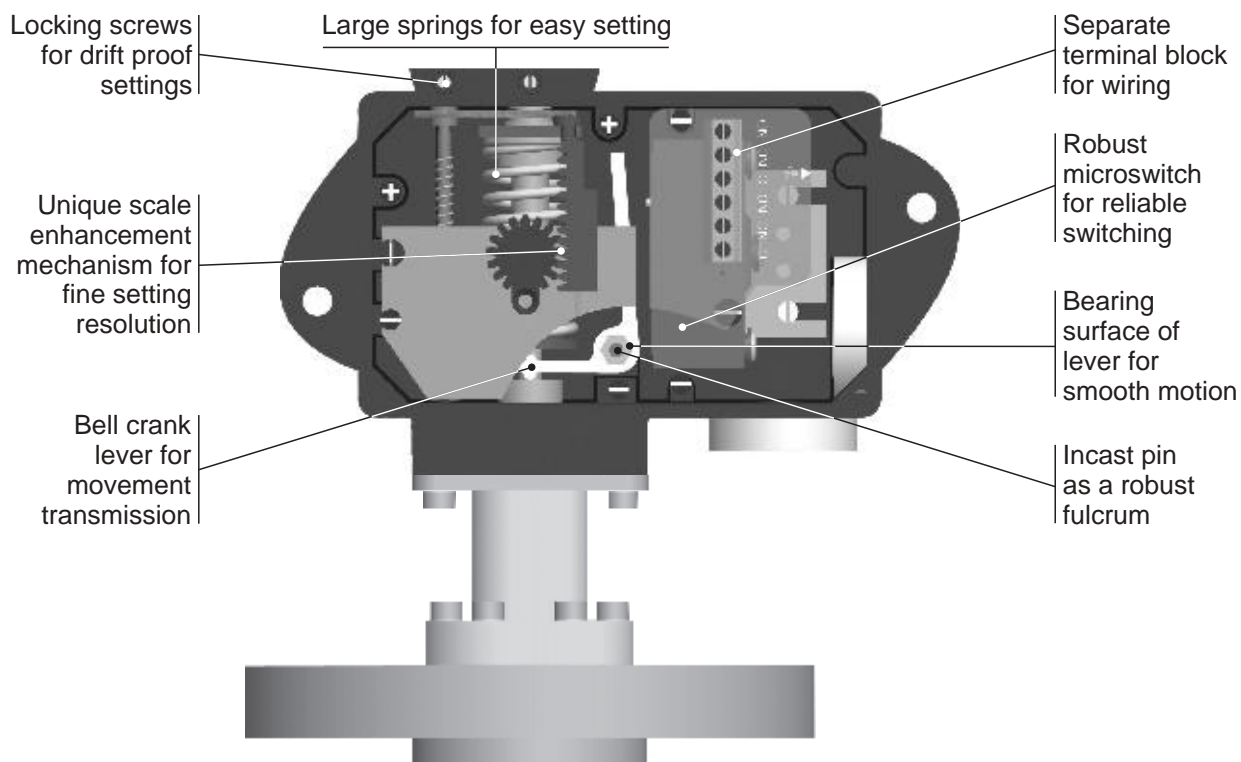
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>7</b> = 1/8" BSPF air inlet & outlet pressure supply = 7 bar max	<b>PF1</b> = pressure switch, fixed differential without scale <b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA1</b> = pressure switch, adjustable differential without scale <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi * Available with A9 (in group 6) only	<b>LP</b> = (0.067 - 0.213) <b>LP5</b> = (0.1 - 0.5) <b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0)	<b>P1</b> = NC valve <b>P2</b> = NO valve	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L

eg. A high range weatherproof switch with 1/8" BSPF air inlet & outlet parts in aluminium housing as a pressure switch, fixed differential without scale, having 0.1 bar to 1 bar pressure range, NC valve, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	7	PF1	H01	P1	S1	0

Please specify full model number to avoid ambiguity.

# MD FLANGED PRESSURE SWITCHES

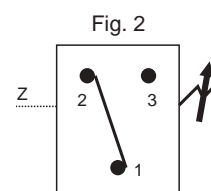


**Approximate Weight :** Varies with flange size. Please consult sales office.

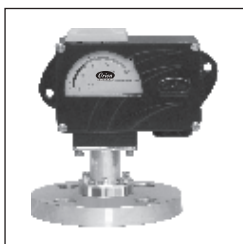
## Some Applications :

In non-hazardous areas for slurry, colloidal solutions, corrosive & non-corrosive working media (unclean working media), etc.

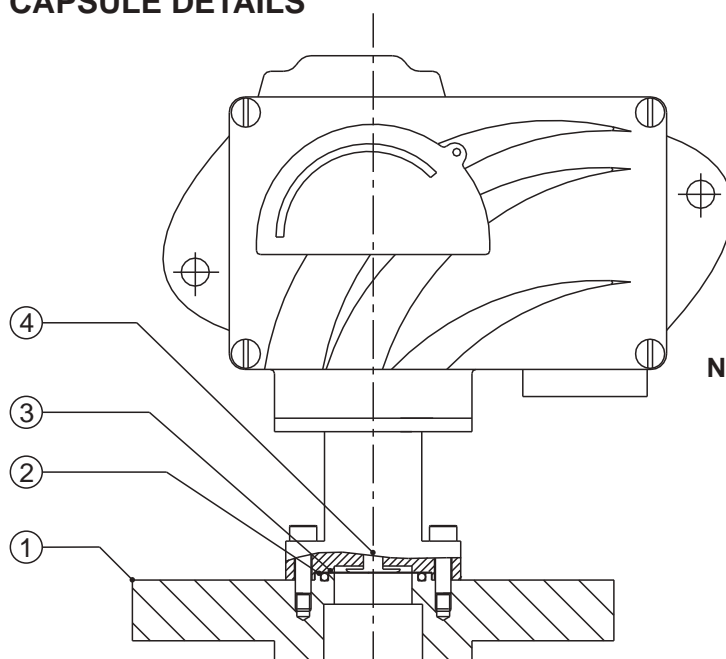
**Electrical Connection :**



# FLANGED PRESSURE SWITCHES MD



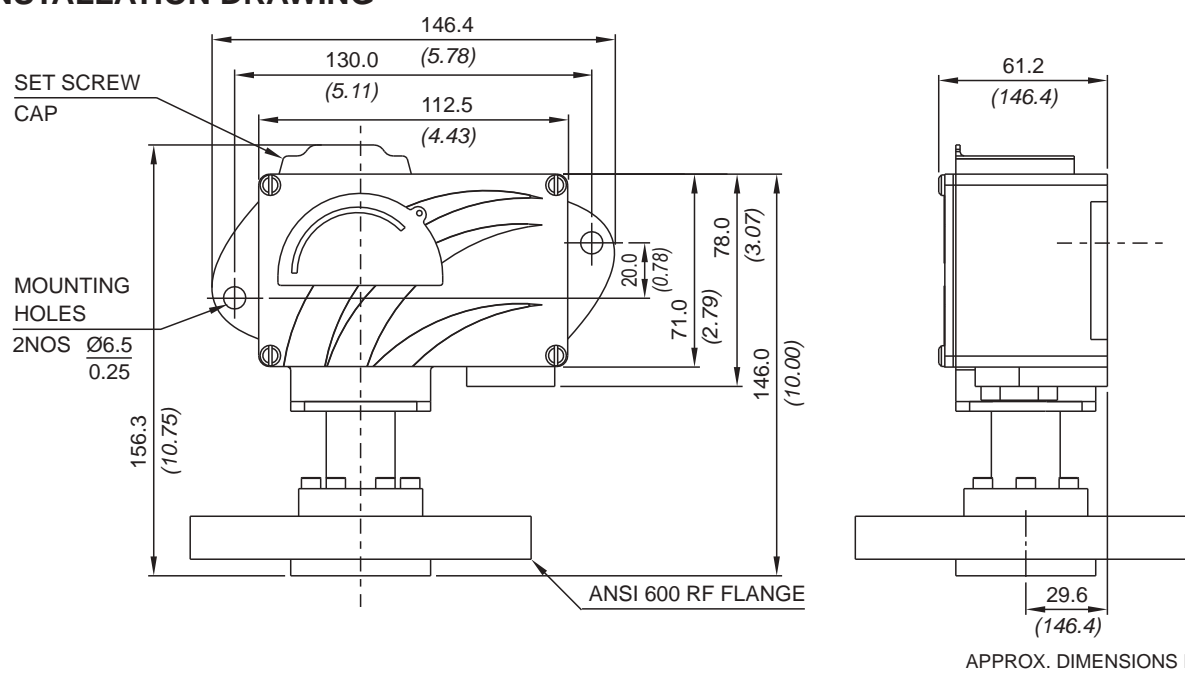
## PRESSURE CAPSULE DETAILS



- No. Description**
1. ANSI 600 Flange
  2. Teflon® O-Ring
  3. Diaphragm
  4. Conical Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD FLANGED PRESSURE SWITCHES

**RANGE SELECTION TABLE**

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	As per the class of flange  Please consult Sales Office in case you need clarification on availability of maximum working pressure for a particular range.
H02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	
H03	0.2 - 2.6 (2.90 - 37.71)	0.15 (2.17)	
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	
H10	0.5 - 10.0 (7.25 - 145.04)	0.40 (5.80)	
H15	1.0 - 15.0 (14.50 - 217.56)	0.80 (11.60)	
H30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	
H4T	5 - 40 (72.52 - 580.15)	5 (72.52)	
H1H	10 - 100 (145.04 - 1450.38)	12 (174.05)	
H2H	7 - 200 (101.53 - 2900.76)	24 (348.09)	

\* Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

**FLANGE CODE TABLE** (Please refer page no. 228 & 229 for more options)

	SS316L		Hastelloy C276		Monel		Titanium		Tantalum	
	RF*	FF*	RF*	FF*	RF*	FF*	RF*	FF*	RF*	FF*
<b>150 #</b>										
1" NB	AC	BS	DI	EY	GO	IE	JU	LK	NA	OQ
2" NB	AF	BV	DL	FB	GR	IH	JX	LN	ND	OT
<b>300#</b>										
1" NB	AI	BY	DO	FE	GU	IK	KA	LQ	NG	OW
2" NB	AL	CB	DR	FH	GX	IN	KD	LT	NJ	OZ
<b>2500#</b>										
1" NB	BM	DC	ES	GI	HY	JO	LE	MU	OK	QA
2" NB	BP	DF	EV	GL	IB	JR	LH	MX	ON	QD

\*RF = Raised Face

\*FF = Flat Face

**RANGE AVAILABILITY AS PER BORE SIZES**

	H01 to H04	H07	H10	H15	H30	H2T to H2H
1" NB	NA	Yes	Yes	Yes	Yes	Yes
2" NB	Yes	Yes	Yes	Yes	Yes	Yes

## HOW TO ORDER INDUSTRIAL FLANGED PRESSURE SWITCHES

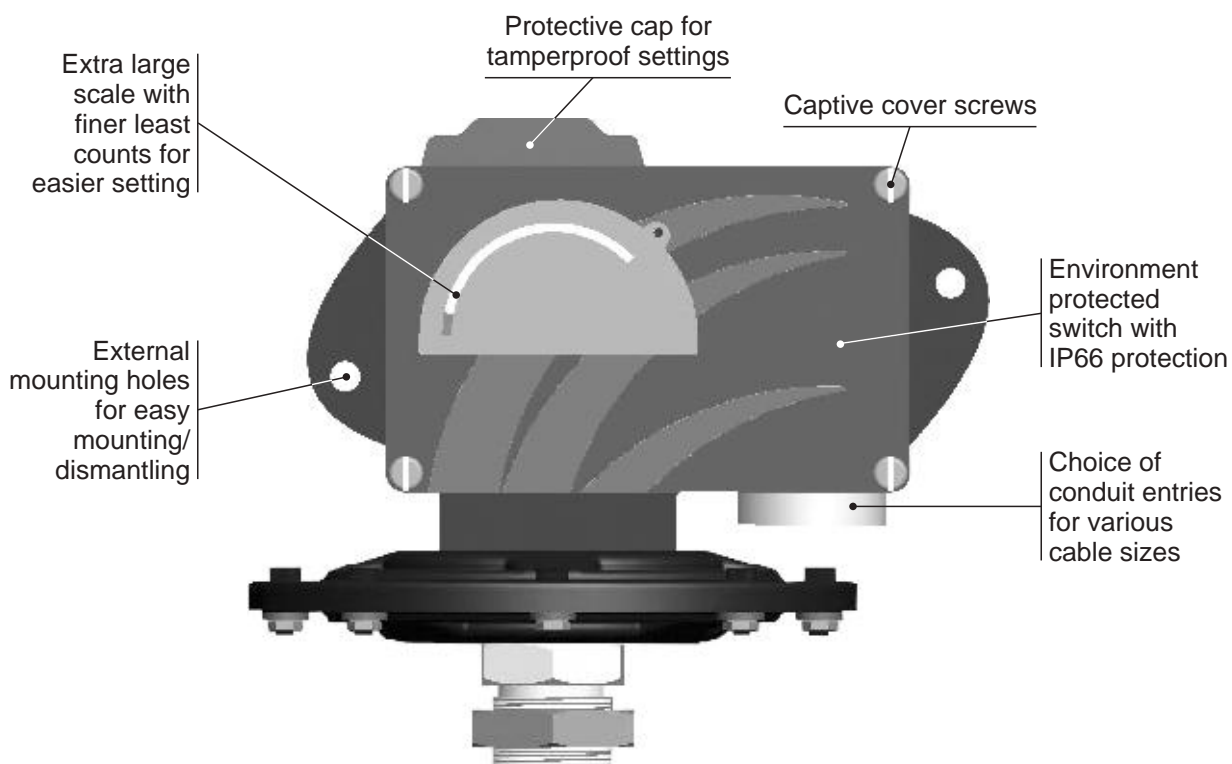
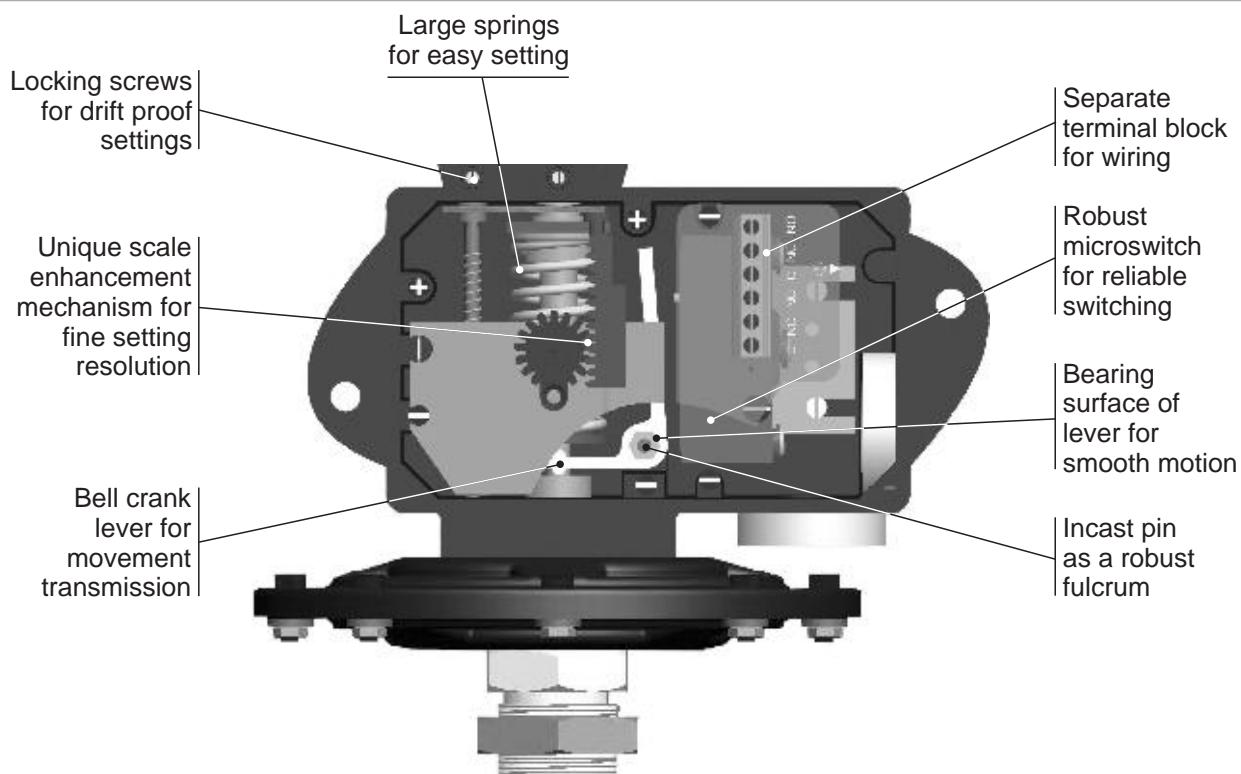
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type ANSI flanged	Range Code (values in bar)	Microswitch Type	Flange Size and Material	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = 1/2" NPT threads <b>2</b> = 3/4" NPT threads <b>3</b> = M20 X 1.5 threads	<b>AF1</b> = pressure switch, fixed differential without scale <b>AF2</b> = pressure switch, fixed differential with scale in bar <b>AF3</b> = pressure switch, fixed differential with scale in psi	<b>H01</b> = 0.1 - 1.0 <b>H02</b> = 0.1 - 1.5 <b>H03</b> = 0.2 - 2.6 <b>H04</b> = 0.2 - 3.6 <b>H07</b> = 0.5 - 7.0 <b>H10</b> = 0.5 - 10.0 <b>H15</b> = 1.0 - 15.0 <b>H30</b> = 5.0 - 25.0 <b>H4T</b> = 5 - 40 <b>H1H</b> = 10 - 100 <b>H2H</b> = 7 - 200 * Available with A9 (in group 6) only	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	Please select as per Flange Code Table  For other classes and sizes please refer page no. 228 & 229	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS316L <b>3</b> = Hastelloy C <b>4</b> = Monel 400 <b>5</b> = Titanium <b>6</b> = Tantalum

eg. A high range Industrial/ANSI flanged pressure switch with 1/2" NPT cable entry with fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15 Amp. microswitch, and 2" 150# RF SS316L flange & SS316L diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	AF1	H01	A1	AF	2

Please specify full model number to avoid ambiguity.

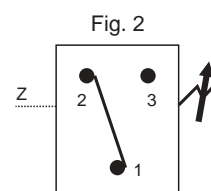
# MD LOW RANGE PRESSURE SWITCHES



**Approximate Weight :** 1.500 Kg.

**Some Applications :** For clean rooms, air duct systems, ventilation systems, etc.

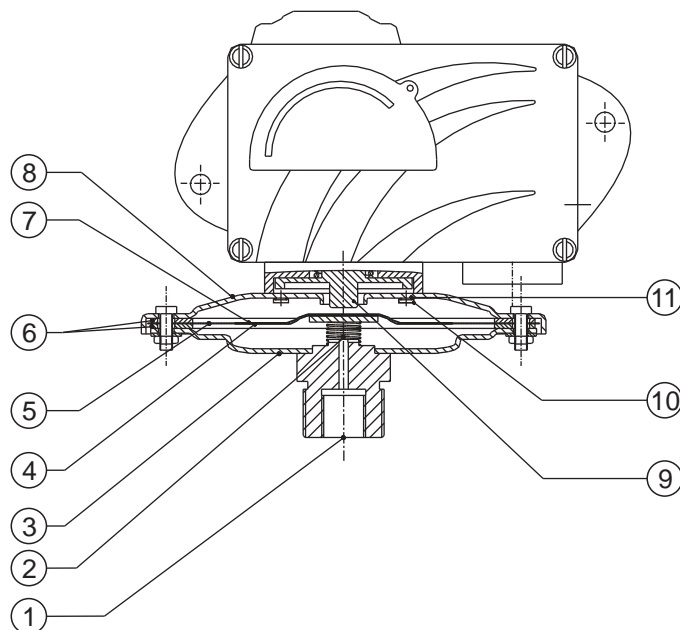
**Electrical Connection :**



# LOW RANGE PRESSURE SWITCHES MD



## PRESSURE CAPSULE DETAILS



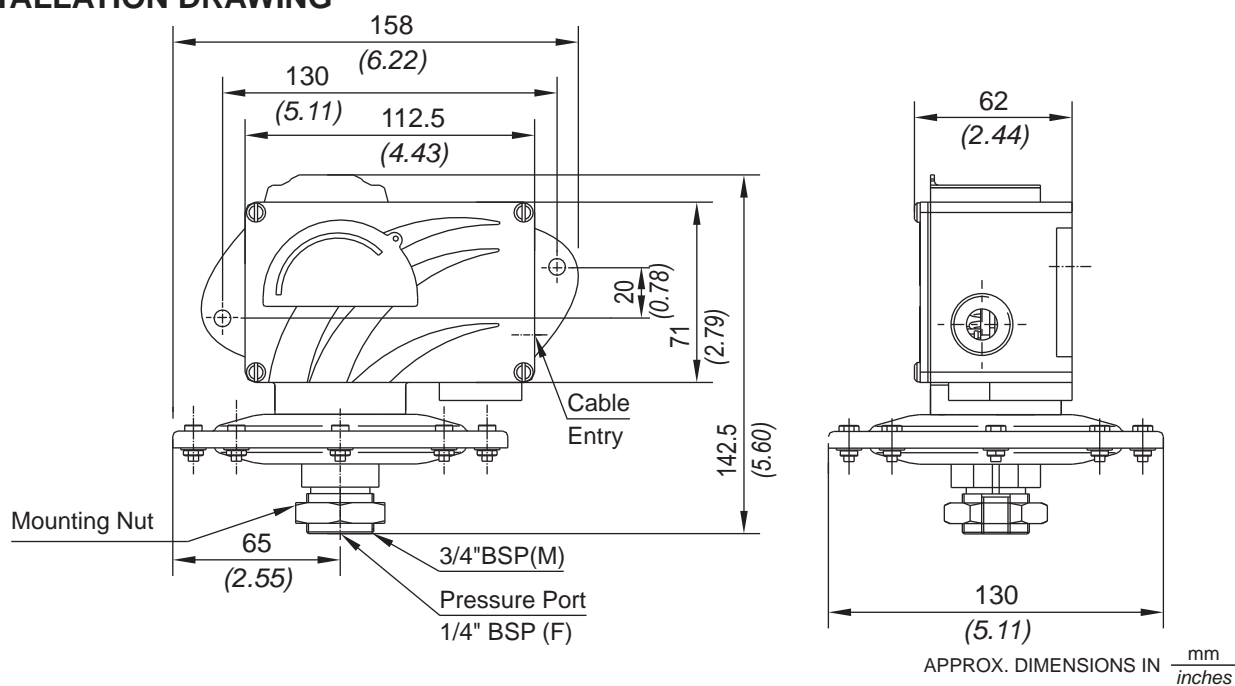
### No. Description

1. *Pressure port (M.S.)\**
2. *Support spring (S.S.)*
3. *Bottom flange (M.S.)*
4. *Support plate (Aluminium)*
5. *Diaphragm (Neoprene)*
6. *Gasket (Nitrile)*
7. *Top plate (Aluminium)*
8. *Top flange (M.S.)*
9. *Plunger*
10. *Top flange screw (M.S.)*
11. *Sealing 'O' ring (Nitrile)*

\*Pressure port is brazed with flange

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD LOW RANGE PRESSURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range mbar ("wc)	Differential* mbar ("wc)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
L02	1.5 - 15.0 (0.602 - 6.021)	3 (1.204)	2 (29.00)
L03	5.0 - 25.0 (2.007 - 10.037)	5 (2.007)	2 (29.00)
L05	10.0 - 50.0 (4.015 - 20.073)	5 (2.007)	2 (29.00)
L10	10.0 - 100.0 (4.015 - 40.146)	10 (4.015)	2 (29.00)
L15	10.0 - 150.0 (4.015 - 60.22)	10 (4.015)	2 (29.00)
L25	20.0 - 250.0 (8.029 - 100.36)	15 (6.021)	2 (29.00)
L35	50.0 - 350.0 (20.073 - 140.52)	25 (10.036)	2 (29.00)

\*Minimum differential increases with setpoint (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.



## HOW TO ORDER INDUSTRIAL LOW RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in mbar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = 1/2" NPT threads <b>2</b> = 3/4" NPT threads <b>3</b> = M20 X 1.5 threads	<b>PF1</b> = pressure switch, fixed differential without scale <b>PF2</b> = pressure switch, fixed differential with scale in mbar <b>PF3</b> = pressure switch, fixed differential with scale in "wc <b>PA1</b> = pressure switch, adjustable differential without scale <b>PA2</b> = pressure switch, adjustable differential with scale in mbar <b>PA3</b> = pressure switch, adjustable differential with scale in "wc * Available with A9 (in group 6) only	<b>L02</b> = (1.5 - 15) <b>L03</b> = (5 - 25) <b>L05</b> = (10 - 50) <b>L10</b> = (10 - 100) <b>L15</b> = (10 - 150) <b>L25</b> = (20 - 250) <b>L35</b> = (50 - 350)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>M1</b> = M.S. powder coated / 1/4" BSP(F) <b>M2</b> = M.S. powder coated / 1/4" NPT(F) <b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS316L

eg. A low range weatherproof switch, with 1/2" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 5 mbar to 25 mbar pressure range, with 15 Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

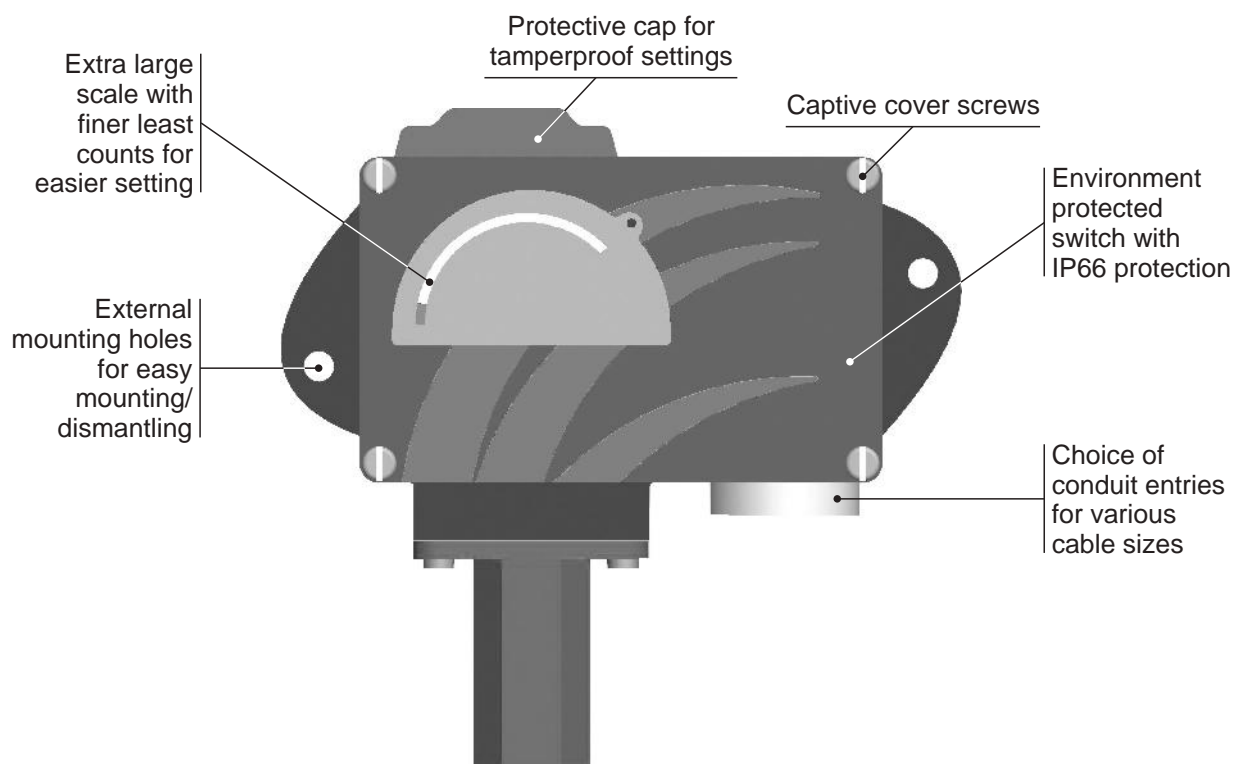
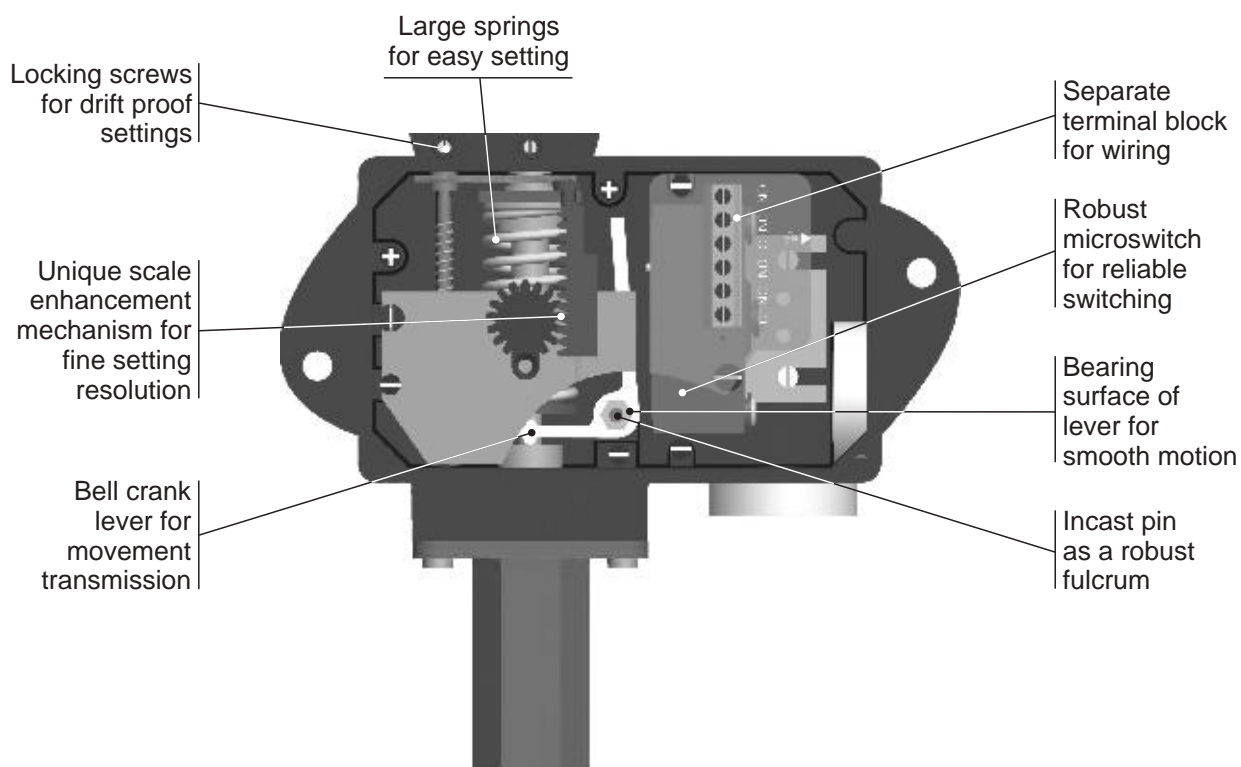
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	PF1	L03	A1	S1	0

Please specify full model number to avoid ambiguity.

## LOW RANGE PRESSURE SWITCHES

# MD

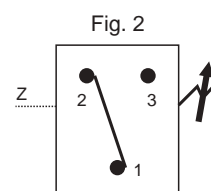
# MD HYDRAULIC RANGE PRESSURE SWITCHES



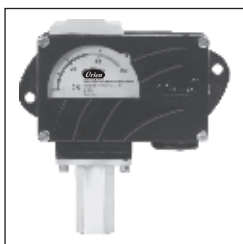
**Approximate Weight :** 0.850 Kg.

**Some Applications :** Used where oil is a working medium.

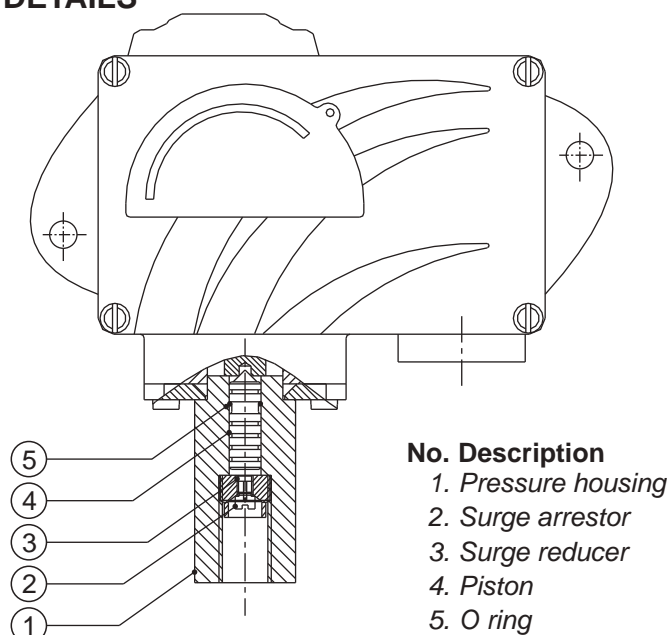
**Electrical Connection :**



# HYDRAULIC RANGE PRESSURE SWITCHES MD

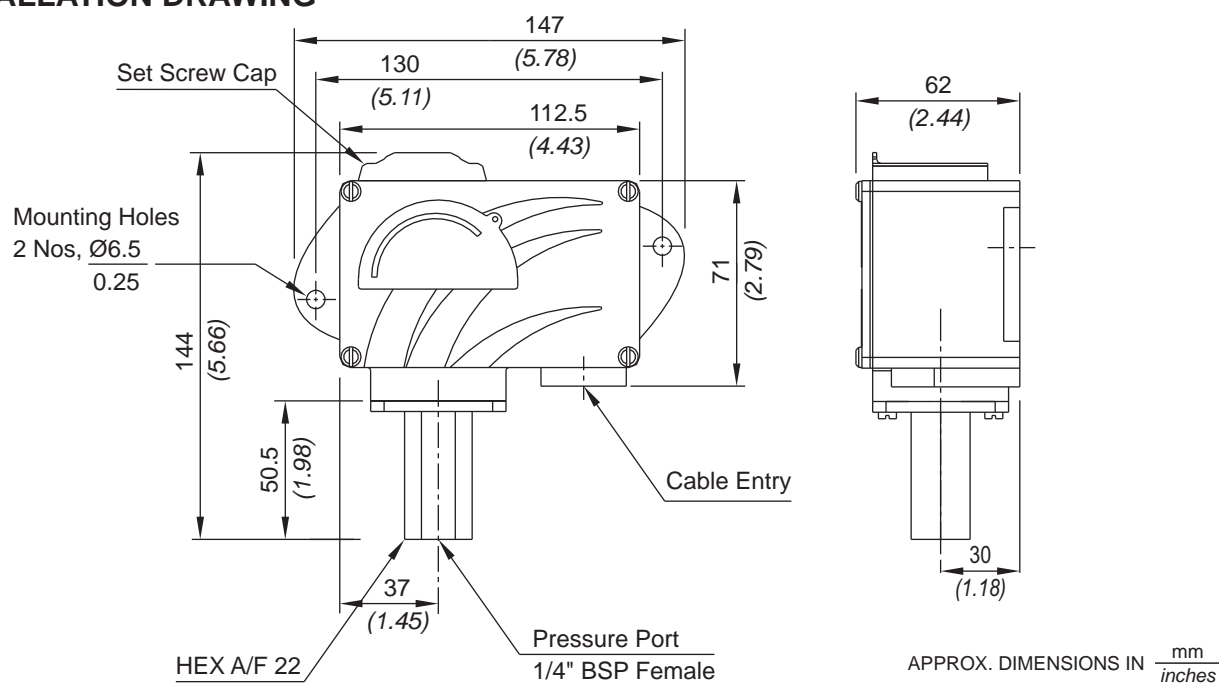


## PRESSURE CAPSULE DETAILS



Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD HYDRAULIC RANGE PRESSURE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
040	5 - 40 (72.52 - 580.15)	5 (72.52)	80 (1160.30)
100	10 - 100 (145.04 - 1450.38)	12 (174.05)	120 (1740.45)
200	7 - 200 (101.53 - 2900.76)	24 (348.09)	200 (2900.76)
350	35 - 350 (507.63 - 5076.33)	30 (435.11)	500 (7251.9)
400	100 - 400 (1450.38 - 5801.52)	30 (435.11)	400 (5801.52)

\*Minimum differential increases with setpoint (Graphs available on request)

**\* Note :**

Microswitches A2 through A7 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.

## HOW TO ORDER INDUSTRIAL HYDRAULIC RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Piston
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>PF1</b> = pressure switch, fixed differential without scale <b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA1</b> = pressure switch, adjustable differential without scale <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi * Available with A9 (in group 6) only	<b>040</b> = (5 - 40) <b>100</b> = (10 - 100) <b>200</b> = (7 - 200) <b>350</b> = (35 - 350) <b>400</b> = (100 - 400)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>2</b> = SS

eg. A hydraulic weatherproof switch, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 5 bar to 40 bar pressure range, with 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size shall be specified by

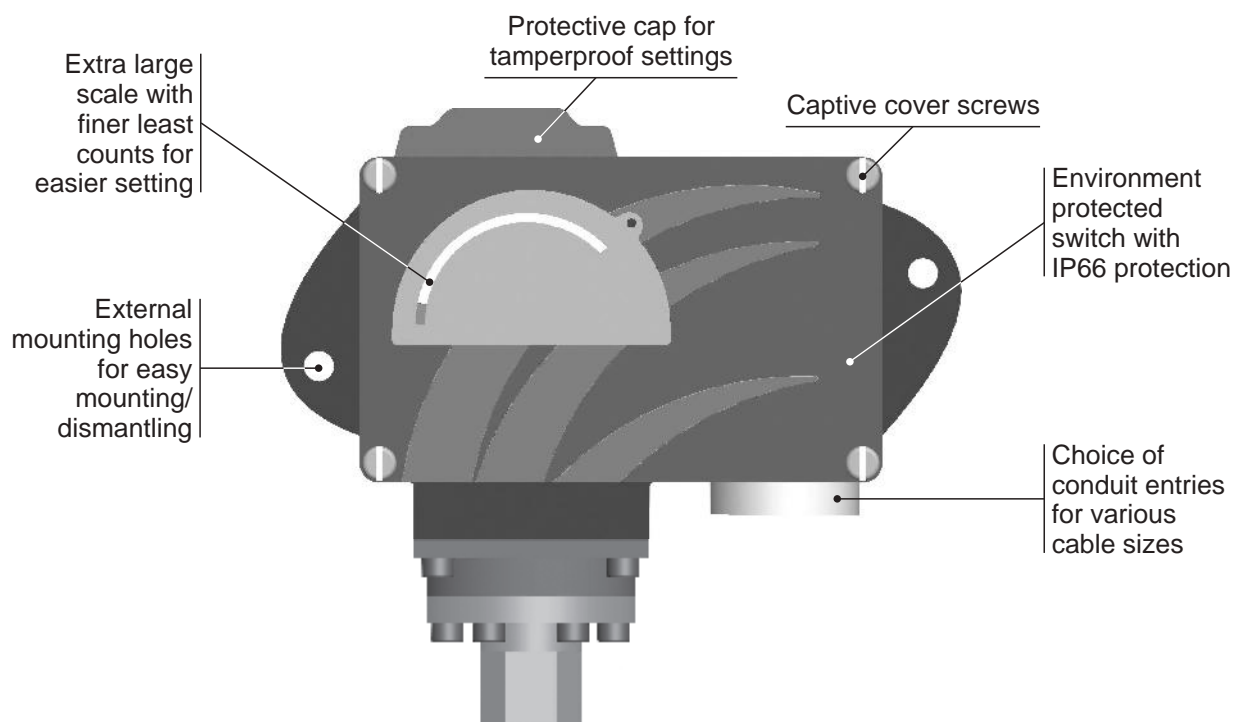
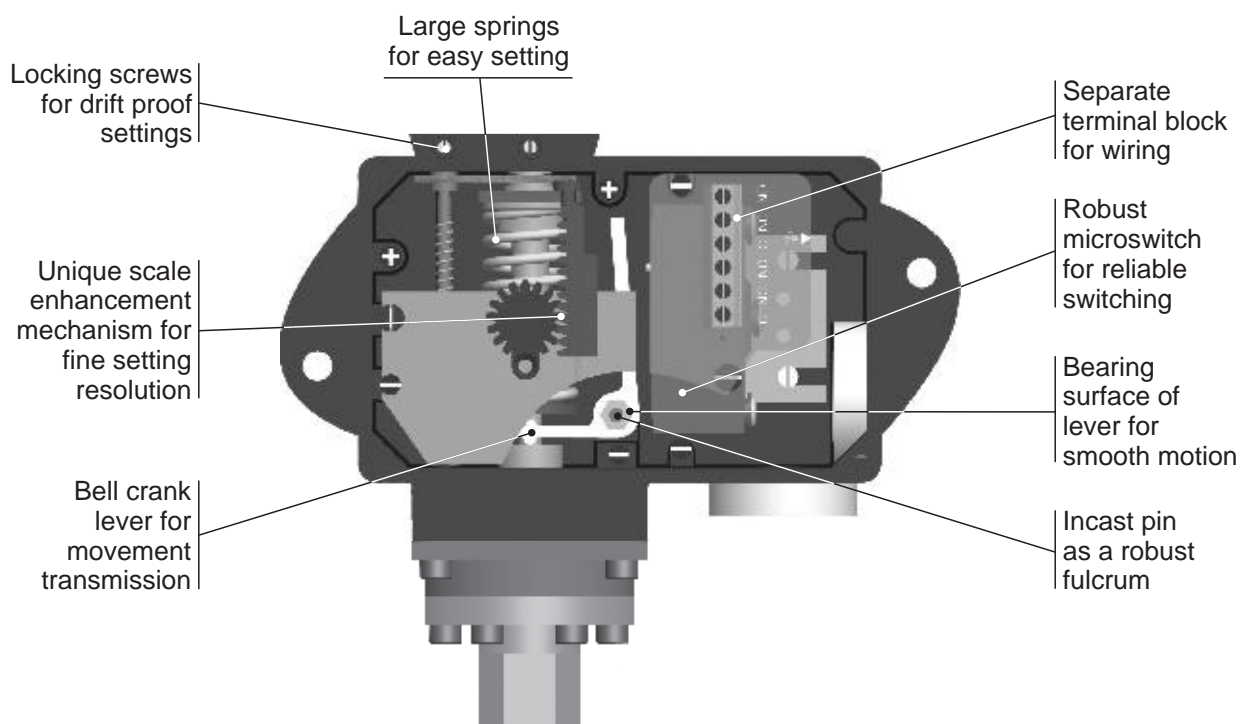
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	PF1	040	A1	S1	-

Please specify full model number to avoid ambiguity.

## HYDRAULIC RANGE PRESSURE SWITCHES

MD

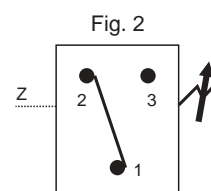
# MD HYDRAULIC DIAPHRAGM SWITCH



**Approximate Weight :** 1.2 Kg.

**Some Applications :** Used for high pressure compressor systems, mainly used for gaseous media.

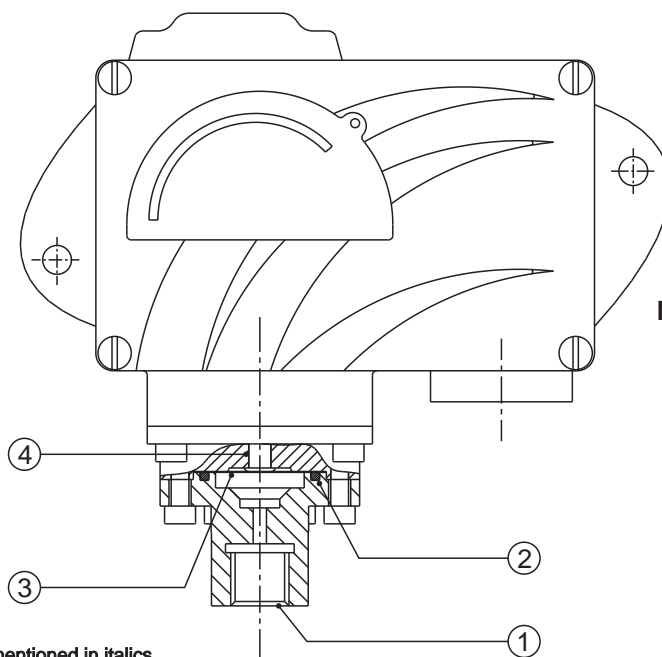
**Electrical Connection :**



# HYDRAULIC DIAPHRAGM SWITCH MD



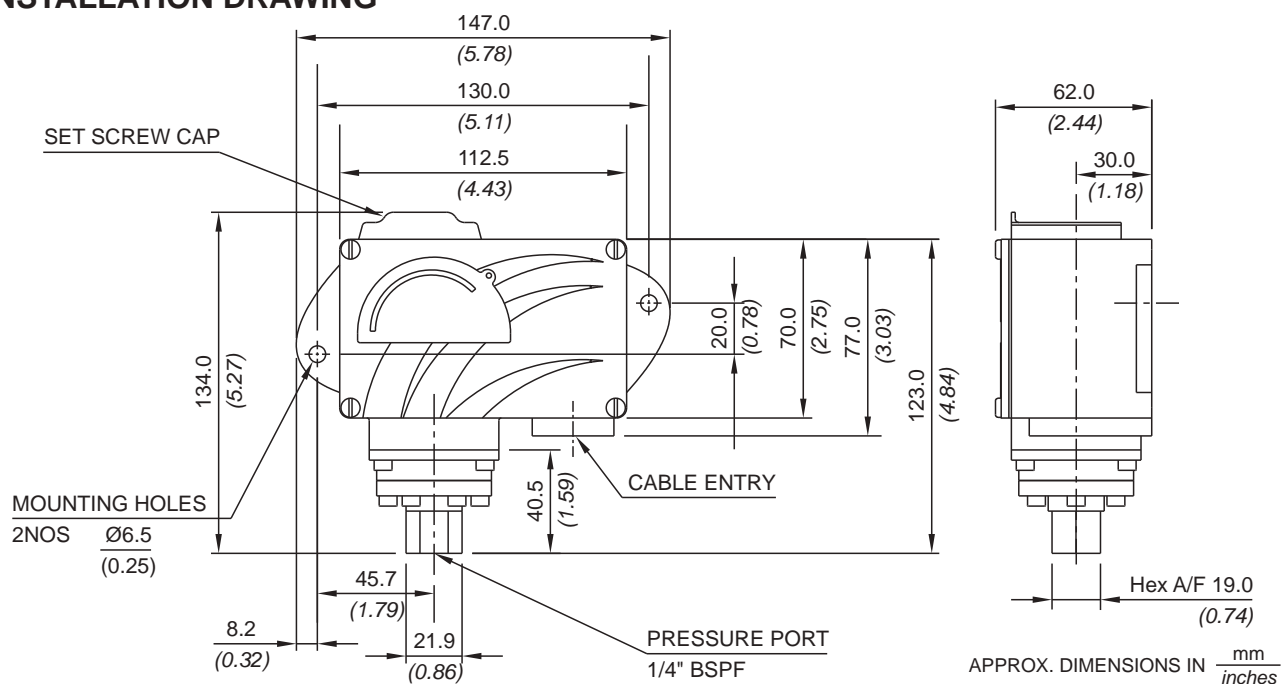
## PRESSURE CAPSULE DETAILS



- No. Description**
1. Pressure Housing
  2. Teflon® O-Ring
  3. Diaphragm
  4. Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD HYDRAULIC DIAPHRAGM SWITCH

RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
H1T	0.5 - 10 (7.25 - 145.04)	0.5 (7.25)	150 (2175.57)
H2T	2 - 20 (29.00 - 290.07)	2 (29.00)	200 (2900.76)
H4T	5 - 40 (72.52 - 580.15)	5 (72.52)	200 (2900.76)
H1H	10 - 100 (145.04 - 1450.38)	12 (174.05)	200 (2900.76)
H2H	7 - 200 (101.53 - 2900.76)	24 (348.09)	400 (5801.52)
H4H	40 - 400 (580.15 - 5801.52)	70 (1015.27)	500 (7251.9)

\* Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.



## HOW TO ORDER INDUSTRIAL HYDRAULIC DIAPHRAGM RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>PF1</b> = pressure switch, fixed differential without scale <b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA1</b> = pressure switch, adjustable differential without scale <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi *Available with A9 (in group 6) only	<b>H1T</b> = (0.5 - 10) <b>H2T</b> = (2 - 20) <b>H4T</b> = (5 - 40) <b>H1H</b> = (10 - 100) <b>H2H</b> = (7 - 200) <b>H4H</b> = (40 - 400)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>2</b> = SS316L

eg. A hydraulic diaphragm pressure switch, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 5 bar to 40 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size shall be specified by

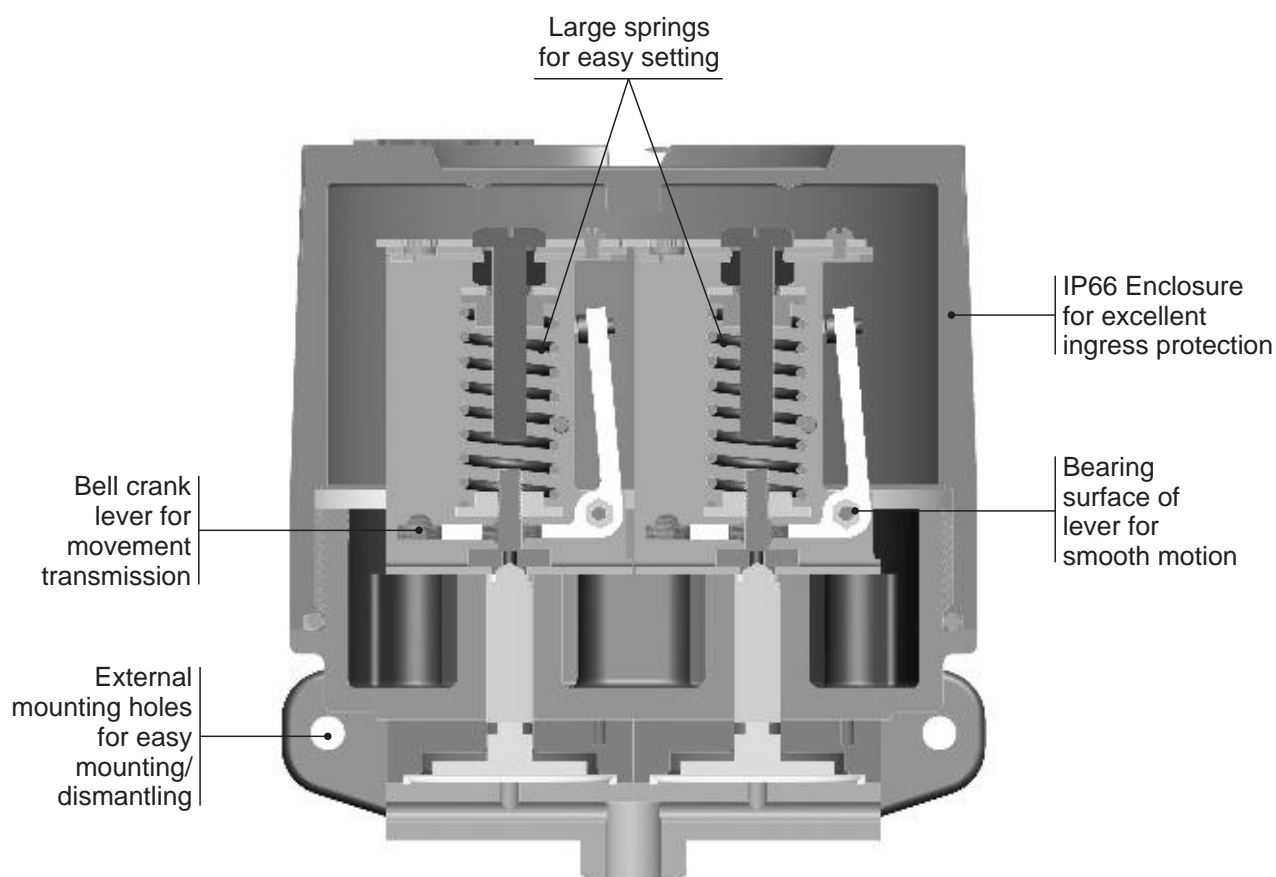
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	PF1	H4T	A1	S1	2

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

## HYDRAULIC DIAPHRAGM SWITCH

# MD

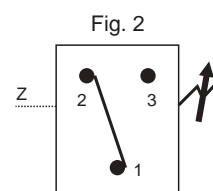
# DS DUAL HIGH RANGE PRESSURE SWITCHES



**Approximate Weight :** 3.5 Kg.

**Some Applications :** Used when two independent set points are required for HI-HI, LO-LO or HI-LO applications, typically alarm and trip functions.

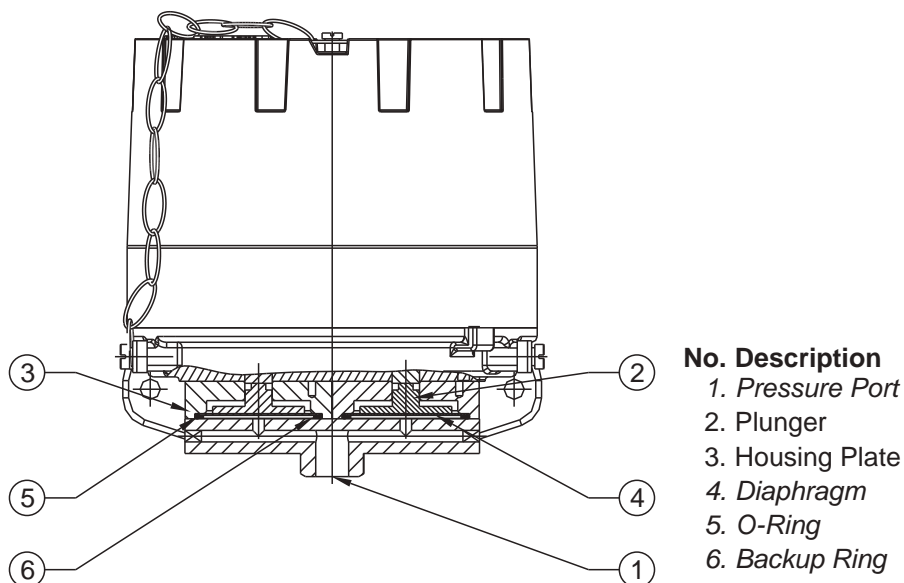
**Electrical Connection :**



# DUAL HIGH RANGE PRESSURE SWITCHES **DS**

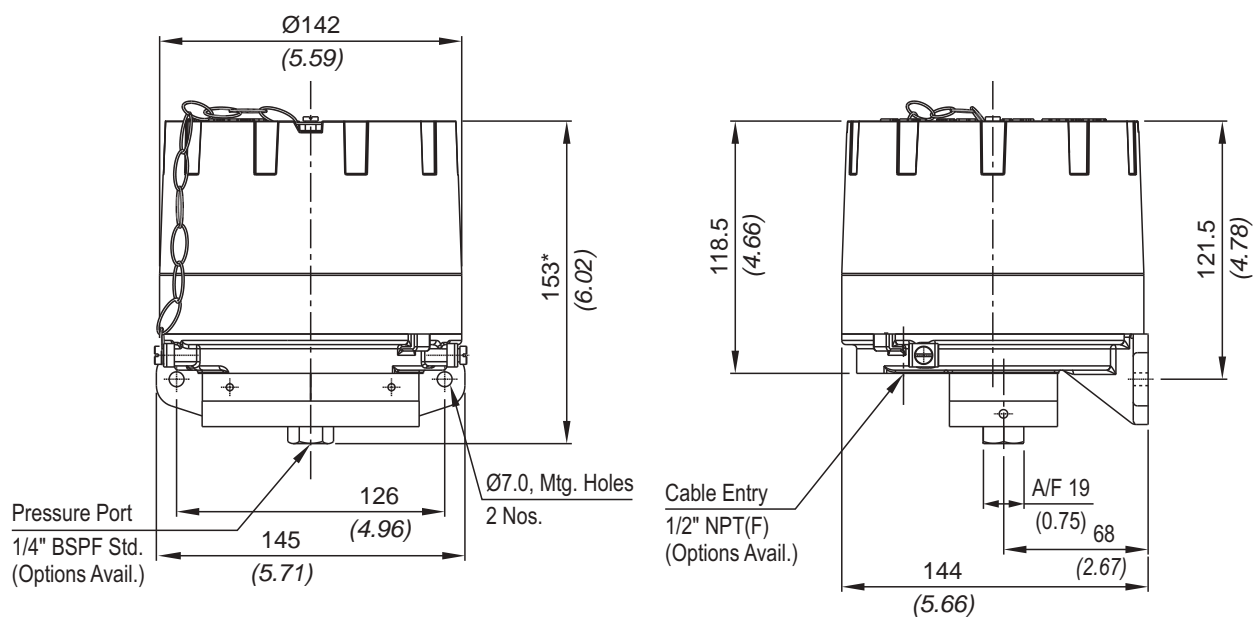


## PRESSURE CAPSULE DETAILS



Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



\*164mm (6.45 inches) for range codes H4T, H1H and H2H

# DS DUAL HIGH RANGE PRESSURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
LP†	0.067 - 0.213 (0.97 - 3.09)	0.05 (0.72)	5 (72.52)
LP5	0.1 - 0.5 (1.45 - 7.25)	0.10 (1.45)	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.60 (8.70)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.56)	0.60 (8.70)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	35 (507.63)
H4T	5.0 - 40.0 (72.52 - 580.15)	5 (72.52)	200 (2900.76)
H1H	10.0 - 100.0 (146.04 - 1450.38)	12 (174.05)	200 (2900.76)
H2H	7.0 - 200.0 (101.52 - 2900.76)	24 (348.09)	400 (5801.88)

\*Minimum differential increases with setpoint (Graphs available on request), results for neoprene diaphragm.

†Range not available in SS316 L diaphragm.

## HOW TO ORDER INDUSTRIAL DUAL HIGH RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>DS</b> = Dual pressure switch with cast aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi *Available with A9 (in group 6) only	<b>LP</b> = (0.067 - 0.213) <b>LP5</b> = (0.1 - 0.5) <b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0) <b>H4T</b> = (5.0 - 40.0) <b>H1H</b> = (10.0 - 100.0) <b>H2H</b> = (7.0 - 200.0)	<b>A8</b> = General purpose microswitch rated at 5A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L

eg. A dual pressure switch with fixed differential having 0.1 bar to 1 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

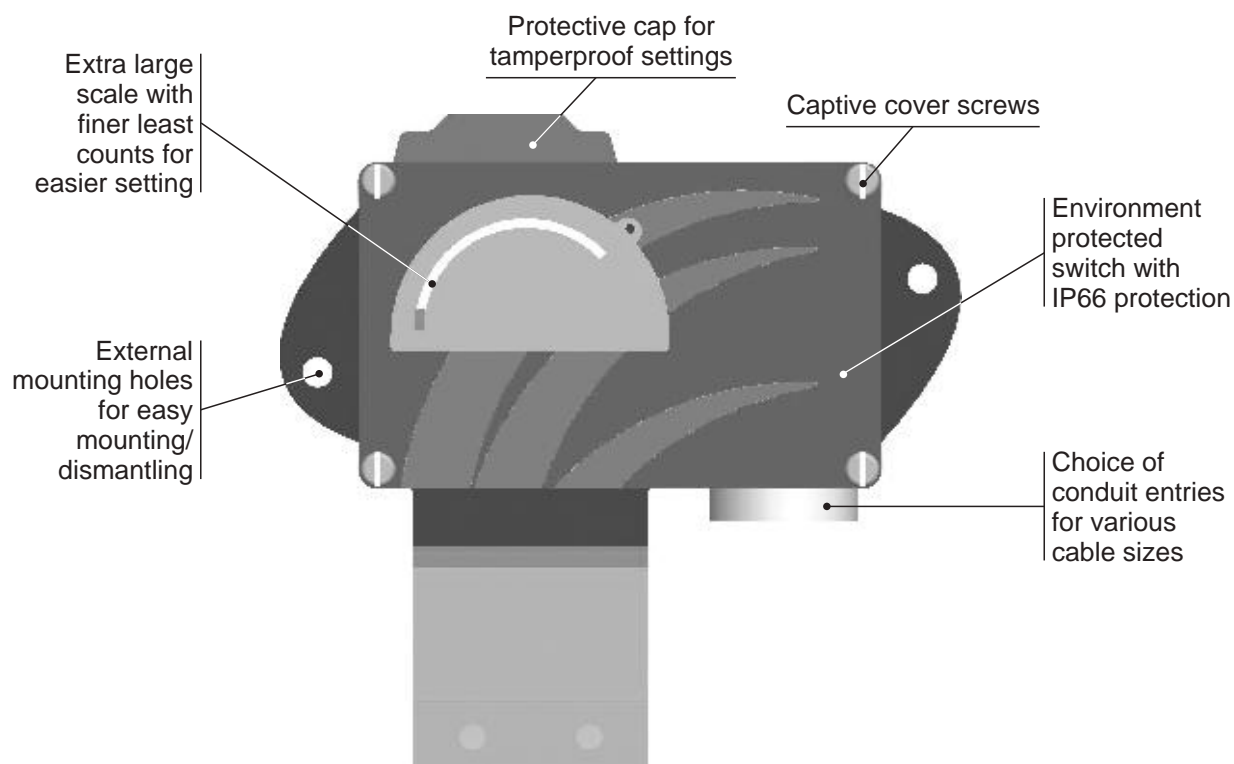
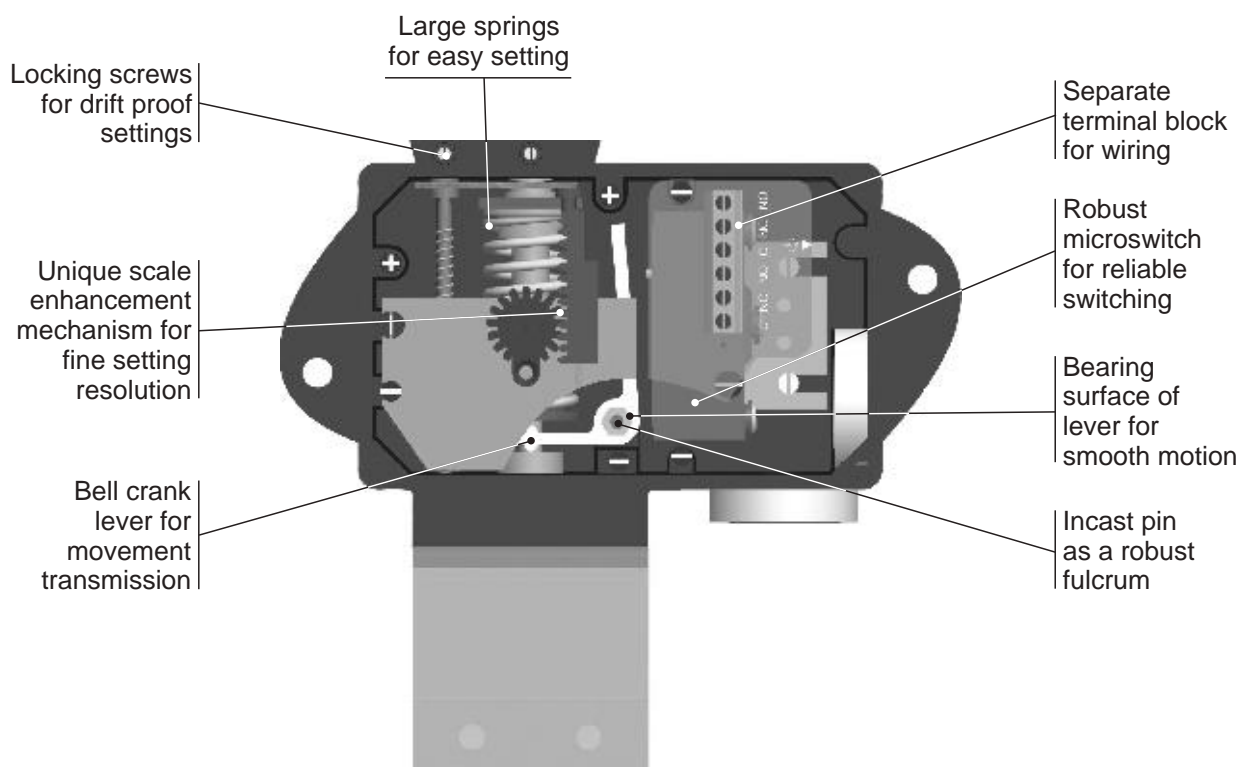
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	DS	3	PF2	H01	A8	S1	0

Please specify full model number to avoid ambiguity.

## DUAL HIGH RANGE PRESSURE SWITCHES

# DS

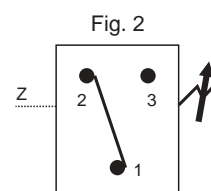
# MD HIGH RANGE PRESSURE DIFFERENCE SWITCHES

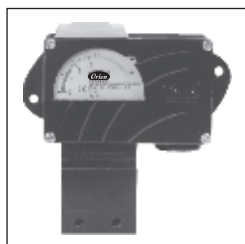


**Approximate Weight :** 1.500 Kg.

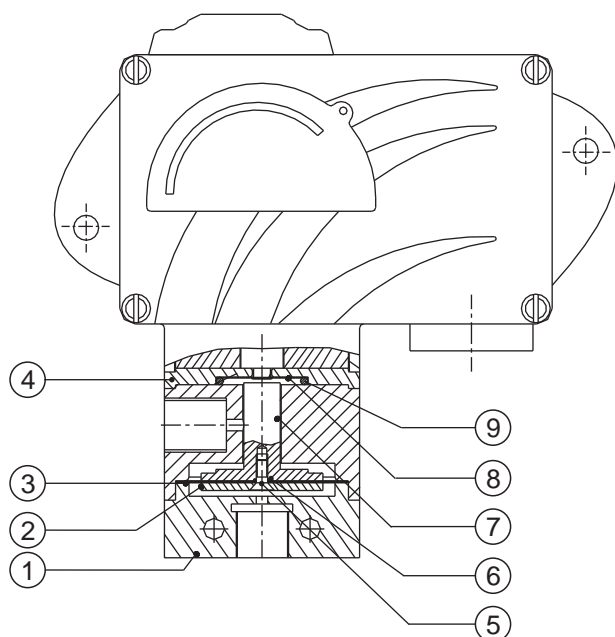
**Some Applications :** In non-hazardous areas for filters, strainers, cooling systems, etc.

**Electrical Connection :**





## PRESSURE CAPSULE DETAILS

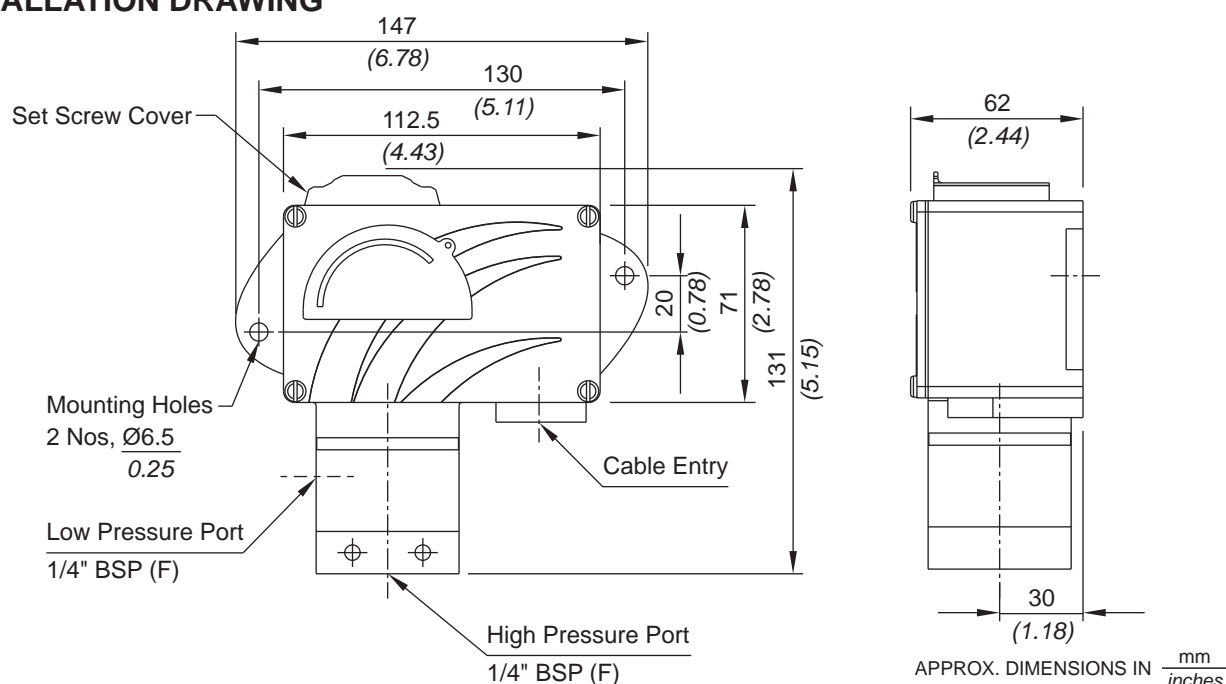


### No. Description

1. Pressure Housing
2. HP Plunger
3. Diaphragm
4. Disc
5. CSK Screw (SS)
6. O-Ring (Teflon®)
7. LP Plunger (SS316)
8. Sealing Diaphragm (Teflon®)
9. Sealing O-Ring (Teflon®)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD HIGH RANGE PRESSURE DIFFERENCE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.12 (1.74)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.30 (4.35)	12 (174.05)

\*Minimum differential increases with setpoint (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.



## HOW TO ORDER INDUSTRIAL HIGH RANGE PRESSURE DIFFERENCE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = 1/2" NPT threads <b>2</b> = 3/4" NPT threads <b>3</b> = M20 X 1.5 threads	<b>DF1</b> = pressure difference switch, fixed differential without scale <b>DF2</b> = pressure difference switch, fixed differential with scale in bar <b>DF3</b> = pressure difference switch, fixed differential with scale in psi <b>DA1</b> = pressure difference switch, adjustable differential without scale <b>DA2</b> = pressure difference switch, adjustable differential with scale in bar <b>DA3</b> = pressure difference switch, adjustable differential with scale in psi <small>* Available with A9 (in group 6) only</small>	<b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A7</b> = 2SPDT switching elements  <small>Please refer page no. 230 for more microswitch options</small> <small>* Please refer note under Range Selection Table</small>	<b>A1</b> = Aluminium / 1/4" BSP(F) <b>A2</b> = Aluminium / 1/4" NPT(F) <b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon

eg. A high range pressure difference weatherproof switch, with 1/2" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

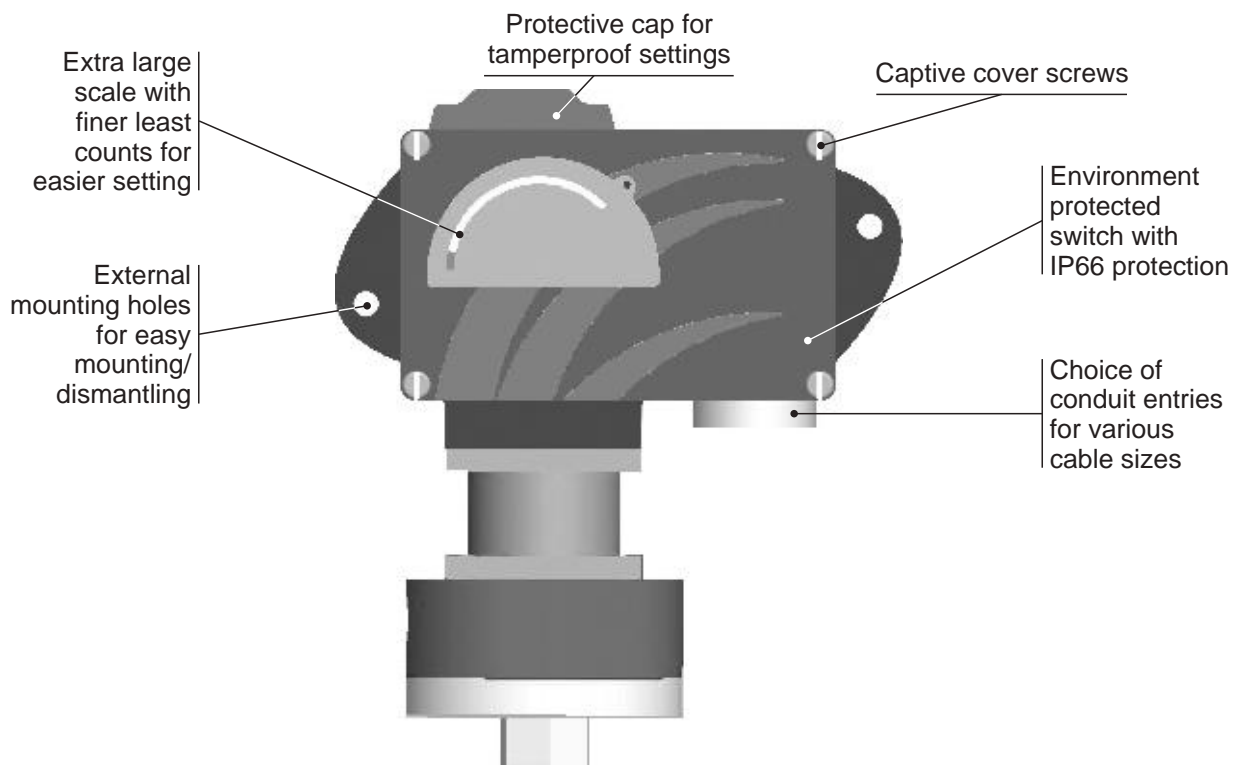
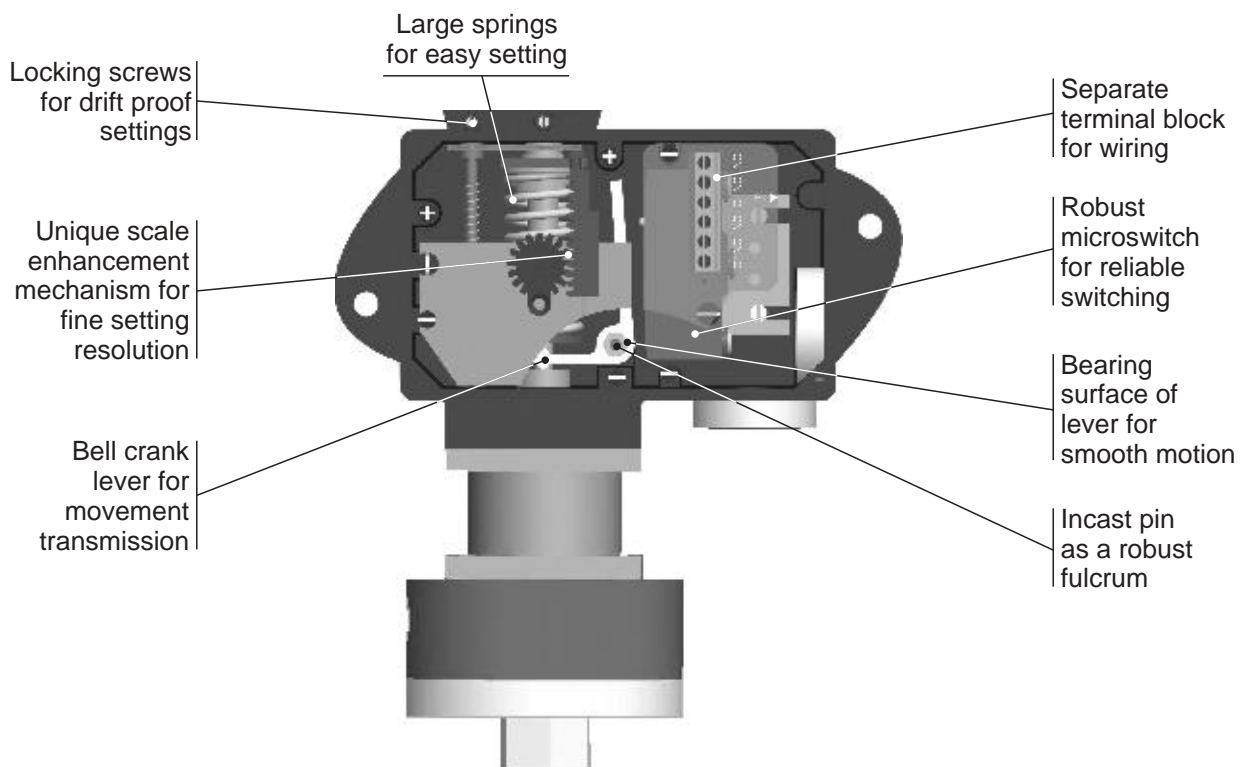
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	DF1	H01	A1	S1	0

Please specify full model number to avoid ambiguity.

## HIGH RANGE PRESSURE DIFFERENCE SWITCHES

MD

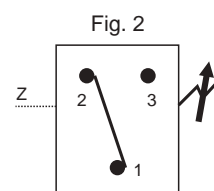
# MD HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES



**Approximate Weight :** 2.000 Kg.

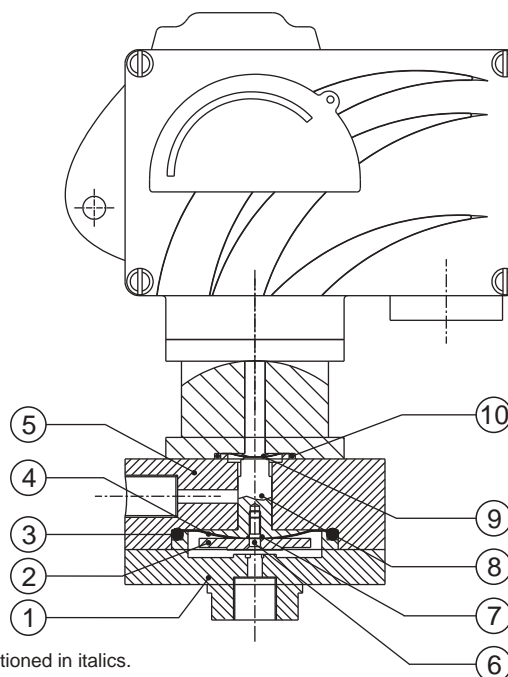
**Some Applications :** Applications requiring high static/system pressure but low pressure difference.

**Electrical Connection :**





## PRESSURE CAPSULE DETAILS

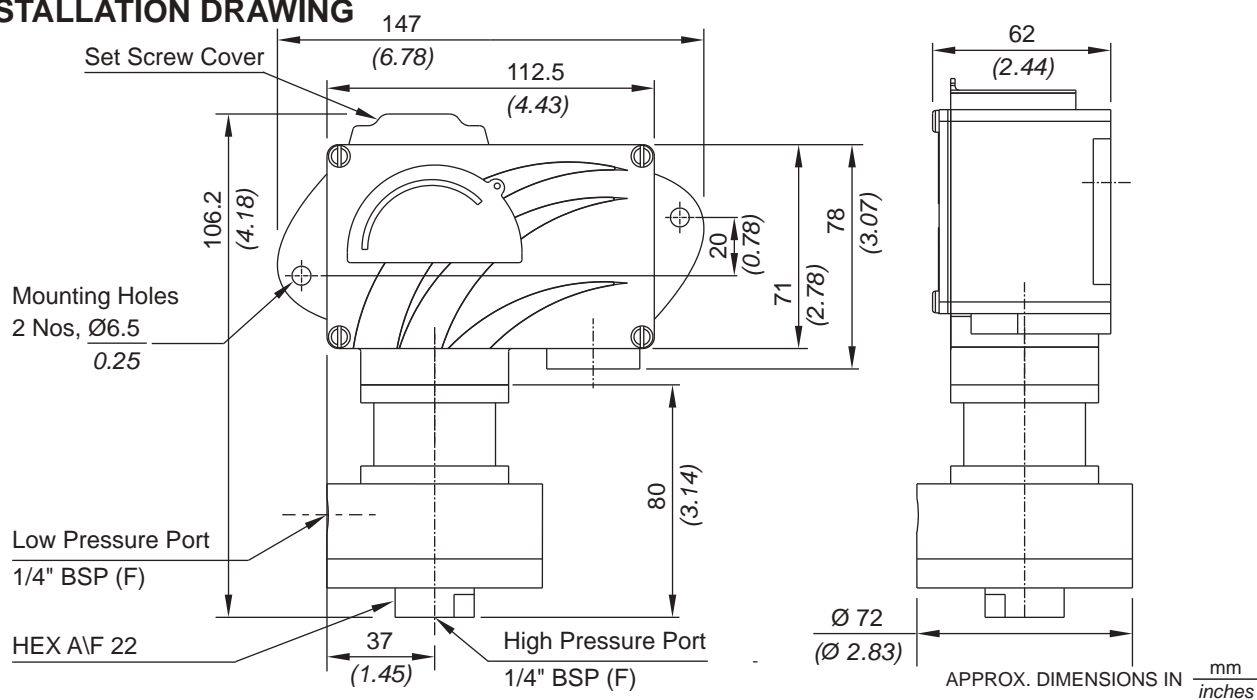


### No. Description

1. Pressure Housing
2. HP Plunger
3. Sealing O-Ring
4. Diaphragm
5. Disc
6. CSK Screw (SS)
7. O-Ring (Teflon®)
8. LP Plunger (SS316)
9. Sealing Diaphragm (Teflon®)
10. Sealing O-Ring (Teflon®)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
P01	0.1 - 1.0 (1.45 - 14.50)	0.24 (3.48)	200 (2900.76)
P02	0.1 - 1.5 (1.45 - 21.76)	0.40 (5.80)	200 (2900.76)
P03	0.2 - 2.6 (2.90 - 37.71)	0.40 (5.80)	200 (2900.76)
P04	0.2 - 3.6 (2.90 - 51.21)	0.60 (8.71)	200 (2900.76)

\*Minimum differential increases with setpoint (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.

## HOW TO ORDER INDUSTRIAL HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES

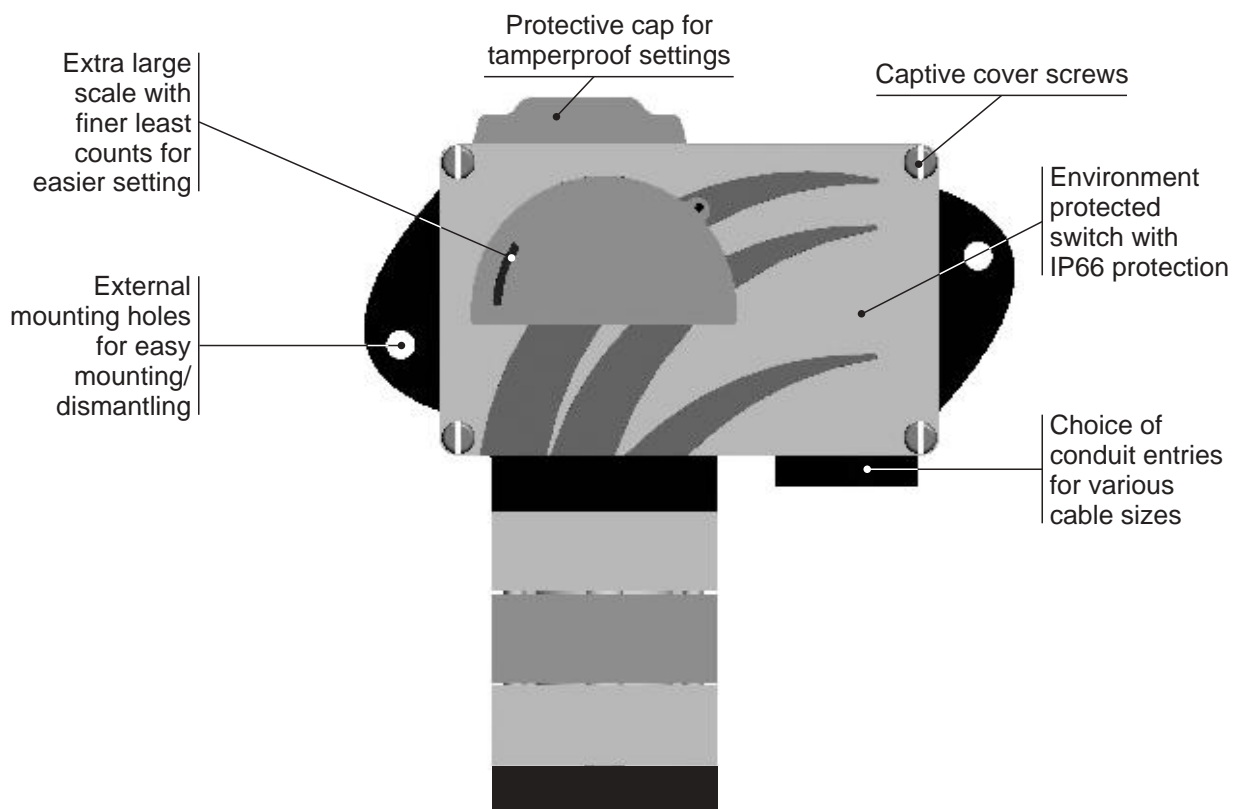
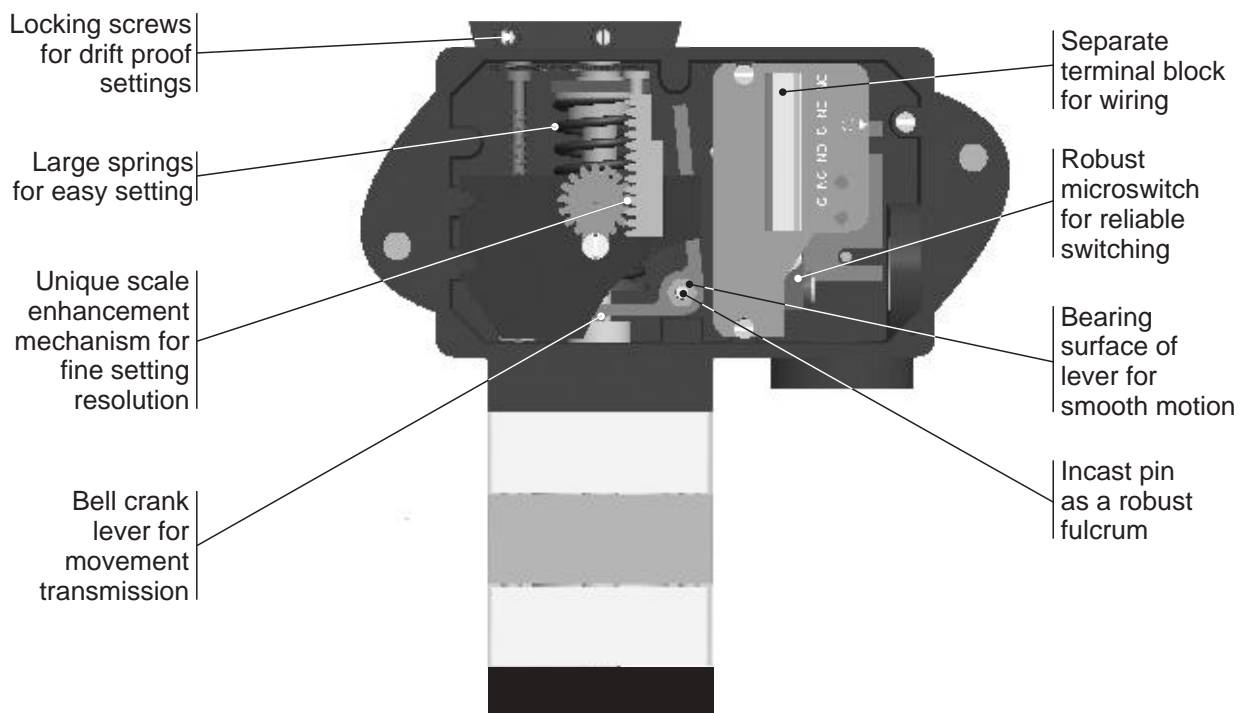
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>DF1</b> = pressure difference switch, fixed differential without scale <b>DF2</b> = pressure difference switch, fixed differential with scale in bar <b>DF3</b> = pressure difference switch, fixed differential with scale in psi <b>*DA1</b> = pressure difference switch, adjustable differential without scale <b>*DA2</b> = pressure difference switch, adjustable differential with scale in bar <b>*DA3</b> = pressure difference switch, adjustable differential with scale in psi * Available with A9 (in group 6) only	<b>P01</b> = (0.1 - 1.0) <b>P02</b> = (0.1 - 1.5) <b>P03</b> = (0.2 - 2.6) <b>P04</b> = (0.2 - 3.6)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon

eg. A high proof high range pressure difference weatherproof switch, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	DF1	P01	A1	S1	0

Please specify full model number to avoid ambiguity.

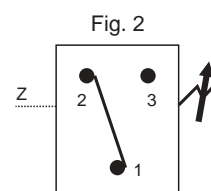
# MD HIGH RANGE DP

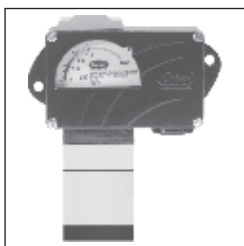


**Approximate Weight :** 2.500 Kg.

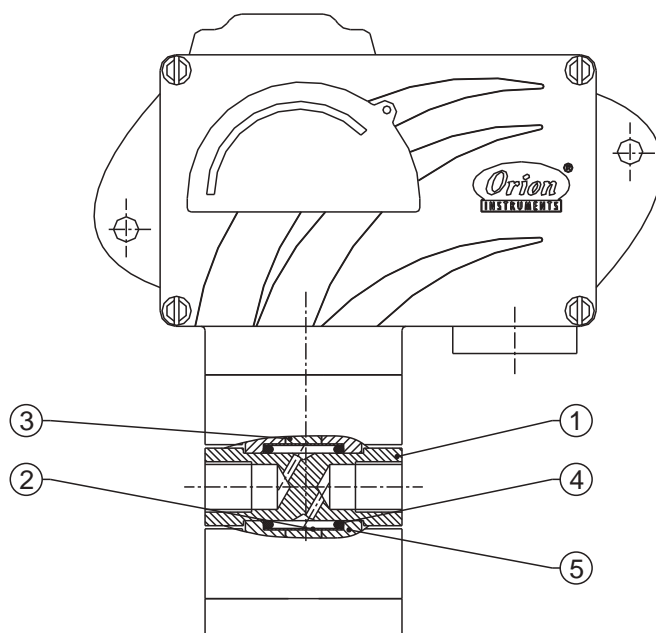
**Some Applications :** Applications requiring high static/system pressure but low pressure difference.

**Electrical Connection :**





## PRESSURE CAPSULE DETAILS

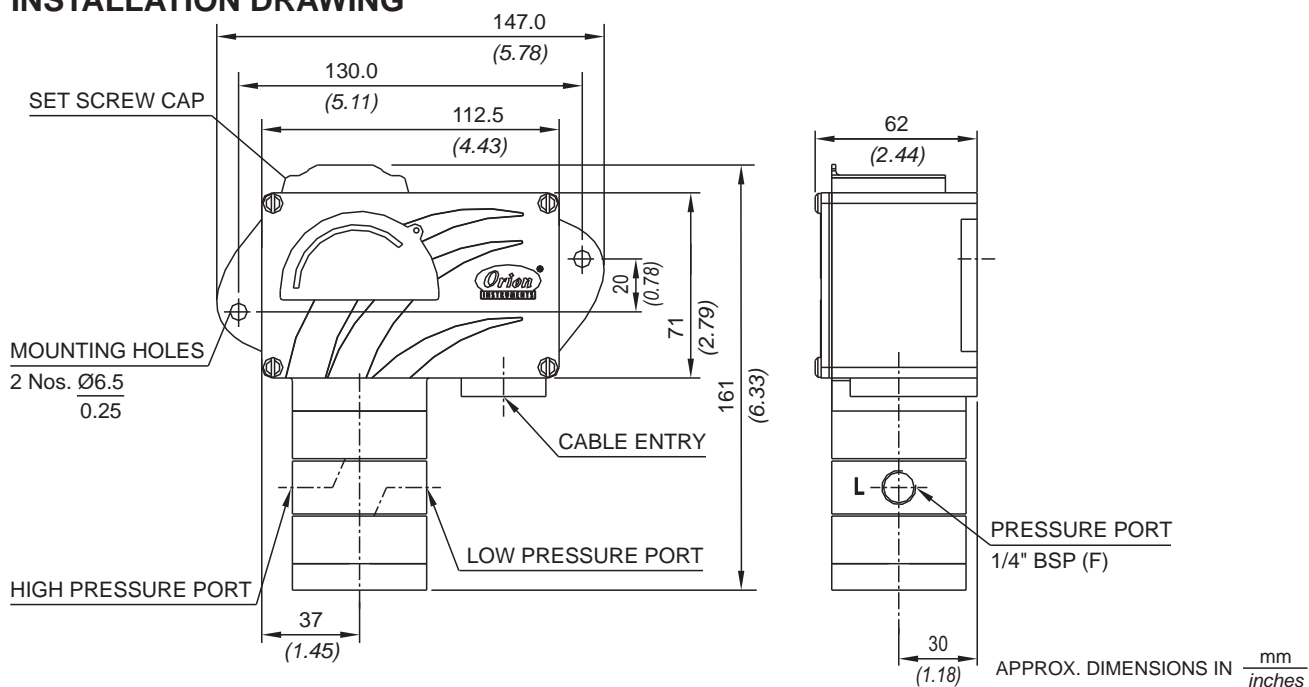


### No. Description

1. Pressure Housing
2. Diaphragm
3. Plunger
4. O-Ring
5. Disc

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD HIGH RANGE DP

## RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
D01	0.1 - 1.0 (1.45 - 14.50)	0.12 (1.74)	70 (1015.26)
D02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	70 (1015.26)
D03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	70 (1015.26)
D04	0.2 - 3.6 (2.90 - 52.21)	0.30 (4.35)	70 (1015.26)
D07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	70 (1015.26)
D10	0.5 - 10.0 (7.25 - 145.04)	0.50 (7.25)	70 (1015.26)
D15	1.0 - 15.0 (14.50 - 217.71)	0.50 (7.25)	70 (1015.26)
D30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	70 (1015.26)

\*Minimum differential increases with setpoint (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.



## HOW TO ORDER INDUSTRIAL HIGH RANGE DP SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = 1/2" NPT threads <b>2</b> = 3/4" NPT threads <b>3</b> = M20 X 1.5 threads	<b>DF1</b> = pressure difference switch, fixed differential without scale <b>DF2</b> = pressure difference switch, fixed differential with scale in bar <b>DF3</b> = pressure difference switch, fixed differential with scale in psi <b>*DA1</b> = pressure difference switch, adjustable differential without scale <b>*DA2</b> = pressure difference switch, adjustable differential with scale in bar <b>*DA3</b> = pressure difference switch, adjustable differential with scale in psi * Available with A9 (in group 6) only	<b>D01</b> = (0.1 - 1.0) <b>D02</b> = (0.1 - 1.5) <b>D03</b> = (0.2 - 2.6) <b>D04</b> = (0.2 - 3.6) <b>D07</b> = (0.5 - 7.0) <b>D10</b> = (0.5 - 10.0) <b>D15</b> = (1.0 - 15.0) <b>D30</b> = (5.0 - 25.0)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>A1</b> = Aluminium / 1/4" BSP(F) <b>A2</b> = Aluminium / 1/4" NPT(F) <b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS316L  For additional wetted parts please refer Pressure Capsule Details on Page 145

eg. A high range pressure difference weatherproof switch, with 1/2" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	DF1	D01	A1	S1	0

Please specify full model number to avoid ambiguity.

# FP ULTRA LOW RANGE PRESSURE DIFFERENCE SWITCHES

## Ultra Low Range Pressure Difference Switches with User Adjustable Knob



### Salient Features

#### Easy to See, Easy to Use!

Set Point easily user adjustable with visible scale in Pascal. (no need of pressure gauge)

#### Enclosure

Robust Gravity Die Cast Aluminum

#### Long Lasting!

10<sup>6</sup> switching operations

#### Trusted all over!

Tested and Proven

#### Technical Specifications

**Media:** Air, non-flammable gases and non-aggressive gases

**Housing Material:** IP 66 Gravity Die Cast Aluminium

**Protection Category:** IP66 with cover.

**Ranges:** 20 Pa to 4000 Pa

**Maximum Working Pressure:** 0.1 bar

**Electrical Rating:** Maximum 1.0A (.4 A) / 250VAC

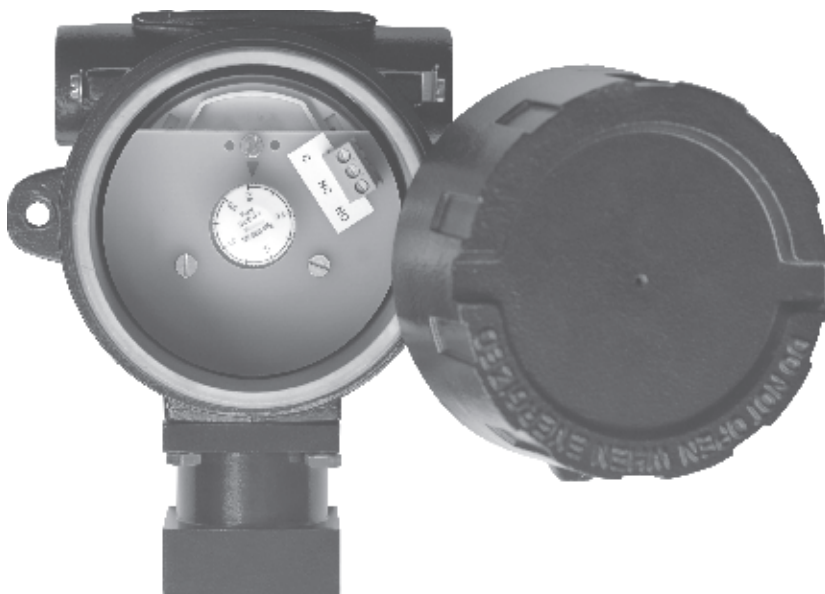
**Electrical Connection:** Standard Terminal Strip provided

**Cable Entry:** ½" NPT

**High Pressure and Low Pressure Port:** 1/8" BSP(F)

**Media Temperature:** 80°C max.

**Ambient Temperature:** -5°C to 60°C



Range Selection Table

Range Code (Orion)	Adjustment Range for Upper Switching Pressure Pa (mm wg)	Switching Differential Set to Pa (mm wg)
FP80	20-200 (2.039-20.395)	10 (1.020)
FP81	40 - 100 (4.079 - 10.197)	20 (2.039)
FP82	40 - 200 (4.0479 - 20.395)	20 (2.039)
FP83	50 - 500 (5.099 - 50.987)	20 (2.039)
FP85	200 - 1000 (20.395 - 101.974)	100 (10.197)
FP86	500 - 2500 (50.987 - 254.935)	150 (15.296)
FP87	1000 - 4000 (101.974 - 407.896)	250 (25.494)

### How to order FP series Low Range Pressure Difference Switches

Please specify the Range Code e.g.. FP82 or FP85 as per range selection table.

## INSTALLATION AND OPERATING INSTRUCTIONS

### Principle of Operation

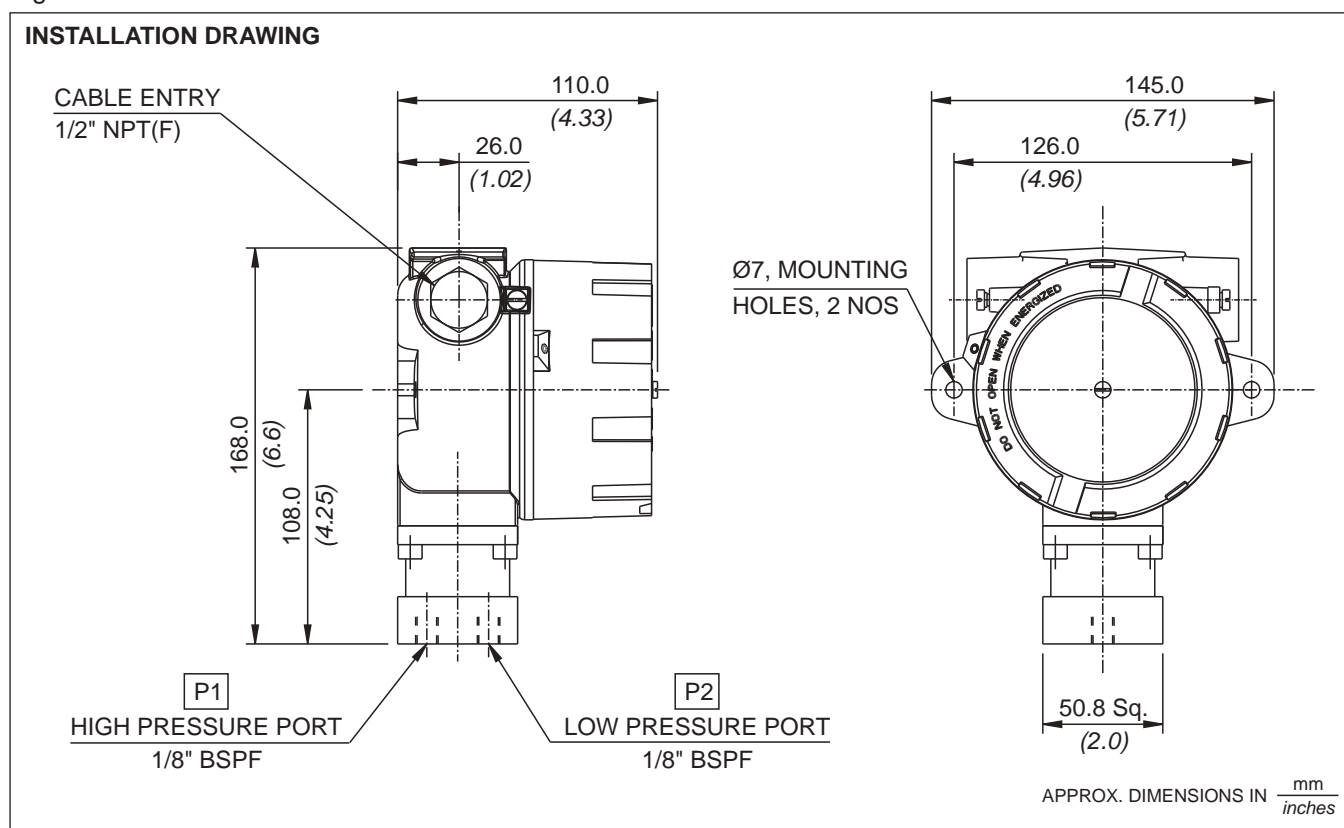
When the effective force generated by the pressure difference in the lower and upper chamber of the pressure capsule exceeds/falls beyond the balancing spring forces, an electrical element is actuated.

### Mounting

The detailed mounting dimensions are shown in Fig. 1.

- 1) Pressure Switches can be mounted on a plate/inside a panel using Ø7 mounting holes provided.
- 2) For any other process connection, please use an adaptor.

Fig. 1



P1 = High Pressure Port

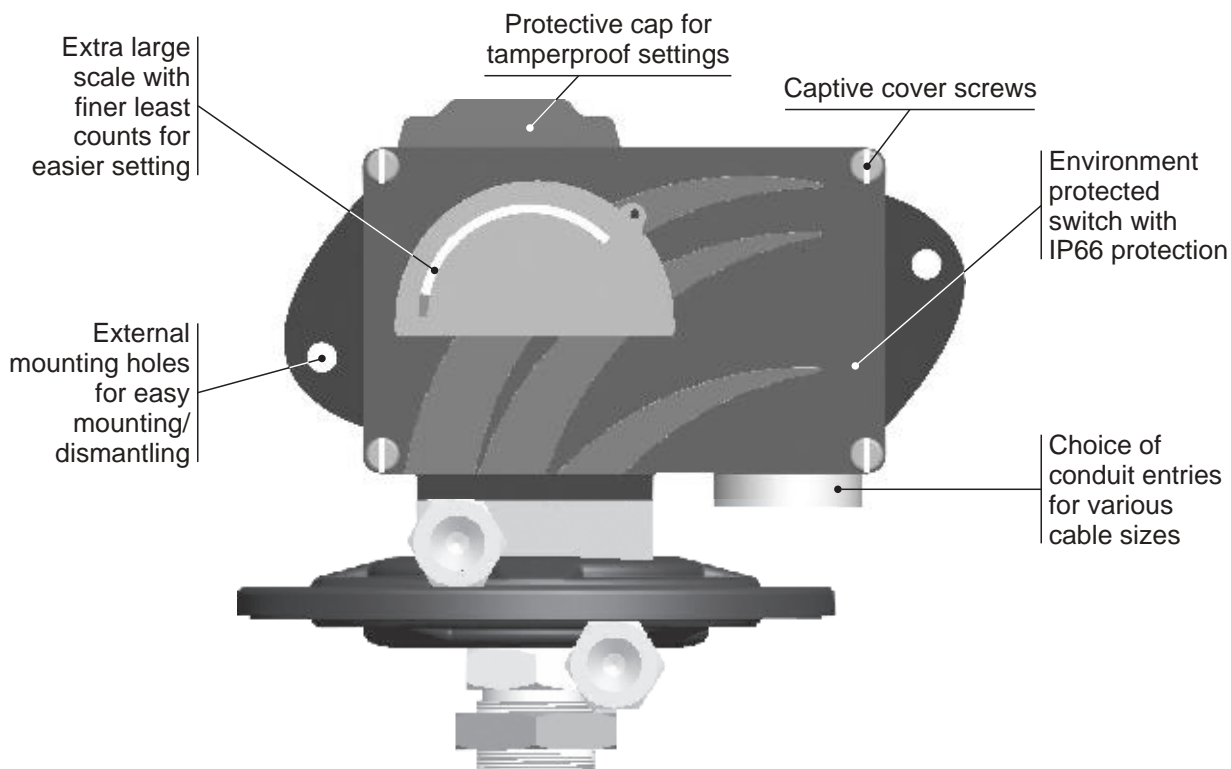
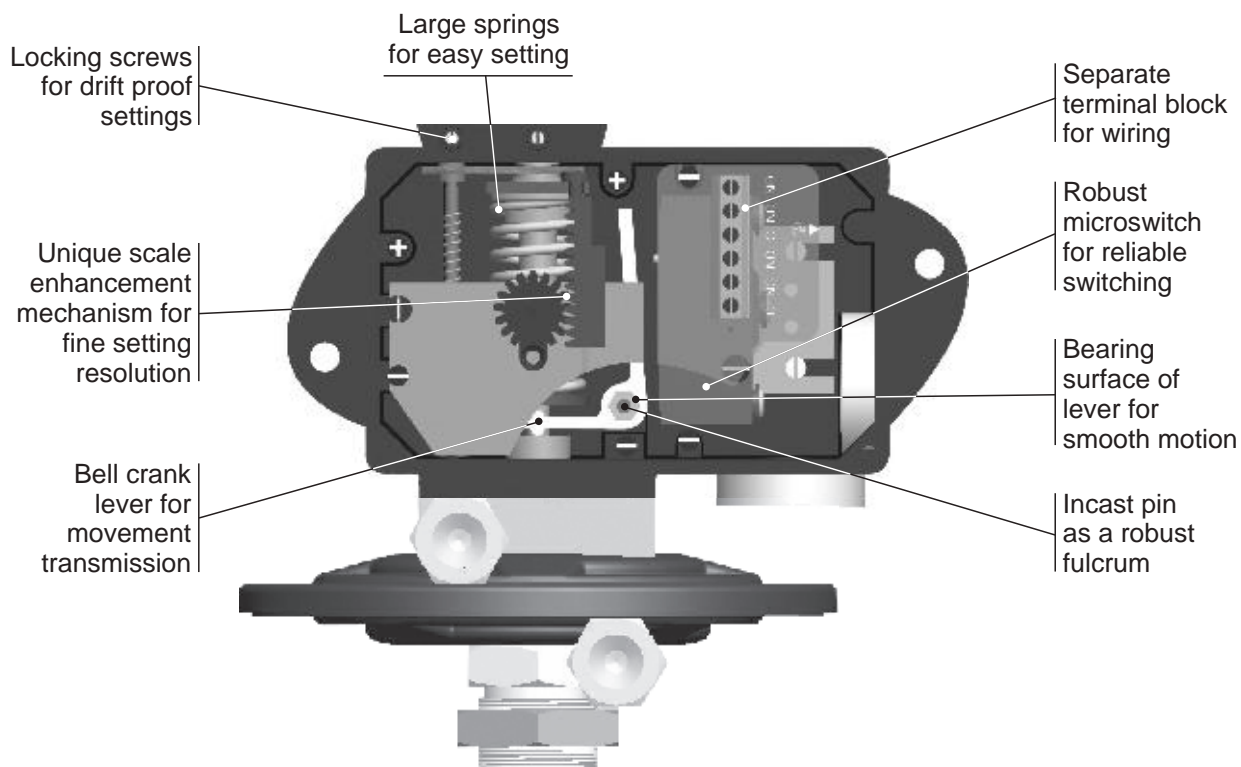
P2 = Low Pressure Port

- Note :
1. Use two screws only, for mounting
  2. Remove transport protection from P1 and P2

### CAUTION :

Install pressure switch vertically. Installing it at an angle more than 30° to vertical may result in malfunction.

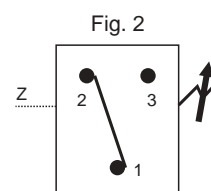
# MD LOW RANGE PRESSURE DIFFERENCE SWITCHES



**Approximate Weight :** 2.000 Kg.

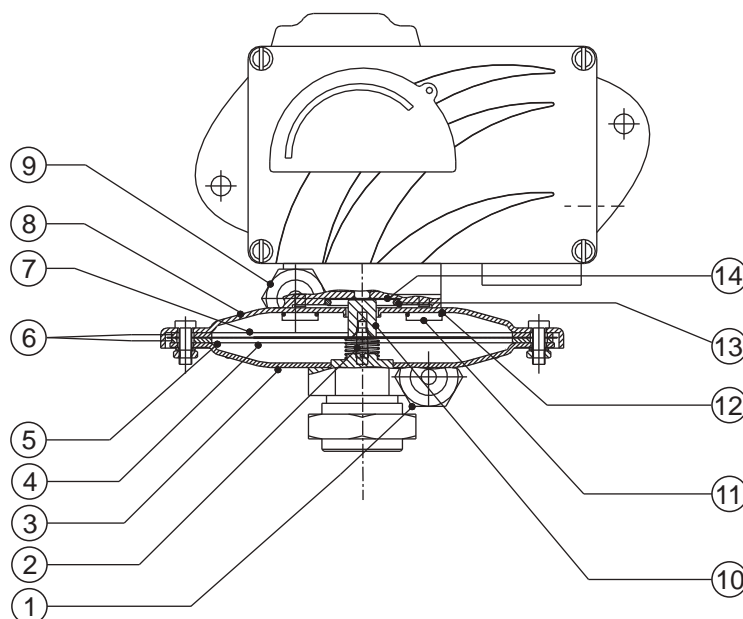
**Some Applications :** Used in ventilation systems, clean rooms, clogged filters, etc.

**Electrical Connection :**





## PRESSURE CAPSULE DETAILS



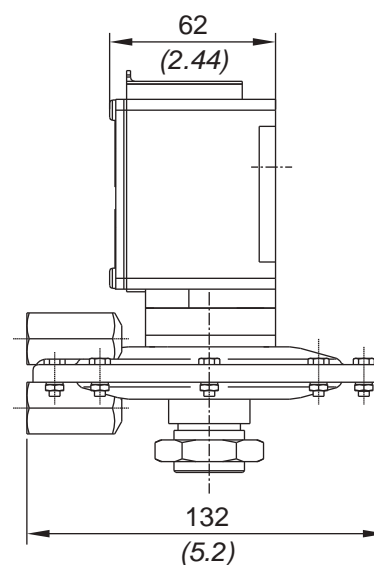
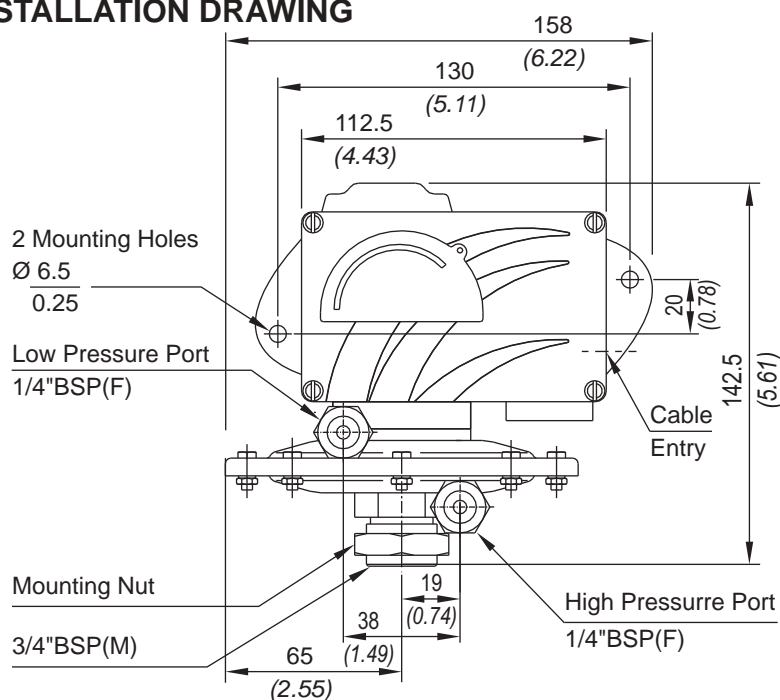
### No. Description

1. *High Pressure Port (M.S.)\**
2. *Support Spring (S.S.)*
3. *Bottom Flange (M.S.)*
4. *Support Plate (Aluminium)*
5. *Diaphragm (Neoprene)*
6. *Gasket (Nitrile)*
7. *Top Plate (Aluminium)*
8. *Top Flange (M.S.)\**
9. *Low Pressure Port (M.S.)*
10. *Transfer Pin (Al)*
11. *Top Flange Screw (M.S.)*
12. *O-Ring (Nitrile)*
13. *O-Ring (Nitrile)*
14. *Sealing Diaphragm (Nitrile)*

\* Pressure ports are brazed with flange

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# MD LOW RANGE PRESSURE DIFFERENCE SWITCHES

RANGE SELECTION TABLE

Range Code	Range mbar ("wc)	Differential* mbar (" wc)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
L02	1.5 - 15 (0.602 - 6.02)	3 (1.204)	2 (29.00)
L03	5 - 25 (2.007 - 10.037)	5 (2.007)	2 (29.00)
L05	10 - 50 (4.015 - 20.073)	5 (2.007)	2 (29.00)
L10	10 - 100 (4.015 - 40.146)	10 (4.015)	2 (29.00)
L15	10 - 150 (4.015 - 60.22)	10 (4.015)	2 (29.00)
L25	20 - 250 (8.03 - 100.36)	15 (4.015)	2 (29.00)
L35	50 - 350 (20.073 - 140.51)	35 (14.05)	2 (29.00)

\*Minimum differential increases with setpoint (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.

## HOW TO ORDER INDUSTRIAL LOW RANGE PRESSURE DIFFERENCE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in mbar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = 1/2" NPT threads <b>2</b> = 3/4" NPT threads <b>3</b> = M20 X 1.5 threads	<b>DF1</b> = pressure difference switch, fixed differential without scale <b>DF2</b> = pressure difference switch, fixed differential with scale in mbar <b>DF3</b> = pressure difference switch, fixed differential with scale in "wc <b>*DA1</b> = pressure difference switch, adjustable differential without scale <b>*DA2</b> = pressure difference switch, adjustable differential with scale in mbar <b>*DA3</b> = pressure difference switch, adjustable differential with scale in "wc * Available with A9 (in group 6) only	<b>L02</b> = (1.5 - 15) <b>L03</b> = (5 - 25) <b>L05</b> = (10 - 50) <b>L10</b> = (10 - 100) <b>L15</b> = (10 - 150) <b>L25</b> = (20 - 250) <b>L35</b> = (50 - 350)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>M1</b> = M.S. powder coated / 1/4" BSP(F) <b>M2</b> = M.S. powder coated / 1/4" NPT(F) <b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon

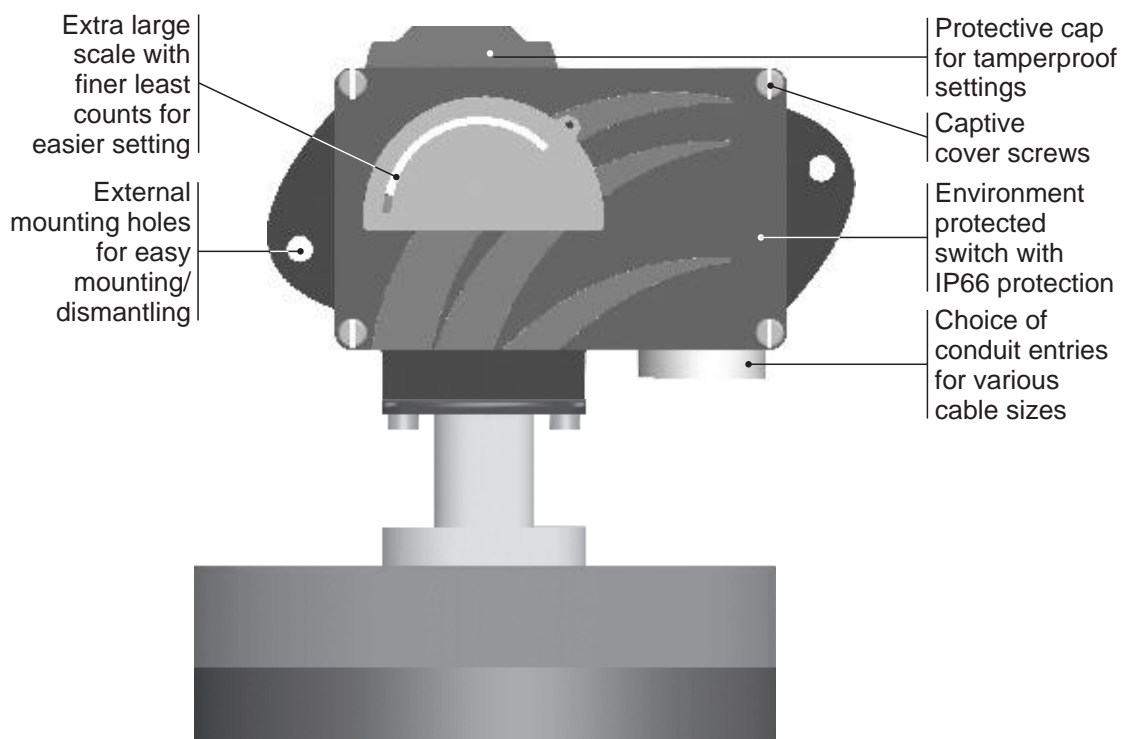
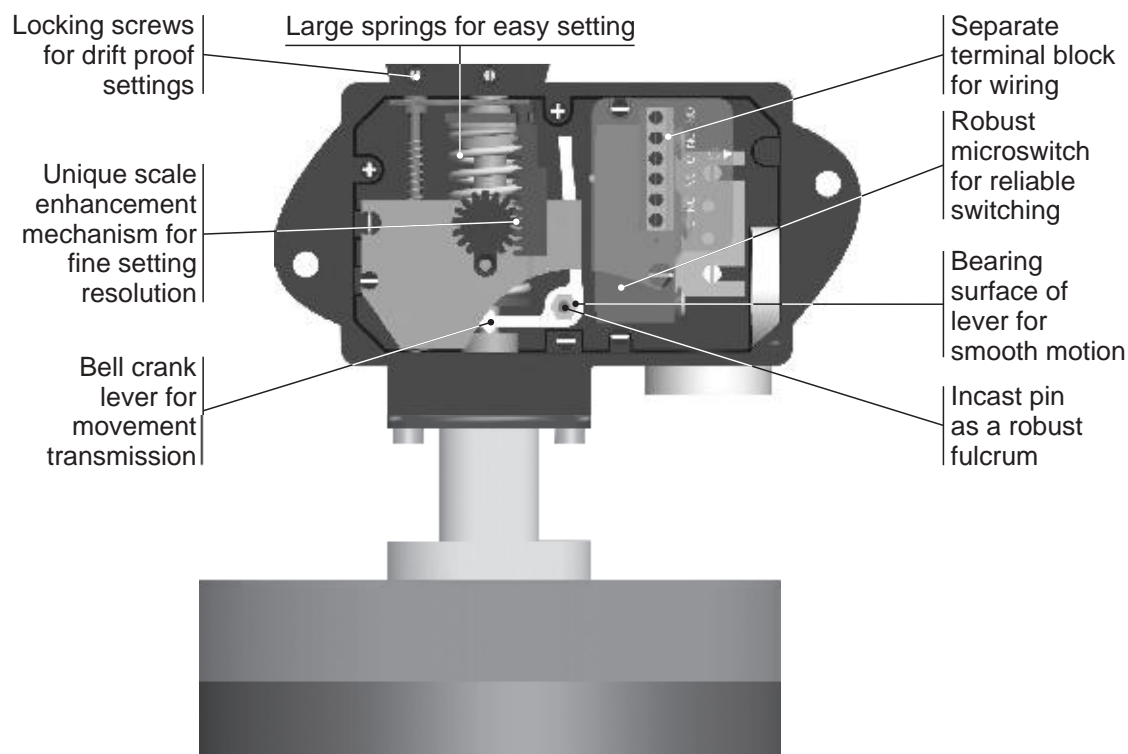
eg. A low range pressure difference weatherproof switch, with 1/2" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 5 mbar to 25 mbar pressure range, with 15Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	DF1	L03	A1	S1	0

Please specify full model number to avoid ambiguity.

## LOW RANGE PRESSURE DIFFERENCE SWITCHES

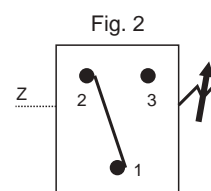
MD



**Approximate Weight :** 6.70 Kg.

**Some Applications :** Used in gas skids, cooling systems, applications requiring very low pressure difference but high system/proof pressure like pressurization in cross country pipelines, etc.

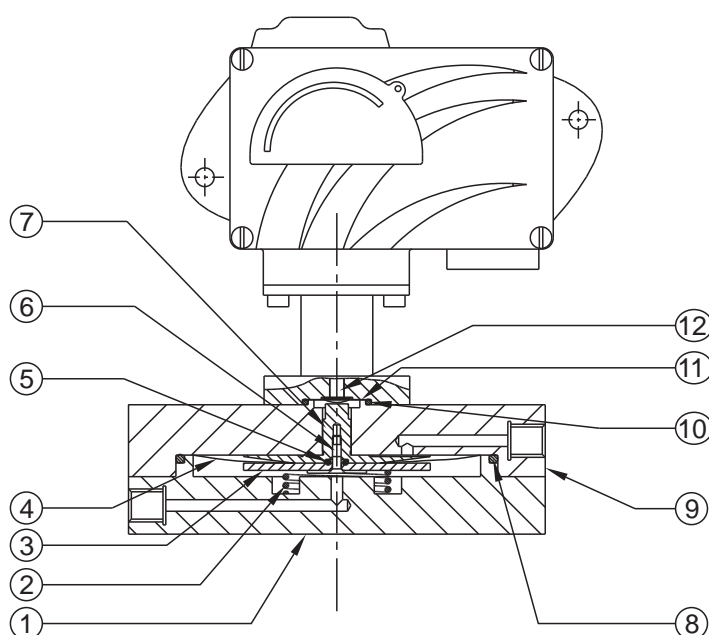
**Electrical Connection :**







## PRESSURE CAPSULE DETAILS

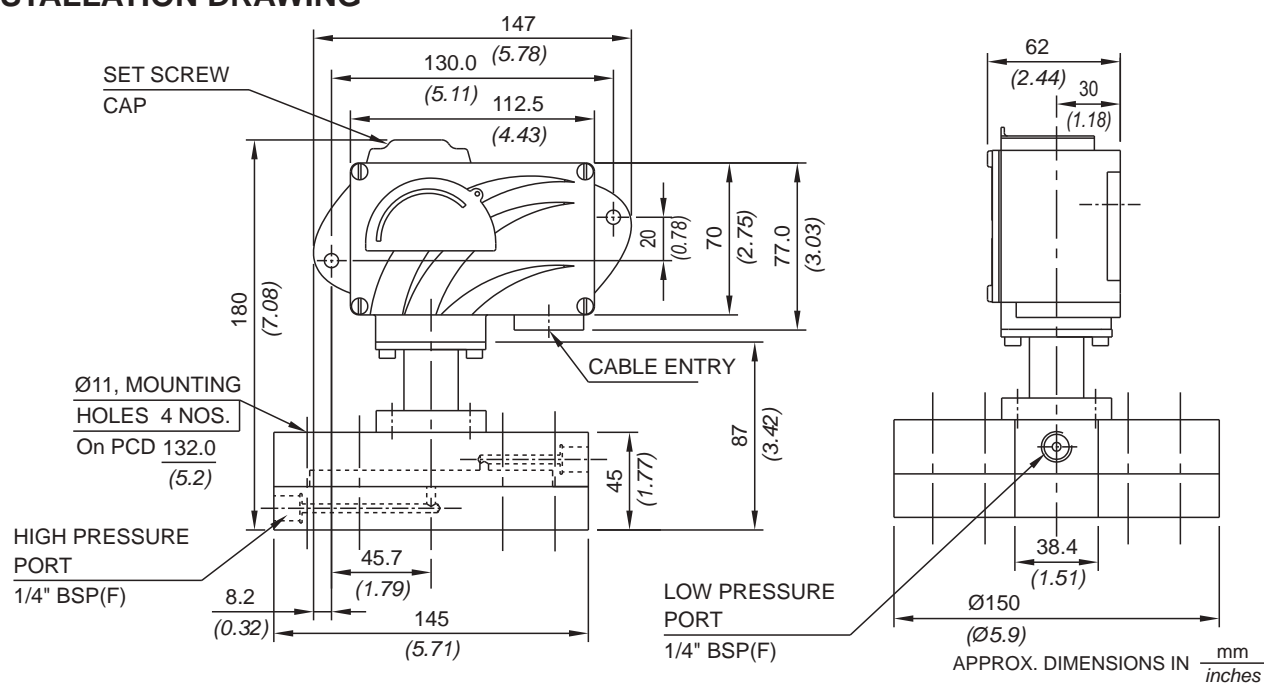


### No. Description

1. *High Pressure Housing*
2. *Spring*
3. *H P Plunger*
4. *Diaphragm*
5. *Plunger 'O' ring*
6. *Plunger Screw*
7. *L P Plunger*
8. *Main Sealing 'O' ring*
9. *Low Pressure Housing*
10. *Sealing 'O' ring*
11. *Diaphragm*
12. *Small Plunger*

Note : *wetted parts* are mentioned in *italics*.

## INSTALLATION DRAWING



## RANGE SELECTION TABLE

Range Code	Range mbar ("wc)	Differential* mbar ("wc)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
M03	5 - 25 (2.007 - 10.037)	5 (2.007)	100 (1450.38)
M05	10 - 50 (4.015 - 20.073)	5 (2.007)	100 (1450.38)
M10	10 - 100 (4.015 - 40.146)	10 (4.015)	100 (1450.38)
M15	10 - 150 (4.015 - 60.22)	10 (4.015)	100 (1450.38)
M25	20 - 250 (8.03 - 100.36)	15 (6.022)	100 (1450.38)
M35	50 - 350 (20.073 - 140.51)	35 (14.05)	110 (1595.42)

\* Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER INDUSTRIAL LOW ΔP HIGH PROOF PRESSURE DIFFERENCE SWITCHES

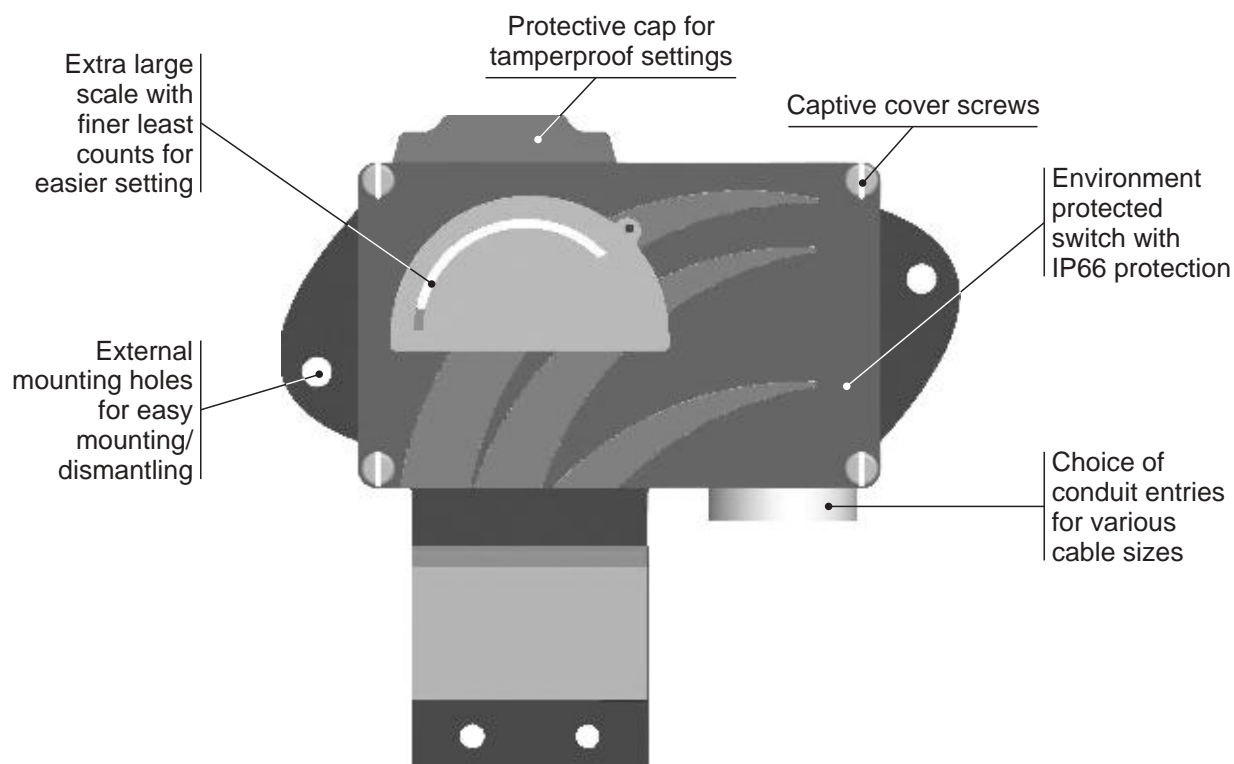
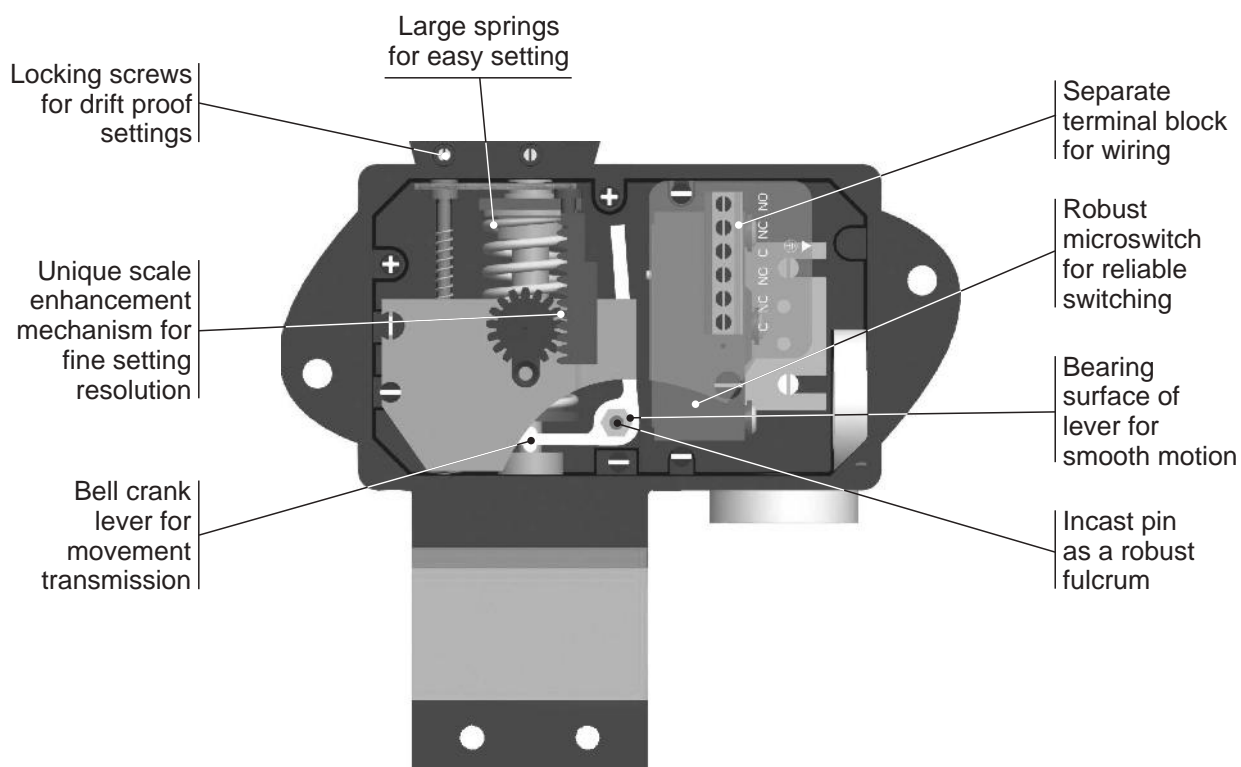
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in mbar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>DF1</b> = pressure difference switch, fixed differential without scale <b>DF2</b> = pressure difference switch, fixed differential with scale in mbar <b>DF3</b> = pressure difference switch, fixed differential with scale in "wc <b>*DA1</b> = pressure difference switch, adjustable differential without scale <b>*DA2</b> = pressure difference switch, adjustable differential with scale in mbar <b>*DA3</b> = pressure difference switch, adjustable differential with scale in "wc * Available with A9 (in group 6) only	<b>M03</b> = (5 - 25) <b>M05</b> = (10 - 50) <b>M10</b> = (10 - 100) <b>M15</b> = (10 - 150) <b>M25</b> = (20 - 250) <b>M35</b> = (50 - 350)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon

eg. A hydraulic diaphragm pressure switch, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 20 mbar to 250 mbar pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	PF1	M25	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

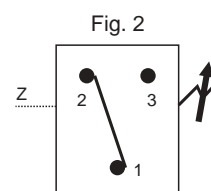
# MD VACUUM SWITCHES



**Approximate Weight :** 1.500 Kg.

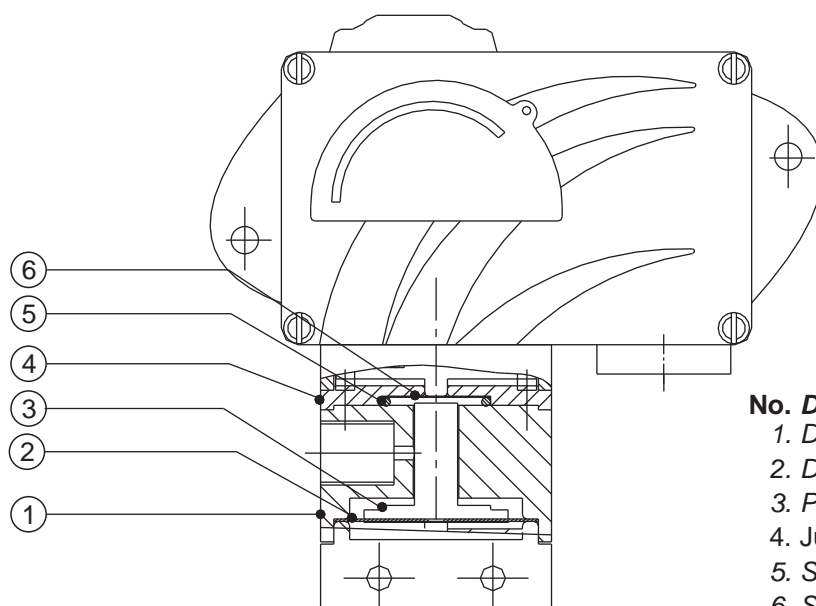
**Some Applications :** Used in filters, vacuum pumps, blower systems, etc.

**Electrical Connection :**





## PRESSURE CAPSULE DETAILS

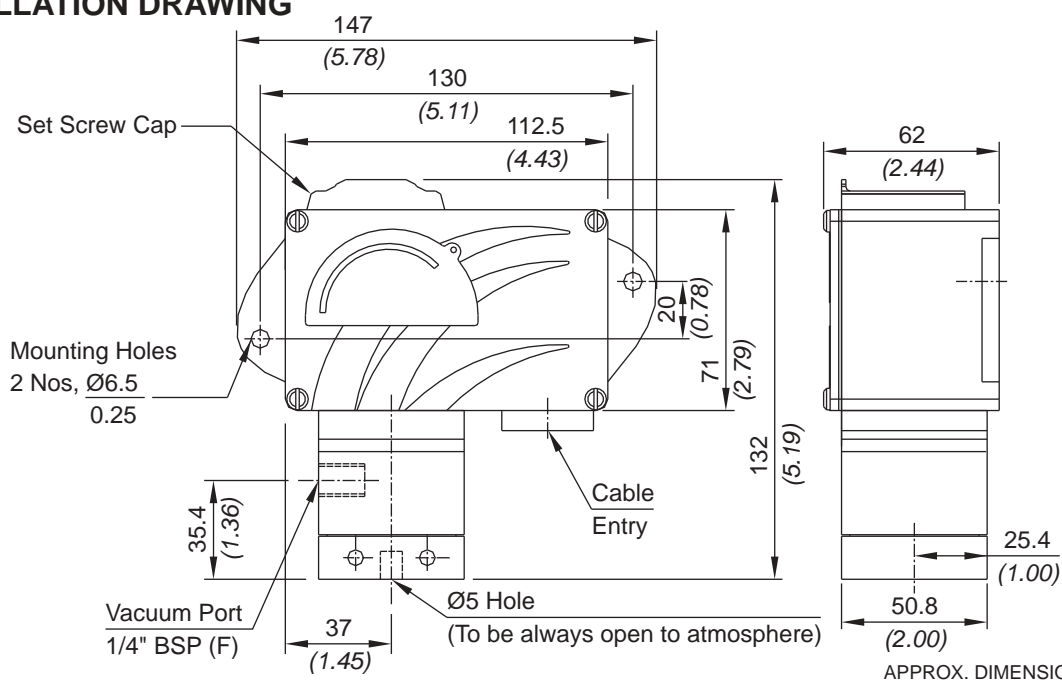


### No. Description

1. Disc
2. Diaphragm
3. Plunger (SS316)
4. Junction Plate
5. Sealing 'O' Ring (Teflon®)
6. Sealing diaphragms (Teflon®)

Note : wetted parts are mentioned in italics.

## INSTALLATION DRAWING



# MD VACUUM SWITCHES

## RANGE SELECTION TABLE

Range Code	Range mm Hg ("Hg)	Differential* mm Hg ("Hg)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
V00	† 760 - 100 (29.92 - 3.94)	30 (1.181)	12 (174.05)

\*Minimum differential increases with setpoint (Graphs available on request)

† Typical values achieved at sea level, total vacuum that can be achieved varies mainly with altitude.

**\* Note :**

Microswitches A2 through A7 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.

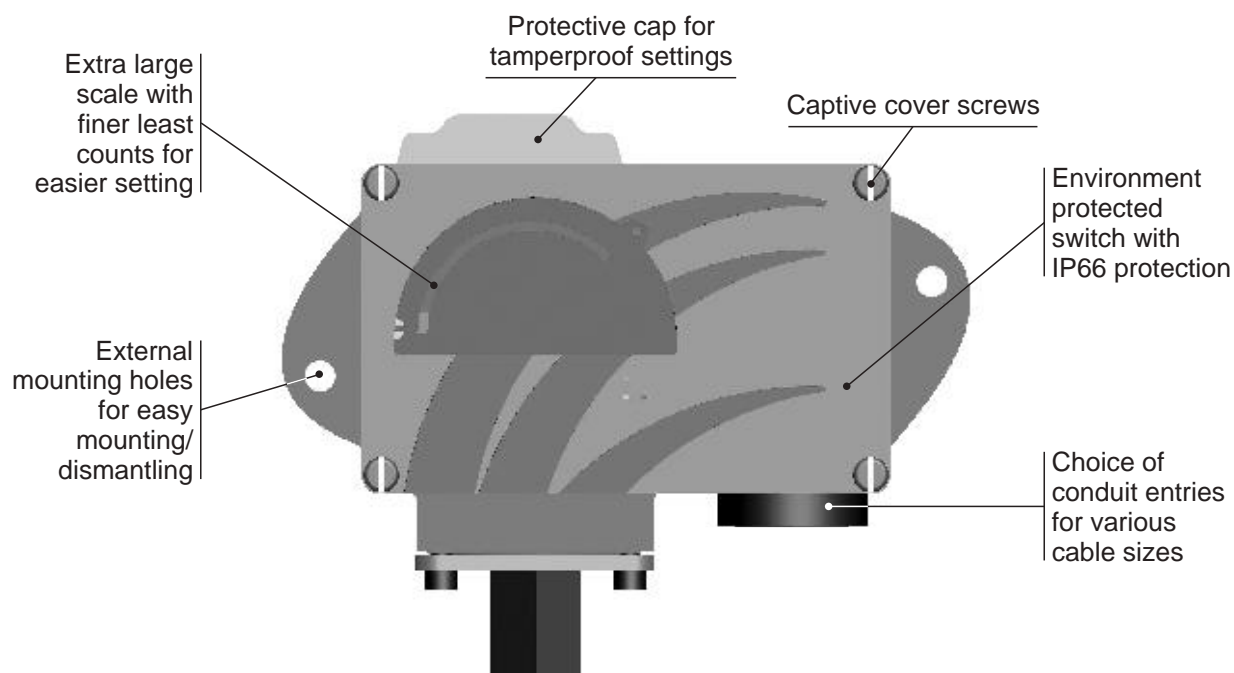
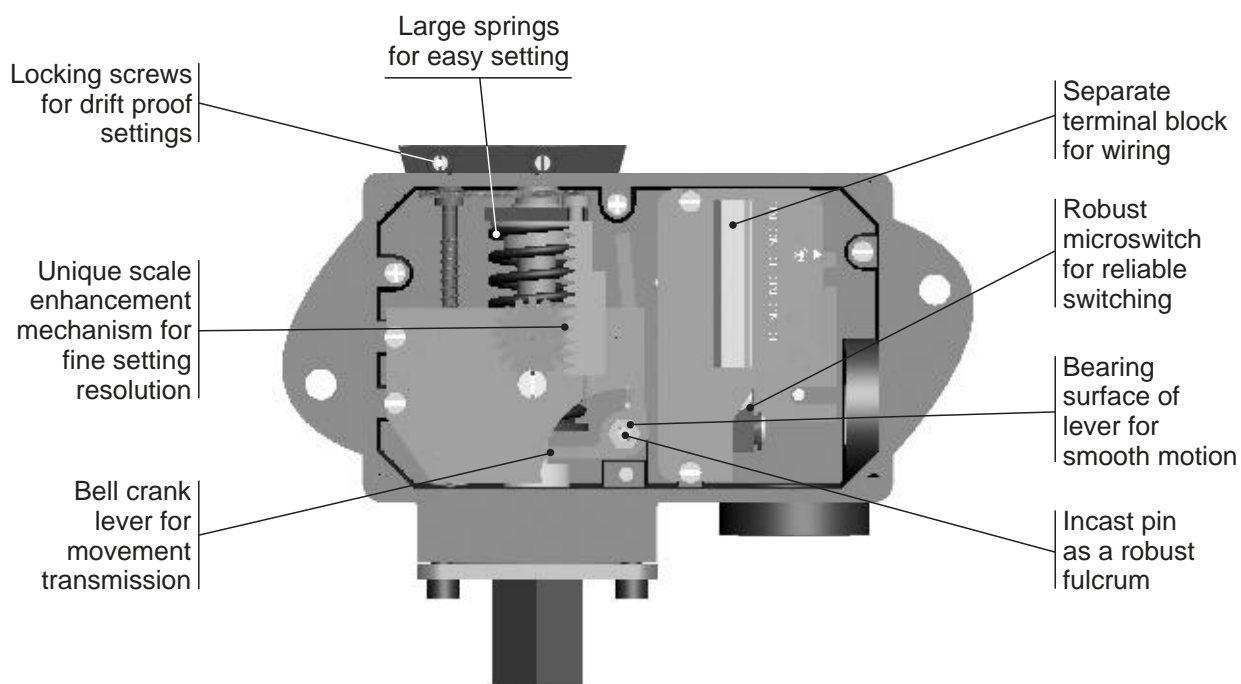
## HOW TO ORDER INDUSTRIAL VACUUM SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in mmHg)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>VF1</b> = vacuum switch, fixed differential without scale <b>VF2</b> = vacuum switch, fixed differential with scale in mmHg <b>VF3</b> = vacuum switch, fixed differential with scale in "Hg <b>*VA1</b> = vacuum switch, adjustable differential without scale <b>*VA2</b> = vacuum switch, adjustable differential with scale in mmHg <b>*VA3</b> = vacuum switch, adjustable differential with scale in "Hg *Available with A9 (in group 6) only	<b>V00</b> = († 760 - 100)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>*A2</b> = Hermetically sealed for corrosive environments <b>*A3</b> = gold plated contacts for low voltage applications <b>*A4</b> = DPDT configuration <b>*A5</b> = for high DC ratings <b>*A7</b> = 2SPDT switching elements <b>*A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>A1</b> = Aluminium / ¼" BSP(F) <b>A2</b> = Aluminium / ¼" NPT(F) <b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon
<input type="checkbox"/>	MD	1	VF1	V00	A1	S1	0

eg. A vacuum weatherproof switch, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, fixed differential without scale, having 760 mmHg to 100 mmHg vacuum range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

Please specify full model number to avoid ambiguity.

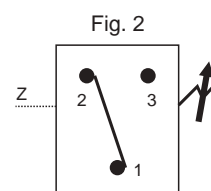
# MD HIGH RANGE COMPOUND SWITCHES



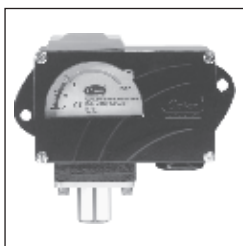
**Approximate Weight :** 0.900 Kg.

**Some Applications :** where the set point can vary from vacuum(-ve) pressure to +ve pressure.

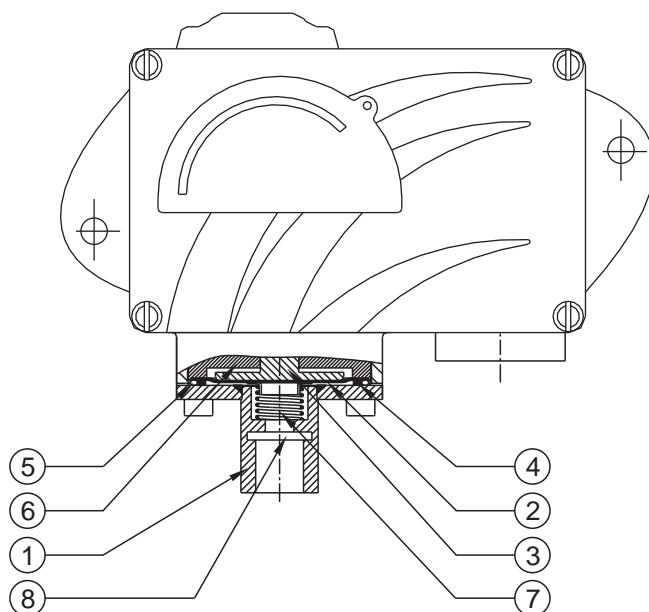
**Electrical Connection :**







## PRESSURE CAPSULE DETAILS

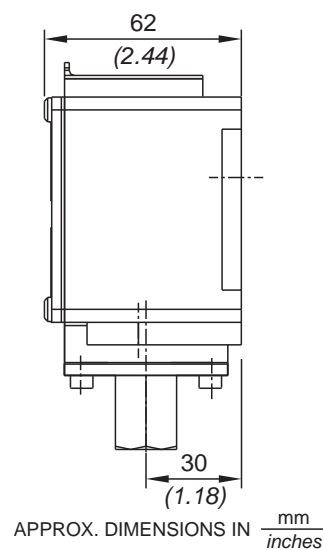
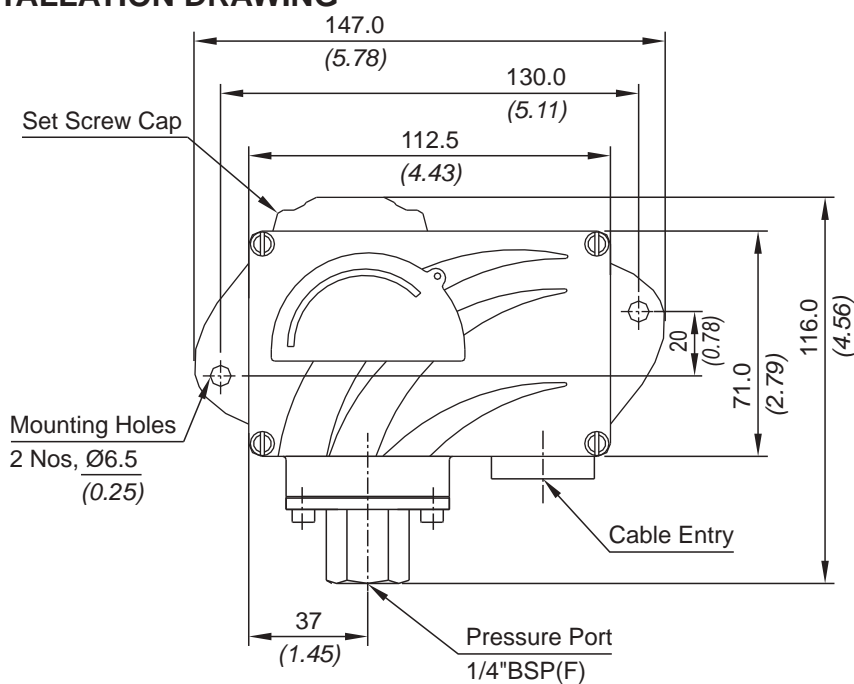


### No. Description

1. Pressure housing (SS316)
2. Diaphragm (Teflon®)
3. Plunger
4. Steel Ring (SS316)
5. 'O' ring (Teflon®)
6. Disc
7. Bottom Spring
8. Support Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD HIGH RANGE COMPOUND SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A1" microswitch	
C01	-1 to 1.0 (-14.50 - 14.50)	0.2 (2.90)	12 (174.05)
C03	-1 to 2.6 (-14.50 - 37.71)	0.6 (8.70)	12 (174.05)
C04	-1 to 3.6 (-14.50 - 52.26)	0.8 (11.60)	12 (174.05)

\* Minimum differential increases with setpoint (Graphs available on request)  
 \* Differentials of miroswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch.  
 Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER INDUSTRIAL HIGH RANGE COMPOUND SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>CF1</b> = compound switch, fixed differential without scale	<b>C01</b> = (-1 to 1.0) <b>C03</b> = (-1 to 2.6) <b>C04</b> = (-1 to 3.6)	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5 A; 250 VAC  Please refer page no. 230 for more microswitch options * Please refer note under Range Selection Table	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, having -1 bar to +1 bar pressure range, with 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & Neoprene diaphragm shall be specified by

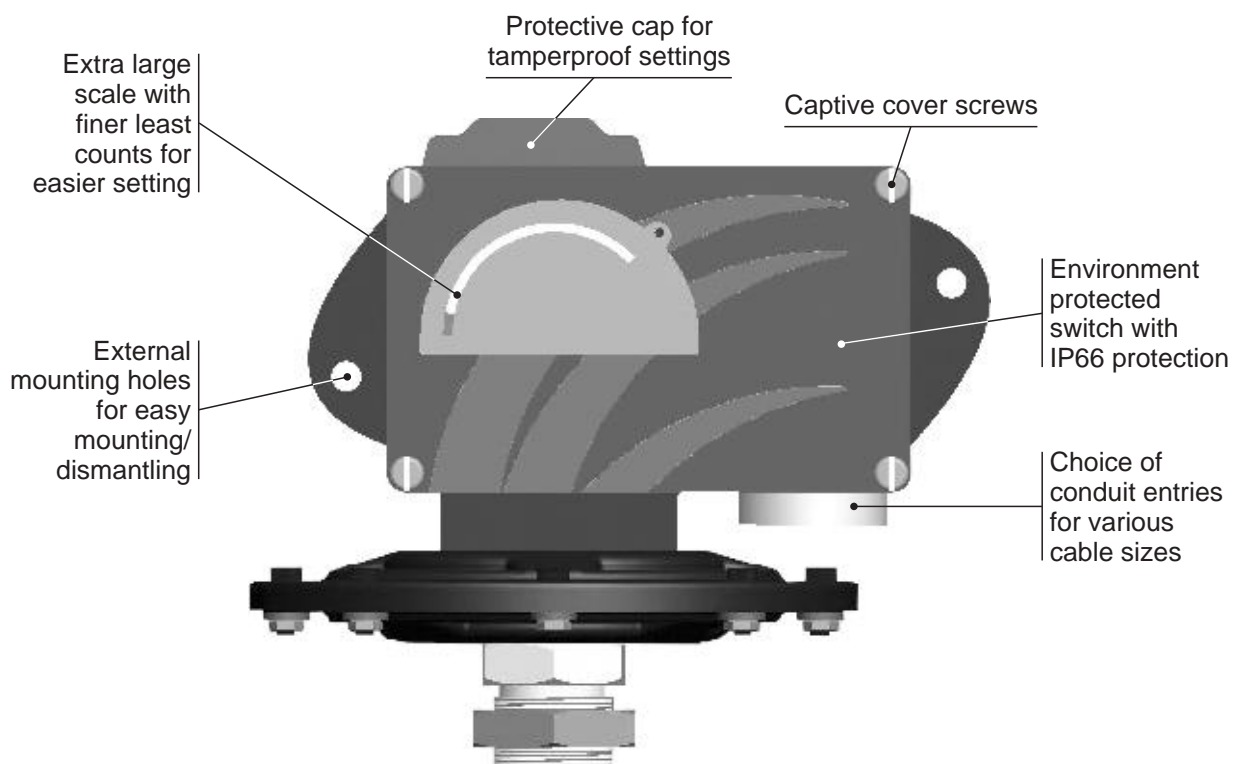
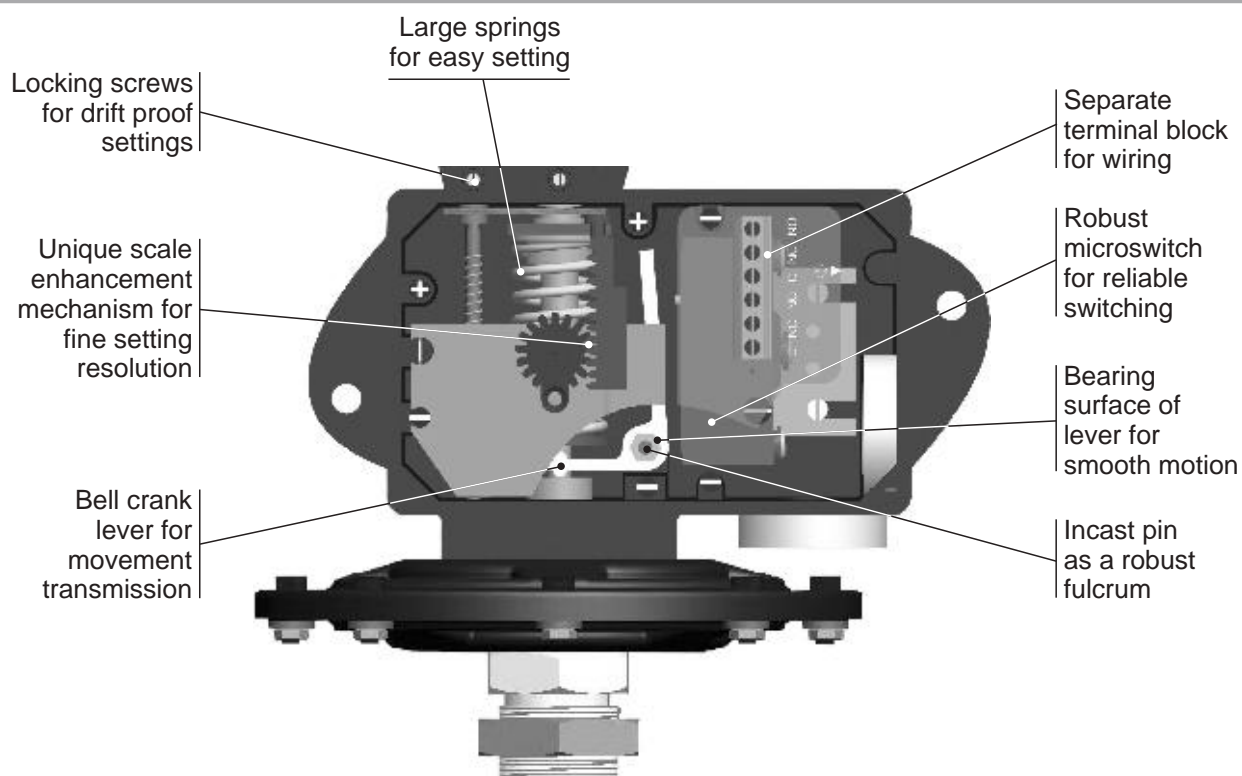
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	CF1	C01	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

## HIGH RANGE COMPOUND SWITCHES

# MD

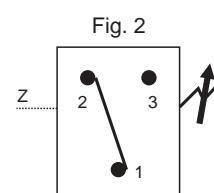
# MD LOW RANGE COMPOUND SWITCHES



**Approximate Weight :** 1.500 Kg.

**Some Applications :** Used in furnaces, turbines etc.

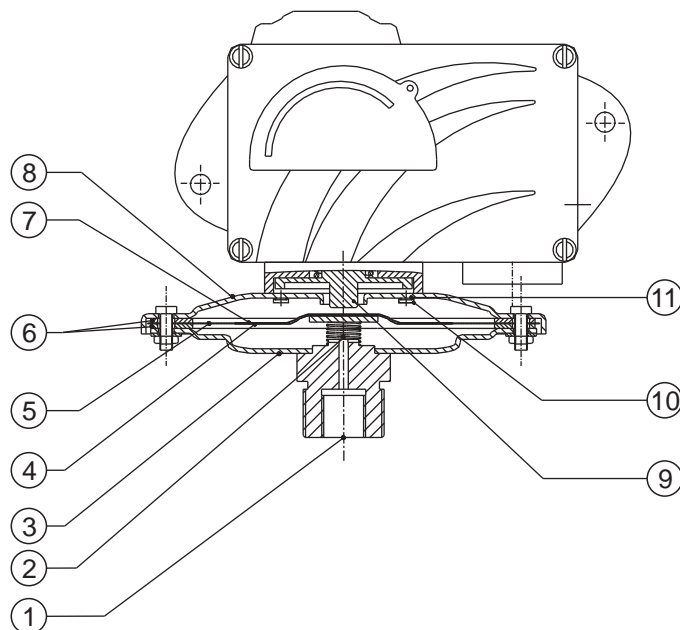
**Electrical Connection :**



# LOW RANGE COMPOUND SWITCHES MD



## PRESSURE CAPSULE DETAILS



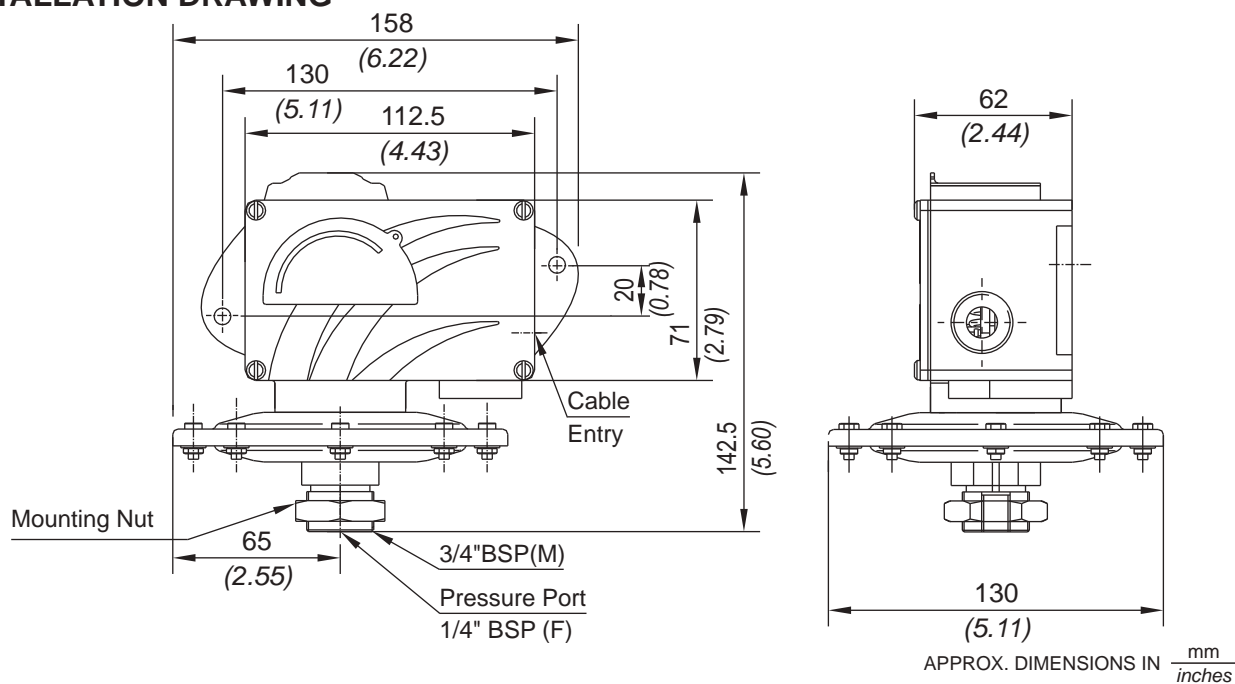
### No. Description

1. *Pressure port (M.S.)\**
2. *Support spring (S.S.)*
3. *Bottom flange (M.S.)*
4. *Support plate (Aluminium)*
5. *Diaphragm (Neoprene)*
6. *Gasket (Nitrile)*
7. *Top plate (Aluminium)*
8. *Top flange (M.S.)*
9. *Plunger*
10. *Top flange screw (M.S.)*
11. *Sealing 'O' ring (Nitrile)*

\*Pressure port is brazed with flange

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MD LOW RANGE COMPOUND SWITCHES

## RANGE SELECTION TABLE

Range Code	Range mm wc ("wc)	Differential* mm wc ("wc)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A1" microswitch	
CL2	-150 to 150 (-5.905 to 5.905)	40 (1.605)	2 (29.00)
CL3	-250 to 250 (-9.842 to 9.842)	60 (2.410)	2 (29.00)

\*Minimum differential increases with setpoint, values with neoprene diaphragm (Graphs available on request)

\* Differentials of miroswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER INDUSTRIAL LOW RANGE COMPOUND SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in mm wc)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MD</b> = Industrial pressure switch with diecast Aluminium enclosure to IP66 as per IS2147	<b>1</b> = ½" NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>CF1</b> = Compound switch, fixed differential without scale	<b>CL2</b> = (-150 to 150) <b>CL3</b> = (-250 to 250)	<b>A1</b> = General purpose microswitch rated at 15A; 250 VAC <b>A2</b> = Hermetically sealed for corrosive environments <b>A3</b> = gold plated contacts for low voltage applications <b>A4</b> = DPDT configuration <b>A5</b> = for high DC ratings <b>A6</b> = elements with adjustable deadband <b>A7</b> = 2SPDT switching elements <b>A9</b> = General purpose microswitch rated at 5A; 250 VAC	<b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon
						Please refer page no. 226 & 227 for more pressure port options	For additional wetted parts please refer Pressure Capsule Details on Page 167
						* Some microswitches may not be available for particular ranges. Please check with sales office. Please refer page no. 230 for more microswitch options	

eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, having -150 to 150 mm wc pressure range, with 15Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

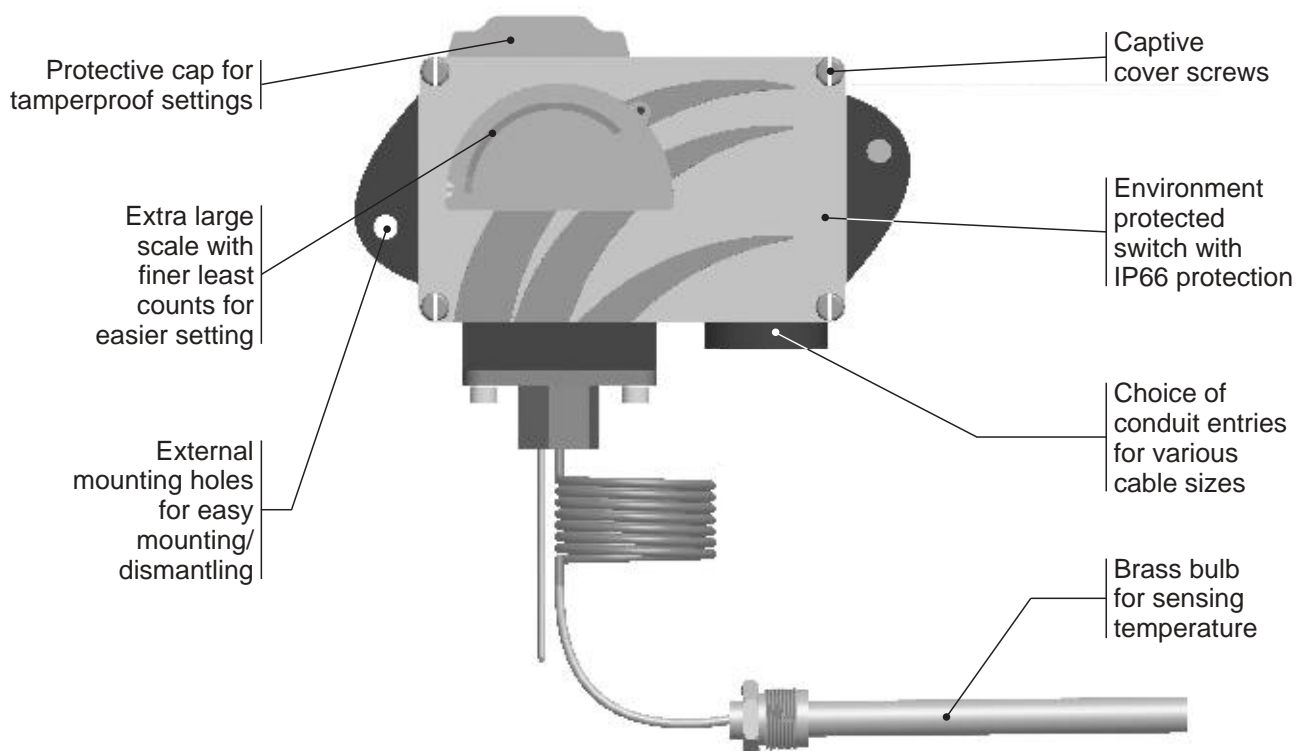
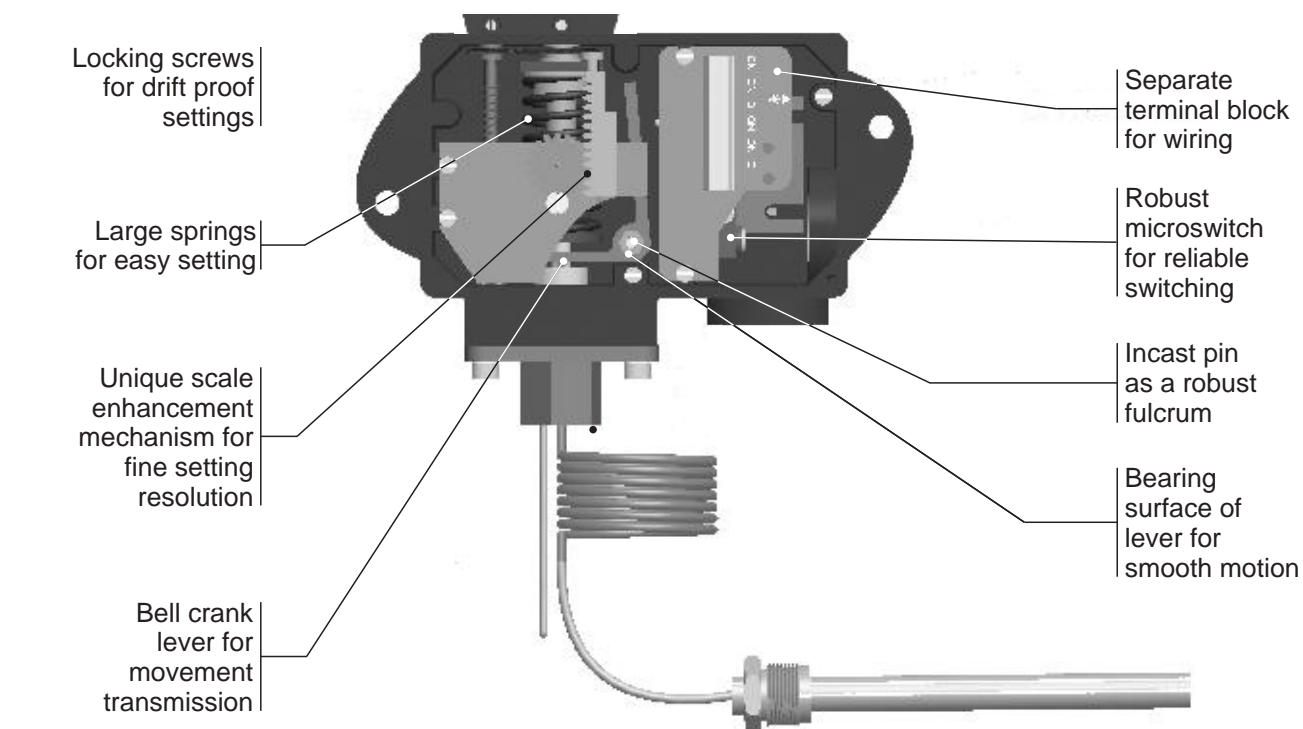
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	CF1	CL2	A1	S1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

## LOW RANGE COMPOUND SWITCHES

# MD

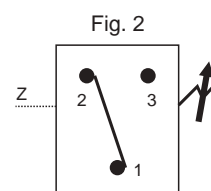
# MD TEMPERATURE SWITCHES



**Approximate Weight :** 0.950 Kg.

**Some Applications :** To detect limiting temperature levels in non-hazardous areas.

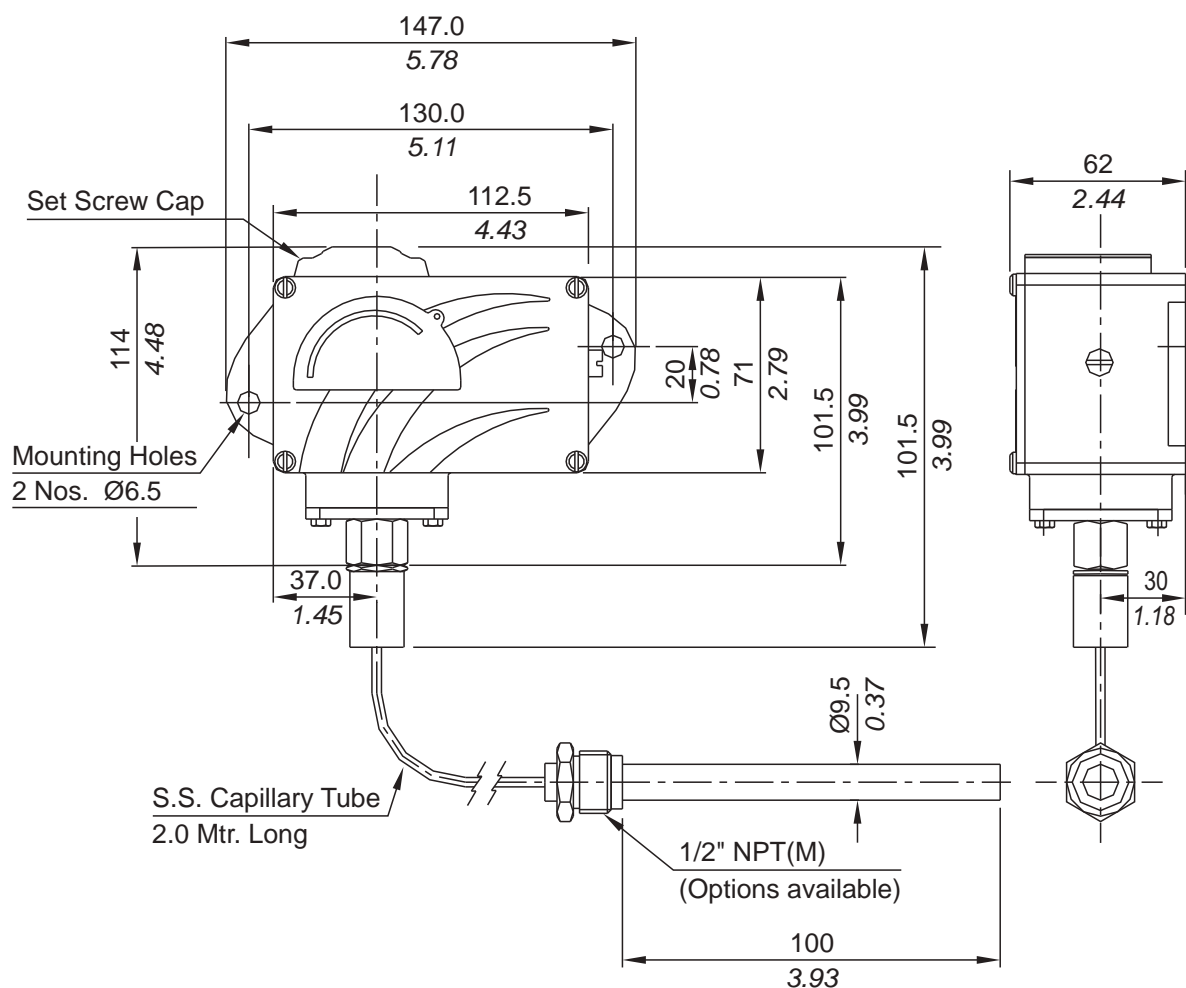
**Electrical Connection :**







## INSTALLATION DRAWING



# MD TEMPERATURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range °C (°F)	Differential* °C (°F)	Maximum Working Temperature °C (°F)
		Approximate Maximum for "A1" microswitch	
T1H	25 - 90 (77 - 194)	15 (59)	150 (302)
T2H	70 - 150 (158 - 302)	20 (68)	200 (392)
T3H	120 - 215 (248 - 419)	30 (86)	300 (572)

\* Approximate differential at midrange for A1 microswitch. Differentials increase with setpoint. Differentials vary with microswitch combinations. Please consult sales office for details

## HOW TO ORDER INDUSTRIAL TEMPERATURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in °C)	Microswitch Type	Temp. Bulb Material / Size	Capillary Material / Size
<input type="checkbox"/> Reserved for Non-standard Options not covered in Catalogue. Will Be given by Manufacturer, Only after Agreement of Supply details With customer.	<b>MD</b> = Industrial temp. switch with diecast Aluminum Enclosure to IP66	<b>1</b> = ½ " NPT threads <b>2</b> = ¾" NPT threads <b>3</b> = M20 X 1.5 threads	<b>TF1</b> = Temperature Switch, fixed differential without scale <b>TF2</b> = Temperature Switch, fixed differential with scale in °C	<b>T1H</b> = 25 - 90 <b>T2H</b> = 70 - 150 <b>T3H</b> = 120 - 215	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A7</b> = 2SPDT switching elements	<b>B1</b> = Brass / Dia. 9.5 mm, 123 mm length, with 3/8" BSP (M) thermowell connection <b>B2</b> = Brass / Dia. 9.5 mm, 123 mm length, with 3/8" NPT (M) thermowell connection <b>B3</b> = Brass / Dia. 9.5 mm, 123 mm length, with 1/2" NPT (M) thermowell connection	<b>2</b> = SS316 / 2.0 meter

E.g. An Industrial Temperature Switch, with 1/2"NPT cable entry in aluminum housing as 1 SPDT, fixed differential without scale, having 25°C to 90°C temperature range, with 15 Amp. microswitch, with Brass 9.5 mm diameter bulb, having length 123 mm with 3/8"BSP(M), with 2.0 meter SS316 capillary length shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	TF1	T1H	A1	B1	2

Please specify full model number to avoid ambiguity.

## Introduction

MZ series pressure switches have been designed for applications that require cost effective outdoor mounting, in aggressive environments. The tough polycarbonate cover, fitted on a stainless steel base, retained by SS screws offers excellent resistance to corrosion, and also allows a view of the internal scale and working of the pressure switch. The reliable microswitch offers narrow deadband, switching values, which have excellent repeatability. By using appropriate capsules and wetted parts, MZ series pressure switches can be used for thousands of applications.

### APPLICATIONS

- Power Generation
- Burners and Furnaces
- Glass and Metal Industries
- Chemical Industries
- Steel Industry
- Hydraulic, Steam and Gas Turbines
- Boilers & Compressors
- Machine tools
- Water treatment
- Sugar and Paper Mills
- Fire protection
- Surgical gas, Breweries, Milk industries
- Tyre Industry

### PRODUCT SPECIFICATIONS:

- Storage temperature : Atmospheric temperature
- Operating ambient temperature : - 20° C to + 60° C
- Media temperature : for rubber diaphragms 80° C max
- Can be offered for higher temperatures with other capsule combinations
- Setpoint repeatability :  $\pm 1\%$  of FSR
- Enclosure : Tough Polycarbonate and SS to IP 66
- Switch output : SPDT / 2SPDT
- Process connection :  $\frac{1}{4}$  "BSP standard,
- Approximate weight : 1 kg

### FEATURES

- Robust
- Externally visible scale for viewing, alongwith internal working of the switch
- Enclosure protection : IP 66 standard
- Reliable accurate microswitches for long life switching
- Customized arrangements for switching values on request
- Easy safe wiring options
- Locking and sealing arrangement to avoid tampering of setpoints on field
- Accuracy  $\pm 1\%$  FSR
- Warranty : 2 years

\*Accuracy changes with switch configuration

# PROCESS SWITCHES

## SPECIFIER'S GUIDE FOR

PRESSURE SWITCHES

PRESSURE DIFFERENCE SWITCHES

VACUUM SWITCHES

TEMPERATURE SWITCHES



## Using the section

This section helps you make a logical choice in selecting the best product for a particular application. It allows a user familiar with our product line to locate the exact page the product is listed on. For those not familiar with our products, a logical sequence is given to help the user pick the best product for their need.

By taking a few minutes to familiarise yourself with the catalogue organization, you will find it very easy to locate the product / information you need.

1. The contents page lists the broad outline in which the catalogue is organized, and will help the user familiar with products to select the page on which the product or other useful information is listed.

2. Need Product Selection help ?

Product selection help will start with the "Pictorial Index" on Page 177, where the products are broadly classified. A brief description of each product group , a typical photo of the product within the group and the page number on which it is listed are given.

If the user is not familiar with the products, a product selection guide is provided on pages 182 through 185, where photos for each product and important specifications are given to help determine and select the best product for the application.

By evaluating and comparing these parameters, a logical selection can be made. Turn to the page on which the product information for the selected product is listed, for :

Capsule Construction details

Physical sizes

Special features

Ranges, hysteresis, electrical ratings etc.

Ordering information

Some applications

The organisation of each of these pages is demonstrated on pages 178 and 179, of this section "How to use this catalogue".

In many cases, more than one product may work. For the most cost effective solution, compare prices and consider alternatives. Remember, the end cost includes initial product price, plus the installation, plus the service.

3. Need the terminology explained? (see page 330)

Turn to page 330 for the definitions and terminology. This will help you familiarize with the terms used throughout the catalogue.

4. Need information on Accessories? (see page 322)

Turn to page 322 for information on important accessories. These will give information on only important accessories, and information needed, when these are to be supplied with our products.

5. Need selection guidance? (see page 331)

A logical procedure on page 331 will help you to consider most of the important factors when selecting a pressure switch.

6. Need other products ? (see page 332)

Products other than those listed in this catalogue are referenced on these pages. Separate catalogues for these products are available.

# Pictorial Index

## PRESSURE SWITCHES

### HIGH RANGE

#### HIGH RANGE



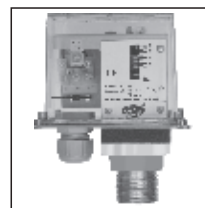
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#### HIGH PROOF HIGH RANGE



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#### LARGE BORE HIGH RANGE



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#### FLANGED



Page No. 198

### HYDRAULIC RANGE\*

#### HYDRAULIC RANGE



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#### HYDRAULIC DIAPHRAGM RANGE



Page No. 206

## PRESSURE DIFFERENCE SWITCHES

#### HIGH RANGE



Page No. 210

#### HIGH RANGE DP



Page No. 214

## VACUUM SWITCHES

#### HIGH RANGE



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## TEMPERATURE SWITCHES



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\*Hydraulic ranges are ranges typically from 2 bar to 600 bar, used in oil applications. However, these switches can be used for other media depending on wetted parts compatibility.

# HOW TO USE this section

Due to the variety in product types and their salient features, catalogue page formats may vary. But generally the following format is adhered to.

Elements appearing on each page will be:

1. Product family / series - A product family / series will appear on the outside page corner, depending on the left / right hand page, and will be in large bold type.
2. Product section - will appear immediately following the product family / series at top of the page and will be in bold type.
3. Features - will appear next to product description & will enlist only the major attributes.
4. Pressure capsule details - will show the construction of the pressure capsule and all it's internal parts. If the process / working medium is variable, the wetted parts will be mentioned in italics. If the wetted parts are unique, the material of construction (MOC) will be mentioned

alongside in brackets. Where the material of construction is not specified, it will vary and the options are to be selected by the user considering the compatibility of the process / working medium. Modifications can be made to suit any particular medium, if the answer for your needs is not in the standard MOC listed. Products for which process / working medium is predefined, pressure capsule details are not provided (e.g as in case of comparison test pump). Pressure capsule details of accessories are not given.

5. Installation drawing - will show the typical installation dimensions of products as they exist in their standard forms. The dimensions are mentioned in millimetres and also in inches to facilitate the user. The dimensions of accessories will have to be added to these to arrive at any particular general arrangement (GA) drawings. The dimensions are approximate and for precise dimensions, where mounting space is restricted, the user may contact the nearest sales office. Installation drawings of only fast moving accessories are given.

**1 MZ HIGH RANGE PRESSURE SWITCHES**

**2**

**3**

Transparent tough polycarbonate cover for visibility

Separate terminal block for wiring

Internal setscrew to avoid easy access to setpoint

Large spring for ease of setpoint

IP66 enclosure for excellent ingress protection

Sealing facility to avoid tampering of working switch

Cable gland as a standard accessory

Non corroding exteriors for a long life of the switch

SS316 & teflon as wetted parts to switch a wide variety of media

Approximate Weight : 0.550 Kg.

Some Applications :  
Used in humid or slightly corrosive atmosphere like jet dyeing machines, etc.

Electrical Connection :  
Fig. 2

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**6 HIGH RANGE PRESSURE SWITCHES MZ**

**7**

**Orion**  
INSTRUMENTS

**4**

**PRESSURE CAPSULE DETAILS**

No. Description  
1. Pressure Housing (SS316)  
2. Diaphragm (Teflon)  
3. Plunger  
4. Steel Ring (SS316)  
5. O-Ring (Teflon)  
6. Disc

Note : wetted parts are mentioned in italics.

**5**

**INSTALLATION DRAWING**

Cover Locking Screw  
4 Nos.

Cable Entry

Mounting Bracket

Pressure Port  
1/4" BSPP Std.  
(Options Avail.)

APPROX. DIMENSIONS IN mm  
inches

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## HOW TO USE this section

6. Photos - will appear on the relevant top of the page for products. If there are mounting variations / styles, all the styles for standard products will appear for easy identification. Options, if included in the photograph, are for demonstration only, and are not a part of the standard equipment. For accessories, the photos are not given due to the sheer variety and range available.

7. Logo - will appear on right hand top of page to identify the manufacturer.

8. Characteristics - Range tables and their relevant data, e.g the range covered, the differentials and maximum working pressures will generally appear on the right hand page. Additional technical details will also be mentioned, wherever required, on the right hand side of the page.

9. Ordering guide - A guide as to how to order the particular series' variations will appear on right hand bottom of the page. Only the variations available within a particular product family / series will appear here. Any additional accessories or modifications required for the product need to be mentioned in text by the user.

10. Some applications - will appear at the bottom left of the page. This is for easy understanding of the specific use of the product.

11. Numerous combinations are possible when pressure switches are provided with accessories like chemical seals, snubbers, remote seals, pipe mounting brackets, combination of switches mounted in a panel etc. Users are requested to provide the details of accessories required in text / drawings, as separate identification codes are provided for pressure switches fitted and supplied with accessories.

### MZ HIGH RANGE PRESSURE SWITCHES

#### RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
LP†	0.067 - 0.213 (0.97 - 3.09)	0.05 (0.72)	5 (72.52)
LP5	0.1 - 0.5 (1.45 - 7.25)	0.10 (1.45)	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.60 (8.70)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.56)	0.60 (8.70)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request), results for neoprene diaphragm.  
†Range not available in SS316 L diaphragm.

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### HIGH RANGE PRESSURE SWITCHES MZ

#### HOW TO ORDER PROCESS HIGH RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Material and allocation	Model	Cable Entry Size	Switch Type	Pressure Range (Values in bar)	Microswitch Type	Material Size	Diaphragm
<p><input type="checkbox"/> Reserved for process pressure switches covered in the product catalogue. Will be supplied as per manufacturer's supply details with customer.</p>	<p><b>MZ</b> = process pressure switch with tough transparent enclosure to IP67 as per SS316 L</p>	<p><b>3</b> = 3/8" x 1/2" cable gland</p>	<p><b>PF2</b> = pressure switch with scale in bar</p> <p><b>PF3</b> = pressure switch with scale in psi</p> <p><b>*PA2</b> = pressure switch differential with scale in bar</p> <p><b>*PA3</b> = pressure switch differential with scale in psi</p> <p><b>H01</b> = (0.1 - 1.0)</p> <p><b>H02</b> = (0.1 - 1.5)</p> <p><b>H03</b> = (0.1 - 2.0)</p> <p><b>H04</b> = (0.2 - 3.6)</p> <p><b>H07</b> = (0.5 - 7.0)</p> <p><b>H10</b> = (1.0 - 10.0)</p> <p><b>H15</b> = (1.0 - 15.0)</p> <p><b>H30</b> = (5.0 - 25.0)</p>	<p><b>LP</b> = (0.067 - 0.213)</p> <p><b>LP5</b> = (0.1 - 0.5)</p> <p><b>H01</b> = (0.1 - 1.0)</p> <p><b>H02</b> = (0.1 - 1.5)</p> <p><b>H03</b> = (0.1 - 2.0)</p> <p><b>H04</b> = (0.2 - 3.6)</p> <p><b>H07</b> = (0.5 - 7.0)</p> <p><b>H10</b> = (1.0 - 10.0)</p> <p><b>H15</b> = (1.0 - 15.0)</p> <p><b>H30</b> = (5.0 - 25.0)</p>	<p><b>A8</b> = General purpose microswitch rated at 5 A, 250 VAC</p> <p><b>A9</b> = ASPDT microswitches</p> <p><b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC</p>	<p><b>S1</b> = SS316 1/2" BSPF</p> <p><b>S2</b> = SS316 1/2" NPTF</p> <p><b>2</b> = SS 316L</p> <p><b>4</b> = Monel</p>	<p><b>0</b> = Neoprene</p> <p><b>1</b> = Teflon</p> <p><b>2</b> = SS 316L</p> <p><b>4</b> = Monel</p>

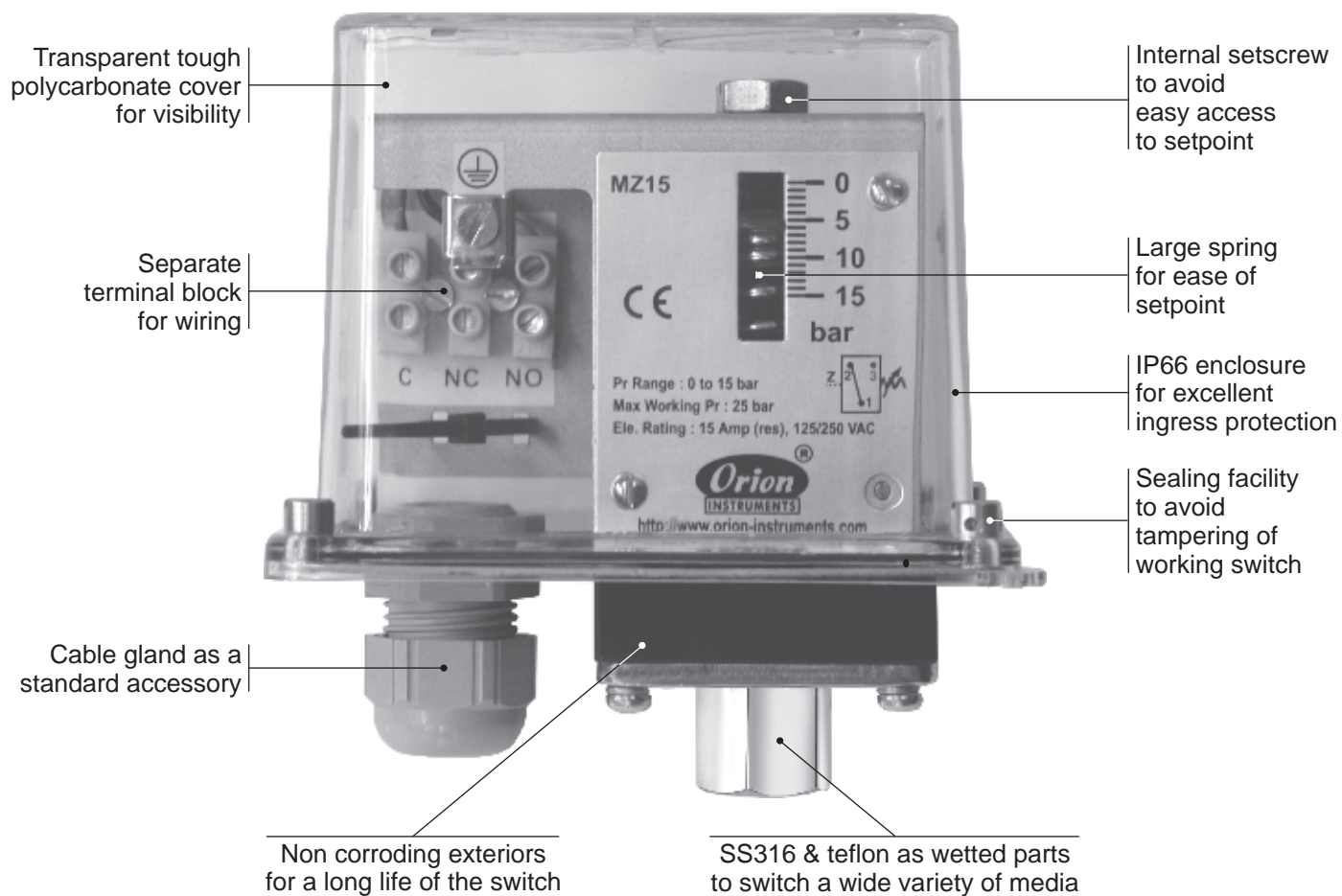
\* Please refer note under Range Selection Table

eg. A process pressure switch with fixed differential having 0.1 bar to 1 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with 1/2" BSPF port size & neoprene diaphragm shall be specified by

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## Switch Construction



The versatile construction of MZ series process pressure switches can be configured to suit applications, by selecting the following main subassemblies / components :

## a) The enclosure

The tough polycarbonate cover, fitted on a stainless steel base, retained by SS screws offers excellent resistance to corrosion, and also allows a view of the internal scale and working of the pressure switch. The reliable snapaction microswitch offers narrow deadband, switching values, which have excellent repeatability. By using appropriate capsules and wetted parts, MZ series pressure switches can be used for thousands of applications.

A standard cable gland (PG13.5 or M20 x 1.5) is provided as a standard accessory.

## b) The electrical element (s) :

Choice of electrical elements to suit end use are offered, like :

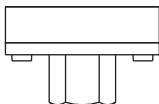
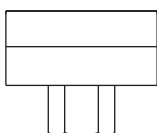
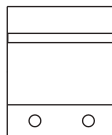
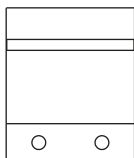
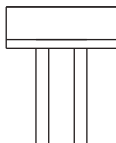
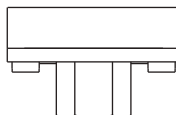
- A8 : General purpose applications
- A7 : 2SPDT switching elements
- A9 : General purpose applications

It is possible to have more options of electrical elements not published here, to suit individual end use.

The deadband (or hysteresis / on-off differential) of the switches will change with the change of the electrical element (s). The approximate values for each range (for standard microswitches offered) are published in this catalogue

## c) The pressure capsule :

To suit the setpoints , the working media and the function of the switch in the application:

<b>High Range Pressure Switches</b> (typically from 0.067 barg to 25 barg) 	<b>High Proof High Range Pressure Switches</b> (typically from 0.1 barg to 25 barg : Pmax = 70) 	<b>High Range Pressure Difference Switches</b> (typically from 0.1 barg to 25 barg) 
<b>Vacuum Switches</b> (typically from 760 mm Hg to atmospheric pressure) 	<b>Hydraulic Range Pressure Switches</b> (typically from 0.5 barg to 400 barg) 	<b>OEM Switches</b> (typically from 0.1 barg to 25 barg) 

The pressure capsule can be modified to take high proof pressures [typically 100 bar for high pressure switches, or pressure difference switches (from high pressure side)].

Several accessories like chemical seals, pipe mounting brackets etc can be supplied with these switches to suit the media to be sensed. All of these are not listed, though most popular ones can be found on pages 322 through 328.

Please do get in touch with us for any of your applications, not addressed in this catalogue. We would be glad to offer you a solution.

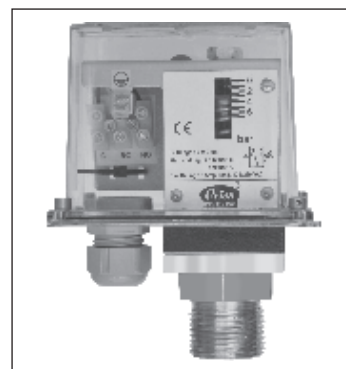
## Product Selection Guide



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Switch type	High range	High range high proof	Large Bore High Range
Repeatability (% FSR)	± 1	± 2	± 2
Range covered	0.067 bar to 25 bar	0.1 bar to 25 bar	0.1 bar to 25 bar
Enclosure Protection	IP 66		
Enclosure Material	Tough transparent polycarbonate		
sensing element Standard Optional	Diaphragm nylon reinforced neoprene diaphragm protected by Teflon SS 316L, Teflon, Monel      SS 316L, Teflon      SS 316L, Teflon, Monel		
Pressure housing Standard Optional	Monel	SS 316	Monel
Other Wetted Parts	Teflon, SS316		Teflon
Optional wetted parts through chem. seal	-		
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.		
Switching element	SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office		

Accessories can be supplied with most of the switches. Please consult sales office.



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Flanged	Hydraulic	Hydraulic Diaphragm	Switch type
$\pm 2$	$\pm 1$	$\pm 2$	Repeatability (% FSR)
0.1 bar to 200 bar	5 bar to 400 bar	0.5 bar to 400 bar	Range covered
IP 66			Enclosure Protection
Tough transparent polycarbonate			Enclosure Material
Diaphragm nylon reinforced neoprene diaphragm Teflon, SS316L, Hastelloy C, Monel, Titanium, Tantalum	Piston SS	Diaphragm SS316 Monel	sensing element Standard Optional
Flange SS316L Hastelloy C276, Monel, Titanium, Tantalum	SS 316		Pressure housing Standard Optional
Teflon, SS 316	SS	SS316, Teflon	Other Wetted Parts
-	-	-	Optional wetted parts through chem. seal
For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.			Temp. of working medium
SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office			Switching element

## Product Selection Guide



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Switch type	High range ?p		High Range DP	Vacuum
Repeatability (% FSR)	± 1		± 1	± 2
Range covered	0.1 bar to 3.6 bar		0.1 bar to 25 bar	760 mmHg to 100 mmHg
Enclosure Protection	IP 66			
Enclosure Material	Tough transparent polycarbonate			
sensing element Standard Optional	Diaphragm nylon reinforced neoprene diaphragm protected by Teflon Teflon			
Pressure housing Standard Optional	Aluminium SS 316	SS 316	Aluminium SS 316	
Other Wetted Parts	Teflon, SS, SS 316	Teflon	Teflon, SS 316	
Optional wetted parts through chem. seal				
Temp. of working medium	For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.			
Switching element	SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office			

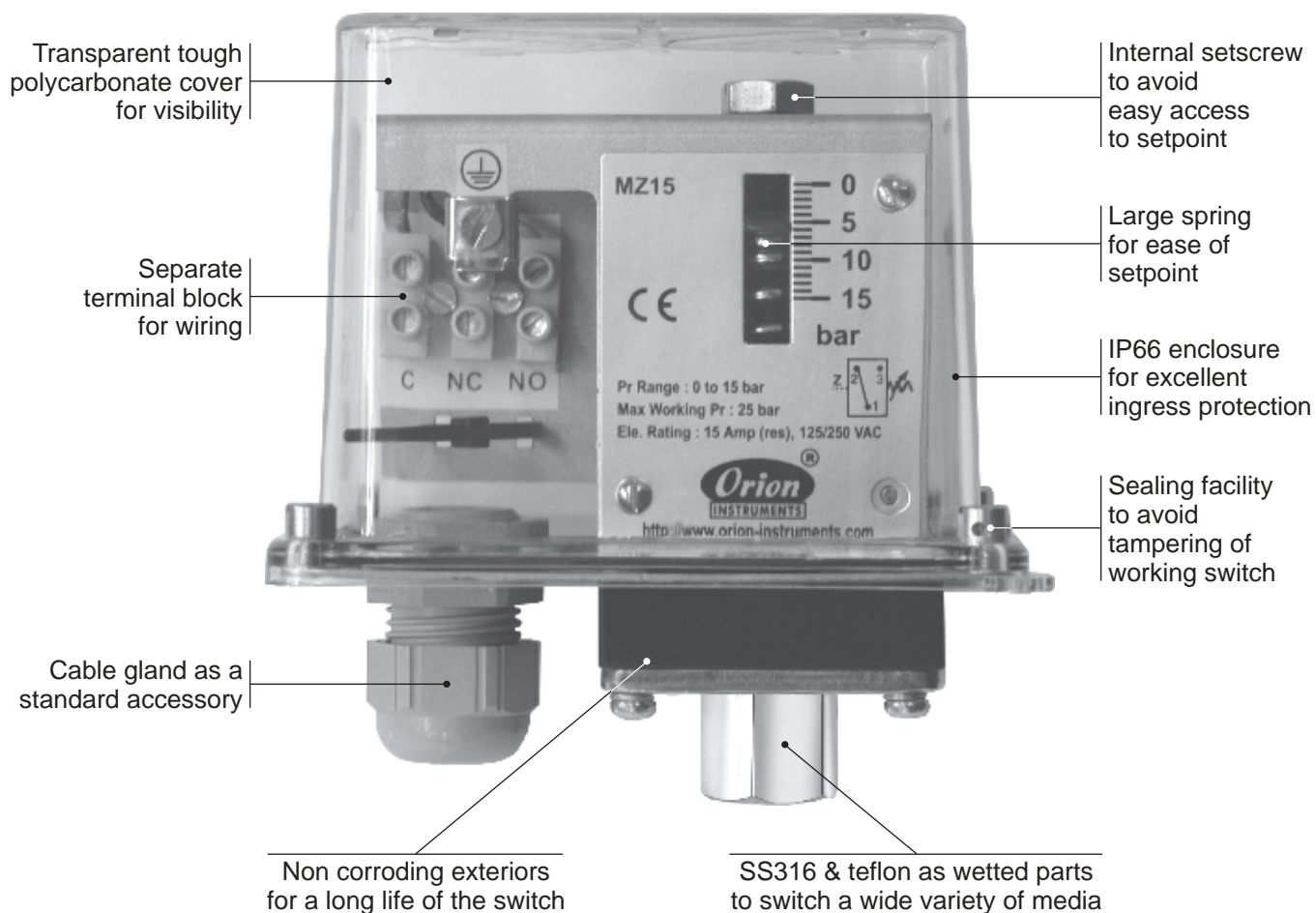
Accessories can be supplied with most of the switches. Please consult sales office.



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Temperature	Switch type	WETTED PARTS
$\pm 1$	Repeatability (% FSR)	
25°C to 215°C	Range covered	
IP 66	Enclosure Protection	
Tough transparent polycarbonate	Enclosure Material	
Bulb / Probe Brass	sensing element Standard Optional	
	Pressure housing Standard Optional	
	Other Wetted Parts	
	Optional wetted parts through chem. seal	
For non-metallic diaphragm: 80°C maximum. For metallic diaphragm: 150°C maximum For higher temperature, please use impulse tubing/chemical seals.	Temp. of working medium	
SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office	Switching element	

# MZ HIGH RANGE PRESSURE SWITCHES

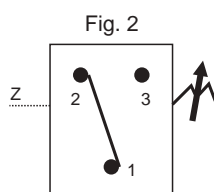


**Approximate Weight :** 0.550 Kg.

## Some Applications :

Used in humid or slightly corrosive atmosphere like jet dyeing machines, etc.

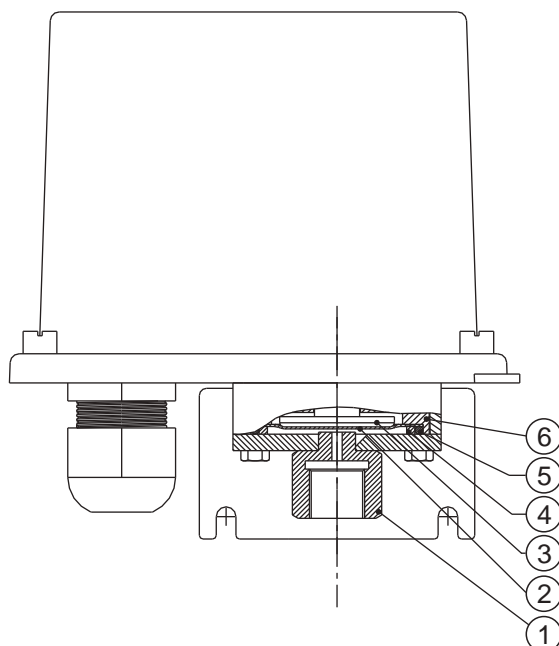
## Electrical Connection :







## PRESSURE CAPSULE DETAILS

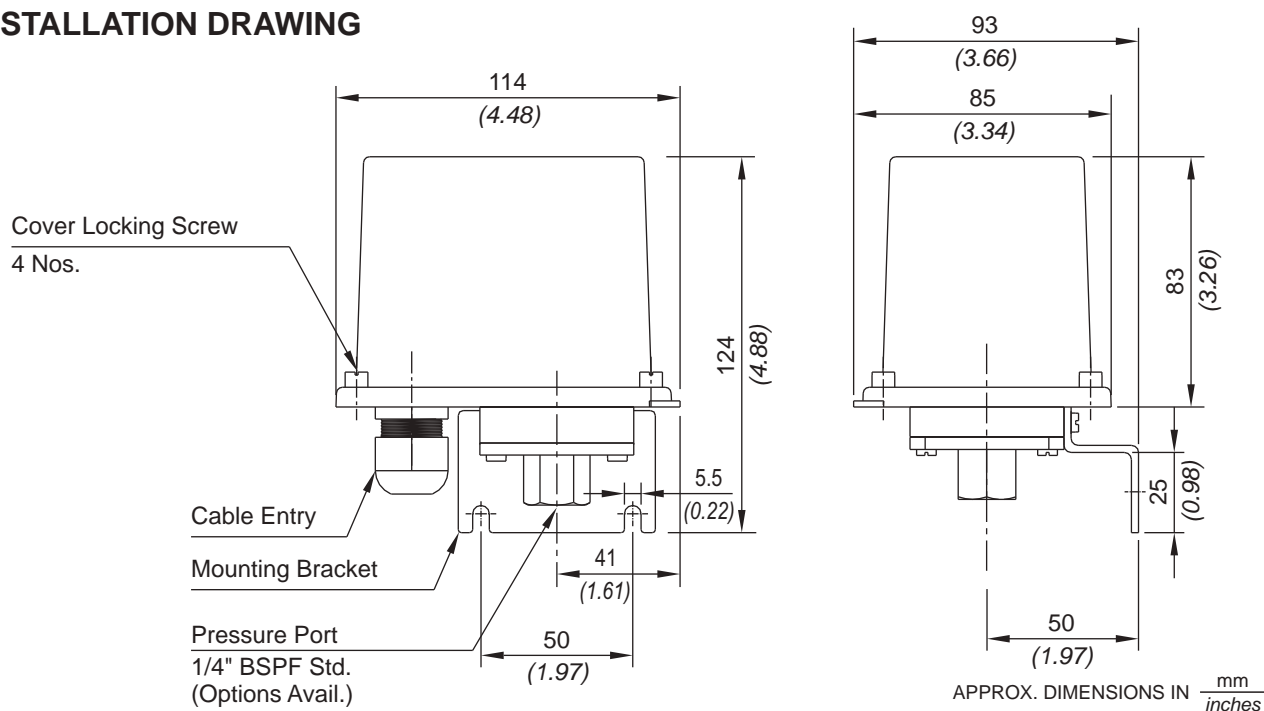


### No. Description

1. Pressure Housing (SS316)
2. Diaphragm (Teflon®)
3. Plunger
4. Steel Ring (SS316)
5. O-Ring (Teflon®)
6. Disc

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MZ HIGH RANGE PRESSURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
LP†	0.067 - 0.213 (0.97 - 3.09)	0.05 (0.72)	5 (72.52)
LP5	0.1 - 0.5 (1.45 - 7.25)	0.10 (1.45)	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.60 (8.70)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.56)	0.60 (8.70)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request), results for neoprene diaphragm.

†Range not available in SS316 L diaphragm.

## HOW TO ORDER PROCESS HIGH RANGE PRESSURE SWITCHES

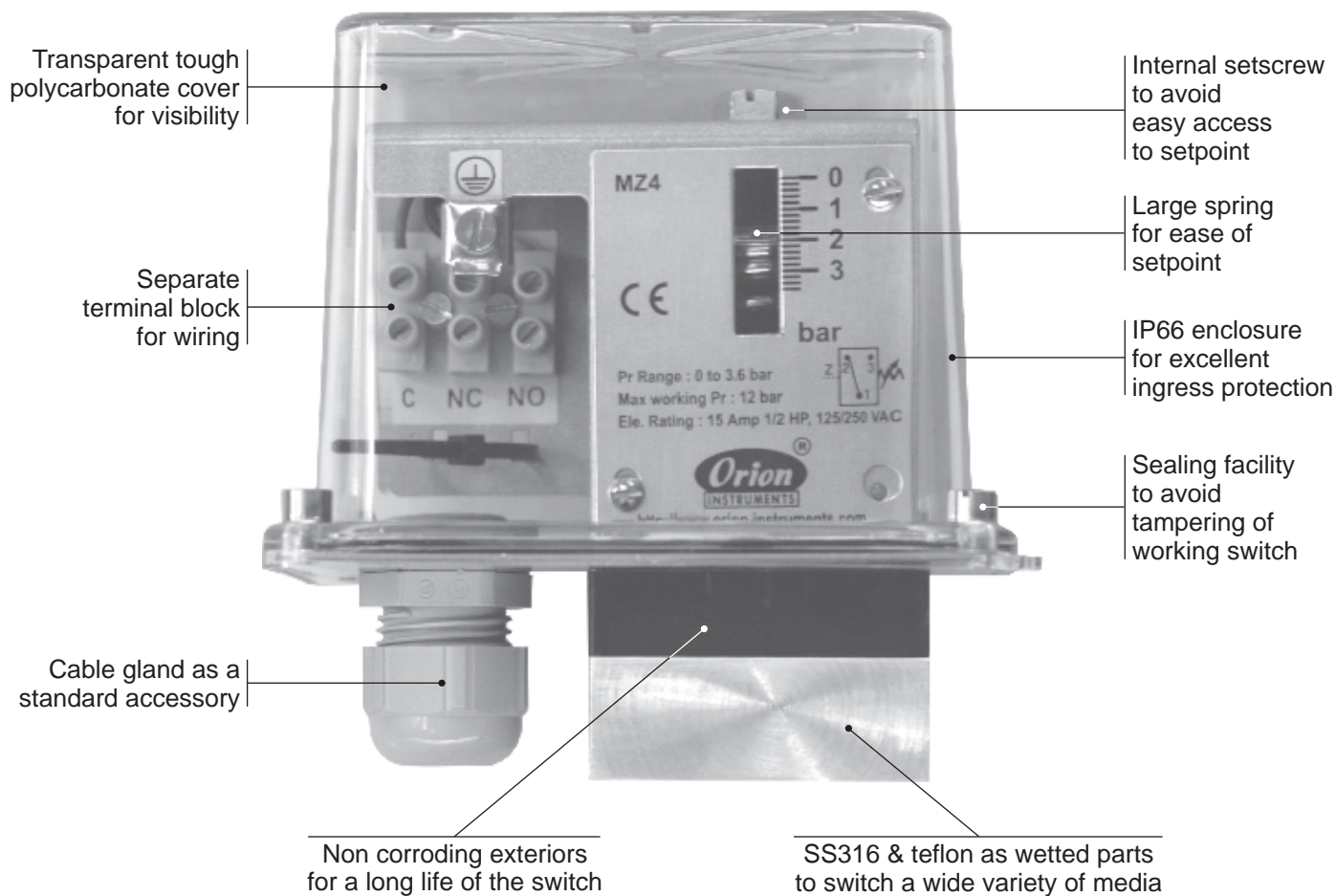
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 cable gland	<b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi *Available only with option A9 in Group 6	<b>LP</b> = (0.067 - 0.213) <b>LP5</b> = (0.1 - 0.5) <b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0)	<b>A8</b> = General purpose microswitch rated at 5A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L <b>4</b> = Monel

eg. A process pressure switch with fixed differential having 0.1 bar to 1 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	PF2	H01	A8	S1	0

Please specify full model number to avoid ambiguity.

# MZ HIGH PROOF HIGH RANGE PRESSURE SWITCHES



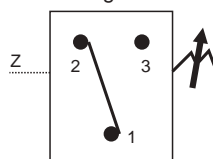
**Approximate Weight :** 0.900 Kg.

## Some Applications :

Used where low set point and high proof pressure is required like tyre moulding machines, etc.

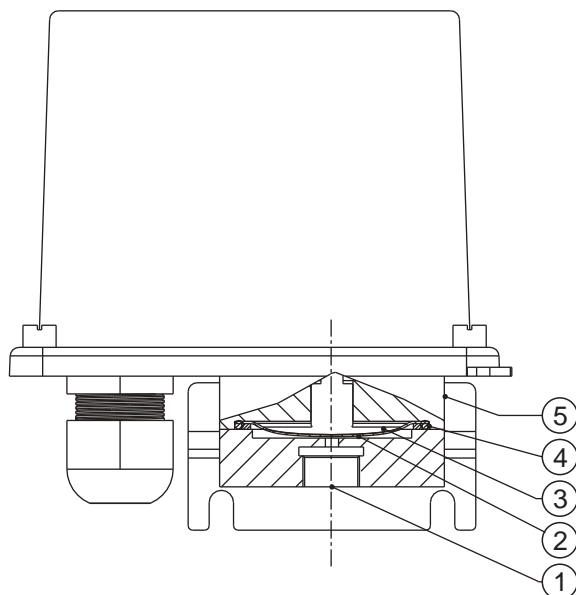
## Electrical Connection :

Fig. 2





## PRESSURE CAPSULE DETAILS

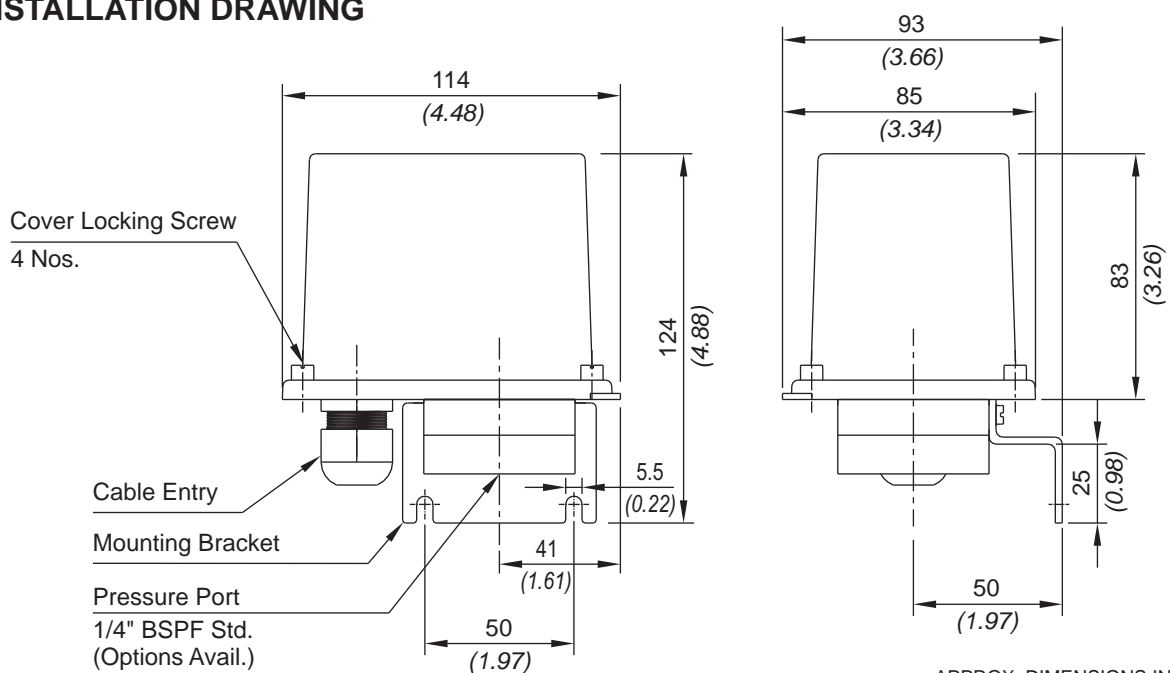


### No. Description

1. Pressure Housing
2. Diaphragm
3. Plunger
4. O-Ring
5. Disc

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# MZ HIGH PROOF HIGH RANGE PRESSURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
PP5	0.1 - 0.5 (1.45 - 7.25)	0.20 (2.90)	70 (1015.26)
P01	0.1 - 1.0 (1.45 - 14.50)	0.20 (2.90)	70 (1015.26)
P02	0.1 - 1.5 (1.45 - 21.76)	0.40 (5.80)	70 (1015.26)
P03	0.2 - 2.6 (2.90 - 37.71)	0.40 (5.80)	70 (1015.26)
P04	0.2 - 3.6 (2.90 - 52.21)	0.50 (7.25)	70 (1015.26)
P07	0.5 - 7.0 (7.25 - 101.53)	1.00 (14.50)	70 (1015.26)
P10	0.5 - 10.0 (7.25 - 145.04)	1.00 (14.50)	70 (1015.26)
P15	1.0 - 15.0 (14.50 - 217.56)	1.5 (21.76)	70 (1015.26)
P30	5.0 - 25.0 (72.52 - 362.6)	1.5 (21.76)	70 (1015.26)

\*Minimum differential increases with setpoint (Graphs available on request), results for neoprene diaphragm.

## HOW TO ORDER PROCESS HIGH PROOF HIGH RANGE PRESSURE SWITCHES

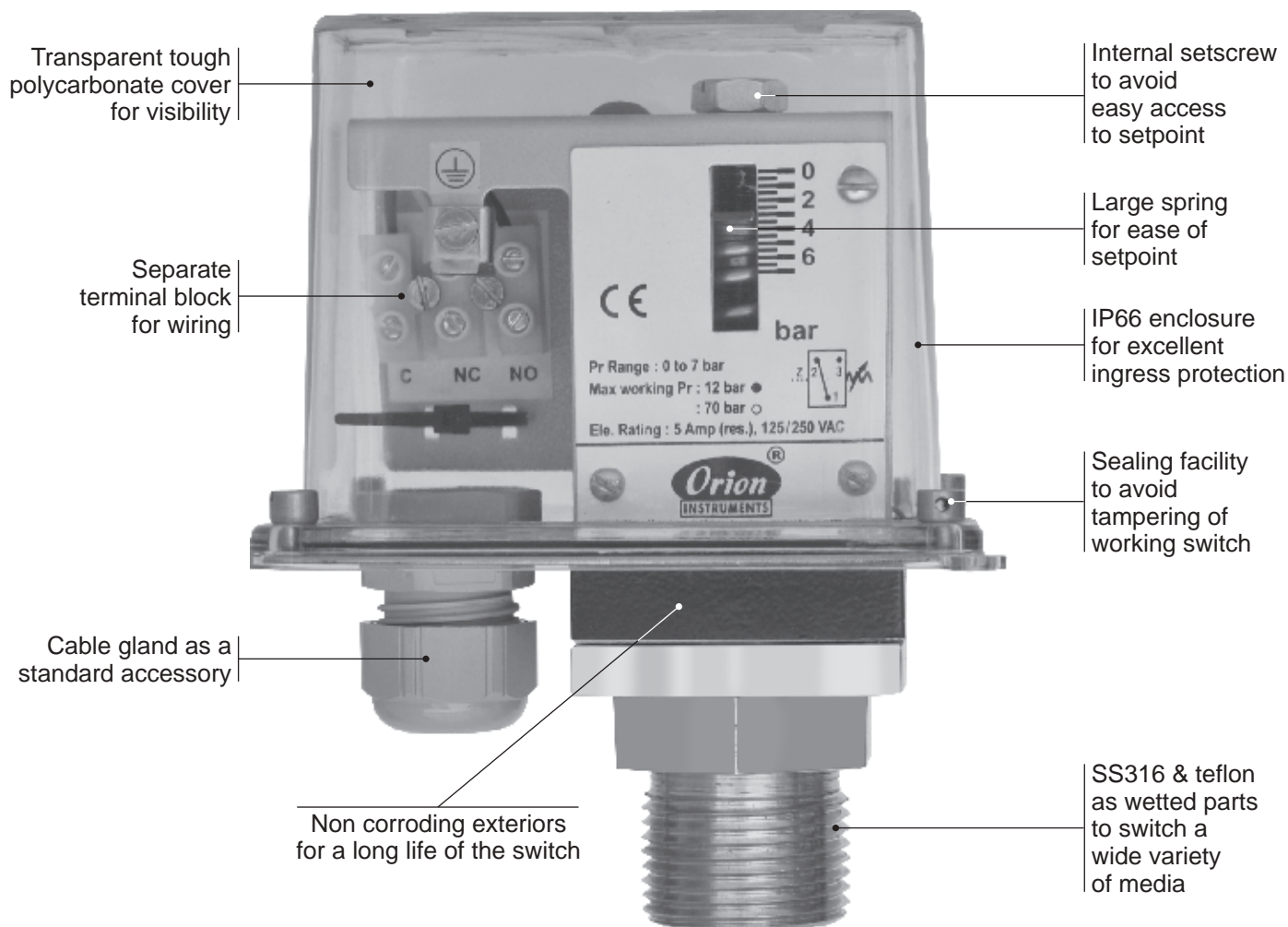
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 cable gland	<b>PF2</b> = pressure switch, fixed differential with scale <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>PA2*</b> = pressure switch, adjustable differential with scale in bar <b>PA3*</b> = pressure switch, adjustable differential with scale in psi *Available only with option A9 in Group 6	<b>PP5</b> = (0.1 - 0.5) <b>P01</b> = (0.1 - 1.0) <b>P02</b> = (0.1 - 1.5) <b>P03</b> = (0.2 - 2.6) <b>P04</b> = (0.2 - 3.6) <b>P07</b> = (0.5 - 7.0) <b>P10</b> = (0.5 - 10.0) <b>P15</b> = (1.0 - 15.0) <b>P30</b> = (5.0 - 25.0)	<b>A8</b> = General purpose microswitch rated at 5A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L

eg. A process pressure switch with fixed differential having 0.1 bar to 1 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	PF2	P01	A8	S1	0

Please specify full model number to avoid ambiguity.

# MZ LARGE BORE HIGH RANGE PRESSURE SWITCHES

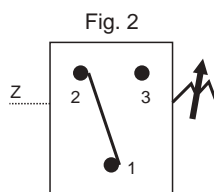


**Approximate Weight :** 0.900 Kg.

## Some Applications :

Applications requiring a large bore, for slurries, sludges, etc.

## Electrical Connection :



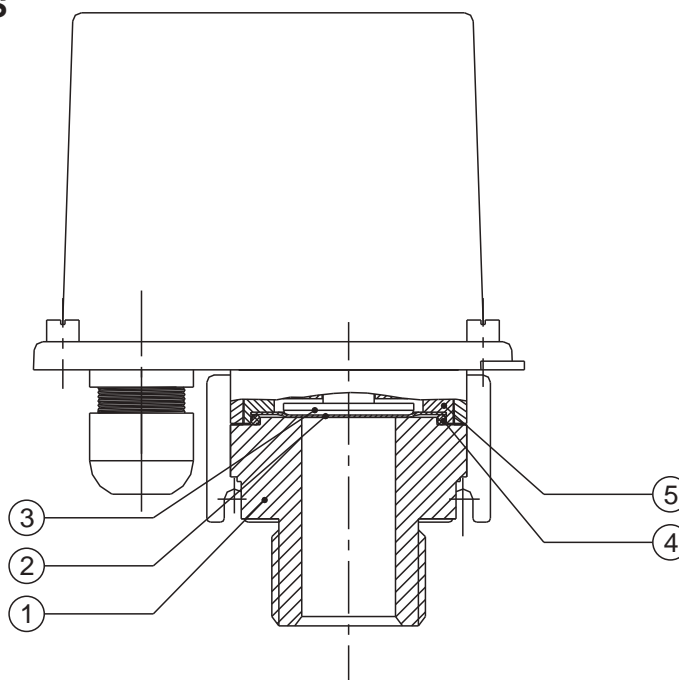




## PRESSURE CAPSULE DETAILS

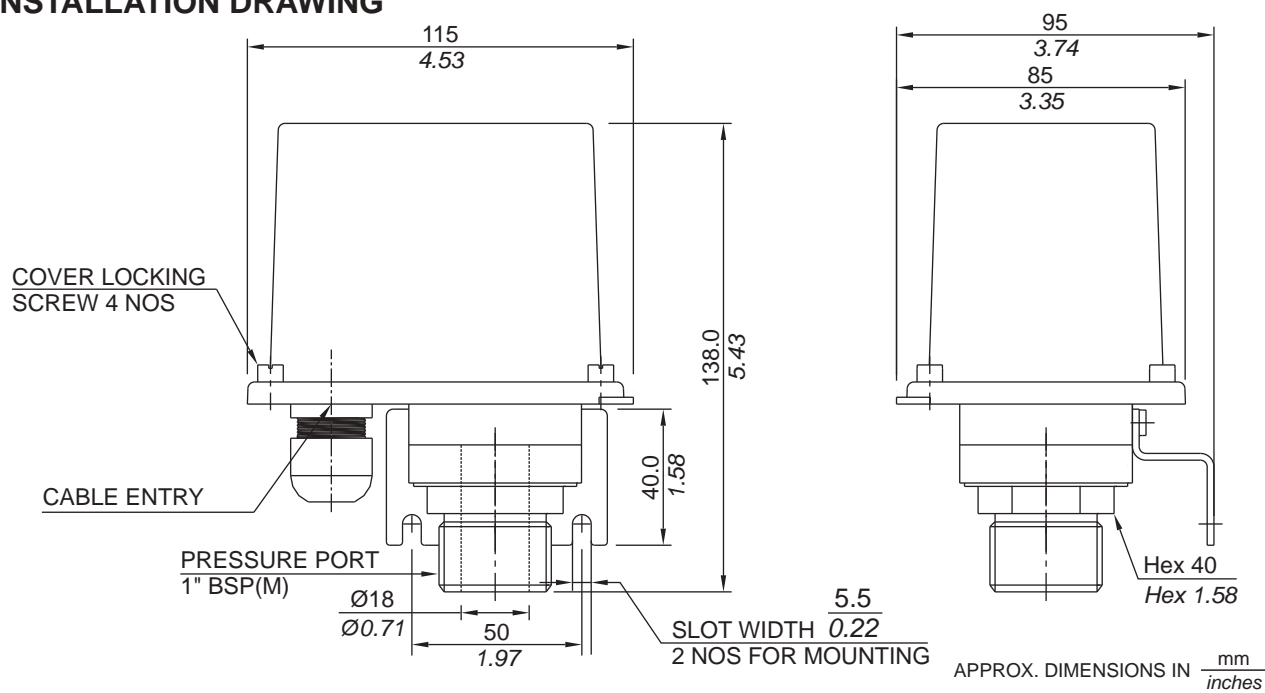
### No. Description

1. *Pressure Port (SS316)*
2. *Diaphragm (Teflon®)*
3. *Plunger*
4. *O-Ring (Teflon®)*
5. *Disc*



Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MZ LARGE BORE HIGH RANGE PRESSURE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.43)	12 (171.43)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.86)	12 (171.43)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.86)	12 (171.43)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.86)	12 (171.43)
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.72)	12 (171.43)
H10	0.5 - 10.0 (7.14 - 142.86)	0.60 (8.58)	25 (357.14)
H15	1.0 - 15.0 (14.29 - 214.29)	0.60 (8.58)	25 (357.14)
H30	5.0 - 25.0 (71.43 - 357.14)	0.80 (11.44)	35 (500.00)

\*Minimum differential increases with setpoint (Graphs available on request), results for neoprene diaphragm.



Note: Welded diaphragm also available as shown

## HOW TO ORDER PROCESS LARGE BORE HIGH RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 cable gland	<b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi <small>*Available only with option A9 in Group 6</small>	<b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6) <b>H07</b> = (0.5 - 7.0) <b>H10</b> = (0.5 - 10.0) <b>H15</b> = (1.0 - 15.0) <b>H30</b> = (5.0 - 25.0)	<b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>S3</b> = SS316 / 1" BSP(M) <b>N3</b> = Monel / 1" BSP(M)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS 316L <b>4</b> = Monel

eg. A process pressure switch with fixed differential having 0.1 bar to 1 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with 1" BSPM port size & neoprene diaphragm shall be specified by

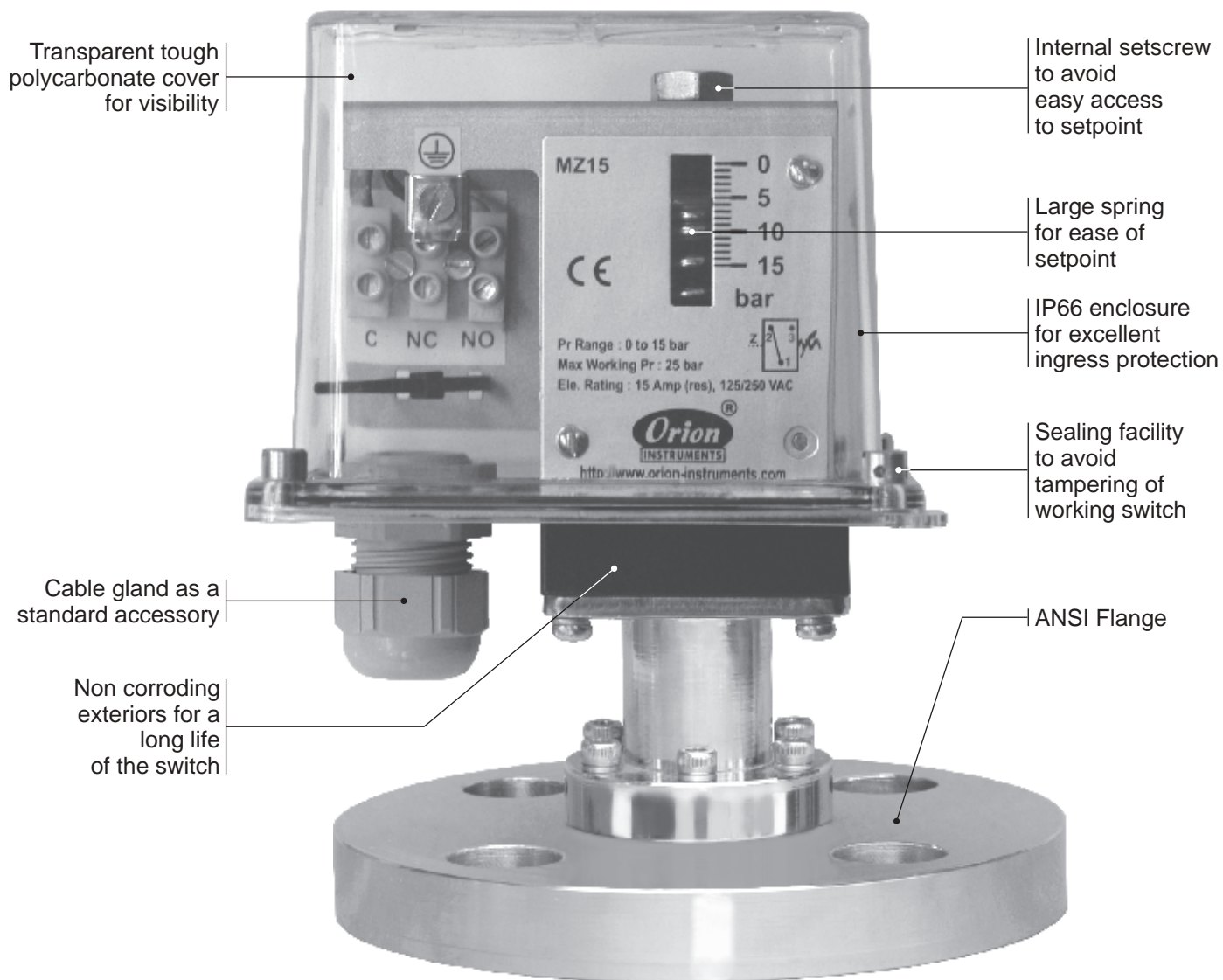
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	PF2	H01	A8	S3	0

Please specify full model number to avoid ambiguity.

## LARGE BORE HIGH RANGE PRESSURE SWITCHES

**MZ**

# MZ FLANGED PRESSURE SWITCHES



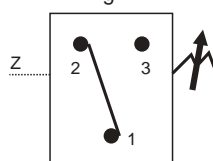
**Approximate Weight :** 0.900 Kg.

## Some Applications :

In non-hazardous areas for slurry, colloidal solutions, corrosive & non-corrosive working media (unclean working media), etc.

## Electrical Connection :

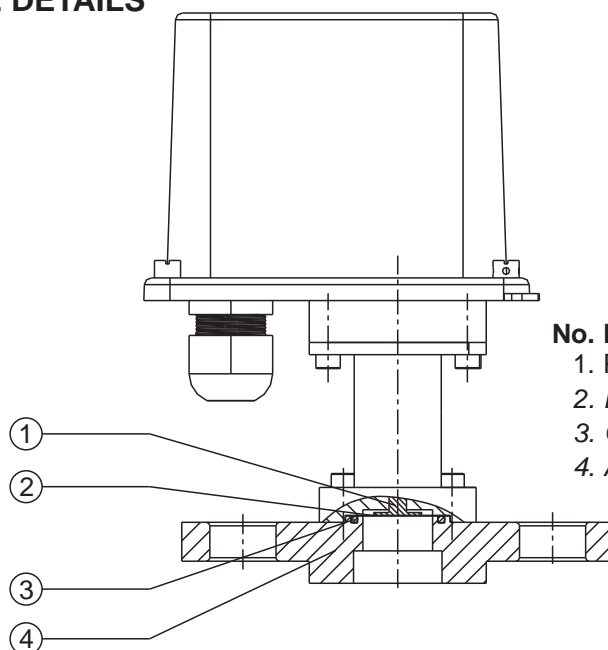
Fig. 2



# FLANGED PRESSURE SWITCHES **MZ**



## PRESSURE CAPSULE DETAILS

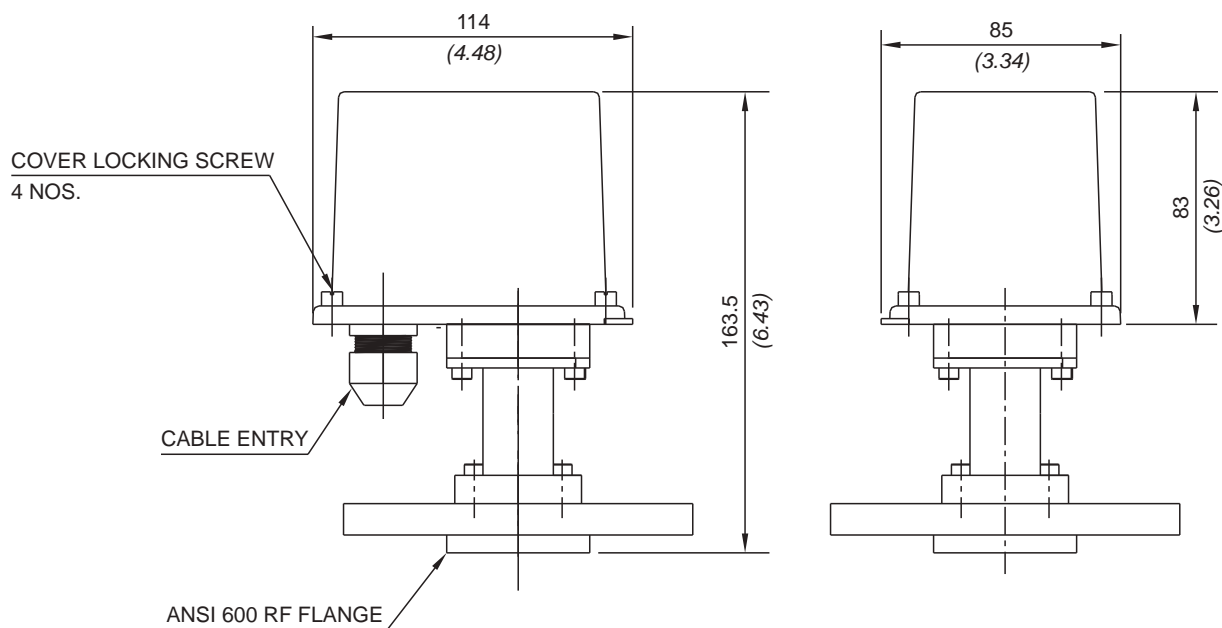


### No. Description

1. Plunger
2. Diaphragm (Teflon)<sup>®</sup>
3. O-Ring (Teflon)<sup>®</sup>
4. ANSI 600 Flange (SS316)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# MZ FLANGED PRESSURE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	As per the class of flange  Please consult Sales Office in case you need clarification on availability of maximum working pressure for a particular range.
H02	0.1 - 1.5 (1.45 - 21.76)	0.12 (1.74)	
H03	0.2 - 2.6 (2.90 - 37.71)	0.17 (2.46)	
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	
H07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.80)	
H10	0.5 - 10.0 (7.25 - 145.04)	0.40 (5.80)	
H15	1.0 - 15.0 (14.50 - 217.71)	0.80 (11.60)	
H30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	
H4T	5 - 40 (72.52 - 580.15)	5 (72.52)	
H1H	10 - 100 (145.04 - 1450.38)	12 (174.05)	
H2H	7 - 200 (101.52 - 2900.76)	24 (348.09)	

\* Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch.

Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## FLANGE CODE TABLE (Please refer page no. 228 & 229 for more options)

	SS316L		Hastelloy C276		Monel		Titanium		Tantalum	
	RF*	FF*	RF*	FF*	RF*	FF*	RF*	FF*	RF*	FF*
<b>150 #</b>										
1" NB	AC	BS	DI	EY	GO	IE	JU	LK	NA	OQ
2" NB	AF	BV	DL	FB	GR	IH	JX	LN	ND	OT
<b>300#</b>										
1" NB	AI	BY	DO	FE	GU	IK	KA	LQ	NG	OW
2" NB	AL	CB	DR	FH	GX	IN	KD	LT	NJ	OZ
<b>2500#</b>										
1" NB	BM	DC	ES	GI	HY	JO	LE	MU	OK	QA
2" NB	BP	DF	EV	GL	IB	JR	LH	MX	ON	QD

## RANGE AVAILABILITY AS PER BORE SIZES

\*RF = Raised Face

\*FF = Flat Face

	H01 to H04	H07	H10	H15	H30	H2T to H2H
1" NB	NA	Yes	Yes	Yes	Yes	Yes
2" NB	Yes	Yes	Yes	Yes	Yes	Yes

## HOW TO ORDER PROCESS FLANGED PRESSURE SWITCHES

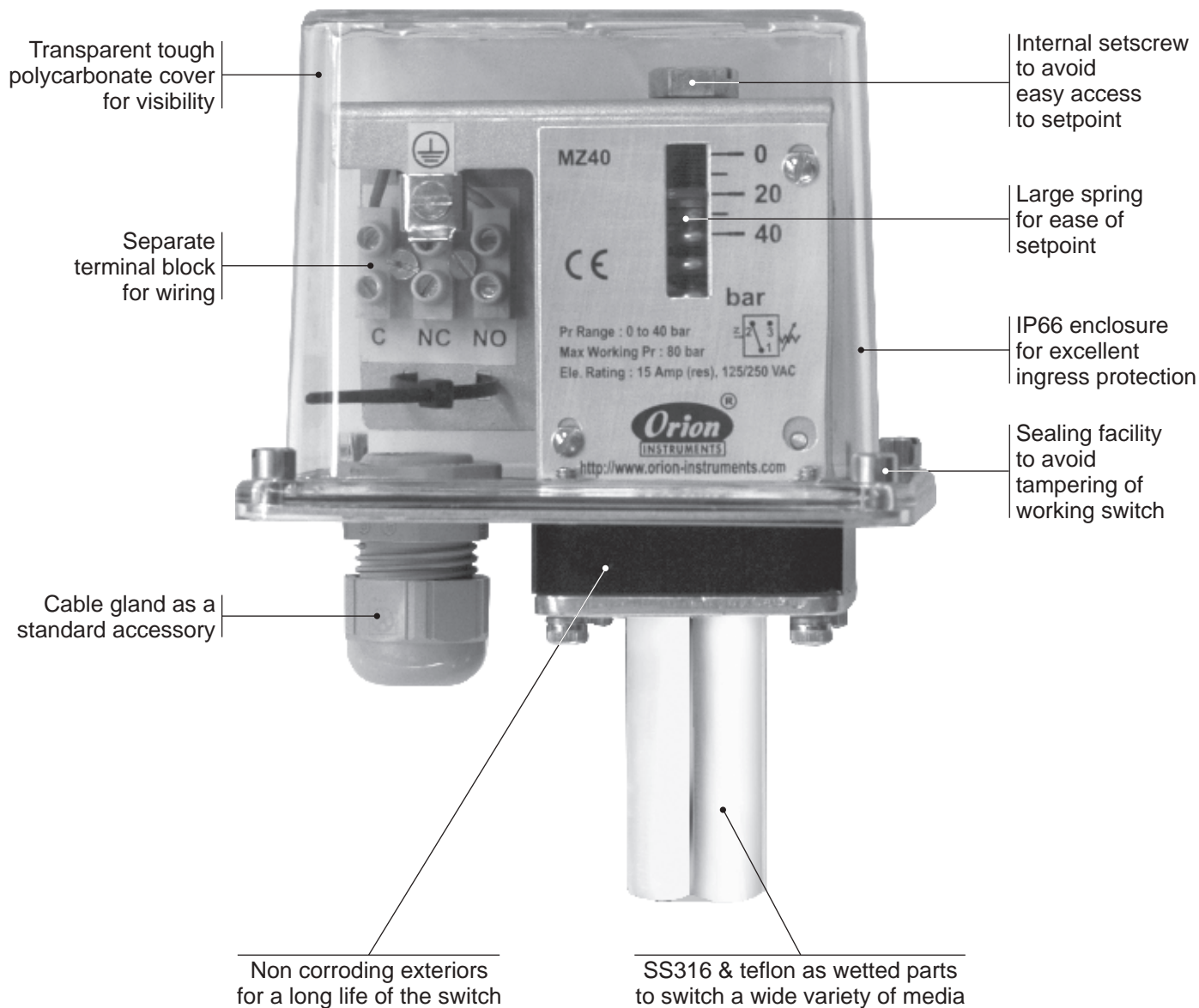
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type ANSI flanged	Range Code (values in bar)	Microswitch Type	Flange Size and Material	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 threads for aluminum housing	<b>AF2</b> = pressure switch, fixed differential with scale in bar <b>AF3</b> = pressure switch, fixed differential with scale in psi <b>*AA2</b> = pressure switch, adjustable differential with scale in bar <b>*AA3</b> = pressure switch, fixed differential with scale in psi <small>*Available with A9 (in group 6) only</small>	<b>H01</b> = 0.1 - 1.0 <b>H02</b> = 0.1 - 1.5 <b>H03</b> = 0.2 - 2.6 <b>H04</b> = 0.2 - 3.6 <b>H07</b> = 0.5 - 7.0 <b>H10</b> = 0.5 - 10.0 <b>H15</b> = 1.0 - 15.0 <b>H30</b> = 5.0 - 25.0 <b>H4T</b> = 5 - 40 <b>H1H</b> = 10 - 100 <b>H2H</b> = 7 - 200	<b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC  <small>* Please refer note under Range Selection Table</small>	Please select as per Flange Code Table  For other classes and sizes please refer page no. 228 & 229	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS316L <b>3</b> = Hastelloy C <b>4</b> = Monel 400 <b>5</b> = Titanium <b>6</b> = Tantalum

eg. A high range Industrial/ANSI flanged pressure switch with 1/2" NPT cable entry with fixed differential without scale, having 0.1 bar to 1 bar pressure range, with 15 Amp. microswitch, and 2" 150# RF SS316L flange & SS316L diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MD	1	AF1	H01	A1	AF	2

Please specify full model number to avoid ambiguity.

# MZ HYDRAULIC RANGE PRESSURE SWITCHES



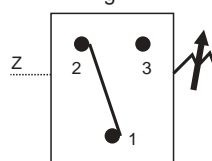
**Approximate Weight :** 0.680 Kg.

## Some Applications :

Used where pressure surges and fluctuations may be present like oil hydraulic systems, etc.

## Electrical Connection :

Fig. 2

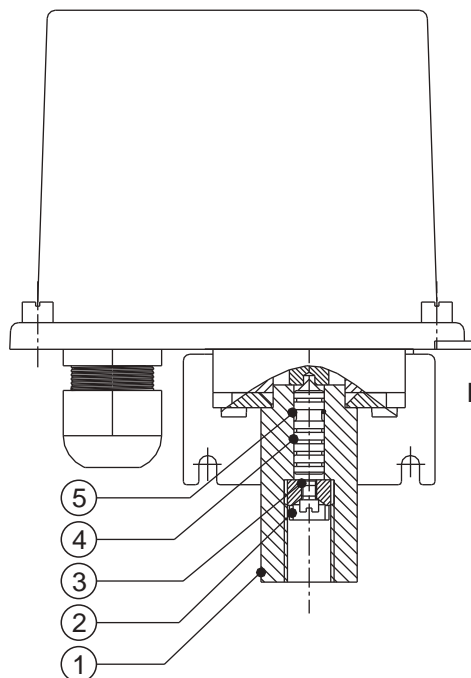




# HYDRAULIC RANGE PRESSURE SWITCHES **MZ**



## PRESSURE CAPSULE DETAILS

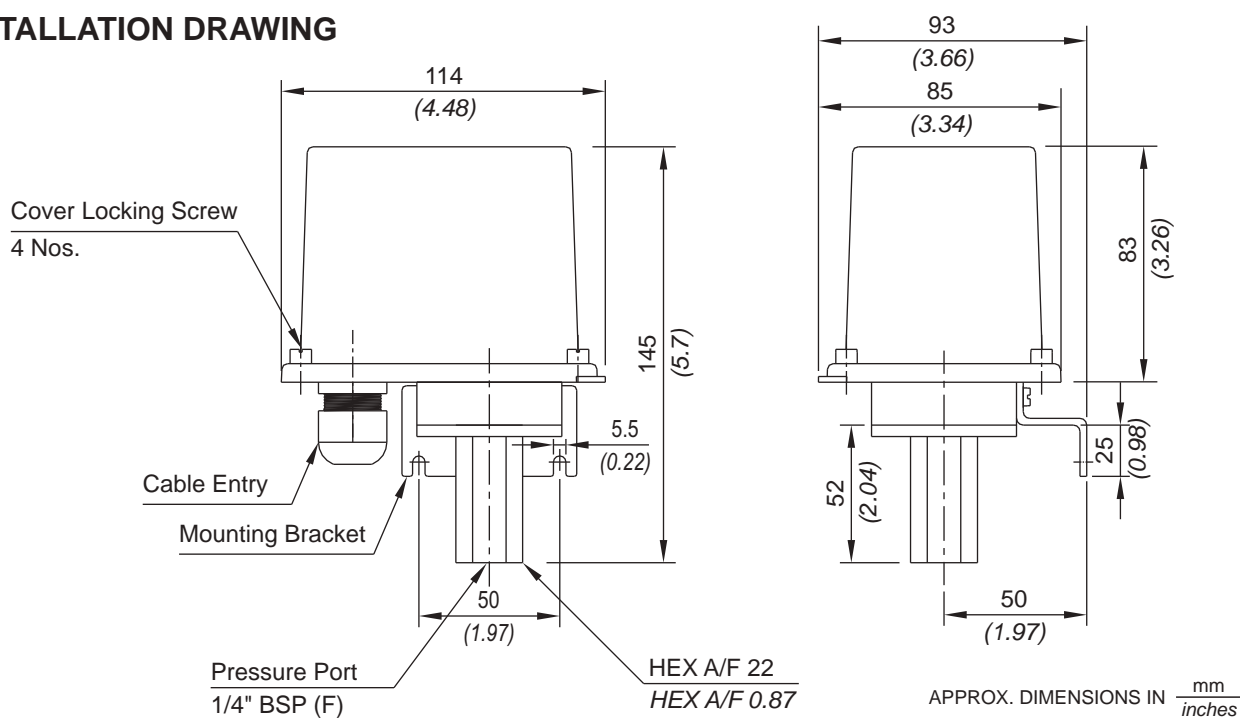


### No. Description

1. Pressure housing (SS)
2. Surge Arrestor (SS)
3. Surge Reducer (SS)
4. Piston (SS)
5. O-Ring (Viton®)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MZ HYDRAULIC RANGE PRESSURE SWITCHES

## RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A8" microswitch	
040	5 - 40 (72.52 - 580.15)	5 (72.52)	80 (1160.31)
100	10 - 100 (145.04 - 1450.38)	12 (174.05)	120 (1740.45)
200	7 - 200 (101.63 - 2900.75)	24 (348.09)	200 (2900.75)
350	35 - 350 (101.53 - 2900.75)	24 (348.09)	500 (7251.89)
400	100 - 400 (1450.38 - 5801.51)	30 (435.11)	400 (5801.59)

\*Minimum differential increases with setpoint (Graphs available on request)

## HOW TO ORDER PROCESS HYDRAULIC RANGE PRESSURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size and Material of Enclosure	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Piston
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 cable gland	<b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi <small>*Available only with option A9 in Group 6</small>	<b>040</b> = (5 - 40) <b>100</b> = (10 - 100) <b>200</b> = (7 - 200) <b>350</b> = (35 - 350) <b>400</b> = (100 - 400)	<b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F) <b>2</b> = SS	
* Please refer note under Range Selection Table Please refer page no. 226 & 227 for more pressure port options							

eg. A process pressure switch with fixed differential having 5 bar to 40 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

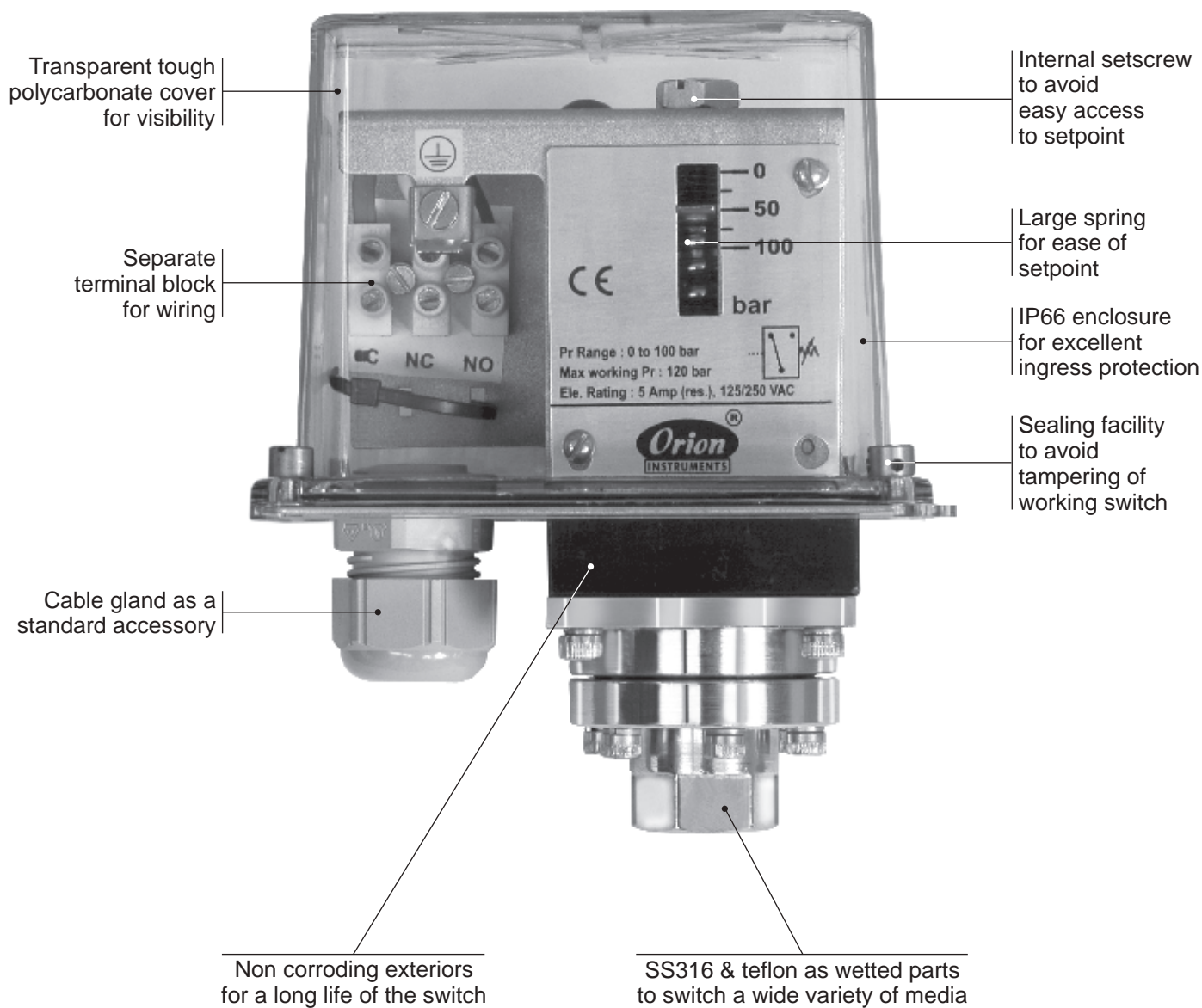
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	PF2	040	A8	S1	0

Please specify full model number to avoid ambiguity.

## HYDRAULIC RANGE PRESSURE SWITCHES

**MZ**

# MZ HYDRAULIC DIAPHRAGM PRESSURE SWITCHES

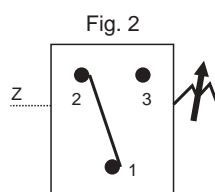


**Approximate Weight :** 0.680 Kg.

## Some Applications :

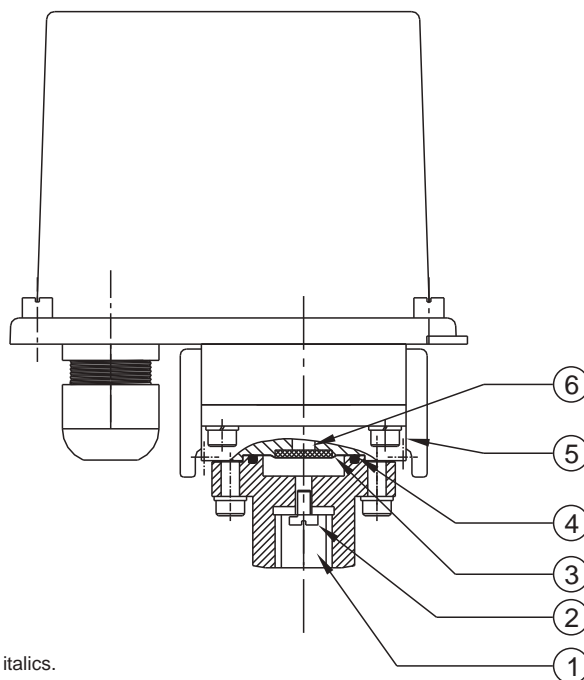
High Pressure applications requiring diaphragm as sensing element like water treatment plants, etc.

## Electrical Connection :





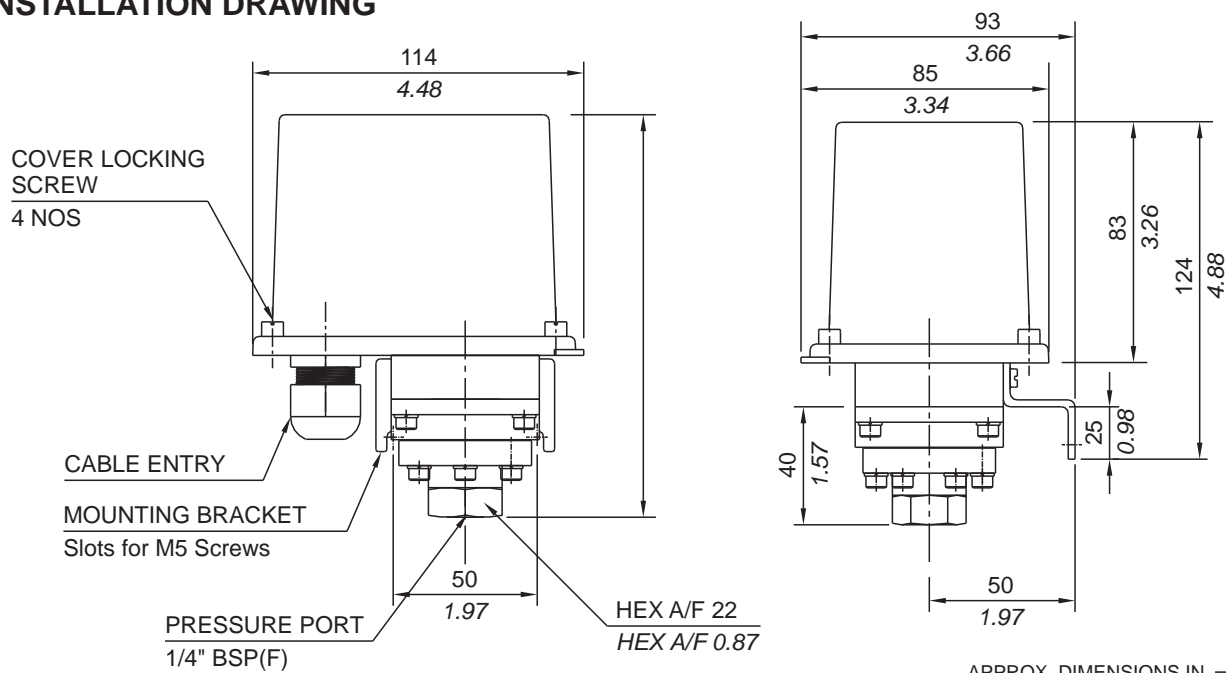
## PRESSURE CAPSULE DETAILS



- No. Description**
1. *Pressure Housing*
  2. *Surge Reducer*
  3. *Diaphragm*
  4. *O-Ring*
  5. *Disc*
  6. *Plunger*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# MZ HYDRAULIC DIAPHRAGM PRESSURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A8" microswitch	
H1T	0.5 - 10 (7.25 - 145.04)	0.5 (7.25)	150 (2175.51)
H2T	2 - 20 (29.00 - 290.07)	2 (29.00)	200 (2900.76)
H4T	5 - 40 (72.52 - 580.15)	5 (72.52)	200 (2900.76)
H1H	10 - 100 (146.04 - 1450.38)	12 (174.05)	200 (2900.76)
H2H	7 - 200 (101.52 - 2900.76)	24 (348.09)	400 (5801.52)
H4H	40 - 400 (580.15 - 5801.52)	70 (1015.27)	500 (7251.88)

\* Minimum differential increases with setpoint (Graphs available on request)

\* Differentials of microswitches A2 through A9 will vary. Differentials for A7 are typically twice that for A1 microswitch. Please indicate specifically the differential value in enquiry/order, when it is critical in your application.

## HOW TO ORDER PROCESS HYDRAULIC DIAPHRAGM PRESSURE SWITCHES

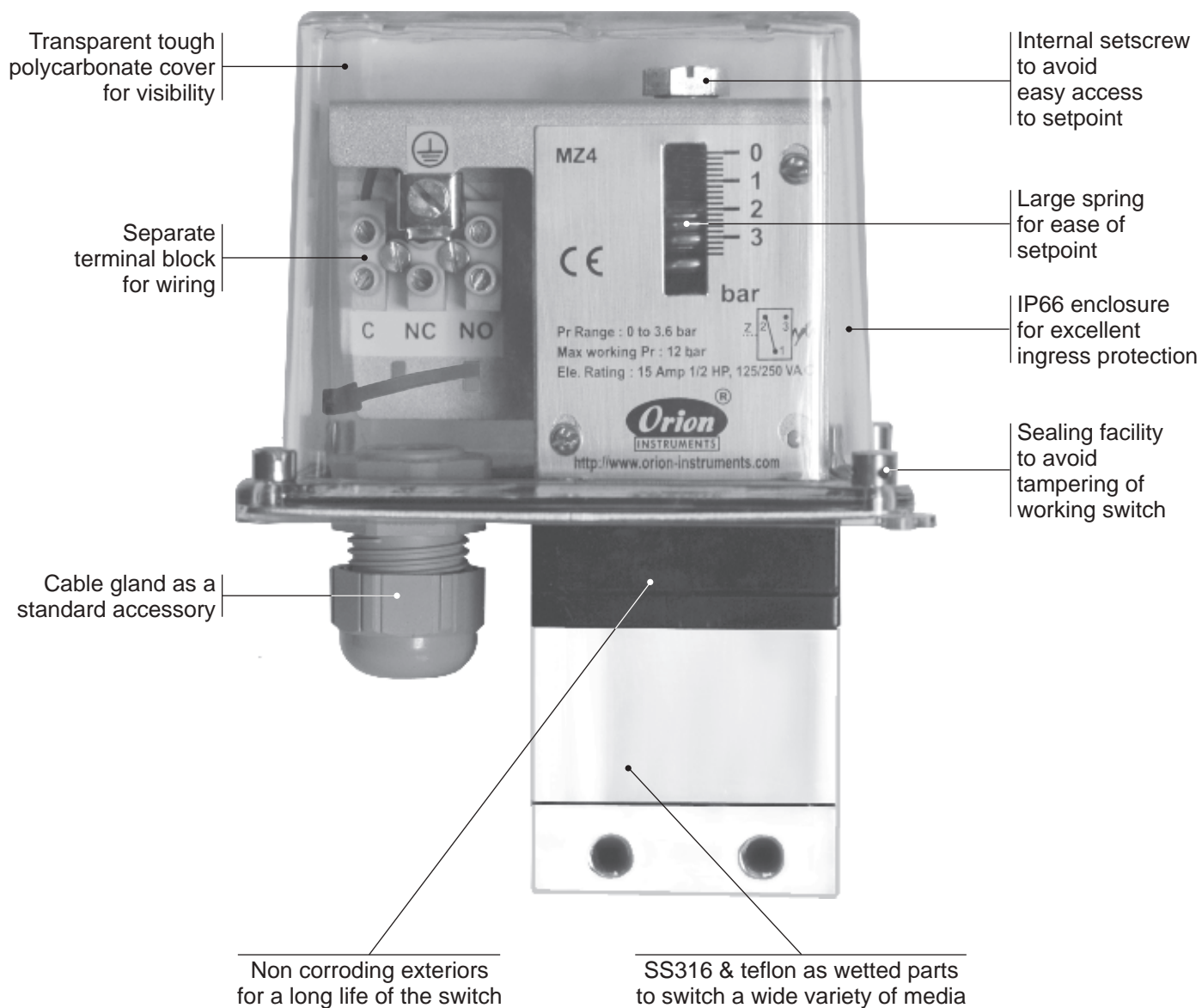
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size and Material of Enclosure	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 cable gland	<b>PF2</b> = pressure switch, fixed differential with scale in bar <b>PF3</b> = pressure switch, fixed differential with scale in psi <b>*PA2</b> = pressure switch, adjustable differential with scale in bar <b>*PA3</b> = pressure switch, adjustable differential with scale in psi <small>*Available only with option A9 in Group 6</small>	<b>H1T</b> = (0.5 - 10) <b>H2T</b> = (2 - 20) <b>H4T</b> = (5 - 40) <b>H1H</b> = (10 - 100) <b>H2H</b> = (7 - 200) <b>H4H</b> = (40 - 400)	<b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F) <b>2</b> = SS316 <b>4</b> = Monel	

eg. A process pressure switch with fixed differential having 5 bar to 40 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	PF2	040	A8	S1	0

Please specify full model number to avoid ambiguity.

# MZ HIGH RANGE PRESSURE DIFFERENCE SWITCHES



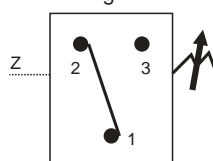
**Approximate Weight :** 1.400 Kg.

## Some Applications :

In non-hazardous areas for filters, strainers, cooling systems, etc.

## Electrical Connection :

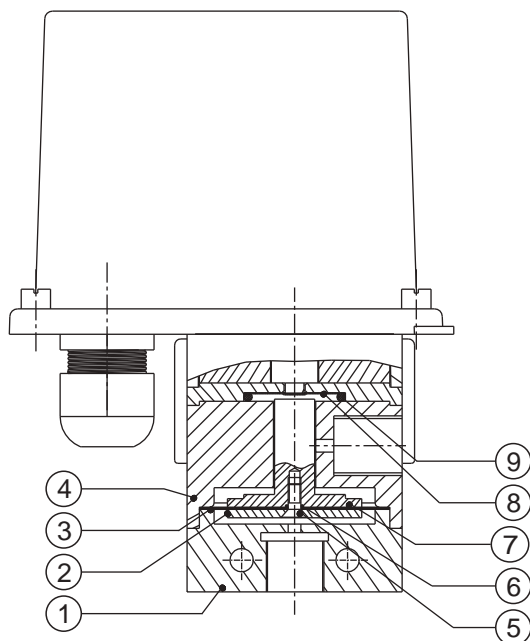
Fig. 2







## PRESSURE CAPSULE DETAILS

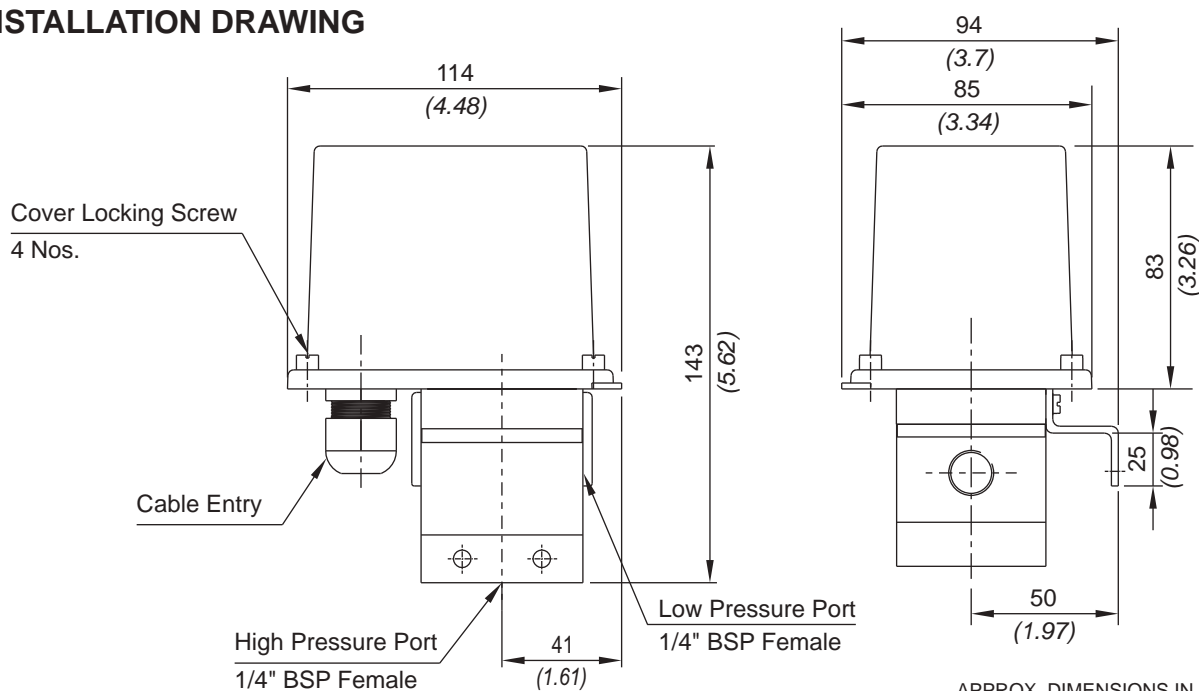


### No. Description

1. Pressure Housing
2. HP Plunger (SS316)
3. Diaphragm
4. Disc
5. CSK Screw (SS)
6. 'O' ring (Teflon)
7. LP Plunger (SS316)
8. Sealing Diaphragm (Teflon)
9. Sealing O-Ring (Teflon)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# MZ HIGH RANGE PRESSURE DIFFERENCE SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar ( <i>psi</i> )	Differential* bar ( <i>psi</i> )	Maximum Working Pressure bar ( <i>psi</i> )
		Approximate Maximum for "A8" microswitch	
H01	0.1 - 1.0 (1.45 - 14.50)	0.12 (1.74)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.30 (4.35)	12 (174.05)

\*Minimum differential increases with setpoint (Graphs available on request)

## HOW TO ORDER PROCESS HIGH RANGE PRESSURE DIFFERENCE SWITCHES

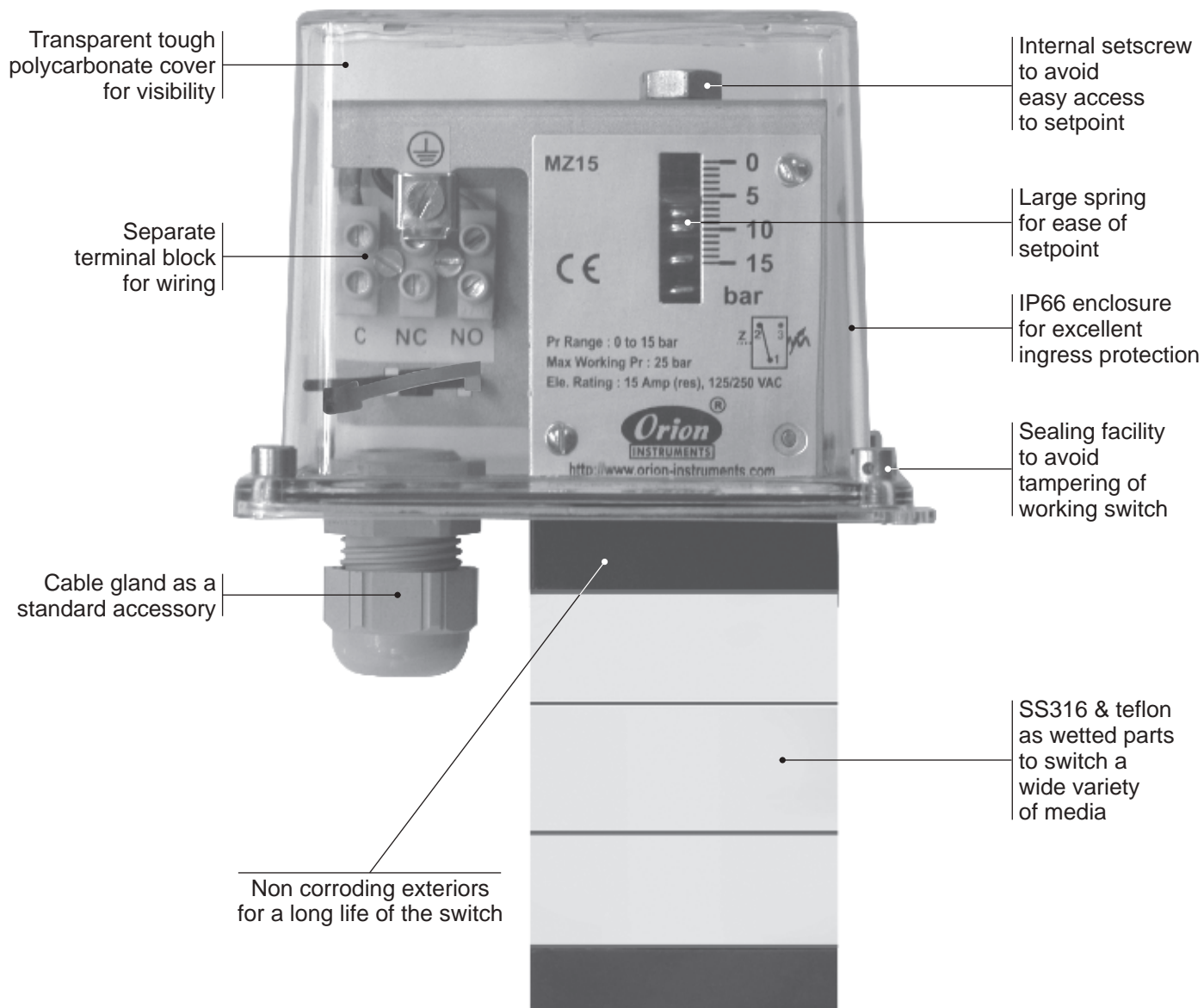
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 cable gland	<b>DF2</b> = pressure difference switch, fixed differential with scale in bar <b>DF3</b> = pressure difference switch, fixed differential with scale in psi <b>*DA2</b> = pressure difference switch, adjustable differential with scale in bar <b>*DA3</b> = pressure difference switch, adjustable differential with scale in psi * Available only with option A9 in Group 6	<b>H01</b> = (0.1 - 1.0) <b>H02</b> = (0.1 - 1.5) <b>H03</b> = (0.2 - 2.6) <b>H04</b> = (0.2 - 3.6)	<b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>A1</b> = Aluminium / ¼" BSP(F) <b>A2</b> = Aluminium / ¼" NPT(F) <b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon

eg. A process pressure difference switch with fixed differential having 0.1 bar to 1 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	DF2	H01	A8	S1	0

Please specify full model number to avoid ambiguity.

# MZ HIGH RANGE DP



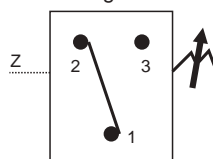
**Approximate Weight :** 1.800 Kg.

## Some Applications :

Applications requiring high static/system pressure but low pressure difference.

## Electrical Connection :

Fig. 2

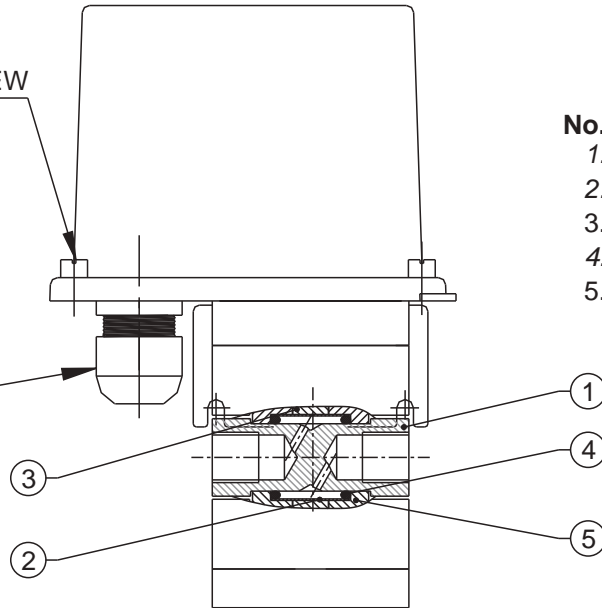




## PRESSURE CAPSULE DETAILS

COVER LOCKING SCREW  
4NOS.

CABLE ENTRY



### No. Description

1. Pressure Housing
2. Diaphragm
3. Plunger
4. 'O' ring
5. Disc

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING

Cover Locking Screw  
4 Nos.

Cable Entry

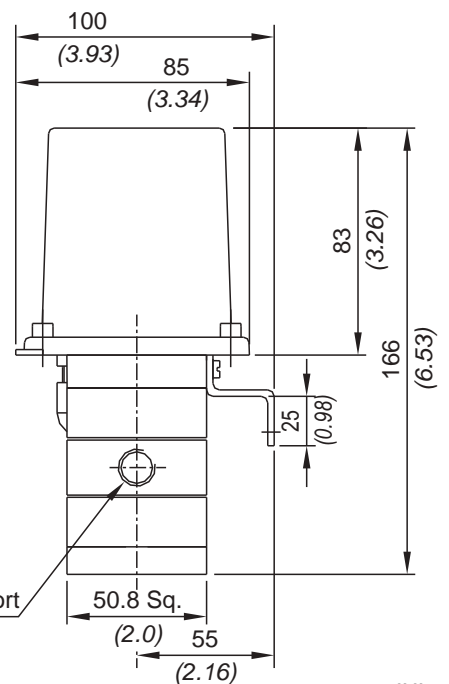
High Pressure Port  
1/4" BSPF

50  
(1.97)

41  
(1.61)

Mounting Bracket  
Slot Width 5.5  
2 Nos. for Mounting

Low Pr. Port  
1/4" BSPF



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

# MZ HIGH RANGE DP

## RANGE SELECTION TABLE

Range Code	Range bar (psi)	Differential* bar (psi)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
D01	0.1 - 1.0 (1.45 - 14.50)	0.12 (0.30)	70 (1000.00)
D02	0.1 - 1.5 (1.45 - 21.76)	0.20 (1.14)	70 (1000.00)
D03	0.2 - 2.6 (2.90 - 37.71)	0.20 (1.14)	70 (1000.00)
D04	0.2 - 3.6 (2.90 - 52.21)	0.30 (1.43)	70 (1000.00)
D07	0.5 - 7.0 (7.25 - 101.50)	0.40 (5.72)	70 (1000.00)
D10	0.5 - 10.0 (7.14 - 142.86)	0.50 (7.14)	70 (1000.00)
D15	1.0 - 15.0 (14.29 - 214.29)	0.50 (7.14)	70 (1000.00)
D30	5.0 - 25.0 (71.43 - 357.14)	0.80 (11.44)	70 (1000.00)

\*Minimum differential increases with setpoint (Graphs available on request)

**\* Note :**

Microswitches A2 through A9 can be supplied in some ranges and differentials will vary with microswitch used. Please contact sales office for details. Please check availability of adjustable differential with sales office.

## HOW TO ORDER PROCESS HIGH RANGE DP SWITCHES

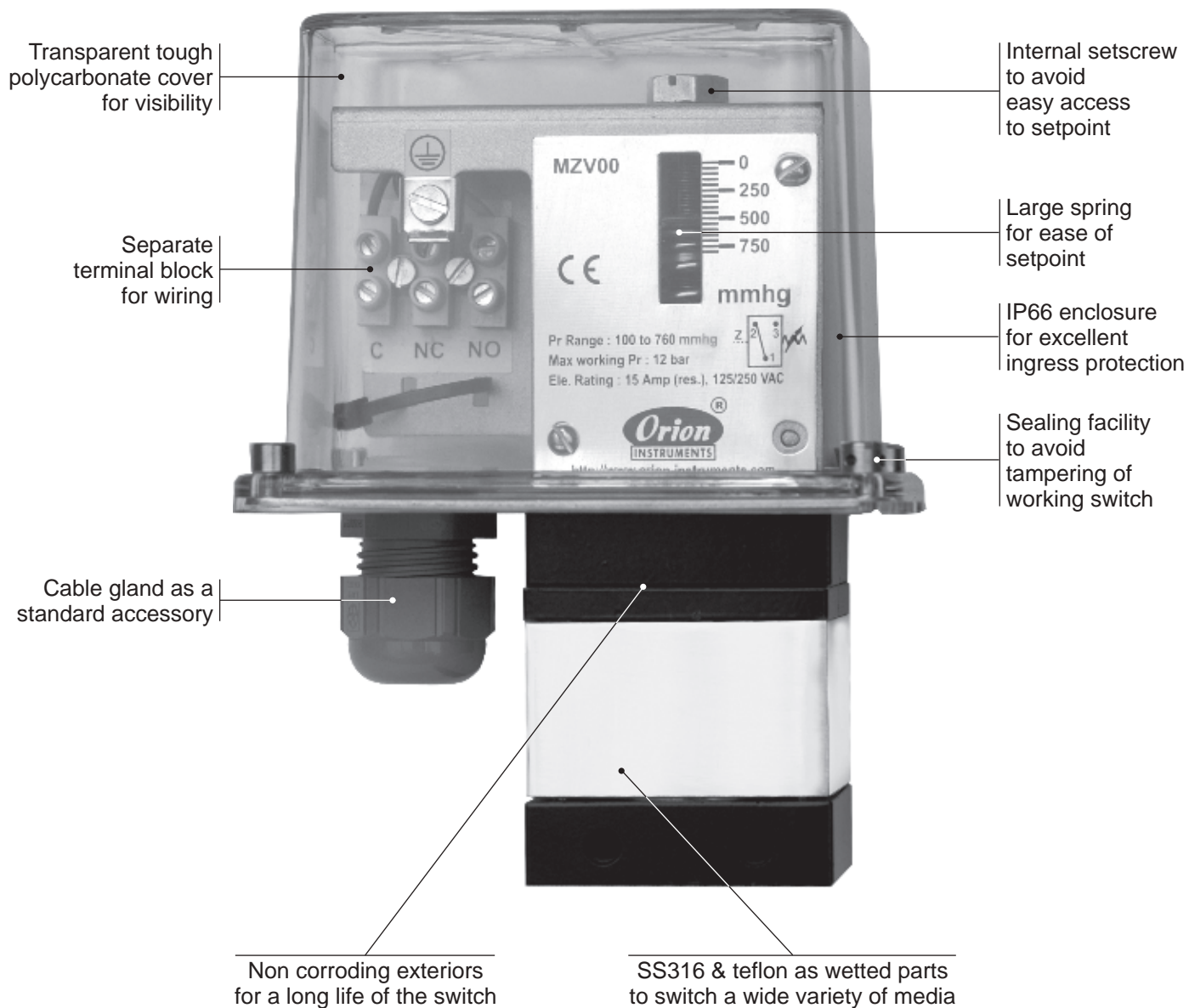
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in bar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 cable gland	<b>DF2</b> = pressure difference switch, fixed differential with scale in bar <b>DF3</b> = pressure difference switch, fixed differential with scale in psi <b>*DA2</b> = pressure difference switch, adjustable differential with scale in bar <b>*DA3</b> = pressure difference switch, adjustable differential with scale in psi <b>*Available only with option A9 in Group 6</b>	<b>D01</b> = (0.1 - 1.0) <b>D02</b> = (0.1 - 1.5) <b>D03</b> = (0.2 - 2.6) <b>D04</b> = (0.2 - 3.6) <b>D07</b> = (0.5 - 7.0) <b>D10</b> = (0.5 - 10.0) <b>D15</b> = (1.0 - 15.0) <b>D30</b> = (5.0 - 25.0)	<b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>S1</b> = SS316 / 1/4" BSP(F) <b>S2</b> = SS316 / 1/4" NPT(F) <b>N1</b> = Monel / 1/4" BSP(F) <b>N2</b> = Monel / 1/4" NPT(F)	<b>0</b> = Neoprene <b>1</b> = Teflon <b>2</b> = SS316L <b>4</b> = Monel
						Please refer page no. 226 & 227 for more pressure port options	

eg. A process pressure difference switch with fixed differential having 0.1 bar to 1 bar pressure range, with 5 Amp. microswitch, SS316 pressure housing with 1/4" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	DF2	D01	A8	S1	0

Please specify full model number to avoid ambiguity.

# MZ VACUUM SWITCHES



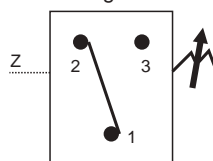
**Approximate Weight :** 1.160 Kg.

## Some Applications :

Used in filters, vacuum pumps, blower systems, etc.

## Electrical Connection :

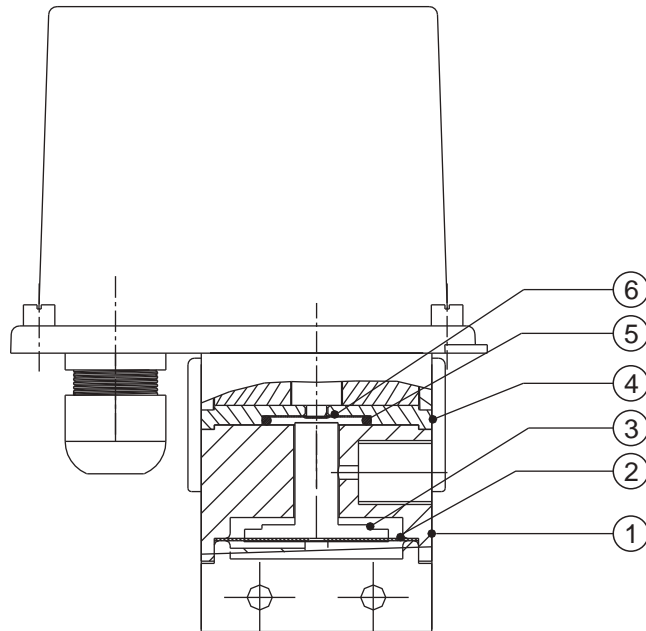
Fig. 2







## PRESSURE CAPSULE DETAILS

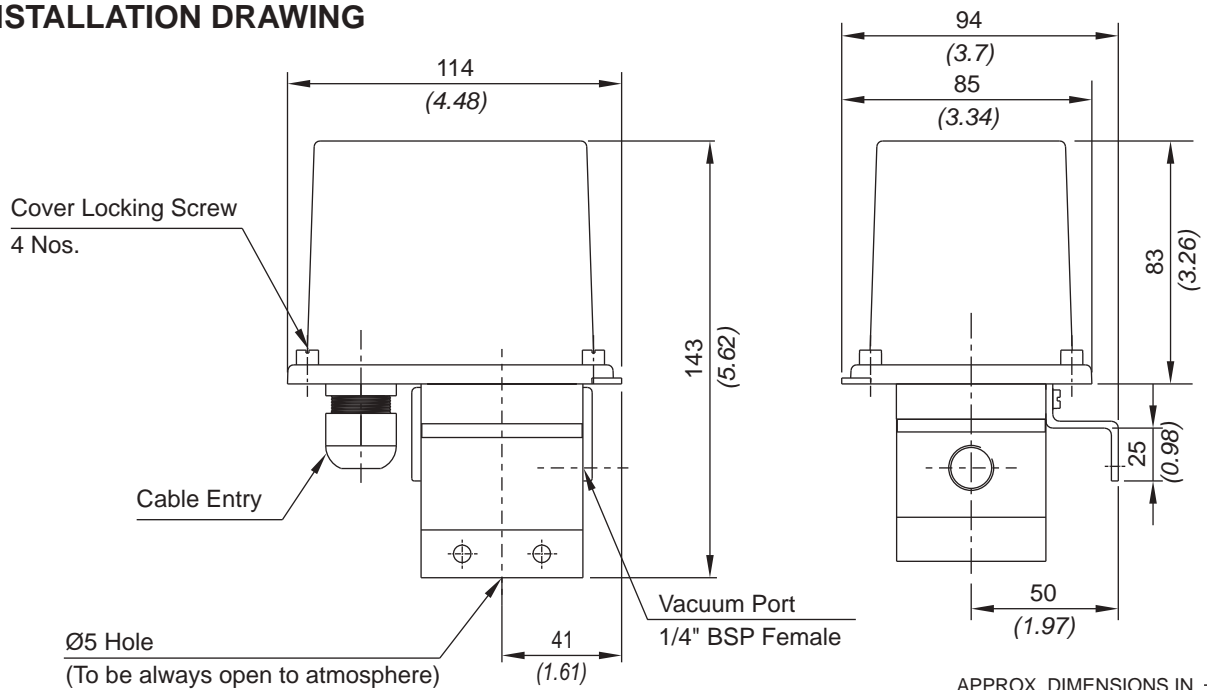


### No. Description

1. *Disc*
2. *Diaphragm*
3. *Plunger (SS316)*
4. *Junction Plate*
5. *Sealing 'O' Ring (Teflon®)*
6. *Sealing diaphragms (Teflon®)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

MZ

VACUUM SWITCHES

RANGE SELECTION TABLE

Range Code	Range mm Hg ("Hg)	Differential* mm Hg ("Hg)	Maximum Working Pressure bar (psi)
		Approximate Maximum for "A8" microswitch	
V00	† 760 - 100 (29.92 - 3.94)	50 (1.97)	12 (174.05)

\*Minimum differential increases with setpoint (Graphs available on request)  
† Typical values achieved at sea level, total vacuum that can be achieved varies mainly with altitude.

## HOW TO ORDER PROCESS VACUUM SWITCHES

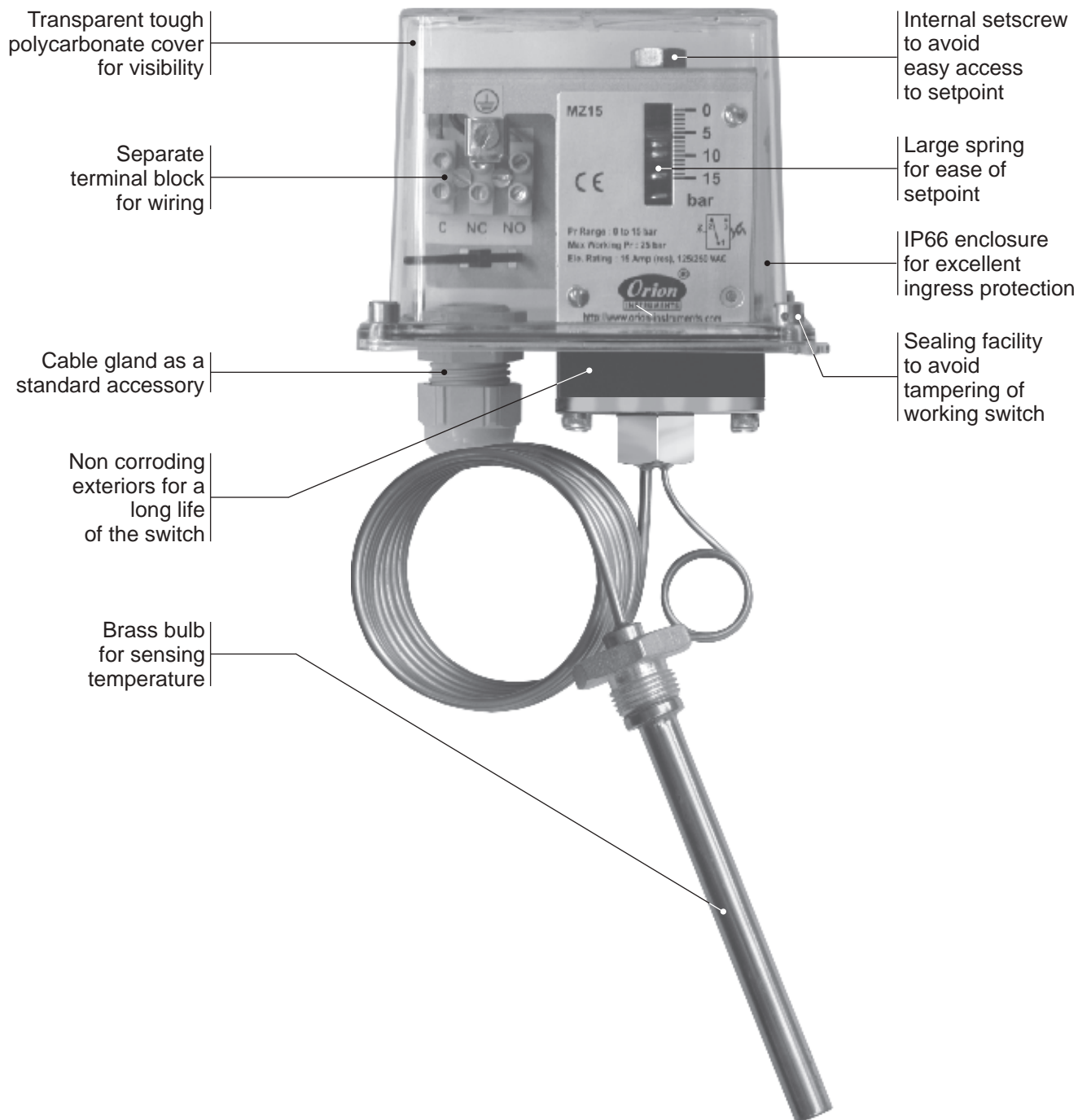
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Model	Cable Entry Size	Switch Type	Range Code (values in mmHg)	Microswitch Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>MZ</b> = Process pressure switch with tough transparent polycarbonate enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 cable gland	<b>VF2</b> = vacuum switch, fixed differential with scale in mmHg <b>VF3</b> = vacuum switch, fixed differential with scale in "Hg <b>*VA2</b> = vacuum switch, adjustable differential with scale in mmHg <b>*VA3</b> = vacuum switch, adjustable differential with scale in "Hg <small>*Available only with option A9 in Group 6</small>	<b>V00</b> = († 760 - 100)	<b>A8</b> = General purpose microswitch rated at 5 A; 250 VAC <b>A7</b> = 2SPDT microswitches <b>A9</b> = General purpose microswitch rated @ 5A, 250 VAC	<b>A1</b> = Aluminium / ¼" BSP(F) <b>A2</b> = Aluminium / ¼" NPT(F) <b>S1</b> = SS316 / ¼" BSP(F) <b>S2</b> = SS316 / ¼" NPT(F)  Please refer page no. 226 & 227 for more pressure port options	<b>0</b> = Neoprene <b>1</b> = Teflon

eg. A process vacuum switch with fixed differential having 760 mmHg vac to 100 mmHg vac vacuum range, with 5 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	VF2	V00	A8	S1	0

Please specify full model number to avoid ambiguity.

# MZ TEMPERATURE SWITCHES

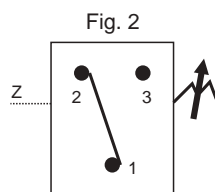


**Approximate Weight :** 0.700 Kg.

## Some Applications :

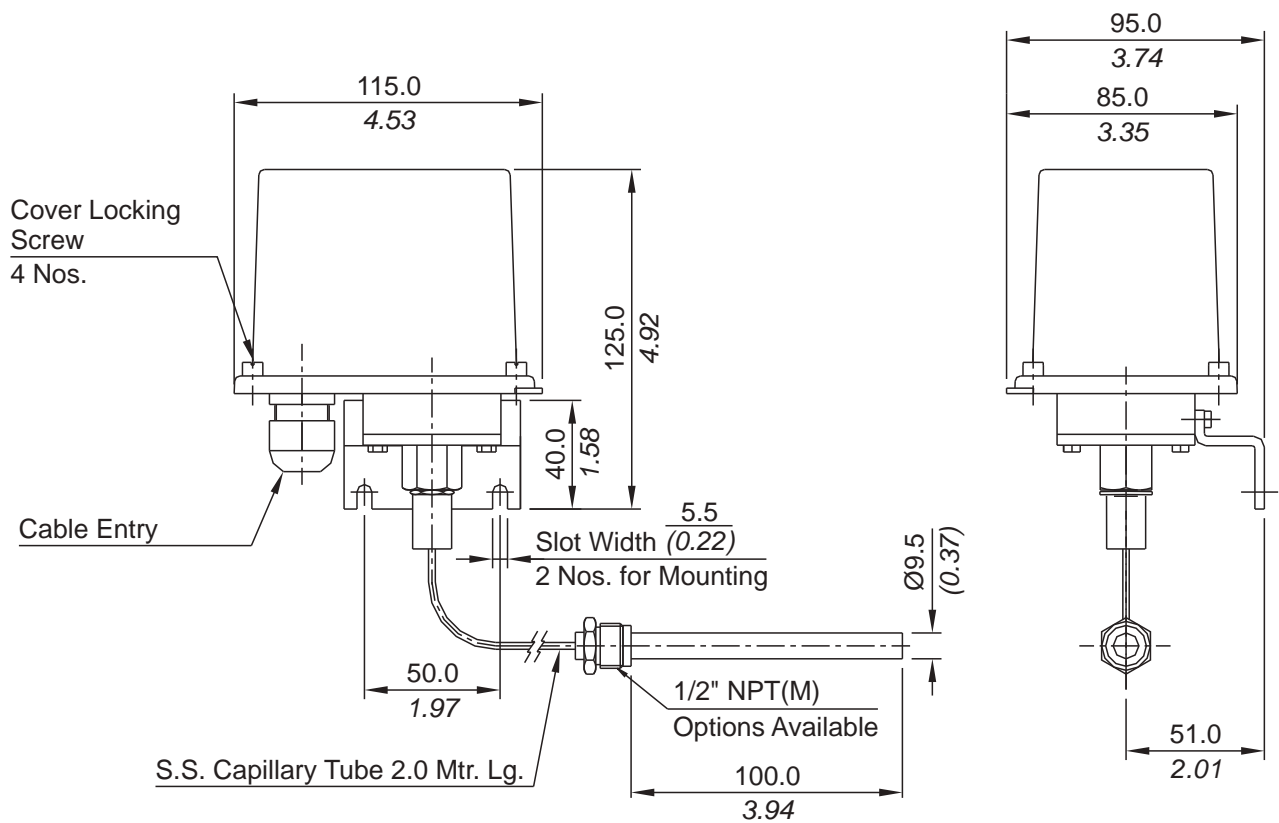
To detect limiting temperature levels in non-hazardous areas.

## Electrical Connection :





## INSTALLATION DRAWING



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

# MZ TEMPERATURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range °C (°F)	Differential* °C (°F)	Maximum Working Temperature °C (°F)
		Approximate Maximum for "A1" microswitch	
T1H	25 - 90 (77 - 194)	15 (59)	150 (302)
T2H	70 - 150 (158 - 302)	20 (68)	200 (392)
T3H	120 - 215 (248 - 419)	30 (86)	300 (572)

\* Approximate differential at midrange for A1 microswitch. Differentials increase with setpoint. Differentials vary with microswitch combinations. Please consult sales office for details

## HOW TO ORDER PROCESS TEMPERATURE SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in Deg. Cen.)	Microswitch Type	Temp. Bulb Material / Size	Capillary Material / Size
<input type="checkbox"/> Reserved for Non-standard Options not covered in Catalogue. Will Be given by Manufacturer, Only after Agreement of Supply details With customer.	<b>MZ</b> = Process temperature switch with tough transparent polycarbonate Enclosure to IP66 as per IS2147	<b>3</b> = M20 X 1.5 threads	<b>TF1</b> = Temperature Switch fixed differential without scale <b>TF2</b> = Temperature Switch fixed differential with scale in °C	<b>T1H</b> = 25 - 90 <b>T2H</b> = 70 - 150 <b>T3H</b> = 120 - 215	<b>A1</b> = General purpose microswitch rated at 15 A; 250 VAC <b>A7</b> = 2SPDT switching elements <b>A8</b> = General purpose microswitch rated at 5A; 250 VAC <b>A9</b> = General purpose microswitch rated at 5A; 250 VAC	<b>B1</b> = Brass / Dia. 9.5 mm, 123 mm length, with 3/8" BSP (M) thermowell connection <b>B2</b> = Brass / Dia. 9.5 mm, 123 mm length, with 3/8" NPT (M) thermowell connection <b>B3</b> = Brass / Dia. 9.5 mm, 123 mm length, with 1/2" NPT (M) thermowell connection	<b>2</b> = SS316 / 2.0 meter

E.g. A Process Temperature switch, with M20x1.5 cable entry as 1 SPDT, fixed differential with scale, having 25°C to 90°C temperature range, with 15 Amp. microswitch, with Brass 9.5 mm diameter bulb, having length 123 mm with 3/8"BSP(M), with 2.0 meter SS316 capillary length shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	MZ	3	TF2	T1H	A1	B1	2

Please specify full model number to avoid ambiguity.

# PRESSURE PORT OPTIONS

Material		Stainless Steel (SS)			Hastelloy C				
Pressure Port Code		S3	S4	S5	H1	H2	H3	H4	H5
Size	Page No.	1" BSP(M)	1/2" NPT(F)	1/2" NPT(M)	1/4" BSP(F)	1/4" NPT(F)	1" BSP(M)	1/2" NPT(F)	1/2" NPT(M)
<b>Flameproof Switches</b>									
FC High Pressure Range	25	✓	✓	✓	✓	✓	✓	✓	✓
FC High Proof High Range	29	✗	✓	✓	✓	✓	✗	✓	✓
FC Low Pressure Range	37	✗	✗	✗	✗	✗	✗	✗	✗
FC Hydraulic Range	41	✗	✗	✗	✓	✓	✗	✗	✗
FC High Range Pressure Difference	49	✗	✗	✗	✓	✓	✗	✗	✗
FC High Proof High Range PD	53	✗	✗	✗	✓	✓	✗	✗	✗
FC High Range DP	57	✗	✗	✗	✗	✗	✗	✗	✗
FC Low Range Pressure Difference	61	✗	✗	✗	✗	✗	✗	✗	✗
FC Low ÄP High Proof	65	✗	✗	✗	✗	✗	✗	✗	✗
FC Vacuum Range	69	✗	✗	✗	✓	✓	✗	✗	✗
FC Compound Range	73	✗	✗	✗	✓	✓	✗	✗	✗
<b>Industrial Switches</b>									
MD High Range	99	✓	✓	✓	✓	✓	✓	✓	✓
MD High Proof High Range	103	✗	✓	✓	✓	✓	✗	✓	✓
MD Low Range	123	✗	✗	✗	✗	✗	✗	✗	✗
MD Hydraulic Range	127	✗	✗	✗	✗	✗	✗	✗	✗
MD Hydraulic Diaphragm	131	✗	✗	✗	✓	✓	✗	✗	✗
DS Dual High Range	135	✗	✗	✗	✓	✓	✗	✗	✗
MD High Range Pressure Difference	139	✗	✗	✗	✓	✓	✗	✗	✗
MD High Proof High Range PD	143	✗	✗	✗	✓	✓	✗	✗	✗
MD High Range DP	147	✗	✗	✗	✓	✓	✗	✗	✗
MD Low Range Pressure Difference	153	✗	✗	✗	✗	✗	✗	✗	✗
MD Low ÄP High Proof	157	✗	✗	✗	✗	✗	✗	✗	✗
MD Vacuum Range	161	✗	✗	✗	✗	✗	✗	✗	✗
MD High Range Compound	165	✗	✗	✗	✗	✗	✗	✗	✗
MD Low Range Compound	169	✗	✗	✗	✗	✗	✗	✗	✗
<b>Process Switches</b>									
MZ High Range	189	✓	✓	✓	✓	✓	✗	✓	✓
MZ High Proof High Range	193	✗	✓	✓	✓	✓	✗	✓	✓
MZ Hydraulic Range	205	✗	✗	✗	✓	✓	✗	✗	✗
MZ Hydraulic Diaphragm	209	✗	✗	✗	✓	✓	✗	✗	✗
MZ High Range Pressure Difference	213	✗	✗	✗	✓	✓	✗	✗	✗
MZ High Range DP	217	✗	✗	✗	✓	✓	✗	✗	✗
MZ Vacuum Range	221	✗	✗	✗	✓	✓	✗	✗	✗

✓ - Available    ✗ - Not Available



Material		Monel				
Pressure Port Code		N1	N2	N3	N4	N5
Size	Page No.	1/4" BSP(F)	1/4" NPT(F)	1" BSP(M)	1/2" NPT(F)	1/2" NPT(M)
<b>Flameproof Switches</b>						
FC High Pressure Range	25	✓	✓	✓	✓	✓
FC High Proof High Range	29	✓	✓	✗	✓	✓
FC Low Pressure Range	37	✗	✗	✗	✗	✗
FC Hydraulic Range	41	✓	✓	✗	✗	✗
FC High Range Pressure Difference	49	✓	✓	✗	✗	✗
FC High Proof High Range Pressure Difference	53	✓	✓	✗	✗	✗
FC High Range DP	57	✓	✓	✗	✗	✗
FC Low Range Pressure Difference	61	✗	✗	✗	✗	✗
FC Low ÄP High Proof	65	✗	✗	✗	✗	✗
FC Vacuum Range	69	✓	✓	✗	✗	✗
FC Compound Range	73	✓	✓	✗	✗	✗
<b>Industrial Switches</b>						
MD High Range	99	✓	✓	✓	✓	✓
MD High Proof High Range	103	✓	✓	✗	✓	✓
MD Low Range	123	✗	✗	✗	✗	✗
MD Hydraulic Range	127	✗	✗	✗	✗	✗
MD Hydraulic Diaphragm	131	✓	✓	✗	✗	✗
DS Dual High Range	135	✓	✓	✗	✗	✗
MD High Range Pressure Difference	139	✓	✓	✗	✗	✗
MD High Proof High Range Pressure Difference	143	✓	✓	✗	✗	✗
MD High Range DP	147	✓	✓	✗	✗	✗
MD Low Range Pressure Difference	153	✗	✗	✗	✗	✗
MD Low ÄP High Proof	157	✗	✗	✗	✗	✗
MD Vacuum Range	161	✓	✓	✗	✗	✗
MD High Range Compound	165	✓	✓	✗	✗	✗
MD Low Range Compound	169	✗	✗	✗	✗	✗
<b>Process Switches</b>						
MZ High Range	189	✓	✓	✗	✓	✓
MZ High Proof High Range	193	✓	✓	✗	✓	✓
MZ Hydraulic Range	205	✓	✓	✗	✗	✗
MZ Hydraulic Diaphragm	209	✓	✓	✗	✗	✗
MZ High Range Pressure Difference	213	✓	✓	✗	✗	✗
MZ High Range DP	217	✓	✓	✗	✗	✗
MZ Vacuum Range	221	✓	✓	✗	✗	✗

✓ - Available      ✗ - Not Available

## FLANGE CODE TABLE

Flanges conform to ANSI B16.5; maximum pressure is limited by flange rating

Class	Stainless Steel		Hastelloy		Alloy 400		Titanium		Tantalum	
	316 L		C276		Monel					
<b>150#</b>	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat
1/2"	AA	BQ	DG	EW	GM	IC	JS	LI	MY	OO
3/4"	AB	BR	DH	EX	GN	ID	JT	LJ	MZ	OP
1"	AC	BS	DI	EY	GO	IE	JU	LK	NA	OQ
1 1/4"	AD	BT	DJ	EZ	GP	IF	JV	LL	NB	OR
1 1/2"	AE	BU	DK	FA	GQ	IG	JW	LM	NC	OS
2"	AF	BV	DL	FB	GR	IH	JX	LN	ND	OT
<b>300#</b>	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat
1/2"	AG	BW	DM	FC	GS	II	JY	LO	NE	OU
3/4"	AH	BX	DN	FD	GT	IJ	JZ	LP	NF	OV
1"	AI	BY	DO	FE	GU	IK	KA	LQ	NG	OW
1 1/4"	AJ	BZ	DP	FF	GV	IL	KB	LR	NH	OX
1 1/2"	AK	CA	DQ	FG	GW	IM	KC	LS	NI	OY
2"	AL	CB	DR	FH	GX	IN	KD	LT	NJ	OZ
<b>400#</b>	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat
1/2"	AM	CC	DS	FI	GY	IO	KE	LU	NK	PA
3/4"	AN	CD	DT	FJ	GZ	IP	KF	LV	NL	PB
1"	AO	CE	DU	FK	HA	IQ	KG	LW	NM	PC
1 1/4"	AP	CF	DV	FL	HB	IR	KH	LX	NN	PD
1 1/2"	AQ	CG	DW	FM	HC	IS	KI	LY	NO	PE
2"	AR	CH	DX	FN	HD	IT	KJ	LZ	NP	PF
<b>600#</b>	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat
1/2"	AS	CI	DY	FO	HE	IU	KK	MA	NQ	PG
3/4"	AT	CJ	DZ	FP	HF	IV	KL	MB	NR	PH
1"	AU	CK	EA	FQ	HG	IW	KM	MC	NS	PI
1 1/4"	AV	CL	EB	FR	HH	IX	KN	MD	NT	PJ
1 1/2"	AW	CM	EC	FS	HI	IY	KO	ME	NU	PK
2"	AX	CN	ED	FT	HJ	IZ	KP	MF	NV	PL
<b>900#</b>	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat
1/2"	AY	CO	EE	FU	HK	JA	KQ	MG	NW	PM
3/4"	AZ	CP	EF	FV	HL	JB	KR	MH	NX	PN
1"	BA	CQ	EG	FW	HM	JC	KS	MI	NY	PO
1 1/4"	BB	CR	EH	FX	HN	JD	KT	MJ	NZ	PP
1 1/2"	BC	CS	EI	FY	HO	JE	KU	MK	OA	PQ
2"	BD	CT	EJ	FZ	HP	JF	KV	ML	OB	PR

## FLANGE CODE TABLE

Flanges conform to ANSI B16.5; maximum pressure is limited by flange rating

Class	Stainless Steel		Hastelloy		Alloy 400		Titanium		Tantalum	
	316 L		C276		Monel					
1500#	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat
1/2"	BE	CU	EK	GA	HQ	JG	KW	MM	OC	PS
3/4"	BF	CV	EL	GB	HR	JH	KX	MN	OD	PT
1"	BG	CW	EM	GC	HS	JI	KY	MO	OE	PU
1 1/4"	BH	CX	EN	GD	HT	JJ	KZ	MP	OF	PV
1 1/2"	BI	CY	EO	GE	HU	JK	LA	MQ	OG	PW
2"	BJ	CZ	EP	GF	HV	JL	LB	MR	OH	PX
2500#	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat	Raised	Flat
1/2"	BK	DA	EQ	GG	HW	JM	LC	MS	OI	PY
3/4"	BL	DB	ER	GH	HX	JN	LD	MT	OJ	PZ
1"	BM	DC	ES	GI	HY	JO	LE	MU	OK	QA
1 1/4"	BN	DD	ET	GJ	HZ	JP	LF	MV	OL	QB
1 1/2"	BO	DE	EU	GK	IA	JQ	LG	MW	OM	QC
2"	BP	DF	EV	GL	IB	JR	LH	MX	ON	QD

### RANGE AVAILABILITY AS PER BORE SIZES

	H01 to H04	H07	H10	H15	H30	H2T to H2H
1" NB	NA	Yes	Yes	Yes	Yes	Yes
2" NB	Yes	Yes	Yes	Yes	Yes	Yes

## MICROSWITCH OPTIONS

Following table lists standard microswitches and there electrical ratings that can be supplied with most FC and MD models. Some can be supplied on MZ models too. Please get in touch with sales office for feasibility of options on each model. Please write to us on electrical rating options you need, but are not mentioned below.

Code	General Description	AC Rating			DC Rating		
		Resistive (A)	Inductive (A)	Voltage	Resistive (A)	Inductive (A)	Voltage
A1	General Purpose Microswitch	15	NA	125/250/480	NA	NA	NA
A2	Hermetically Sealed for Corrosive Environments	4	2	115	4	2	28
A3	Gold Plated Contacts for Low Voltage Applications	1	NA	125	NA	NA	NA
A4	DPDT Configuration	10	NA	125/250	0.3/0.15	NA	125/250
A5	For High DC Ratings	NA	NA	NA	10/3	7.5/2	125/250
A6	Elements with Adjustable Deadband	15	NA	115/250	1	NA	24
A7	2SPDT Switching Elements	5	NA	250	5	3	28
A8	General Purpose Microswitch	5	NA	250	5	3	28
A9	General Purpose Microswitch	5	NA	125/250	NA	NA	NA
B2	2SPDT Hermetically Sealed Microswitches	4	2	115	4	2	28
B3	2SPDT Gold Plated Contacts for Low Voltage Applications	1	NA	125	1	0.5	30
B4	2SPDT Hermetically Sealed Microswitches	NA	NA	NA	1	0.25	28
B5	1SPDT Hermetically Sealed Gold Plated Contacts	NA	NA	NA	1	0.25	28
B6	2SPDT Hermetically Sealed Gold Plated Contacts	NA	NA	NA	1	0.25	28
B7	2SPDT Switching Elements	15	NA	125/250	NA	NA	NA
B9	2SPDT Switching Elements for Adjustable	5	NA	125/250	NA	NA	NA

# Triclover Switches



Pressure Ranges from 0.2 bar to 15 bar

Please refer page no. 256 for Triclover Switch details

## Introduction

The initial of our product lines, these switches are meant for light duty applications for the OEM industry. Many of them need to be used in clean atmospheres, sometimes inside a panel. These are compact, low cost and built just for the intended use. Most of them can be configured for a particular purpose by selecting the wetted parts, but electrical ratings are restricted to 5 A, 250 VAC.

## APPLICATIONS

- Lubrication Systems
- Steam Sterilisers
- Hospital Equipment
- Water treatment
- Fire protection
- Machine Tools
- Boilers and Compressors
- Furnaces
- Textile Machinery
- Pharmaceuticals
- Hydraulics & Pneumatics
- Automobiles

## PRODUCT SPECIFICATIONS:

- Storage temperature : Atmospheric temperature
- Operating ambient temperature : - 20° C to + 60° C
- Media temperature : for rubber diaphragms 80° C max
- Can be offered for higher temperatures with other capsule combinations
- Setpoint repeatability :  $\pm 1\%$  of FSR
- Enclosure : Pressed steel powder coated with plastic cover
- Switch output : Choice of SPDT, 2SPDT, hermetically sealed, gold plated contacts
- Process connection :  $\frac{1}{4}$ " BSP standard, other options like flanges, triclover clamps, diaphragm seals available.
- Accessories : Adaptors, 2" pipe-mounting brackets, syphons, impulse tubes etc.

## FEATURES

- Compact
- Scale for easier setpoint (optional)
- Enclosure protection : upto IP 65 (varies with model)
- Reliable accurate microswitches for long life switching
- Customized arrangements for switching values on request
- Easy safe wiring options
- Field adjustable
- Accuracy  $\pm 1\%$  FSR
- Warranty : 2 years

\*Accuracy changes with switch configuration

# COMPACT SWITCHES

## SPECIFIER'S GUIDE FOR

PRESSURE SWITCHES

PRESSURE DIFFERENCE SWITCHES

VACUUM SWITCHES





## Using the section

This section on helps you make a logical choice in selecting the best product for a particular application. It allows a user familiar with our product line to locate the exact page the product is listed on. For those not familiar with our products, a logical sequence is given to help the user pick the best product for their need.

By taking a few minutes to familiarise yourself with the catalogue organization, you will find it very easy to locate the product / information you need.

1. The contents page lists the broad outline in which the catalogue is organized, and will help the user familiar with products to select the page on which the product or other useful information is listed.

2. Need Product Selection help ?

Product selection help will start with the “Pictorial Index” on Page 235, where the products are broadly classified. A brief description of each product group , a typical photo of the product within the group and the page number on which it is listed are given.

If the user is not familiar with the products, a product selection guide is provided on pages 238 through 244, where photos for each product and important specifications are given to help determine and select the best product for the application.

By evaluating and comparing these parameters, a logical selection can be made. Turn to the page on which the product information for the selected product is listed, for :

Capsule Construction details

Physical sizes

Special features

Ranges, hysteresis, electrical ratings etc.

Ordering information

Some applications

The organisation of each of these pages is demonstrated on pages 236 and 237, of this section “How to use this catalogue”.

In many cases, more than one product may work. For the most cost effective solution, compare prices and consider alternatives. Remember, the end cost includes initial product price, plus the installation, plus the service.

3. Need the terminology explained? (see page 330)

Turn to page 330 for the definitions and terminology. This will help you familiarize with the terms used throughout the catalogue.

4. Need information on Accessories? (see page 322)

Turn to page 322 for information on important accessories. These will give information on only important accessories, and information needed, when these are to be supplied with our products.

5. Need selection guidance? (see page 331)

A logical procedure on page 331 will help you to consider most of the important factors when selecting a pressure switch.

6. Need other products ? (see page 332)

Products other than those listed in this catalogue are referenced on these pages. Separate catalogues for these products are available.



## PRESSURE SWITCHES

### HIGH RANGE

**MG/ME**



P. No. 246

**MN/MA**



P. No. 248

**HM**



P. No. 258

**DT**



P. No. 264

**MJ**



P. No. 274

**MK**



P. No. 276

### LOW RANGE

**MN/MA**



P. No. 272

### HYGEINE RANGE

**MG/ME TRICLOVER**



P. No. 256

### HYDRAULIC RANGE\*

**DN/DA**



P. No. 250

**HM**



P. No. 260

**DT**



P. No. 266

**DJ**



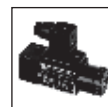
P. No. 252

**DK**



P. No. 254

**HM350**

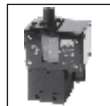


P. No. 262

## PRESSURE DIFFERENCE SWITCHES

### HIGH RANGE

**PD**



P. No. 280

**DP**



P. No. 278

**PJ**



P. No. 282

### LOW RANGE

**PD**



P. No. 284

**PA**



P. No. 286

## VACUUM SWITCHES

### HIGH RANGE

**VS1**



P. No. 270

**MN/MA**



P. No. 268

### LOW RANGE

Low range pressure difference switches can be used as vacuum switches when high pressure port is vented to atmosphere

\*Hydraulic ranges are ranges typically from 2 bar to 600 bar, used in oil applications. However, these switches can be used for other media depending on wetted parts compatibility.

# HOW TO USE this catalogue

Due to the variety in product types and their salient features, catalogue page formats may vary. But generally the following format is adhered to.

Elements appearing on each page will be:

1. Product family / series - A product family / series will appear on the outside page corner, depending on the left / right hand page, and will be in large bold type.
2. Product description - will appear immediately following the product family / series at top of the page and will be in bold type.
3. Features - will appear next to product description & will enlist only the major attributes.
4. Pressure capsule details - will show the construction of the pressure capsule and all its internal parts. If the process / working medium is variable, the wetted parts will be mentioned in italics. If the wetted parts are unique, the material of construction (MOC) will be mentioned

alongside in brackets. Where the material of construction is not specified, it will vary and the options are to be selected by the user considering the compatibility of the process / working medium. Modifications can be made to suit any particular medium, if the answer for your needs is not in the standard MOC listed. Products for which process / working medium is predefined, pressure capsule details are not provided (e.g as in case of comparison test pump). Pressure capsule details of accessories are not given.


5. Installation drawing - will show the typical installation dimensions of products as they exist in their standard forms. The dimensions are mentioned in millimetres and also in inches to facilitate the user. The dimensions of accessories will have to be added to these to arrive at any particular general arrangement (GA) drawings. The dimensions are approximate and for precise dimensions, where mounting space is restricted, the user may contact the nearest sales office. Installation drawings of only fast moving accessories are given.

6


4

5

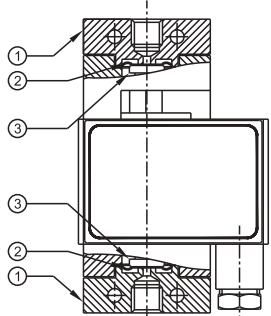
**DP**



**HIGH RANGE PRESSURE DIFFERENCE SWITCHES**



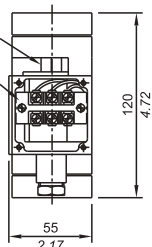
**PRESSURE CAPSULE DETAILS**



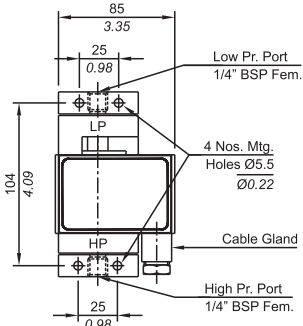
**No. Description**  
 1. Pressure housing  
 2. Diaphragm  
 3. Plunger

Note : wetted parts are mentioned in italics.

**INSTALLATION DRAWING**



Set Screw  
Terminal Strip



APPROX. DIMENSIONS IN mm  
inches

Bulletin No. KA121024

**278**

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## HOW TO USE this catalogue

6. Photos - will appear on the relevant top of the page for products. If there are mounting variations / styles, all the styles for standard products will appear for easy identification. Options, if included in the photograph, are for demonstration only, and are not a part of the standard equipment. For accessories, the photos are not given due to the sheer variety and range available.

7. Logo - will appear on left hand top of page to identify the manufacturer.

8. Characteristics - Range tables and their relevant data, e.g the range covered, the differentials and maximum working pressures will generally appear on the right hand page. Additional technical details will also be mentioned, wherever required, on the right hand side of the page.

9. Ordering guide - A guide as to how to order the particular series' variations will appear on right hand bottom of the page. Only the variations available within a particular product family / series will appear here. Any additional accessories or modifications required for the product need to be mentioned in text by the user.

10. Some applications - will appear under features. This is for easy understanding of the specific use of the product.

11. Numerous combinations are possible when pressure switches are provided with accessories like chemical seals, snubbers, remote seals, pipe mounting brackets, combination of switches mounted in a panel etc. Users are requested to provide the details of accessories required in text / drawings, as separate identification codes are provided for pressure switches fitted and supplied with accessories.

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### HIGH RANGE PRESSURE DIFFERENCE SWITCHES DP

#### General information:

DP series pressure difference switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or indoor service based on the type of enclosure opted for. The repeat accuracy is better than  $\pm 1\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure ports are  $\frac{1}{4}"$  BSPF standard.

#### Features:

- Compact
- Separate chamber for working parts
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)
- Pressure ports:  $\frac{1}{4}"$  BSPF

**Some Applications :** Works on opposed diaphragm principle, diaphragm seals can be coupled to this switch. Used in water treatment plants, bag filters, strainers, etc.

#### Range Selection Table

Range Code	Range bar (psi) $\Delta P$	Approximate Maximum Differential* bar (psi)	Maximum Working Pressure bar (psi)
H01	0.1 - 1.0 (1.45 - 14.50)	0.15 (2.18)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.15 (2.18)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.2 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.2 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.52)	0.2 (2.90)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.5 (7.25)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.71)	0.5 (7.25)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	1.0 (14.50)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

#### How to order DP series high range pressure difference switches

Group 1 Model	Group 2 Range Code	Group 3 Range Scale	Group 4 Pressure Housing	Group 5 Diaphragm	Group 6 Enclosure
DP - Pressure Difference Switch (Can be used for both side Positive Pressures Only)	H - High Pressure Range	U - Uncalibrated C - Calibrated	A - Aluminium B - Brass S - SS 316	0 - Neoprene 1 - Teflon	0 - IP 54
for special wetted parts through chemical seals, please refer page 330, 331 & 332 and specify in text accordingly.					

eg. A pressure difference switch, high pressure range from 0.1-1.5 bar in calibrated style with brass pressure housing & a teflon diaphragm as wetted parts, with IP54 Enclosure shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
DP	H02	C	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

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Bulletin No. KA121024

# Product Selection Guide

## High Range Pressure Switches



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Page No. 246



Page No. 248



Page No. 248

Model	MG	ME	MN	MA
Switch type	Single (High Pr.)	Adj. Diff. (High Pr.)	Single (High Pr.)	Adj. Diff. (High Pr.)
Differential type	Fixed	Adjustable	Fixed	Adjustable
Repeatability (% FSR)	± 1.5	± 1.5	± 1	± 1
Range covered	0.067 bar to 25 bar	0.1 bar to 25 bar	0.067 bar to 25 bar	0.1 bar to 25 bar
Enclosure Standard Optional	Pressed steel enclosures IP 40 as per IS 2147		Pr. diecast Al. (IP 54 as per IS 2147) Pr. diecast Al. (IP 65 as per IS 2147)	
sensing element Standard Optional	Diaphragm nylon reinforced neoprene diaphragm teflon			
Pressure housing Standard Optional	Aluminium Brass/SS316			
Other Wetted Parts	-			
Optional wetted parts through chem. seal	-		SS316, Hastelloy B2, Hastelloy C4, Hastelloy C22, Hastelloy C276, Inconel Alloy 600, Monel Alloy 400, Mone Alloy K500, Nickel, Platinum, Tantalum, Titanium, Zirconium, Silver, PTFE	
Temp. of working medium	80°C maximum. For higher temperature, please use impulse tubing/chemical seals.			
Switching element	SPDT Snap action switch rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive.			

Accessories can be supplied with most of the switches. Please consult sales office.

## Product Selection Guide

### Hydraulic Pressure Switches 2SPDT Hydraulic Pressure Switches



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Page No. 254

DN	DA	DJ	DK
Single (Hydr. Pr.)	Adj. Diff. (Hydr. Pr.)	2 SPDT (Hydr. Pr.)	2 SPDT (Hydr. Pr.)
Fixed	Adjustable	Diff. Fixed Stage Diff. Fixed	Diff. Fixed Stage Diff. Adjustable
$\pm 1$	$\pm 1$	$\pm 2$	$\pm 2$
3 bar to 400 bar		5 bar to 400 bar	5 bar to 100 bar
Pr. diecast Al. IP 65 as per IS 2147			
Piston EN8 SS			
Aluminium Brass			
Teflon, Viton, Brass, EN8			
SS316, Hastelloy B2, Hastelloy C4, Hastelloy C22, Hastelloy C276, Inconel Alloy 600, Monel Alloy 400, Monel Alloy K500, Nickel, Platinum, Tantalum, Titanium, Zirconium, Silver, PTFE			
80°C maximum. For higher temperature, please use impulse tubing/chemical seals.			
SPDT Snap action switch rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive.			

Accessories can be supplied with most of the switches. Please consult sales office.

## Product Selection Guide

### Hygiene Range Pressure Switches

### Hydraulic Pressure Switches



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WETTED PARTS	Model	MG	ME	HM (HIGH)	HM
	Switch type	Single (Triclover)		High range pr. switch	Hydraulic pr. switch
	Differential type	Fixed	Adjustable	Fixed	Fixed
	Repeatability (% FSR)	$\pm 1.5$		$\pm 2$	$\pm 1$
	Range covered	0.2 bar to 15 bar		0.2 bar to 25 bar	3 bar to 400 bar
	Enclosure Standard Optional	Pressed Steel Enclosure IP 40 as per IS 2147		Machined aluminium to IP 65	Machined aluminium to IP 65
	sensing element Standard Optional	Diaphragm SS316L		nylon reinforced neoprene diaphragm teflon	Piston EN8 SS
	Pressure housing Standard Optional	Triclover SS316L SS316L			Aluminium Brass
	Other Wetted Parts			Viton, MS/Brass, Nitrile	
	Optional wetted parts through chem. seal			SS316, Hastelloy B2, Hastelloy C4, Hastelloy C22, Hastelloy C276, Inconel Alloy 600, Monel Alloy 400, Monel Alloy K500, Nickel, Platinum, Tantalum, Titanium, Zirconium, Silver, PTFE	
	Temp. of working medium	80°C maximum. For higher temperature, please use impulse tubing/chemical seals.			
	Switching element	SPDT Snap action switch rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive.			

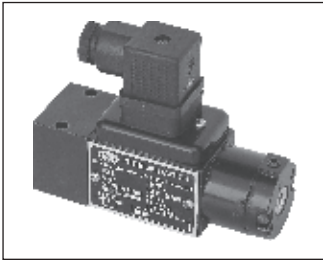
Accessories can be supplied with most of the switches. Please consult sales office.

## Product Selection Guide

### High Range Pressure Switches

### Hydraulic Pressure Switches

### Vacuum Switches



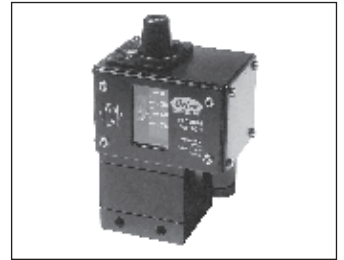
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Page No. 266



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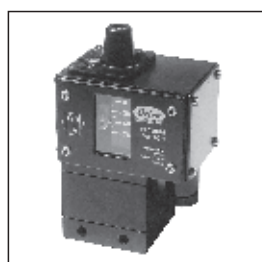
HM 350	DT (HIGH)	DT	MN
Hydraulic pr. switch	High range pr. switch	Hydraulic pr. switch	HI range vacuum sw.
Fixed	Fixed	Fixed	Fixed
$\pm 2$	$\pm 2$	$\pm 2$	$\pm 2$
35 bar to 350 bar	1 bar to 15 bar	4 bar to 600 bar	760 to 100 mm Hg vac
Pr. diecast Al. (IP 65 as per IS 2147)	Cast aluminium to IP 54		Pr. diecast Al. (IP 54 as per IS 2147) Pr. diecast Al. (IP 65 as per IS 2147)
Piston EN8	Diaphragm nylon reinforced neoprene diaphragm	Piston EN8 SS	Diaphragm nylon reinforced neoprene diaphragm Teflon
MS		Aluminium Brass	Aluminium Brass/SS316
Viton, Teflon	EN8, Brass	EN8, Brass/SS, Viton	SS
-	-	-	-
80°C maximum. For higher temperature, please use impulse tubing/chemical seals.			
SPDT Snap action switch rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive.			
		15 A, 250 VAC (res.) Optionally	

Accessories can be supplied with most of the switches. Please consult sales office.

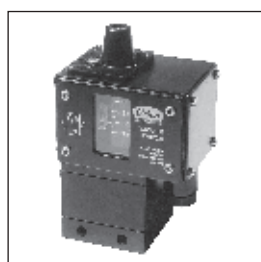
## Product Selection Guide

### High Range Vacuum Switches

### Low Range Pressure Switches



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Page No. 272

Model	MA	VS1	MN	MA
Switch type	HI range vacuum sw.	HI range vacuum sw.	low range pr. sw.	low range pr. switch
Differential type	Adjustable	Fixed	Fixed	Adjustable
Repeatability (% FSR)	± 2	± 2	± 2	± 2
Range covered	760 to 100 mm Hg vac	760 to 100 mm Hg vac	20 to 2500 mm wg	
Enclosure Standard Optional	Pressure diecast Aluminium IP 54 as per IS 2147 IP 65 as per IS 2147			
sensing element Standard Optional	Diaphragm nylon reinforced neoprene diaphragm Teflon			
Pressure housing Standard Optional	Aluminium Brass/SS316		Aluminium SS316	
Other Wetted Parts	SS		SS, Nitrile	
Optional wetted parts through chem. seal	-		-	
Temp. of working medium	80°C maximum. For higher temperature, please use impulse tubing.			
Switching element	SPDT Snap action switch rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive.		SPDT Snap action switch rated at2A, 250 VAC, 0.2 A, 250 VDC resistive.	2A, 250 VAC, 0.2 A, 250 VDC resistive.

Accessories can be supplied with most of the switches. Please consult sales office.



## Product Selection Guide

### 2 SPDT High Range Pressure Switches Pressure Difference Switches



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MJ	MK	DP	PD
2 SPDT (HI Range Pr.)	2 SPDT (HI Range Pr.)	Pr. Difference switch	Pressure Difference Switch
Diff. Fixed, Stage Diff. Fixed	Diff. Fixed, Stage Diff. Adjustable	Fixed	Fixed
$\pm 2$	$\pm 2$	$\pm 1$	$\pm 2$
0.067 bar to 25 bar	0.1 bar to 25 bar	0.1 bar to 25 bar	0.1 bar to 3.6 bar
Pressure diecast Aluminium IP 54 as per IS 2147 IP 65 as per IS 2147			
diaphragm nylon reinforced neoprene teflon			
Aluminium Brass/SS 316			
			SS, Teflon
SS316, Hastelloy B2, Hastelloy C4, Hastelloy C22, Hastelloy C276, Inconel Alloy 600, Monel Alloy 400, Monel Alloy K500, Nickel, Platinum, Tantalum, Titanium, Zirconium, Silver, PTFE			
80°C maximum. For higher temperature, please use impulse tubing/chemical seals.			
SPDT Snap action switch TWO Microswitches rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive.		5A, 250VAC, 0.2 A, 250VDC resistive.	

Accessories can be supplied with most of the switches. Please consult sales office.

## Product Selection Guide

### 2 SPDT Pressure Difference Switches

#### Low Range Pressure Difference Switches



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Page No. 286

Model	PJ	PD	PA
Switch type	2SPDT Pressure Diff.	Low range pr. diff.	Low range pr. diff.
Differential type	Fixed	Fixed	Adjustable
Repeatability (% FSR)	± 2	± 2	± 2
Range covered	0.1 bar to 3.6 bar	15 to 2500 mm wg	100 to 500 mm wg
Enclosure Standard Optional	Pressure diecast Aluminium IP 54 as per IS 2147 IP 65 as per IS 2147		
sensing element Standard Optional	diaphragm nylon reinforced neoprene teflon	diaphragm nylon reinforced neoprene	
Pressure housing Standard Optional	Aluminium Brass/SS 316	MS SS316	
Other Wetted Parts	SS, Teflon	SS, Nitrile, Aluminium	
Optional wetted parts through chem. seal			
Temp. of working medium	80°C maximum. For higher temperature, please use impulse tubing/chemical seals.		
Switching element	5A, 250VAC, 0.2 A, 250VDC resistive.	SPDT Snap action switch rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive.	
	TWO Microswitches of above rating		

Accessories can be supplied with most of the switches. Please consult sales office.



#### Application Note (Pressure Difference Switches) :

\*A Pressure Difference Switch can be used to sense  $\Delta P$  between :

- Two positive pressures
- Two negative pressures or
- One positive, one negative pressure

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It can also be used as :

- a pressure switch, when low pressure port is vented to atmosphere
- a vacuum switch, when high pressure port is vented to atmosphere

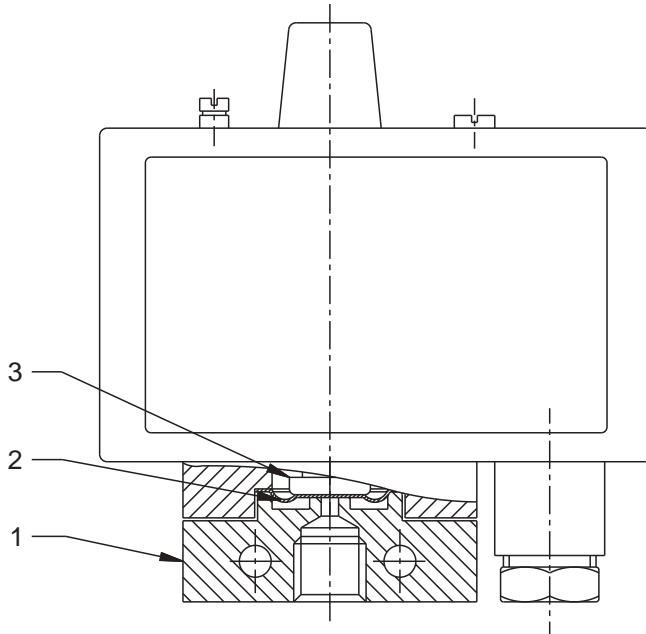
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\*An exception to the rule is DP model, where both pressures need to be positive.

# MG / ME HIGH RANGE PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS

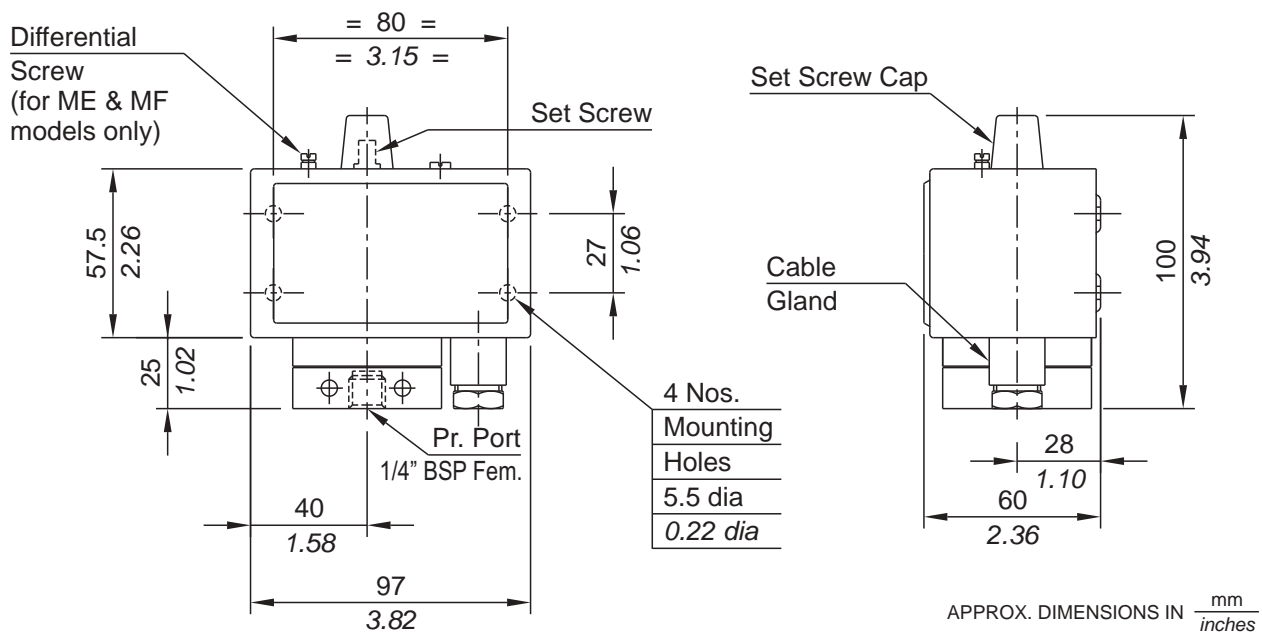


### No. Description

1. Pressure Housing
2. Diaphragm
3. Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# HIGH RANGE PRESSURE SWITCHES MG / ME

## General information:

MG / ME series pressure switches are housed in pressed steel powder coated enclosure and are recommended for panel mounting or indoor service. The repeat accuracy is better than  $\pm 1.5\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure port is 1/4" BSPF standard.

## Features:

- Compact
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250VDC (res.)
- Proof pressure available can be 4 times MWP (optional)
- Pressure port: 1/4" BSPF

**Some Applications :** Used in textile industries, furnaces, compressors, etc.

Range Selection Table

MG		ME		
Range Code	Range † bar (psi)	*Approximate Maximum Differential bar (psi)	* Adjustable Differential bar (psi)	Maximum Working Pressure bar (psi)
LP	0.067 - 0.213 (0.96 - 3.09)	0.02 (0.30)	-	5 (72.52)
LP5	0.1 - 0.5 (1.45 - 7.25)	0.10 (1.45)	-	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.08 (1.16)	0.12 - 1.0 (1.74 - 14.50)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.10 (1.45)	0.3 - 1.0 (4.35 - 14.50)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	0.3 - 1.5 (4.35 - 21.76)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	0.3 - 1.5 (4.35 - 21.76)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.53)	0.40 (5.80)	1.0 - 6.0 (14.50 - 87.02)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.60 (8.70)	1.5 - 8.0 (21.76 - 116.03)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.71)	0.60 (8.70)	1.8 - 10.0 (26.11 - 145.04)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	2.50 (36.26)	2.5 - 10.0 (36.26 - 145.04)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

† rising pressure for MG series; falling pressure for ME series

? approx 50 mm Hg to 160 mm Hg. Scale calibrated in mm Hg for this range only.

## How to order MG / ME series high range pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
MG - Fixed Differential Pressure Switch ME - Adj. Differential Pressure Switch	H - High range Pressure Switch	C - Calibrated	A - Aluminium B - Brass S - SS316	0 - Neoprene 1 - Teflon	0 - IP 40 as per IS 2147

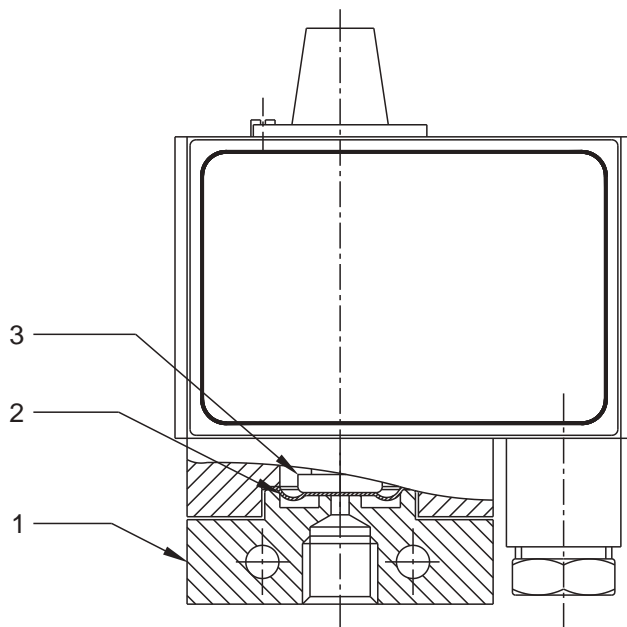
eg. A fixed differential pressure switch, high pressure range from 0.1-1.0 bar in calibrated style with brass pressure housing & a teflon diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
MG	H01	C	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, calibrated switches with standard wetted parts will be supplied.



## PRESSURE CAPSULE DETAILS

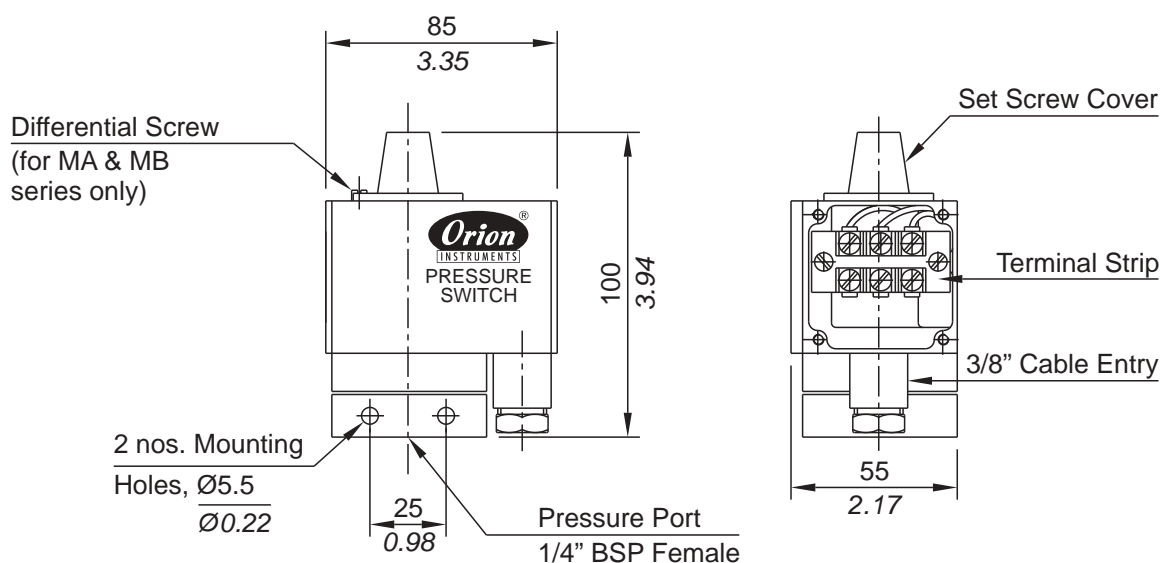


### No. Description

1. Pressure Housing
2. Diaphragm
3. Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# HIGH RANGE PRESSURE SWITCHES MN / MA

## General information:

MN / MA series pressure switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service based on the type of enclosure opted for. The repeat accuracy is better than  $\pm 1\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure port is 1/4" BSPF standard.

## Features:

- Compact
- Separate chamber for working parts
- Wide band adjustable differential in MA series
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250VDC (res.)
- Proof pressure available can be 4 times MWP (optional)
- Pressure port: 1/4" BSPF

**Some Applications :** Used in boilers, water treatment plants, fire fighting systems, compressors, etc.

Range Selection Table

MN		MA		
Range Code	Range † bar (psi)	*Approximate Maximum Differential bar (psi)	* Adjustable Differential bar (psi)	Maximum Working Pressure bar (psi)
LP	0.067 - 0.213 (0.96 - 3.09)	0.02 (0.30)	-	5 (72.52)
LP5	0.1 - 0.5 (1.45 - 7.25)	0.10 (1.45)	-	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.1 (1.45)	0.15 - 1.0 (2.17 - 14.50)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	0.3 - 1.0 (4.35 - 14.50)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.30 (4.35)	0.2 - 1.5 (2.90 - 21.76)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.30 (4.35)	0.30 - 1.5 (4.35 - 21.76)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.53)	0.40 (5.80)	0.80 - 6.0 (11.6 - 87.02)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.60 (8.70)	1.5 - 8.0 (21.75 - 116.03)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.71)	0.60 (8.70)	1.5 - 10.0 (21.75 - 145.04)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	2.50 (36.26)	2.5 - 10.0 (36.26 - 145.04)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

† rising pressure for MN series; falling pressure for MA series

? approx 50 mm Hg to 160 mm Hg. Scale calibrated in mm Hg for this range only

## How to order MN / MA high range pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
MN - Fixed differential Switch MA - Adjustable Differential Switch	H - High Pressure ranges	U - Uncalibrated C - Calibrated	A - Aluminium B - Brass S - SS316	0 - Neoprene 1 - Teflon	0 - Standard (IP 54) 1 - IP65as per IS 2147
			for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.		

eg. A fixed differential switch, high pressure range from 0.1-1.0 bar in calibrated style with brass pressure housing & a teflon diaphragm & a standard enclosure shall be specified by

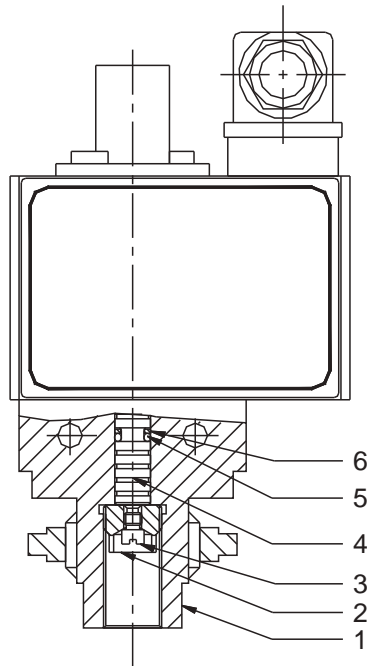
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
MN	H01	C	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and a standard enclosure will be supplied.

# DN / DA HYDRAULIC PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS

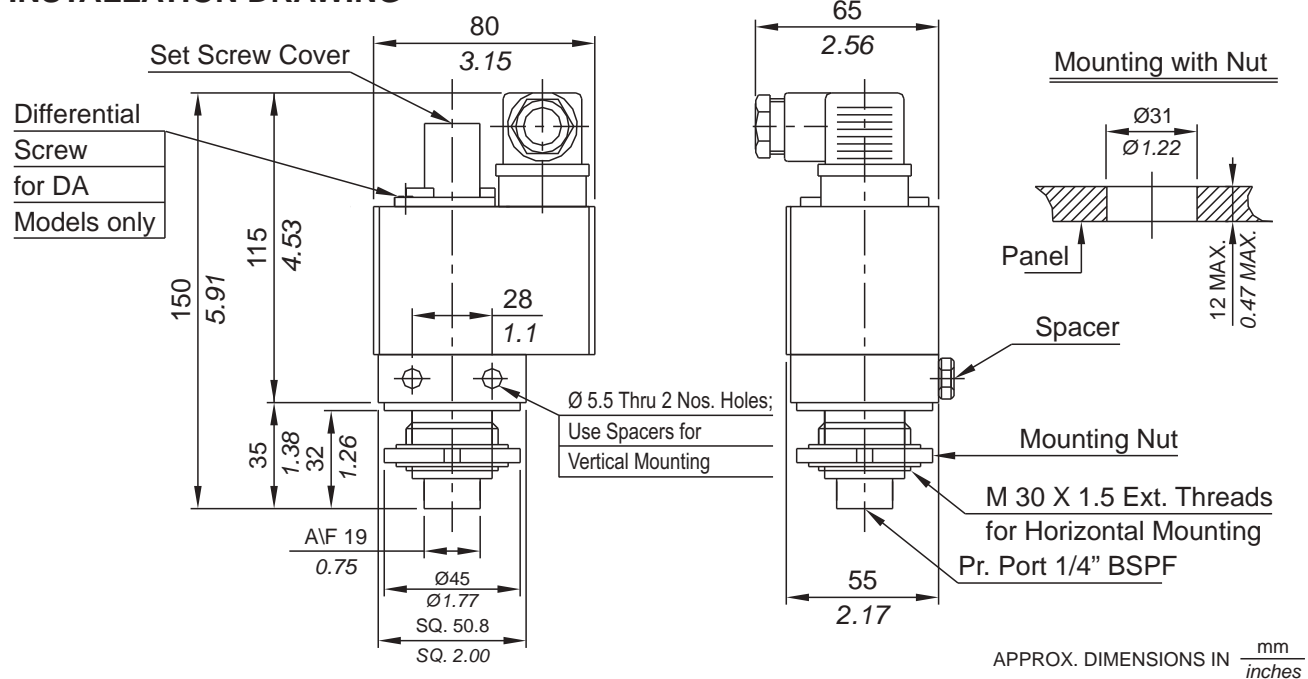


### No. Description

1. Pressure Housing
2. Surge arrestor
3. Surge reducer
4. Piston
5. O ring
6. Backup ring

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING





# HYDRAULIC PRESSURE SWITCHES DN / DA

## General information:

DN / DA series pressure switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel / line mounting or outdoor service. The repeat accuracy is better than  $\pm 1\%$  FSR. A connector to DIN 43650 is provided for electrical wiring. Pressure port is  $\frac{1}{4}$ " BSPF standard.

## Features:

- Compact
- Separate chamber for working parts
- Choice of wetted parts to suit working media
- Wide band adjustable differential in DA series.
- Electrical rating : 5A,250VAC;0.2A,250VDC(res.)
- Pressure port :  $\frac{1}{4}$ " BSPF

**Some Applications :** Used for hydraulic applications like loading and unloading in CNC, VMC machining centres, chuck clamping, etc.

## Range Selection Table

		DN	DA	
Range Code	Range † bar (psi)	*Approximate Maximum Differential bar (psi)	* Adjustable Differential bar (psi)	Maximum Working Pressure bar (psi)
040	3 - 40 (43.51 - 580.15)	5 (72.52)	5 - 10 (72.52 - 145.04)	80 (1160.30)
100	10 - 100 (145.04 - 1450.38)	12 (174.05)	10 - 20 (145.04 - 290.08)	120 (1740.45)
200	7 - 200 (101.52 - 2900.76)	24 (348.09)	18 - 30 (261.06 - 435.11)	200 (2900.76)
400	100 - 400 (1450.38 - 5801.51)	40 (580.15)	30 - 40 (435.11 - 580.15)	400 (5801.51)

\* minimum differential rises with setpoint (Graphs available on request)

† rising pressure for DN series; falling pressure for DA series.

## Wetted Parts Table for DN / DA Series.

	Standard	Optional	Special
Piston	EN8	S.S.	for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.
*Backup ring	Teflon	Teflon	
O ring	Viton	Viton	
Pressure housing	Aluminium	Brass	
Surge suppressor	EN8	Brass	
Surge reducer	Brass	Brass	

\* Backup ring is not used in all pressure ranges. Please contact sales office for details.

## How to order DN / DA series hydraulic pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5
Model	Range	Range Scale	Wetted Parts	-
DN - Fixed diff. Hydraulic Pressure switch DA - Adjustable diff. Hydraulic Pressure Switch	Please select as per range code table	U - uncalibrated C - calibrated	S - for Standard Wetted parts. B - for optional wetted parts mentioned in table above. X - Specify wetted parts in text as per wetted parts table above.	Reserved for non Standard modifications. Code will be given by company

eg. A fixed differential hydraulic pressure switch, pressure range from 5 to 40 bar, in uncalibrated style and standard wetted parts shall be specified by

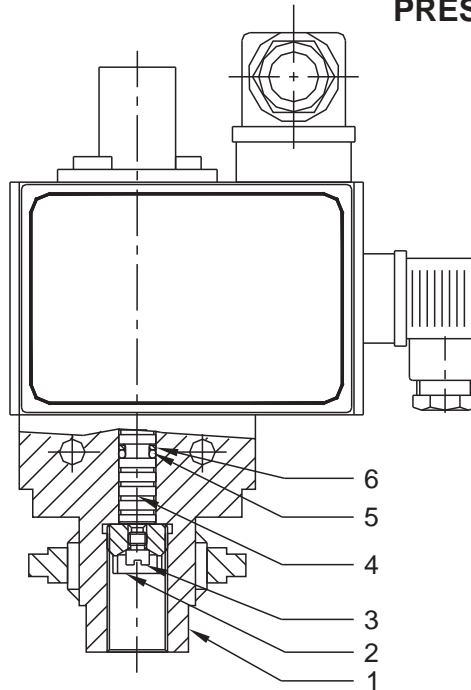
Group 1	Group 2	Group 3	Group 4	Group 5
DN	040	U	S	-

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, pressure switches with standard wetted parts will be supplied.

# DJ 2 SPDT HYDRAULIC PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS

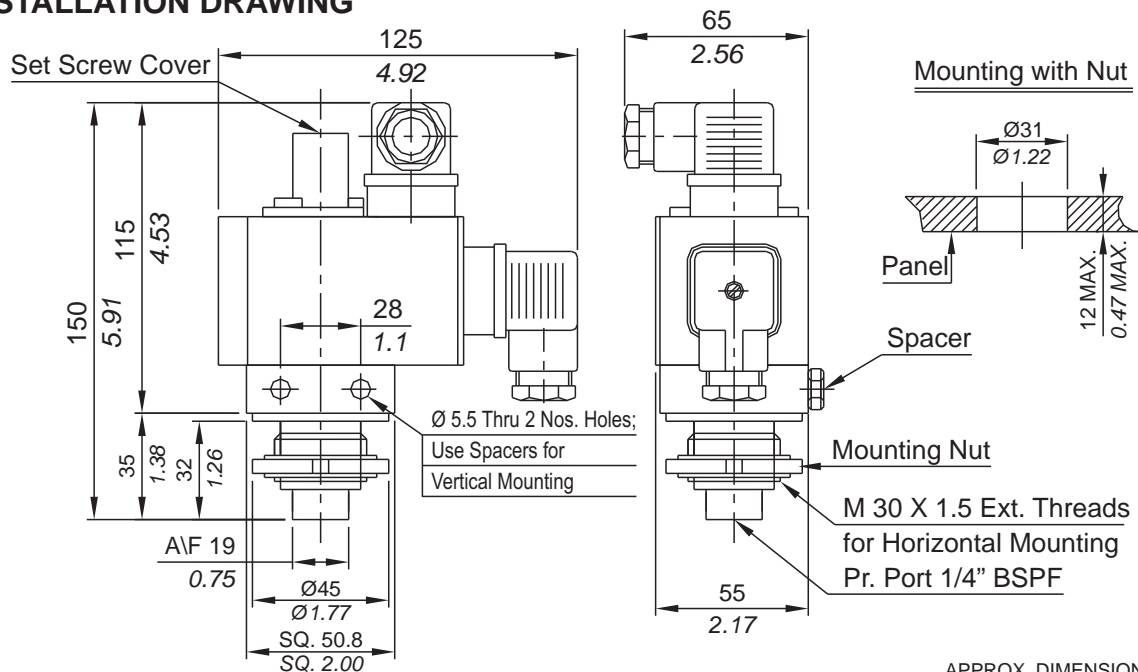


### No. Description

1. Pressure Housing
2. Surge arrester
3. Surge reducer
4. Piston
5. O ring
6. Backup ring

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

## 2 SPDT HYDRAULIC PRESSURE SWITCHES

**DJ**

### General information:

DJ series pressure switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service based on the type of enclosure opted for. No stage differential can be set in these 2SPDT versions (DJ series). Both microswitches are synchronised for operation within practical limits and a slight stage difference is bound to remain between the setpoints (generally not exceeding 2 % of FSR). The repeat accuracy is better than  $\pm 2$  % FSR. Two separate connectors to DIN 43650 are provided for electrical wiring for two independant circuits. Pressure port is  $\frac{1}{4}$ " BSPF standard.

### Features:

- Compact
- Separate chamber for working parts
- Choice of wetted parts to suit working media
- Electrical rating : 5A,250VAC;0.2A,250VDC(res.)
- Electrical element : SPDT snapaction microswitch
- Pressure port:  $\frac{1}{4}$ " BSPF

**Some Applications :** Used in fire fighting systems requiring additional safety, e.g. in large power plants, etc.

### Range Selection Table

Range Code	Range (rising pressure) bar (psi)	*Approximate Maximum Differential bar (psi)	Maximum Working Pressure bar (psi)
040	5 - 40 (72.52 - 580.15)	6 (87.02)	80 (1160.3)
100	10 - 100 (145.04 - 1450.38)	12 (174.05)	120 (1440.45)
200	7 - 200 (101.52 - 2900.76)	24 (348.009)	200 (2900.76)
400	100 - 400 (1450.38 - 5801.51)	40 (580.15)	400 (5801.51)

\*minimum differential rises with setpoint (Graphs available on request)

### Wetted Parts Table for DJ Series.

	Standard	Optional	Special
Piston	EN8	S.S.	for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.
*Backup ring	Teflon	Teflon	
O ring	Viton	Viton	
Pressure housing	Aluminium	Brass	
Surge suppressor	EN8	Brass	
Surge reducer	Brass	Brass	

\* Backup ring is not used in all pressure ranges. Please contact sales office for details.

### How to order DJ series 2SPDT hydraulic pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5
Model	Range	Range Scale	Wetted Parts	-
DJ - 2 SPDT Fixed diff. Hydraulic Pressure Switch	Please select as per range code table	U - uncalibrated C - calibrated	S -for Standard Wetted parts. B -for optional wetted parts mentioned in table above. X -Specify wetted parts in text as per wetted parts table above	Reserved for nonstandard modifications. Code will be given by company.

eg. A 2SPDT fixed differential hydraulic pressure switch, pressure range from 5 to 40 bar, in uncalibrated style and standard wetted parts shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5
DJ	040	U	S	-

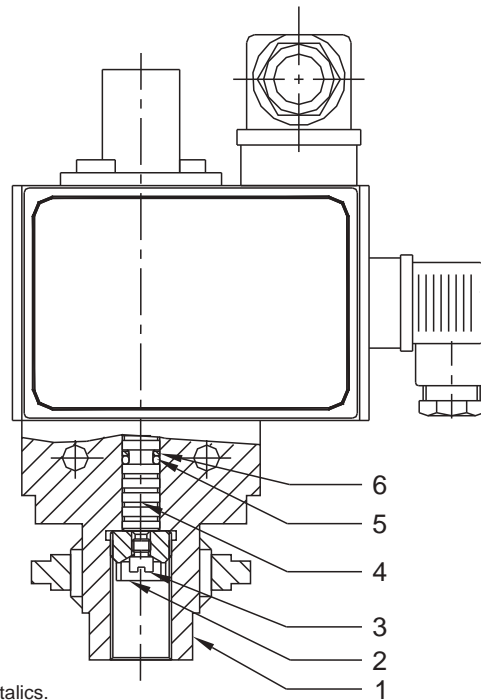
Please specify full model number to avoid ambiguity. Please refer range table & technical details table before arriving at any model number. If only the first two groups are specified while ordering, pressure switches with standard wetted parts will be supplied.

# DK

## 2 SPDT HYDRAULIC PRESSURE SWITCHES (adjustable stage difference)



### PRESSURE CAPSULE DETAILS

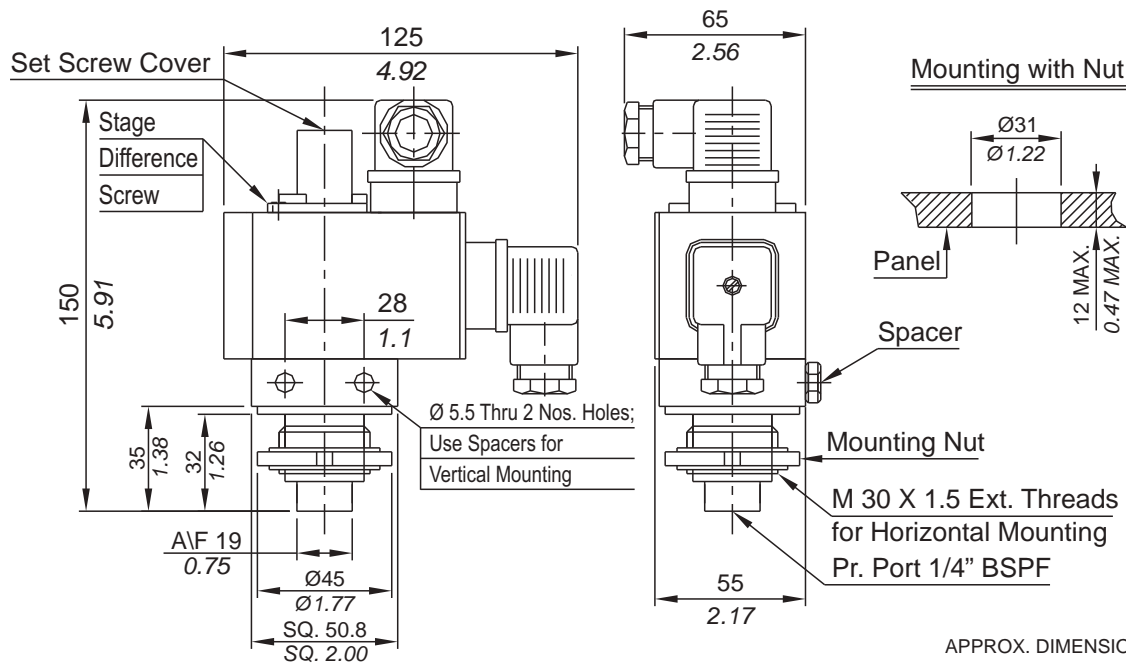


#### No. Description

1. Pressure Housing
2. Surge arrestor
3. Surge reducer
4. Piston
5. O ring
6. Backup ring

Note : *wetted parts* are mentioned in italics.

### INSTALLATION DRAWING



## 2 SPDT HYDRAULIC PRESSURE SWITCHES (adjustable stage difference)

# DK

### General information:

DK series pressure switches are housed in pressure die cast aluminium powder coated enclosure (IP65) and are recommended for panel mounting or outdoor service. Stage differential can be set in these 2SPDT versions (DK series). Both microswitches are synchronised for operation such that the stage difference (or gap) can be adjusted from minimum 15 % of FSR to a maximum of 50% of FSR (on falling setpoints). The repeat accuracy is better than 2 % FSR. Two separate connectors to DIN 43650 are provided for electrical wiring for two independent circuits. Pressure port is ¼ " BSPF standard.

### Features:

- Compact
- Separate chamber for working parts
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)
- Choice of wetted parts to suit working media
- Pressure port : ¼" BSPF

**Some Applications :** Used in systems requiring an alarm and trip function, e.g. HI-HI/Lo-Lo setpoints, etc.

### Range Selection Table

Range Code	Range (rising pressure) bar (psi)	*Approximate Maximum Differential (Fixed) for low microswitch bar (psi)	* Approximate Maximum Differential (Fixed) for high microswitch at minimum gap bar (psi)	* Approximate Maximum Differential (Fixed) for high microswitch at maximum gap bar (psi)	Maximum Working Pressure bar (psi)
040	5 - 40 (72.52 - 580.15)	6 (87.02)	8 (116.03)	18 (261.07)	80 (1160.3)
100	10 - 100 (145.04 - 1450.38)	12 (174.05)	14 (203.05)	75 (1087.87)	200 (2900.76)

\*minimum differential rises with setpoint (Graphs available on request)

### Wetted Parts Table for DK Series.

	Standard	Optional	Special
Piston	EN8	S.S.	for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.
*Backup ring	Teflon	Teflon	
O ring	Viton	Viton	
Pressure housing	Aluminium	Brass	
Surge suppressor	EN8	Brass	
Surge reducer	Brass	Brass	

\* Backup ring is not used in all pressure ranges. Please contact sales office for details.

### How to order DK series 2SPDT hydraulic pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5
Model	Range	Range Scale	Wetted Parts	-
DK - 2 SPDT Fixed diff. Switch with adjustable stage difference	Please select as per range code table	U - uncalibrated	S - for Standard Wetted parts. B - for brass pressure housing, brass surge reducer & suppressor, SS piston. All seals of viton only X - Specify wetted parts in text as per wetted parts table Above	Reserved for nonstandard modifications. Code will be given by company.

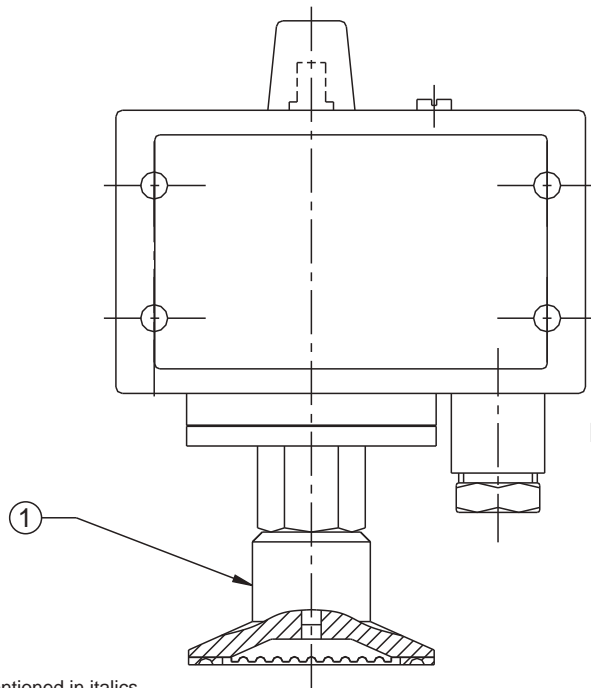
eg. A 2 SPDT fixed differential hydraulic pressure switch with adjustable stage difference, pressure range from 5 to 40 bar, with two no.s 5 A, 250 VAC microswitch and standard wetted parts shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5
DK	040	U	S	-

Please specify full model number to avoid ambiguity. Please refer range table & technical details table before arriving at any model number. If only the first two groups are specified while ordering, pressure switches with standard wetted parts will be supplied.



### PRESSURE CAPSULE DETAILS

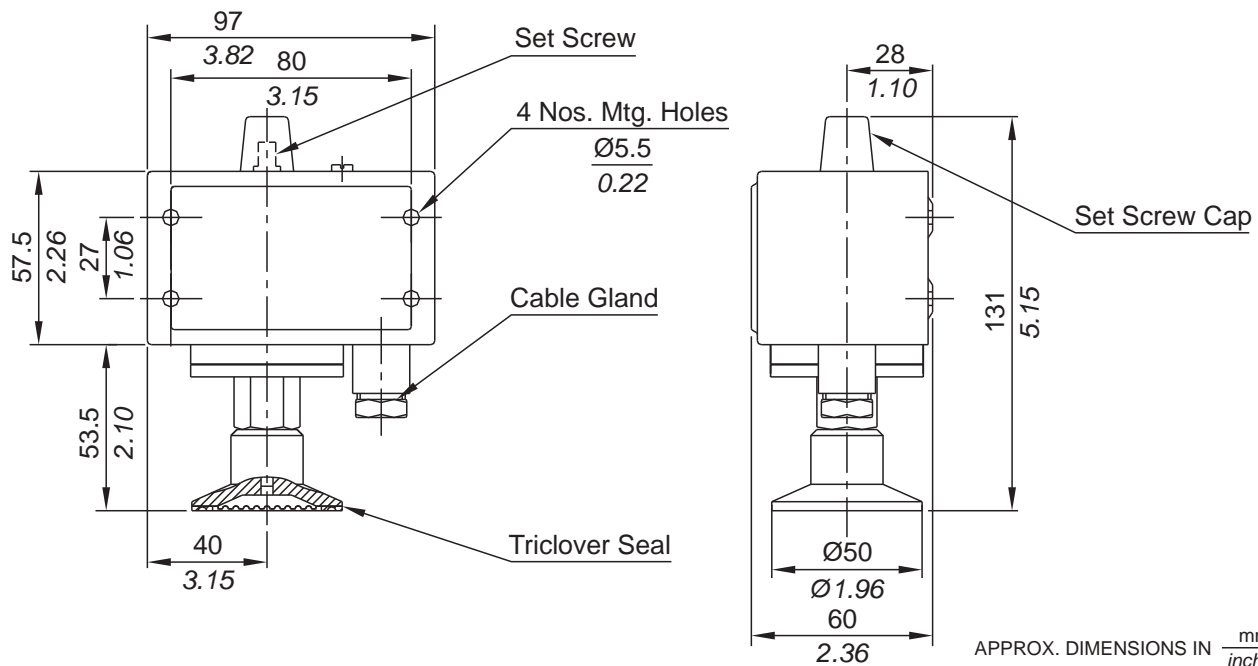


#### No. Description

1. *Triclover seal (SS316L)*

Note : *wetted parts* are mentioned in italics.

### INSTALLATION DRAWING



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

# HYGIENE RANGE PRESSURE SWITCHES

# MG / ME

## General information:

MG series pressure switches are housed in pressed steel powder coated enclosure and are recommended for panel mounting or indoor service. The repeat accuracy is better than  $\pm 1.5\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure port is a triclover seal.

## Features:

- Compact
- Electrical rating : 5A, 250 VAC; 0.2A, 250VDC (res.)
- Pressure port: Triclover / 1/4" BSPF

**Some Applications :** Used in pharma industries, food industry, bulk drugs, dairy products, etc.

Range Selection Table

MG		ME		
Range Code	Range † bar (psi)	*Approximate Maximum Differential bar (psi)	* Adjustable Differential bar (psi)	Maximum Working Pressure bar (psi)
H03	0.2 - 2.6 (2.86 - 37.14)	0.20 (2.86)	0.3 - 1.5 (4.29 - 21.43)	12 (171.43)
H04	0.2 - 3.6 (2.86 - 51.43)	0.20 (2.86)	0.3 - 1.5 (4.29 - 21.43)	12 (171.43)
H07	0.5 - 7.0 (7.14 - 100.00)	0.40 (5.71)	1.0 - 6.0 (14.29 - 85.71)	12 (171.43)
H10	0.5 - 10.0 (7.14 - 142.86)	0.60 (8.57)	1.5 - 8.0 (21.43 - 114.29)	25 (357.14)
H15	1.0 - 15.0 (14.29 - 214.29)	0.60 (8.57)	1.8 - 10.0 (26.11 - 142.86)	25 (357.14)

\*Minimum differential increases with setpoint (Graphs available on request)

† rising pressure for MG series; falling pressure for ME series

## How to order MG/ME series high range triclover pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Triclover Size	Enclosure
MG - Fixed Differential Triclover Pressure Switch ME - Adj. Differential Triclover Pressure Switch	H - High range Pressure Switch	C - Without Knob K - With Knob	T - Triclover SS316L S - SS316L (1/4" BSPF Pressure port)	1 - No Triclover (Teflon diaphragm) B - 1.5" OD C - 2" OD	0 - IP 40 as per IS 2147

eg. A fixed differential triclover pressure switch, high pressure range from 0.5 - 7.0 bar with knob style with triclover pressure housing with 1 & 1/2" triclover size shall be specified by

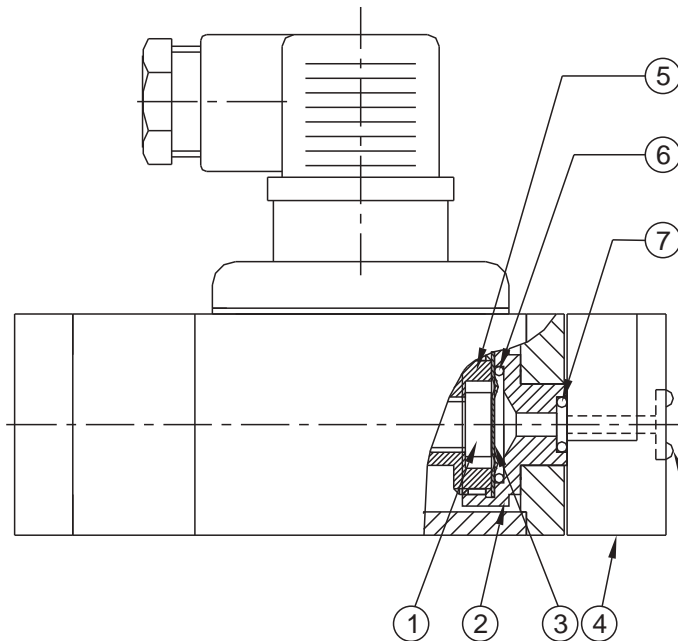
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
MG	H07	K	T	B	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, calibrated switches with standard wetted parts will be supplied.

# HM HIGH RANGE PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS



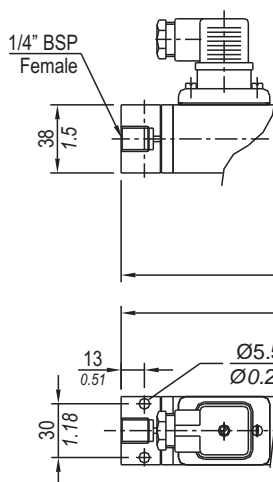
### No. Description

1. Plunger
2. Pressure housing
3. Diaphragm
4. Base
5. Disc
6. High pressure seal
7. Pressure housing seal
8. Base seal (O ring)  
(N.A for line mounting style)

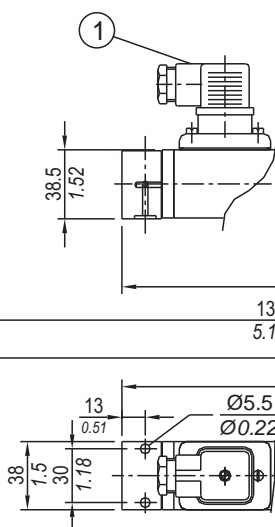
Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING

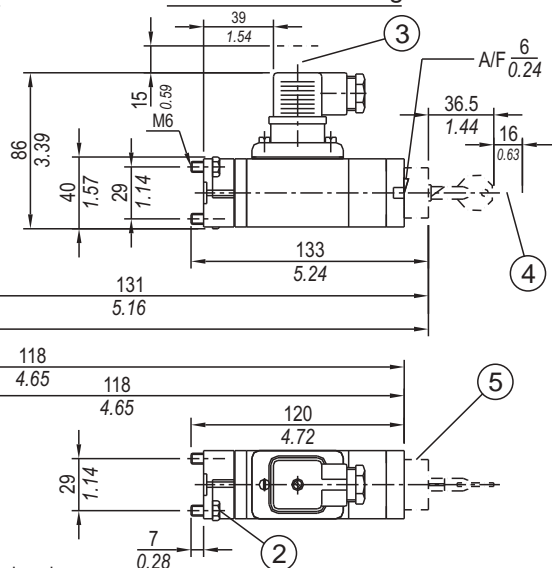
### For line mounting



### For subplate mounting



### For vertical stacking



- ① can be rotated 90°    ② two fixing screws    ③ space for removing plug  
④ space for removing key    ⑤ lockable protective cap

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



# HIGH RANGE PRESSURE SWITCHES HM

## General information:

HM series pressure switches have a machined aluminium powder coated enclosure and are recommended for manifold mounting hydraulic applications, where setpoints are low but working pressures are high. The repeat accuracy is better than  $\pm 2$  % FSR. A connector to DIN 43650 is provided for wiring. Three mounting styles are available.

## Features:

- Compact
- Lightweight
- Three mounting styles
- low on-off differentials
- low setpoints with high working pressures
- Lockable protective cap to avoid tampering (optional)
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)

**Some Applications :** Used in high/low pressure alarms in CNC machines, manifolds/in stacks, etc.

## Range Selection Table

Range Code	Range (falling pressure) bar (psi)	*Approximate Maximum Differential bar (psi)	Maximum Working Pressure bar (psi)
H01	0.2 - 1.0 (2.90 - 14.50)	0.20 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.40 (5.80)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.52)	0.40 (5.80)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.80 (11.60)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.71)	1.00 (14.50)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	2.50 (36.26)	35 (507.63)

\*differential rises with setpoint (Graphs available on request)

## Wetted Parts Table for HM High Series.

	Standard	Optional
Pressure Housing	Aluminium	Brass
Diaphragm	Neoprene	Teflon
High Pressure Seal	Nitrile	Viton
Pressure Housing Seal	Nitrile	Viton
Base	M.S.	Brass
Base Seal	Nitrile	Viton

## How to order HM High series pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Base Type	Protective Cap	Wetted Parts	Enclosure
HM - High range Pressure Switch	H - High Range Pressure Switch	S - for Subplate mounting. L - for line Mounting V - for vertical Stacking	U - without any protective cap P - with a lockable protective cap	M - for Standard Wetted parts. B - for optional wetted parts mentioned in table above X - Specify wetted parts in text as per wetted parts	0 - IP 65 as per IS 2147

eg. A high range pressure switch, pressure range from 0.2 to 3.6 bar, as a vertical element with a lockable protective cap & standard wetted parts with a standard enclosure shall be specified by

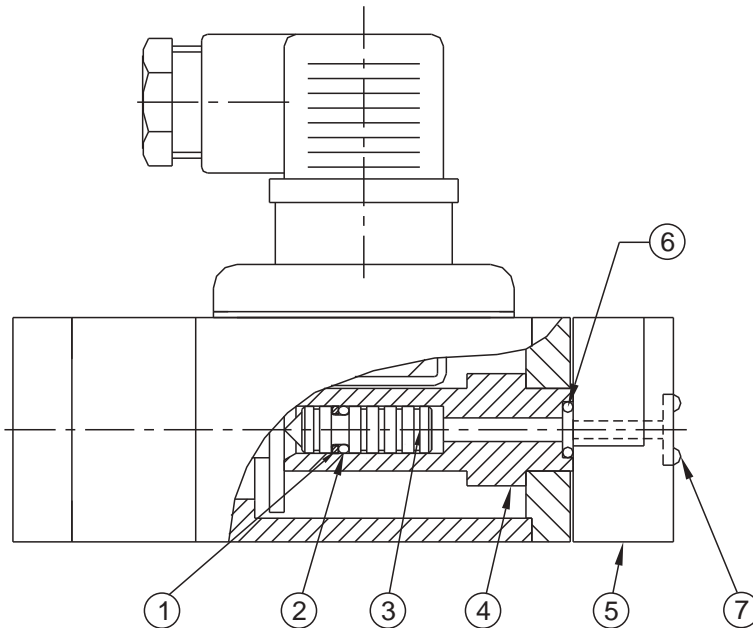
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
HM	H04	V	P	M	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, pressure switches with standard wetted parts will be supplied.

# HM HYDRAULIC PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS



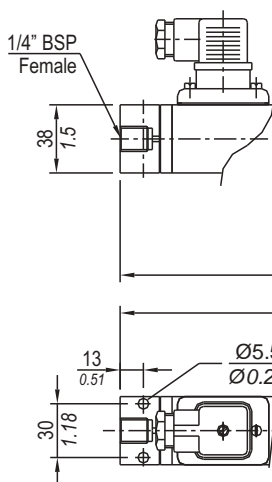
### No. Description

1. Backup ring
2. Piston seal
3. Piston
4. Pressure housing
5. Base
6. Pressure housing seal
7. Base seal (O ring)  
(N.A for line mounting style)

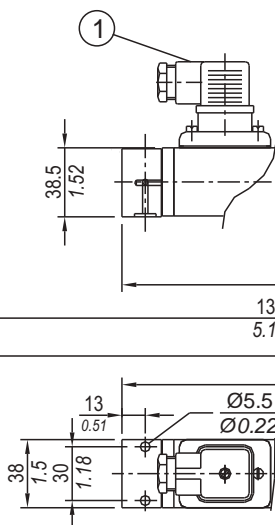
Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING

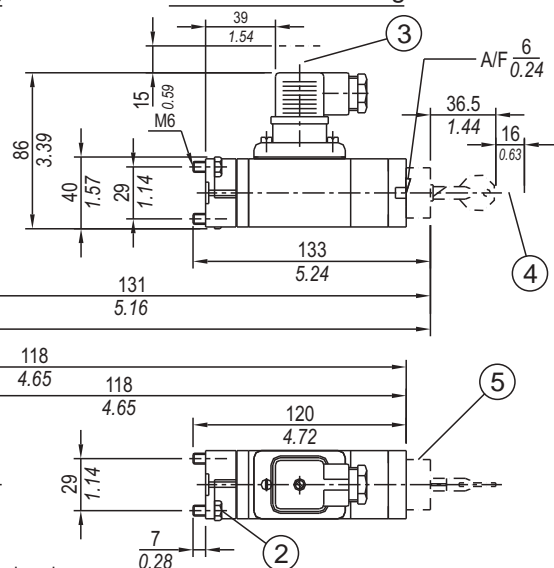
### For line mounting



### For subplate mounting



### For vertical stacking



- ① can be rotated 90°    ② two fixing screws    ③ space for removing plug
- ④ space for removing key    ⑤ lockable protective cap

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

# HYDRAULIC PRESSURE SWITCHES

# HM

## General information:

HM series pressure switches have a machined aluminium powder coated enclosure and are recommended for manifold mounting hydraulic applications. When fitted with different types of chemical seals these can also be used for various processes. The repeat accuracy is better than  $\pm 1\%$  FSR. A connector to DIN 43650 is provided for wiring.

## Features:

- Compact
- Lightweight
- Three mounting styles
- Lockable protective cap to avoid tampering (optional)
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)

**Some Applications :** Used in compressors, hydraulic power packs, manifolds/stacks with sandwich plates, etc.

## Range Selection Table

Range Code	Range (falling pressure) bar (psi)	*Approximate Maximum Differential bar (psi)	Maximum Working Pressure bar (psi)
040	3 - 40 (43.51 - 580.15)	5 (72.52)	200 (2900.76)
100	10 - 100 (145.04 - 1450.38)	12 (174.05)	200 (2900.76)
200	7 - 200 (101.52 - 2900.76)	24 (348.09)	200 (2900.76)
400	100 - 400 (1450.38 - 5801.51)	40 (580.15)	400 (5801.51)

\*differential rises with setpoint (Graphs available on request)

## Wetted Parts Table for HM Hydraulic Series.

	Standard	Optional	Special
Piston	EN8	S.S.	for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.
Piston Seal	Viton	Viton	
Pressure housing	Aluminium	Brass/ M.S.	
Housing Seal	Nitrile	Viton	
Base	M.S.	Brass	
Base Seal	Nitrile	Viton	

## How to order HM Hydraulic Series pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Base Type	Protective Cap	Wetted Parts	Enclosure*
HM - Hydraulic Pressure Switch	Hydraulic Pressure Range	S - for Subplate mounting. L - for line Mounting V - for vertical Stacking	U - without any protective cap P - with a lockable protective cap	M - for Standard Wetted parts. B - for Brass pressure housing, brass base, SS piston. All seals of Viton only X - Specify wetted parts in text as	0 - IP 65 as per IS 2147

\*HM series flameproof versions will be available with 1/4" BSPF threading arrangement only. For corrosive media, a separate chemical seal can be provided.

eg. A hydraulic pressure switch, pressure range from 5 to 40 bar, as a vertical element with a lockable protective cap & standard wetted parts with a standard enclosure shall be specified by

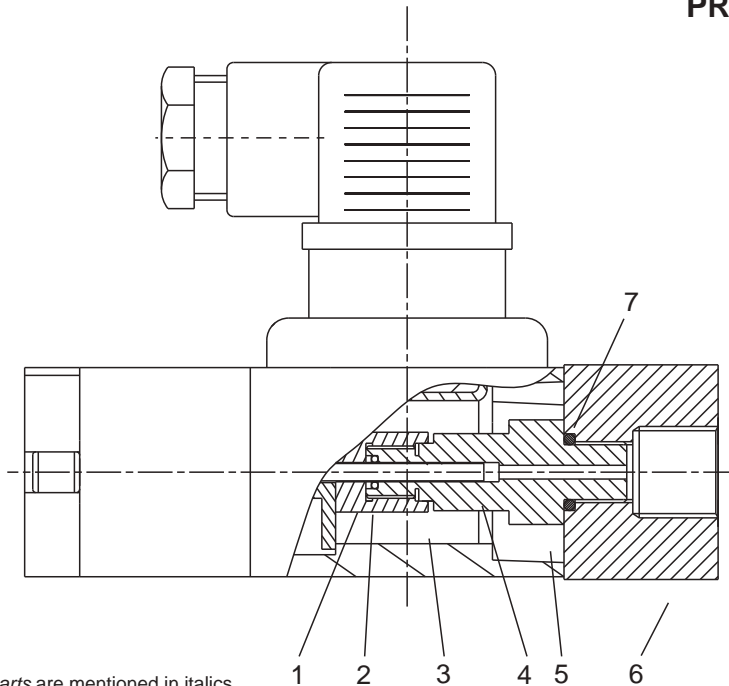
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
HM	040	V	P	M	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, pressure switches with standard wetted parts will be supplied.

# HM350 HYDRAULIC PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS



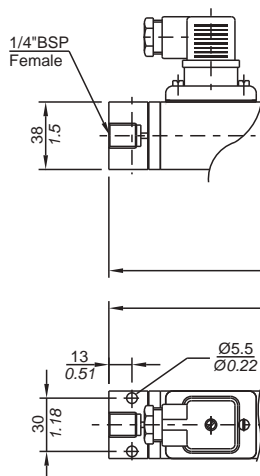
### No. Description

1. Backup ring (Teflon®)
2. O Ring (Viton®)
3. Cap
4. Piston (S.S.)
5. Pressure Housing (M.S.)
6. Base (M.S.)
7. Sealing Ring (Viton®)

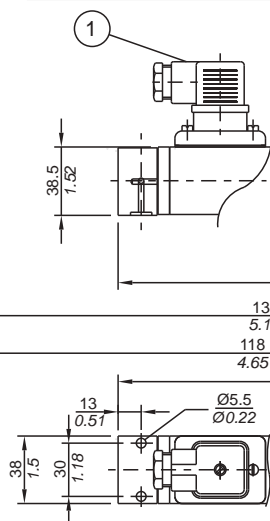
Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING

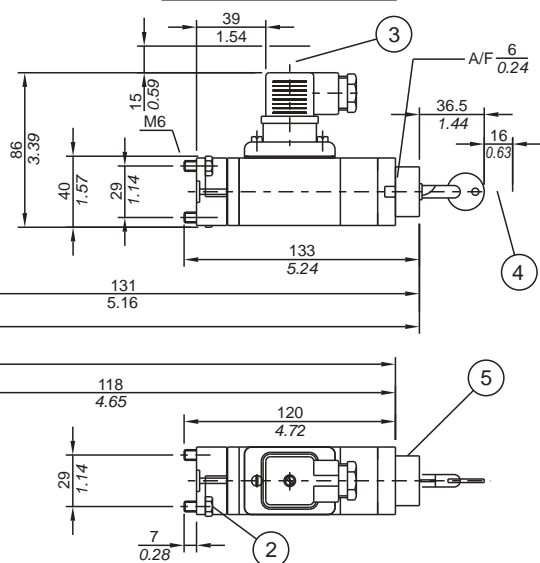
### For line mounting



### For subplate mounting



### For vertical stacking



- ① can be rotated 90°    ② two fixing screws    ③ space for removing plug  
 ④ space for removing key    ⑤ lockable protective cap

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

# HYDRAULIC PRESSURE SWITCHES HM350

## GENERAL INFORMATION :

HM series pressure switches have a pressure die-cast aluminium powder coated enclosure and are recommended for manifold mounting hydraulic applications. The repeat accuracy is better than  $\pm 1\%$  FSR. A connector to DIN 43650 is provided for wiring. Mainly intended for high pressure hydraulic presses.

## FEATURES :

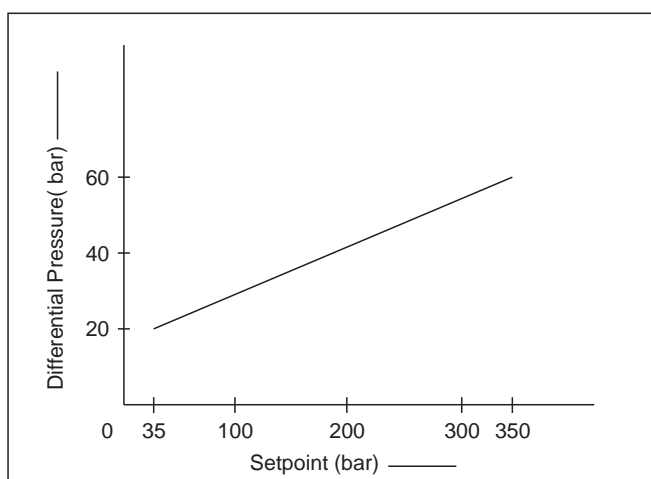
- Compact
- Lightweight
- Three mounting styles
- Lockable protective cap to avoid tampering (optional)
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC (res.)

**Some Applications :** Used in high/low pressure alarms in CNC machines, compressors, hydraulic power packs, manifolds/stacks with sandwich plates, etc.

## Range Selection Table

Range Code	Range (rising pressure) bar (psi)	Approximate Maximum Differential* bar (psi)	Maximum Working Pressure bar (psi)
HM350	35 - 350 (507.63 - 5076.32)	60 (870.22)	500 (7251.89)

\* Differential rises with setpoint



## How to order HM350 Hydraulic pressure switches

Group 1 Model	Group 2 Range Code	Group 3 Base Type	Group 4 Protective Cap	Group 5 Wetted Parts	Group 6 Enclosure
HM - Hydraulic Pressure Switch	350	S - for Subplate mounting. L - for line Mounting V - for vertical Stacking	U - without any protective cap P - with a lockable protective cap	M - for Standard Wetted parts	0 - IP 65 as per IS 2147

Eg. A hydraulic pressure switch, pressure range from 35 bar to 350 bar, as a subplate mounting element without a lockable protective cap and standard wetted parts with a standard enclosure shall be specified by

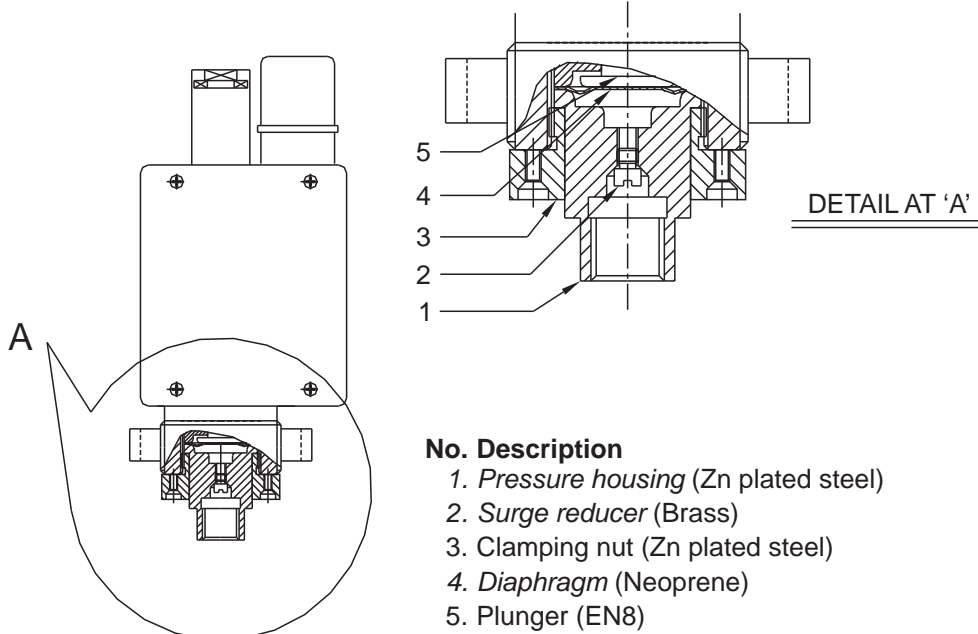
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
HM	350	S	U	M	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# DT HIGH RANGE PRESSURE SWITCHES

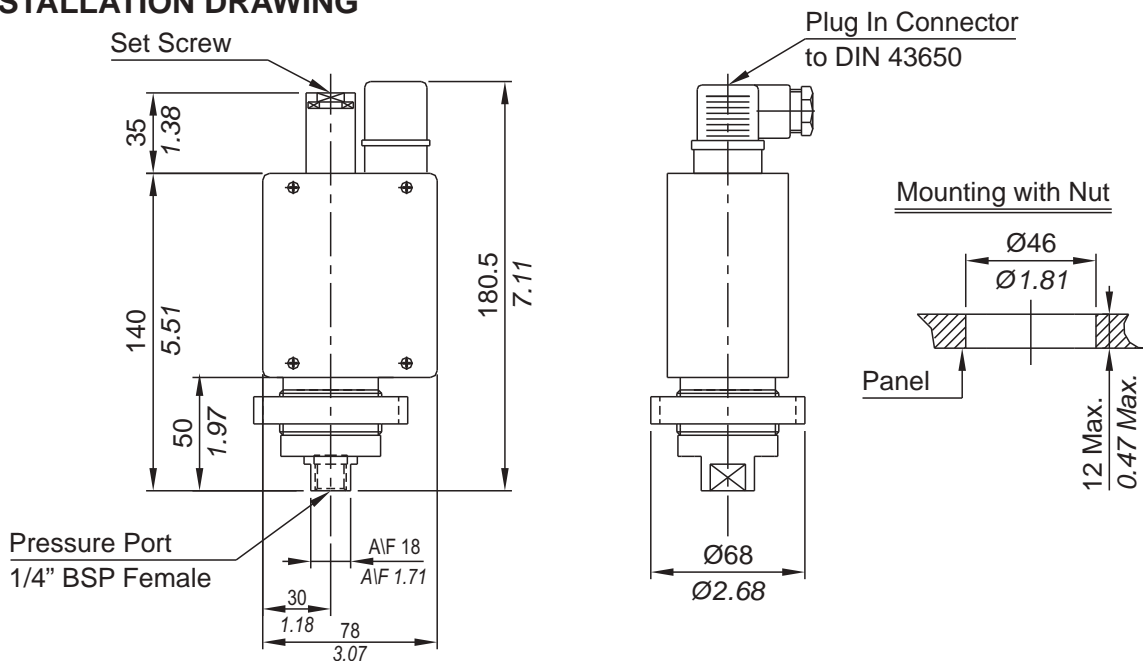


## PRESSURE CAPSULE DETAILS



Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# HIGH RANGE PRESSURE SWITCHES

# DT

## General information:

DT series pressure switches have a cast aluminium enclosure (IP54) and are recommended for panel / line mounted hydraulic / pneumatic applications. The repeat accuracy is better than  $\pm 2\%$  FSR. An electrical connector to DIN 43650 is provided for wiring. Pressure port is  $\frac{1}{4}$ " BSPF standard.

## Features:

- Robust construction
- 15 A switching possible (optional)
- Panel mounting
- Protective lock to avoid tampering (optional)
- Electrical rating : 5A,250VAC;0.2A,250VDC(RES.) (optionally 15 A, 250 VAC)

**Some Applications :** Used in high pressure power packs, press application, space and defence, etc.

## Range Selection Table

Range Code	Range (rising pressure) bar (psi)	*Approximate Maximum Differential bar (psi)	Maximum Working Pressure bar (psi)
10	1 - 10 (14.50 - 145.04)	1 (14.50)	15 (217.71)
15	2 - 15 (29.00 - 217.71)	2 (29.00)	15 (217.71)

\*differential rises with setpoint (Graphs available on request)

## How to order DT high range pressure switches.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Microswitch	Wetted Parts	Protective Lock	
DT - High Range Pressure Switch	Please select as per range code table	C - rated at 5A, 250 VAC (res.) H - rated at 15A, 250 VAC (res.)	S - Standard	U - without any lock P - with a protective lock	Reserved for non standard modifications. Code will be given by company

eg. A hydraulic pressure switch, pressure range from 1 to 10 bar, with a standard 5 A,250 VAC microswitch, standard wetted parts and a protective lock shall be specified by

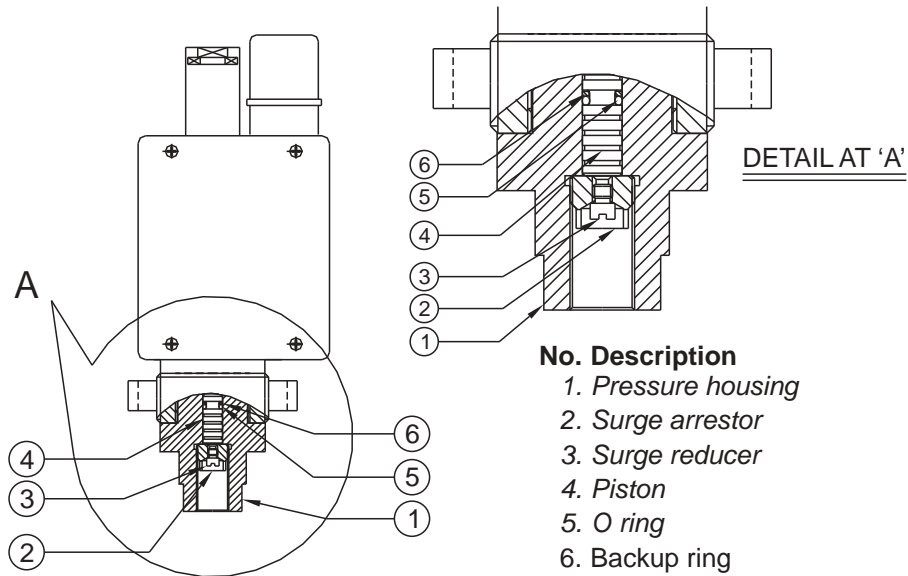
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
DT	10	C	S	P	-

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, pressure switches without a protective lock & with standard wetted parts will be supplied.

# DT HYDRAULIC PRESSURE SWITCHES

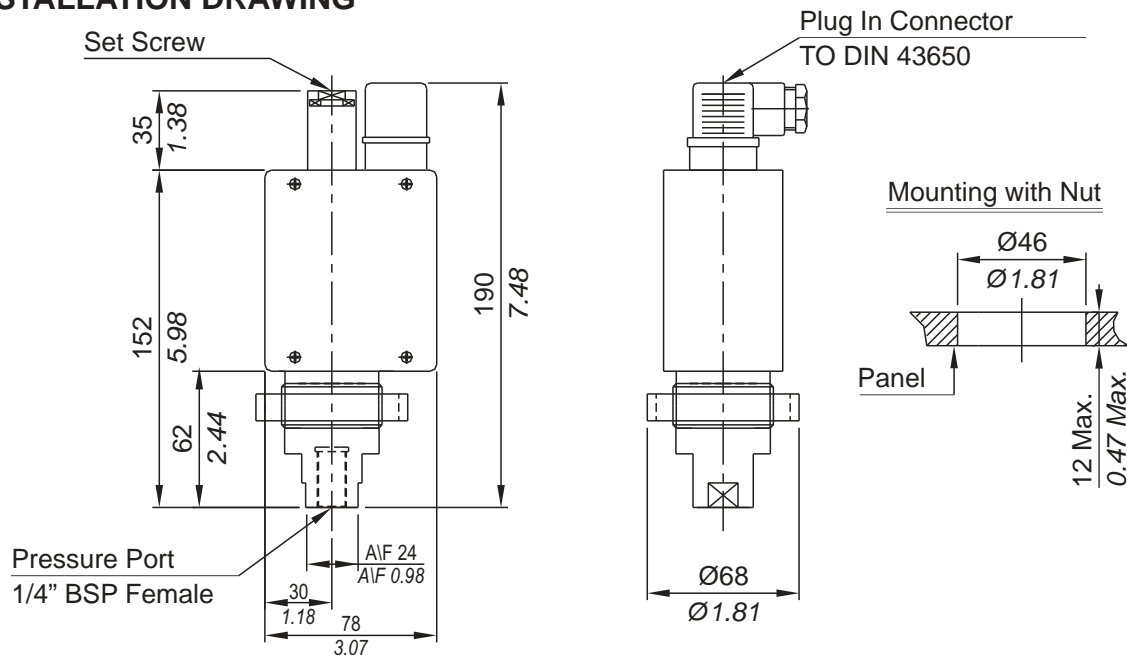


## PRESSURE CAPSULE DETAILS



Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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



# HYDRAULIC PRESSURE SWITCHES DT

## General information:

DT series pressure switches have a cast aluminium enclosure (IP54) and are recommended for panel / line mounted hydraulic applications. The repeat accuracy is better than  $\pm 2\%$  FSR. An electrical connector to DIN 43650 is provided for wiring. Pressure port is  $\frac{1}{4}$ " BSPF standard.

## Features:

- Robust construction
- 15 A switching possible (optional)
- Panel mounting
- Protective lock to avoid tampering (optional)
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)  
(Optionally 15A, 250 VAC)

**Some Applications :** Used for heavy duty machine tool applications, low on-off differential, better sensitivity, high electrical rating(15A), etc.

## Range Selection Table

Range Code	Range (rising pressure) bar (psi)	*Approximate Maximum Differential bar (psi)	Maximum Working Pressure bar (psi)
20A	4 - 20 (58.01 - 290.08)	3 (43.51)	200 (2900.76)
40	5 - 40 (72.52 - 580.15)	5 (72.52)	80 (1160.3)
100	10 - 100 (145.04 - 1450.38)	12 (174.05)	120 (1740.45)
200	7 - 200 (101.52 - 2900.76)	24 (348.09)	200 (2900.76)
400	100 - 400 (1450.38 - 5801.51)	40 (580.15)	400 (5801.51)
600	60 - 600 (870.22 - 8702.26)	90 (1305.34)	600 (8702.26)

\*differential rises with setpoint (Graphs available on request)

## Wetted Parts Table for DT Series.

	Standard	Optional	Special
Piston	EN8	S.S.	for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.
*Backup ring	Teflon	Teflon	
O ring	Viton	Viton	
Pressure housing	Aluminium	Brass	
Surge suppressor	EN8	Brass	
Surge reducer	Brass	Brass	

\* Backup ring is not used in all pressure ranges. Please contact sales office for details.

## How to order DT series hydraulic pressure switches.

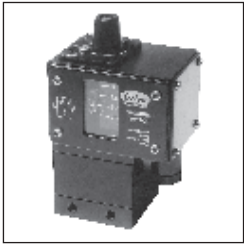
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Microswitch	Wetted Parts	Protective Lock	
DT - Hydraulic Pressure Switch	Please select as per range code table	C - rated at 5A, 250 VAC H - rated at 15A, 250 VAC	S - for Standard Wetted parts B - for optional wetted parts mentioned in table above X - Specify wetted parts in text as per technical	U - without any lock P - with a protective lock	Reserved for non standard modifications. Code will be given by company

eg. A hydraulic pressure switch, pressure range from 5 to 40 bar, with a standard 5 A,250 VAC microswitch, standard wetted parts and a protective lock shall be specified by

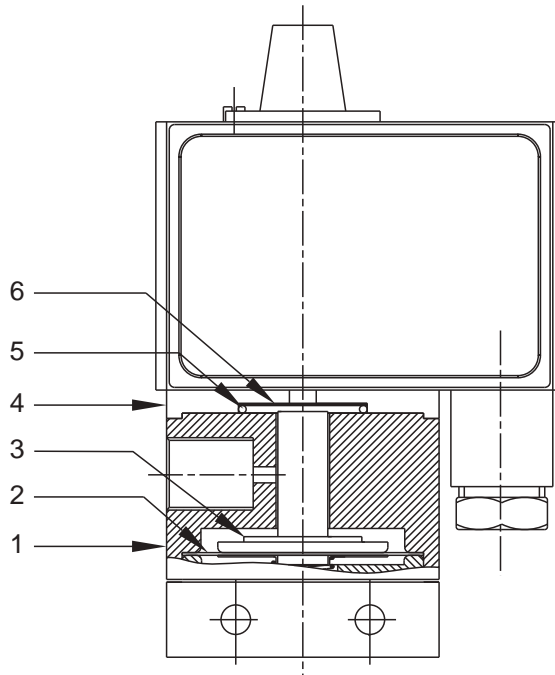
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
DT	40	C	S	P	-

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, pressure switches with standard wetted parts will be supplied.

# MN / MA VACUUM SWITCHES



## PRESSURE CAPSULE DETAILS

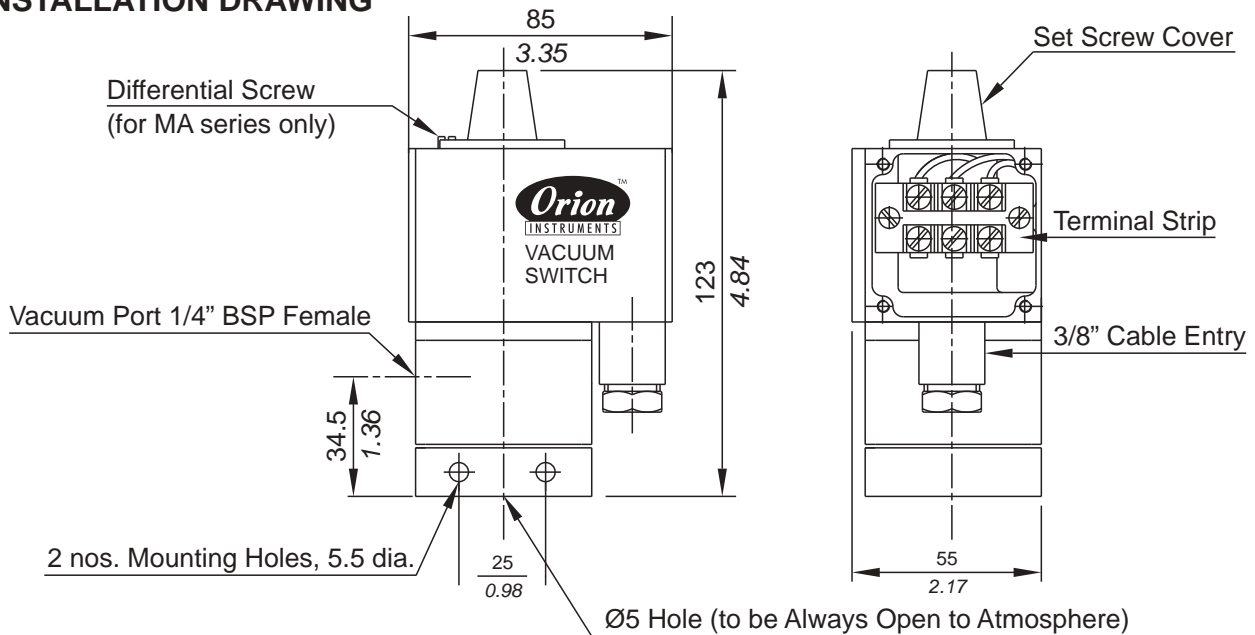


### No. Description

1. *Disc*
2. *Diaphragm*
3. *Plunger (SS 316)*
4. *Junction Plate*
5. *Sealing 'O' ring (Teflon®)*
6. *Sealing diaphragms (Teflon®)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# VACUUM SWITCHES MN / MA

## GENERAL INFORMATION :

MN / MA series vacuum switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service based on the type of enclosure opted for. The repeat accuracy is better than  $\pm 2\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure port is 1/4" BSPF standard.

## FEATURES :

- Compact
- Separate chamber for working parts
- Wide band adjustable differential in MA series.
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC
- Pressure port : 1/4" BSPF

**Some Applications :** Used in grinding machines for holding jobs, vacuum systems, blowers, pumps, etc.

## RANGE SELECTION TABLE

Range code	Range vacuum (falling) mm Hg ("Hg)	MN	MA	Maximum Working Pressure bar (psi)
		*Approximate Maximum Differential (Fixed) mm Hg ("Hg)	*Adjustable Differential mm Hg (" Hg)	
V00	† 760 - 100 (29.92 - 3.94)	100 (3.94)	100 - 500 (3.94 - 19.69)	12 (174.05)

\* Minimum differential increases with setpoint (Graphs available on request)

† Typical values achieved at sea level, total vacuum that can be achieved varies mainly with altitude.

## HOW TO ORDER MN / MA SERIES VACUUM SWITCHES

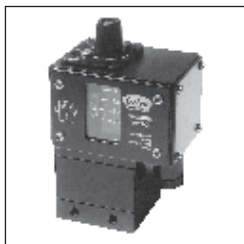
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Disc	Diaphragm	Enclosure
MN - Fixed differential Vacuum Switch MA - Adjustable diff. Vacuum Switch	V00 - High range vacuum Switch	C - Calibrated U - Uncalibrated	A - Aluminium B - Brass S - SS 316	0 - Neoprene 1 - Teflon	0 - Standard (IP54) 1 - IP65 as per IS 2147

Eg. A fixed differential vacuum switch, high range from 760 mm Hg vac. To 100 mm Hg vac. in uncalibrated style, with brass pressure housing, a Teflon diaphragm & a standard enclosure shall be specified by

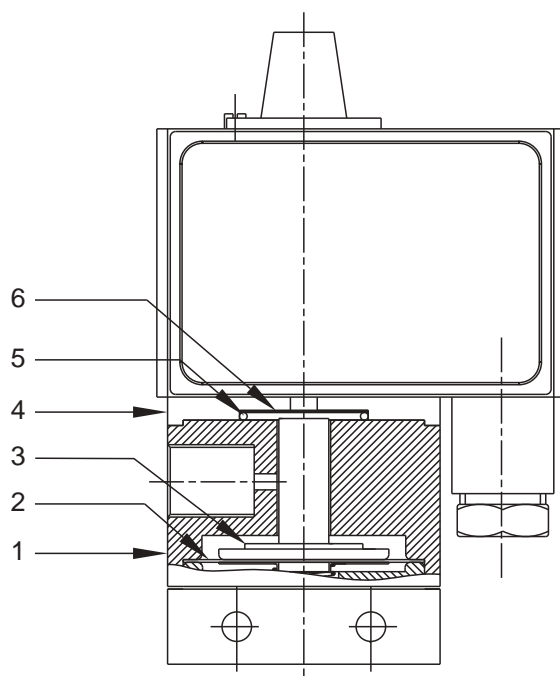
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
MN	V00	U	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# VS1 VACUUM SWITCHES



## PRESSURE CAPSULE DETAILS

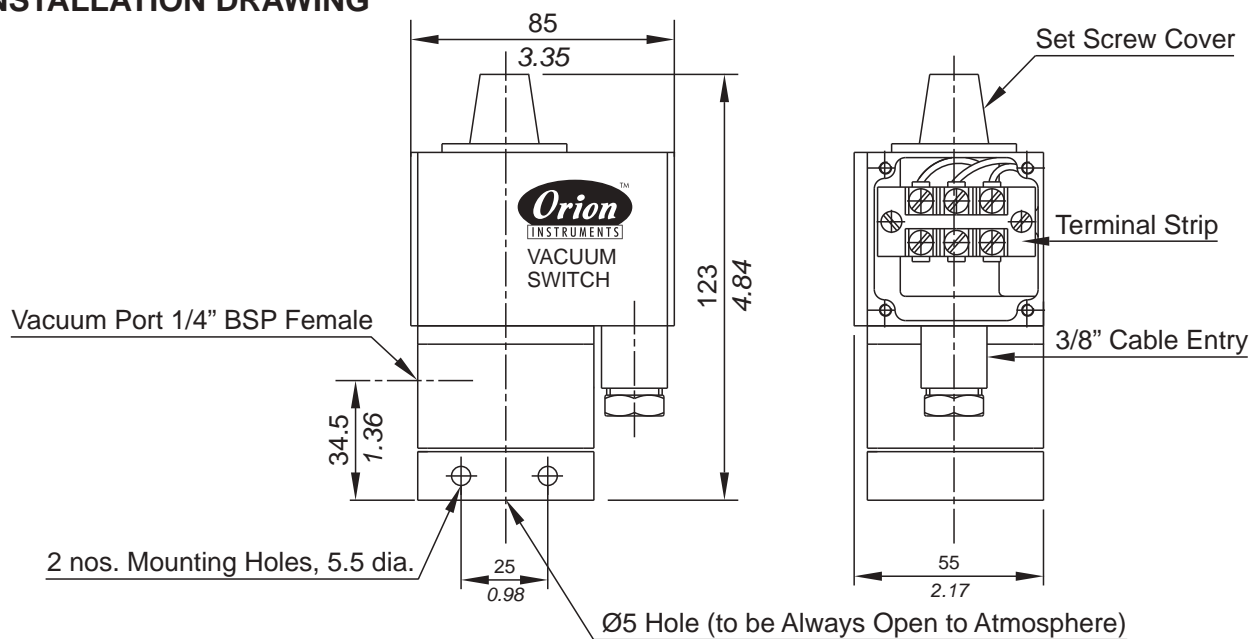


### No. Description

1. *Disc (Aluminium)*
2. *Diaphragm (Teflon®)*
3. *Plunger (SS 316)*
4. *Junction Plate*
5. *Sealing 'O' ring (Teflon®)*
6. *Sealing diaphragms (Teflon®)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



## GENERAL INFORMATION :

VS1 series vacuum switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service. The repeat accuracy is better than  $\pm 2\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure port is 1/4" BSPF standard.

## FEATURES :

- Compact
- Separate chamber for working parts
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC
- Pressure port : 1/4" BSPF

**Some Applications :** Vacuum Systems requiring low on-off differential.

## RANGE SELECTION TABLE

Range code	Range vacuum (falling) mm Hg ("Hg)	*Approximate Maximum Differential (Fixed) mm Hg ("Hg)	Maximum Working Pressure bar (psi)
V00	† 760 - 100 (29.92 - 3.94)	10 (0.39)	12 (174.05)

\* Minimum differential increases with setpoint (Graphs available on request)

† Typical values achieved at sea level, total vacuum that can be achieved varies mainly with altitude.

## HOW TO ORDER VS1 SERIES VACUUM SWITCHES

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Disc	Diaphragm	Enclosure
VS1 - Fixed differential Vacuum Switch	-	-	-	-	-

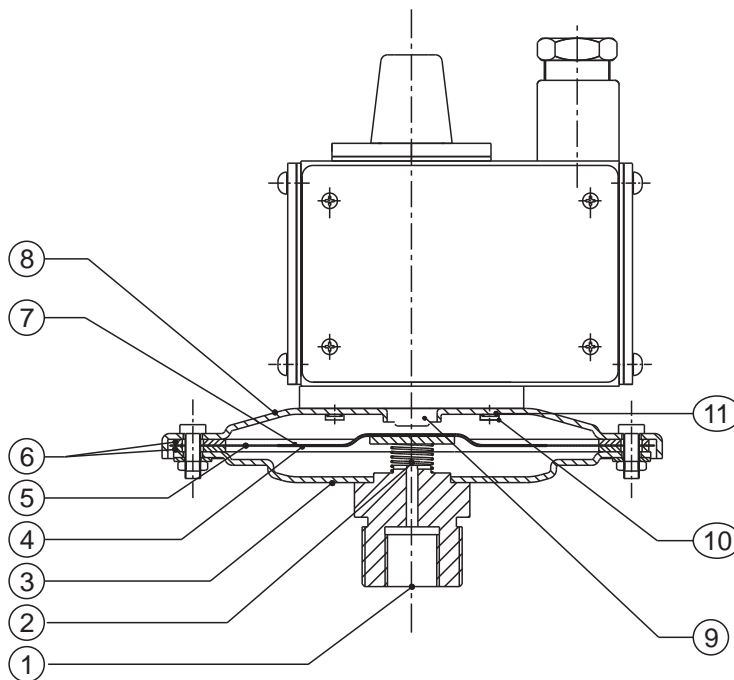
Eg. A fixed differential vacuum switch, high range from 760 mm Hg vac. To 100 mm Hg vac. shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
VS1	-	-	-	-	-

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.



## PRESSURE CAPSULE DETAILS



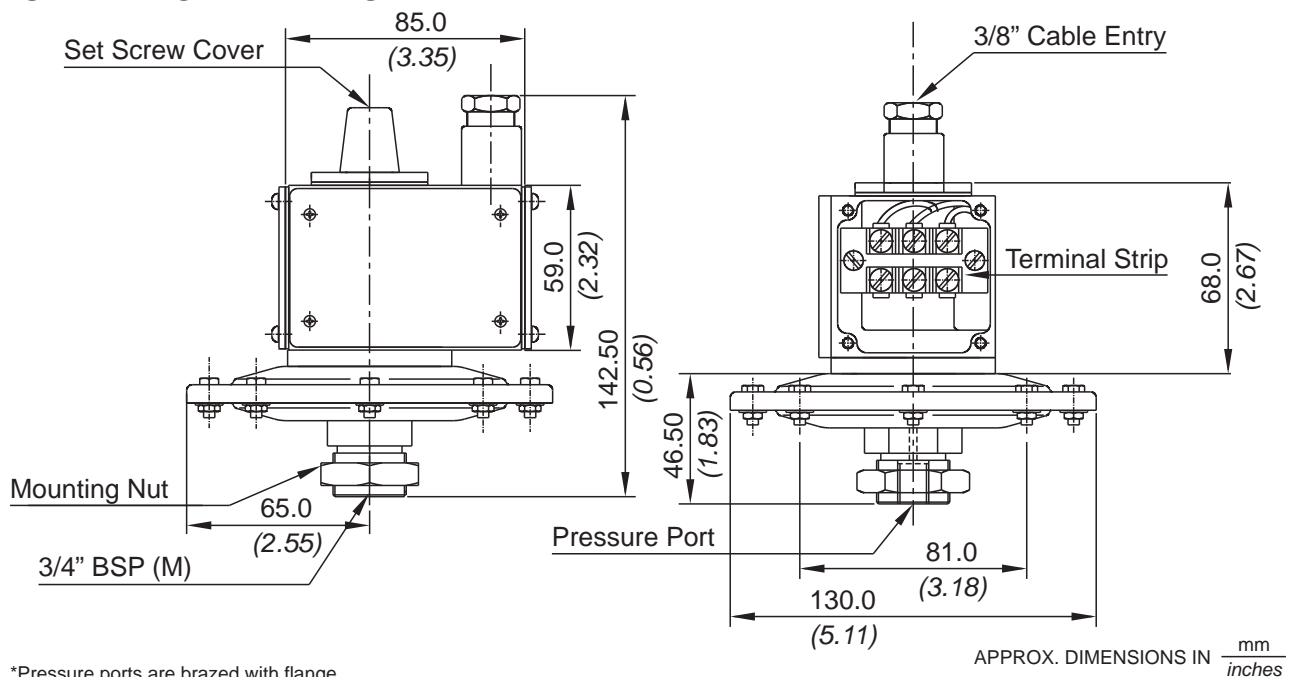
### No. Description

1. *Pressure Port (M.S.)\**
2. *Support Spring (S.S.)*
3. *Bottom Flange (M.S.)*
4. *Support plate (Aluminium)*
5. *Diaphragm (Neoprene)*
6. *Gasket (Nitrile)*
7. *Top Plate (Aluminium)*
8. *Top flange (M.S.)*
9. *Plunger*
10. *Top Flange Screw (M.S.)*
11. *Sealing 'O' ring (Nitrile)*

\*Pressure ports are brazed with flange

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



\*Pressure ports are brazed with flange

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

# LOW RANGE PRESSURE SWITCHES MN / MA

## General information:

MN /MA series low pressure range switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service based on the type of enclosure opted for. The repeat accuracy is better than  $\pm 2\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure port is 1/4" BSPF standard.

## Features:

- Separate chamber for working parts
- Wide band adjustable differential in MA series.
- Choice of wetted parts to suit working media
- Electrical rating : 2A, 250 VAC; 0.2A, 250 VDC (res.)
- Proof pressure available is 1.5 times MWP
- Pressure port : 1/4" BSPF

**Some Applications :** Used in air dryers, low vacuum systems, etc.

Range Selection Table

MN		MA		
Range Code	†Range mm wg ("wc)	*Approximate Maximum Differential (Fixed) mm wg ("wc)	* Adjustable Differential mm wg ("wc)	Maximum Working Pressure bar (psi)
L02	20 - 150 (0.787 - 5.905)	30 (1.181)	30 - 100 (1.181 - 3.937)	2 (29.00)
L03	50 - 250 (1.969 - 9.843)	50 (1.969)	50 - 250 (1.969 - 9.843)	2 (29.00)
L05	100 - 500 (3.937 - 19.685)	75 (2.952)	50 - 300 (1.969 - 11.811)	2 (29.00)
L10	100 - 1000 (3.937 - 39.370)	100 (3.937)	100 - 600 (3.937 - 23.622)	2 (29.00)
L15	100 - 1500 (3.937 - 59.055)	125 (4.921)	125 - 900 (4.921 - 35.433)	2 (29.00)
L25	200 - 2500 (7.874 - 98.425)	150 (5.906)	150 - 1500 (5.906 - 59.055)	2 (29.00)

\*Minimum differential increases with setpoint (Graphs available on request)

†Rising pressure for MN series, falling pressure for MA series

## How to order MN / MA low range pressure switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
MN - Fixed Differential pressure switch  MA- Adjustable differential pressure Switch	L - Low ranges	U - Uncalibrated C - Calibrated	M - M.S. S - SS316	0 - Neoprene 1 - Teflon	0 - IP 54 1 - IP 65

eg. A fixed diff. pressure switch, low pressure range from 200-2500 mmwg in uncalibrated style with M.S. pressure housing, a teflon diahramg & IP65 enclosure shall be specified by

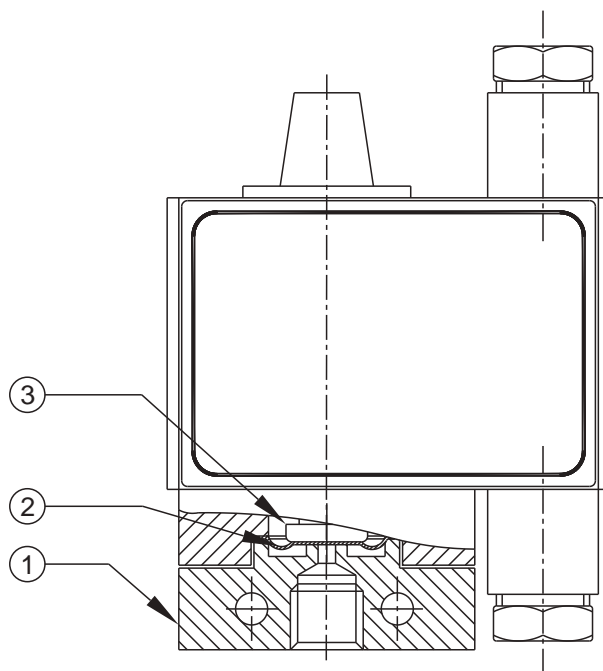
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
MN	L25	U	M	1	1

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# MJ 2 SPDT HIGH RANGE PRESSURE SWITCHES



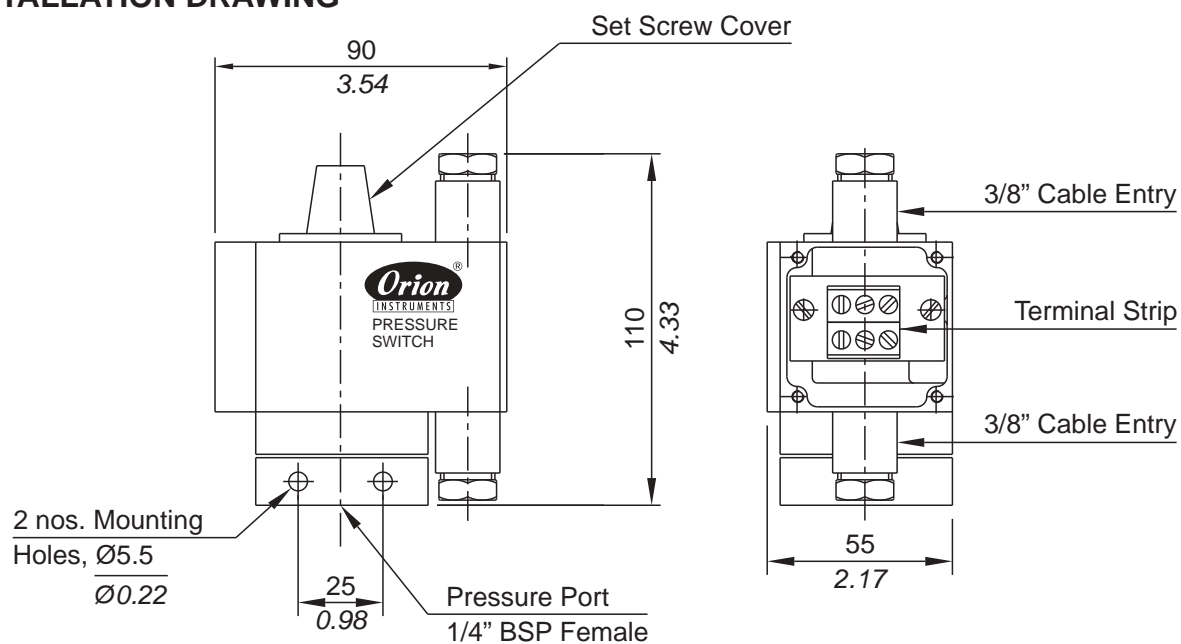
## PRESSURE CAPSULE DETAILS



- No. Description**  
 1. *Pressure housing*  
 2. *Diaphragm*  
 3. *Plunger*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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



## 2 SPDT HIGH RANGE PRESSURE SWITCHES

**MJ**

### General information:

MJ series pressure switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service based on the type of enclosure opted for. No stage differential can be set in these 2SPDT versions (MJ series). Both microswitches are synchronised for operation within practical limits and a slight stage difference is bound to remain between the setpoints (generally not exceeding  $\pm 2\%$  of FSR). The scale indicates the rising setpoint for one of the microswitches. The repeat accuracy is better than  $\pm 2\%$  FSR. 3/8" cable entries are provided for cables and a terminal strip suitable for wired ends is fitted inside the enclosure. Other variations for cable termination, such as plugin connectors can be provided. Pressure port is 1/4" BSPF standard.

### Features:

- Compact
- Separate chamber for working parts
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)
- Proof pressure available can be 4 times MWP (optional)
- Pressure port : 1/4" BSPF

**Some Applications :** Used in transformers, boilers, water treatment plants, fire fighting systems, compressors, etc.

### Range Selection Table

Range Code	Range (rising pressure) bar (psi)	Approximate Maximum Differential* (fixed) bar (psi)	Maximum Working Pressure bar (psi)
LP	† 0.067 - 0.213 (0.96 - 3.09)	0.04 (0.58)	5 (72.52)
H01	0.1 - 1.0 (1.45 - 14.50)	0.16 (2.32)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.40 (5.80)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.40 (5.80)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.52)	0.80 (11.60)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	1.20 (17.40)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.71)	1.20 (17.40)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	3.00 (43.51)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

† approx 50 mmHg to 160 mmHg. Scale Calibrated in mmHg for this range only.

### How to order MJ series 2SPDT high range pressure switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
MJ - 2 SPDT Fixed differential Switch	H - High Pressure range	U - without scale C - with a scale corresponding to low microswitch	A - Aluminium B - Brass S - SS 316	0 - Neoprene 1 - Teflon	0 - Standard (IP 54) 1 - IP65 as per IS 2147
			for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.		

eg. A 2SPDT fixed differential switch, high pressure range from 0.1-1.0 bar in calibrated style with brass pressure housing, a teflon diaphragm & a standard enclosure shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
MJ	H01	C	B	1	0

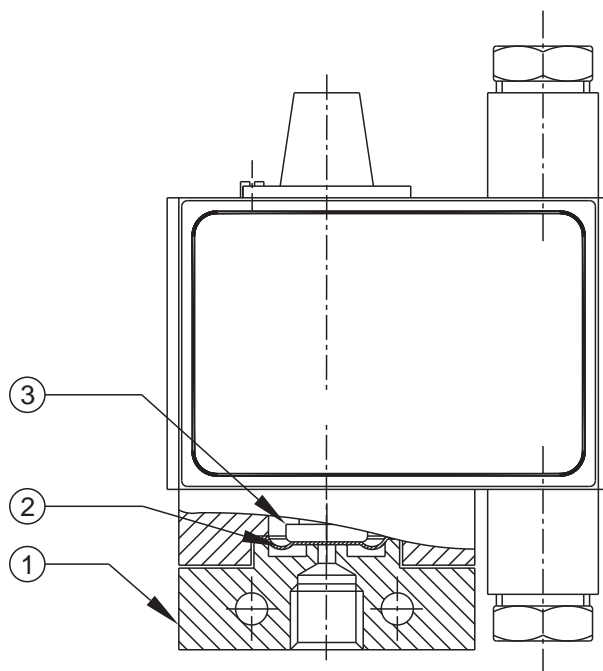
Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and a standard enclosure will be supplied

# MK

## 2 SPDT HIGH RANGE PRESSURE SWITCHES (adjustable stage difference)



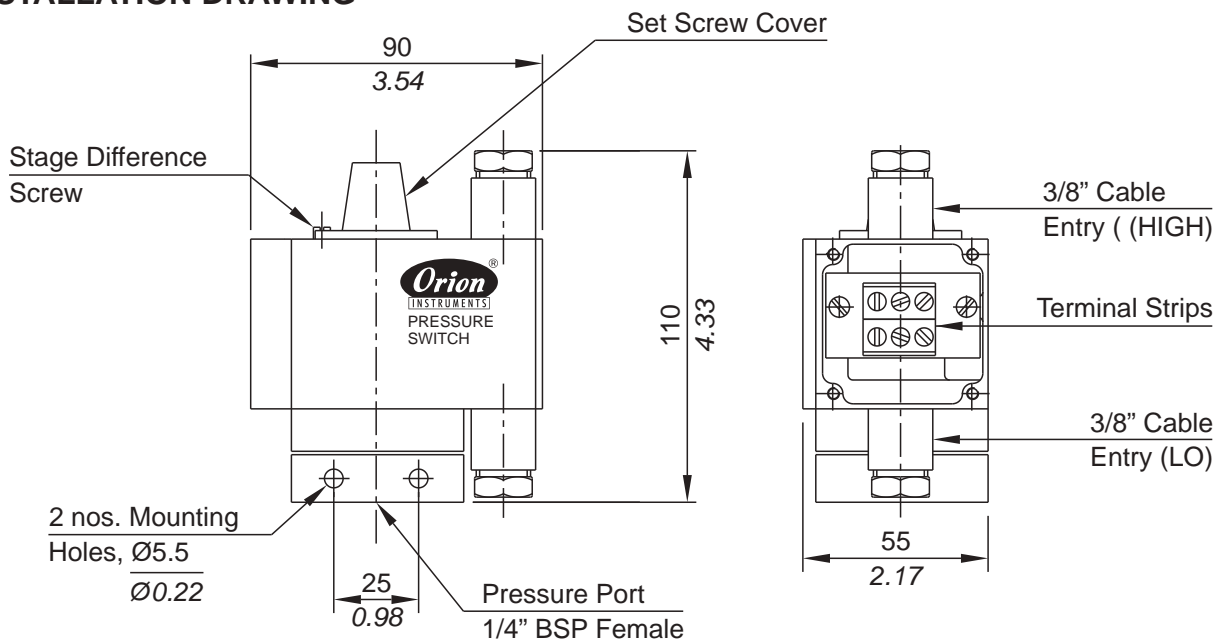
### PRESSURE CAPSULE DETAILS



- No. Description**  
1. *Pressure housing*  
2. *Diaphragm*  
3. *Plunger*

Note : *wetted parts* are mentioned in italics.

### INSTALLATION DRAWING



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

## 2 SPDT HIGH RANGE PRESSURE SWITCHES (adjustable stage difference)

**MK**

### General information:

MK series pressure switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service based on the type of enclosure opted for. Stage differential can be set in these 2SPDT versions (MK series). Both microswitches are synchronised for operation such that the stage difference (or gap) can be adjusted from minimum 15 % of FSR to a maximum of 50% of FSR (on falling setpoints). The scale indicates falling setpoint for low microswitch. The repeat accuracy is better than  $\pm 2\%$  FSR. 3/8" cable entries are provided for cables and a terminal strip suitable for wired ends is fitted inside the enclosure. Other variations for cable termination, such as plugin connectors can be provided. Pressure port is 1/4" BSPF standard.

### Features:

- Compact
- Separate chamber for working parts
- Adjustable stage difference
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)
- Proof pressure available can be 4 times MWP (optional)
- Pressure port: 1/4" BSPF

**Some Applications :** Used in systems requiring an alarm and trip function, e.g. HI-HI/Lo-Lo setpoints, etc. Also used in transformers.

### Range Selection Table

Range Code	Range (falling pressure) bar (psi)	*Approximate Maximum Differential (Fixed) for low microswitch bar (psi)	* Approximate Maximum Differential (Fixed) for high microswitch at minimum gap bar (psi)	* Approximate Maximum Differential (Fixed) for high microswitch at maximum gap bar (psi)	Maximum Working Pressure bar (psi)
H01	0.1 - 1.0 (1.45 - 14.50)	0.15 (2.18)	0.4 (5.80)	1.5 (21.75)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (1.45)	0.5 (7.25)	1.8 (26.11)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.20 (2.90)	0.5 (7.25)	1.0 (14.50)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	0.5 (7.25)	1.0 (14.50)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.52)	0.40 (5.80)	1.5 (21.75)	2.5 (36.26)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.60 (8.70)	1.5 (21.75)	4.5 (65.27)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.71)	0.8 (11.60)	2.0 (29.00)	6.5 (94.27)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	1.50 (21.75)	2.5 (36.26)	12.0 (174.05)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

### How to order MK series high range pressure switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
MK-2 SPDT Fixed differential switch with adjustable stage difference	H - High Pressure range	U - without scale C - with a scale corr. to low microswitch	A - Aluminium B - Brass S - SS 316	0 - Neoprene 1 - Teflon	0 - Standard (IP 54) 1 - IP65 as per IS 2147
			for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.		

eg. A 2 SPDT High Range Pressure switch with adjustable stage difference, high pressure range from 1-10 bar in calibrated style with brass pressure housing, a teflon diaphragm & a standard enclosure shall be specified by

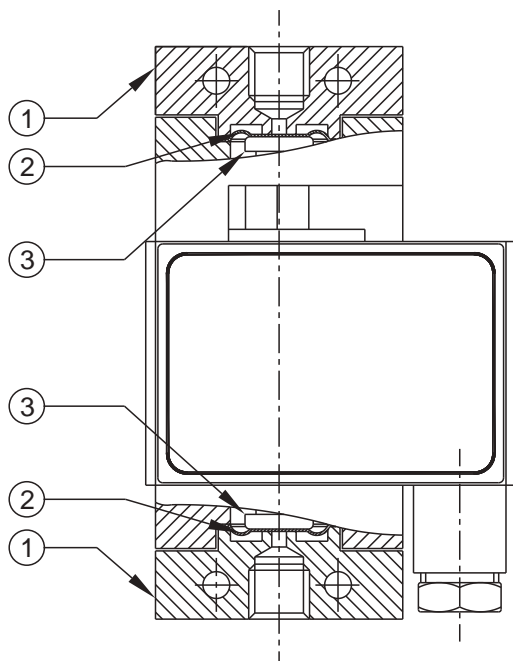
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
MK	H10	C	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# DP HIGH RANGE PRESSURE DIFFERENCE SWITCHES



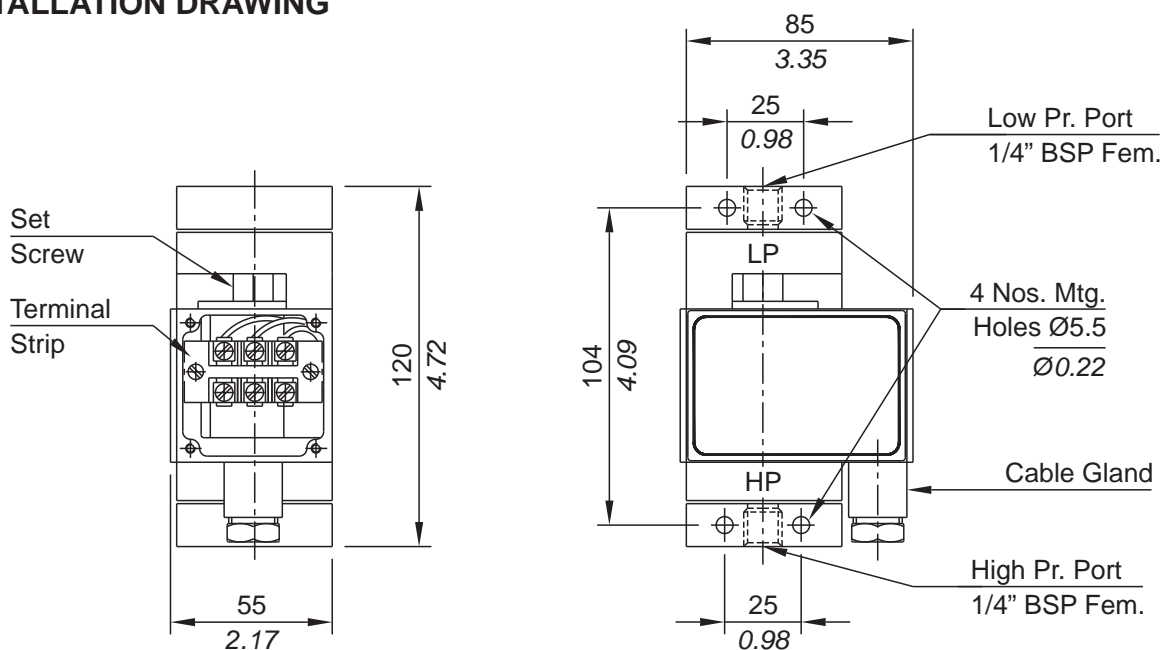
## PRESSURE CAPSULE DETAILS



- No. Description**  
 1. Pressure housing  
 2. Diaphragm  
 3. Plunger

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# HIGH RANGE PRESSURE DIFFERENCE SWITCHES

**DP**

## General information:

DP series pressure difference switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or indoor service based on the type of enclosure opted for. The repeat accuracy is better than  $\pm 1\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure ports are 1/4" BSPF standard.

## Features:

- Compact
- Separate chamber for working parts
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)
- Pressure ports: 1/4" BSPF

**Some Applications :** Works on opposed diaphragm principle, diaphragm seals can be coupled to this switch. Used in water treatment plants, bag filters, strainers, etc.

## Range Selection Table

Range Code	Range bar (psi) ? P	Approximate Maximum Differential* bar (psi)	Maximum Working Pressure bar (psi)
H01	0.1 - 1.0 (1.45 - 14.50)	0.15 (2.18)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.15 (2.18)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.2 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.2 (2.90)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.52)	0.2 (2.90)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	0.5 (7.25)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.71)	0.5 (7.25)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	1.0 (14.50)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

## How to order DP series high range pressure difference switches

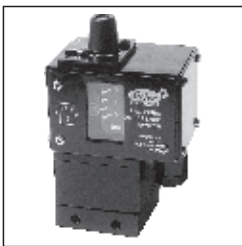
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
DP - Pressure Difference Switch (Can be used for both side Positive Pressures Only)	H - High Pressure Range	U - Uncalibrated C - Calibrated	A - Aluminium B - Brass S - SS 316	0 - Neoprene 1 - Teflon	0 - IP 54
			for special wetted parts through chemical seals, please refer page 330,331 & 332 and specify in text accordingly.		

eg. A pressure difference switch, high pressure range from 0.1-1.5 bar in calibrated style with brass pressure housing & a teflon diaphragm as wetted parts, with IP54 Enclosure shall be specified by

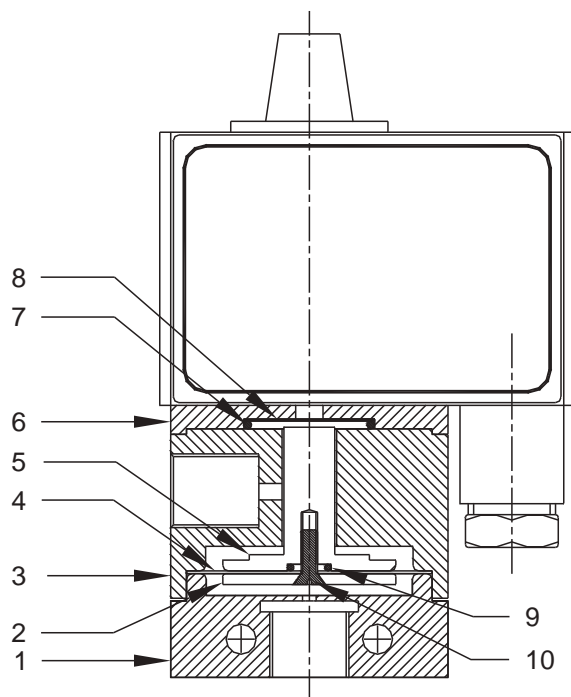
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
DP	H02	C	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# PD HIGH RANGE PRESSURE DIFFERENCE SWITCHES



## PRESSURE CAPSULE DETAILS

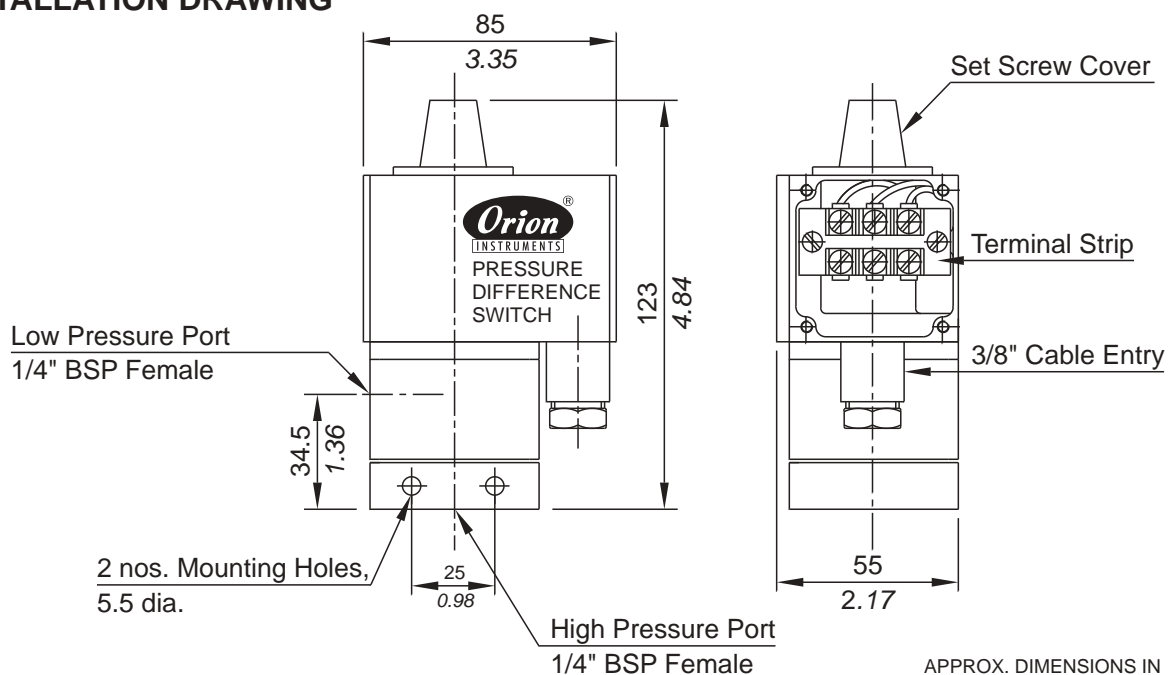


### No. Description

1. *Pressure Housing*
2. *HP Plunger (SS316)*
3. *Disc*
4. *Diaphragm*
5. *LP Plunger (SS316)*
6. *Junction Plate*
7. *Sealing 'O' ring (Teflon®)*
8. *Sealing diaphragms (Teflon®)*
9. *'O' ring (Teflon®)*
10. *CSK screw (SS)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# HIGH RANGE PRESSURE DIFFERENCE SWITCHES PD

## GENERAL INFORMATION :

PD series pressure difference switches are housed in pressure die cast aluminium powder coated enclosure and recommended for panel mounting or outdoor service based on the type of enclosure opted for. The repeat accuracy is better than  $\pm 1\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure ports are 1/4" BSPF standard.

## FEATURES :

- Compact
- Separate chamber for working parts
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC (res.)
- Pressure ports : 1/4" BSPF

**Some Applications :** Used in water treatment plants, bag filters, strainers, etc.

## Range Selection Table

Range Code	Range bar (psi) ? P	Approximate Maximum Differential* bar (psi)	Maximum Working Pressure bar (psi)
H01	0.1 - 1.0 (1.45 - 14.50)	0.1 (1.45)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.1 (1.45)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.2 (2.90)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.2 (2.90)	12 (174.05)

\*Minimum differential increases with setpoint (Graphs available on request)

## How to order PD series high range pressure difference switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
PD - Pressure Difference Switch	H - High Pressure Range	U - Uncalibrated C - Calibrated	A - Aluminium B - Brass S - SS 316	0 - Neoprene 1 - Teflon	0 - IP 54 1 - IP 65

Eg. A pressure difference switch, high pressure range from 0.1-1.5 bar in calibrated style with brass pressure housing & teflon diaphragm as wetted parts & a standard enclosure shall be specified by

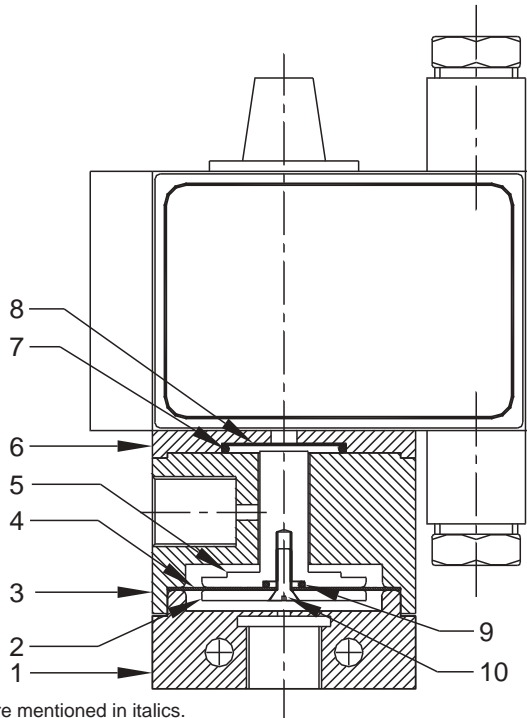
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
PD	H02	C	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# PJ 2 SPDT HIGH RANGE PRESSURE DIFFERENCE SWITCHES



## PRESSURE CAPSULE DETAILS

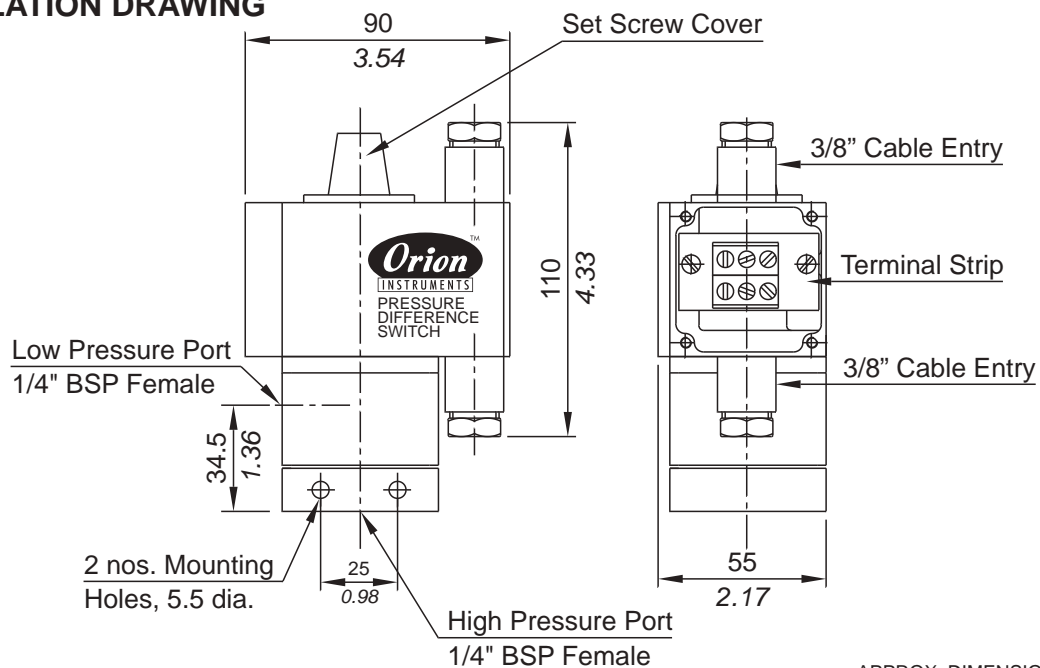


### No. Description

1. *Pressure Housing*
2. *SS Plate*
3. *Disc*
4. *Diaphragm*
5. *Plunger (SS 316)*
6. *Junction Plate*
7. *'O' ring (Teflon®)*
8. *Sealing diaphragms (Teflon®)*
9. *O' ring*
10. *CSK screw (SS 316)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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



## 2 SPDT HIGH RANGE PRESSURE DIFFERENCE SWITCHES

PJ

### GENERAL INFORMATION :

PJ series pressure difference switches are housed in die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service depending on the type of enclosure opted for. No stage differential can be set in these 2SPDT versions (PJ series). Both microswitches are synchronized for operation within practical limits and a slight stage difference is bound to remain between the setpoints (generally not exceeding 2% of FSR). The scale indicates the falling setpoint for one of the microswitches. The repeat accuracy is better than 2% FSR. 3/8" cable entries are provided for cables and a terminal strip suitable for wired ends is fitted inside the enclosure. Other variations for cable termination such as plugin connectors can be provided. Pressure ports are 1/4" BSPF standard.

### FEATURES :

- Compact
- Separate chamber for working parts
- Choice of wetted parts to suit working media
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC
- Pressure ports : 1/4" BSPF

**Some Applications :** Switch fitted with extra microswitch for emergencies, typical use in large power plants that require 24x7 operation, water treatment plants, bag filters, strainers, etc.

### Range Selection Table

Range Code	Range (falling pressure) ? p bar (psi)	Approximate Maximum Differential* (Fixed) bar (psi)	Maximum Working Pressure bar (psi)
H01	0.1 - 1.0 (1.45 - 14.50)	0.20 (2.90)	12 (174.05)
H02	0.1 - 1.5 (1.45 - 21.76)	0.20 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.40 (5.80)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.40 (5.80)	12 (174.05)

\*Minimum differential increases with setpoint (Graphs available on request)

### How to order PJ series 2 SPDT pressure difference switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Disc	Diaphragm	Enclosure
PJ - 2 SPDT Pressure Difference Switch	Please select as per Range Selection Table	C -Calibrated U -Uncalibrated	A -Aluminium B -Brass S -SS 316	0 - Neoprene 1 - Teflon	0 - Standard (IP 54) 1 - IP 65 as per IS 2147

Eg. A 2 SPDT Pressure Difference Switch, high pressure range from 0.2 bar to 3.6 bar in calibrated style with brass pressure housing, brass pressure disc and a neoprene diaphragm, with IP65 enclosure shall be specified by

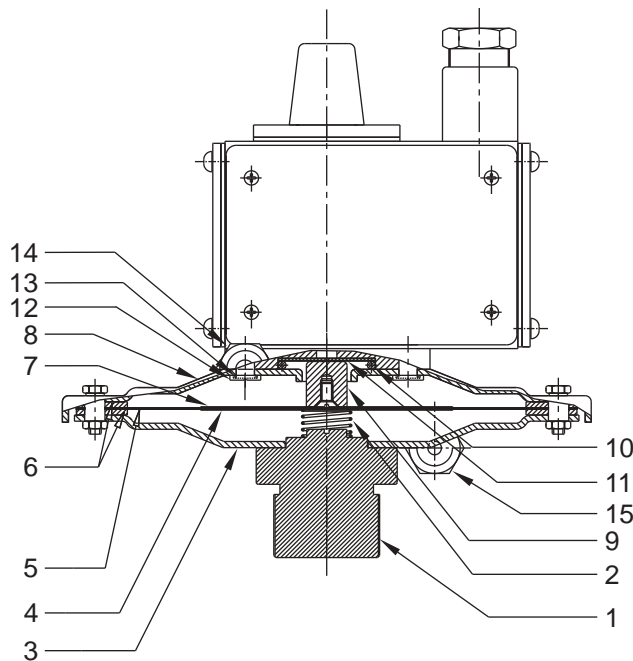
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
PJ	H04	C	B	0	1

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# PD LOW RANGE PRESSURE DIFFERENCE SWITCHES (M.S.)



## PRESSURE CAPSULE DETAILS



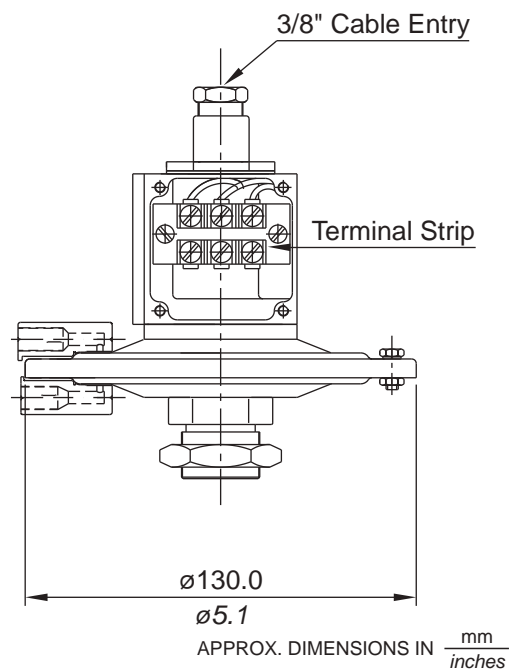
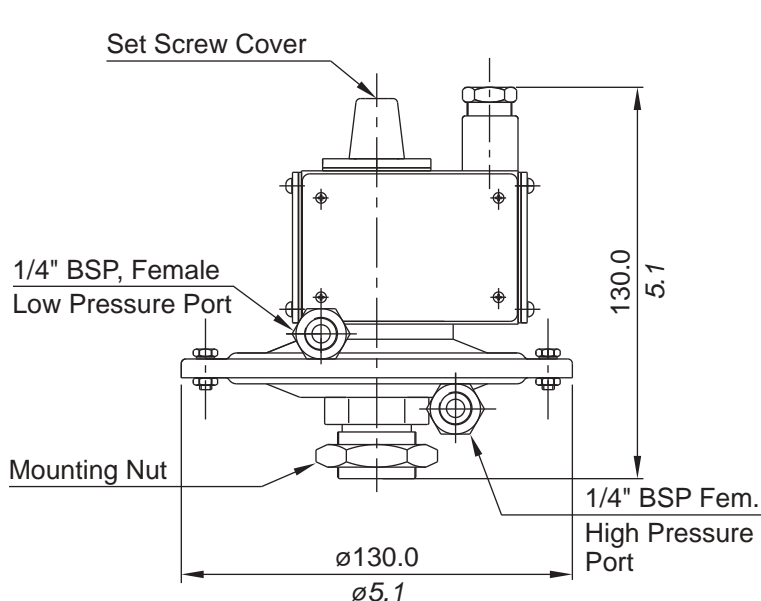
### No. Description

1. Pressure housing (M.S.)\*
2. Support spring (S.S.)
3. Bottom flange (M.S.)\*
4. Support plate (Aluminium)
5. Diaphragm (Neoprene)
6. Gasket (Nitrile)
7. Top plate (Aluminium)
8. Top flange (M.S.)\*
9. Transfer pin (Aluminium)
10. O' Ring (Teflon)
11. Sealing diaphragm (Teflon)
12. Top flange screw (M.S.)
13. Sealing 'O' Ring (Nitrile)
14. Low Pressure Port(M.S)
15. High Pressure Port(M.S)

Note : *wetted parts* are mentioned in italics.

\*Pressure housing is brazed with bottom flange

## INSTALLATION DRAWING



# LOW RANGE PRESSURE DIFFERENCE SWITCHES (M.S.) PD

## GENERAL INFORMATION :

PD series pressure difference switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service based on the type of enclosure opted for. The repeat accuracy is better than  $\pm 2\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure ports are 1/4" BSPF standard.

## FEATURES :

- Compact
- Separate chamber for working parts
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC (res.)
- High pressure port : 1/4" BSPF
- Low pressure port : 1/4" BSPF
- Can be used for  $\Delta p$  between +ve +ve, -ve +ve & -ve -ve pressure/vacuum

**Some Applications :** Used in low vacuum systems, clean room applications, air blower systems, furnaces, cooling systems, etc.

## Range Selection Table

Range Code	Range ( $\Delta p$ ) mm wc ("wc) (falling)	*Approximate Maximum Differential (Fixed) mm wg ("wc)	Maximum Working Pressure bar (psi)
L02	15 - 150 (0.590 - 5.905)	30 (1.181)	0.5 (7.252)
L03	50 - 250 (1.969 - 9.843)	50 (1.969)	0.5 (7.252)
L05	100 - 500 (3.937 - 19.685)	50 (1.969)	0.5 (7.252)
L10	100 - 1000 (3.937 - 39.370)	50 (1.969)	0.5 (7.252)
L15	100 - 1500 (3.937 - 59.055)	50 (1.969)	0.5 (7.252)
L25	200 - 2500 (7.874 - 98.425)	150 (5.906)	0.5 (7.252)

\* Maximum differential increases with setpoint. (Graphs available on request)

## How to order PD low range series switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
PD - Pressure Difference Switch	L - Low Pressure Range	U - Uncalibrated C - Calibrated	M - Mild Steel	0 - Neoprene	0 - Standard (IP 54) 1 - IP 65 as per IS 2147

Eg. A pressure difference switch, low range pressure from 50 to 250 mm WC in calibrated style with mild steel pressure housing and neoprene diaphragm as wetted parts, with standard enclosure shall be specified by

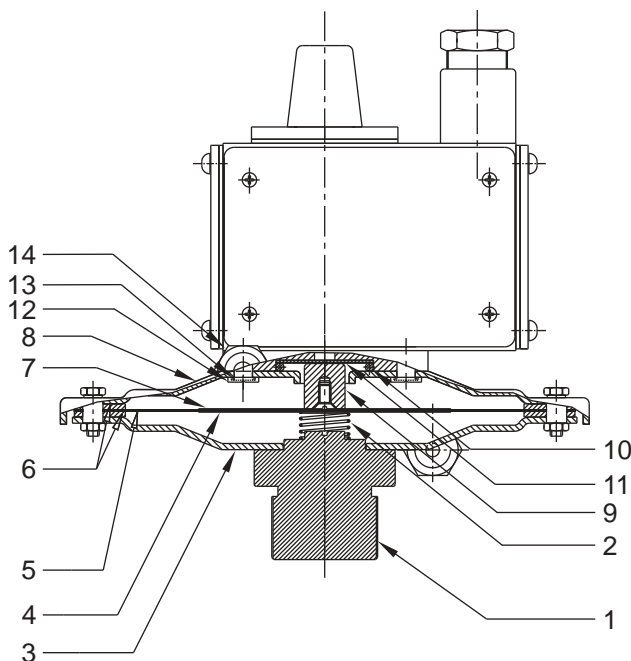
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
PD	L03	C	M	0	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

# PA LOW RANGE PRESSURE DIFFERENCE SWITCHES



## PRESSURE CAPSULE DETAILS



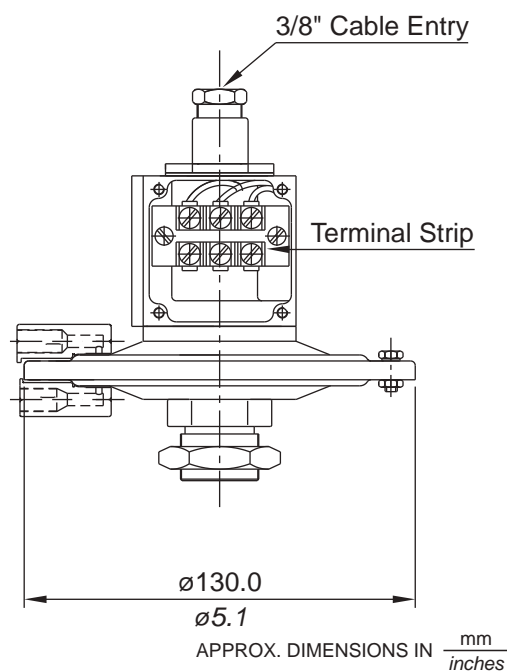
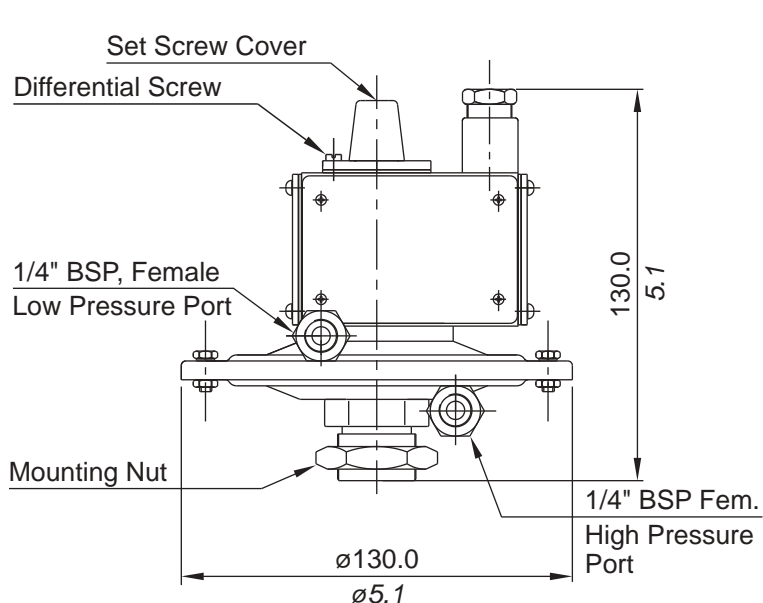
### No. Description

1. Pressure housing (M.S.)\*
2. Support spring (S.S.)
3. Bottom flange (M.S.)\*
4. Support plate (Aluminium)
5. Diaphragm (Neoprene)
6. Gasket (Nitrile)
7. Top plate (Aluminium)
8. Top flange (M.S.)\*
9. Transfer pin (Aluminium)
10. O' Ring (Teflon)
11. Sealing diaphragm (Teflon)
12. Top flange screw (M.S.)
13. Sealing 'O' Ring (Nitrile)
14. Low Pressure Port(M.S)
15. High Pressure Port(M.S)

\*Pressure housing is brazed with bottom flange

Note : wetted parts are mentioned in italics.

## INSTALLATION DRAWING



# LOW RANGE PRESSURE DIFFERENCE SWITCHES

# PA

## General information:

PA series pressure switches are housed in pressure die cast aluminium powder coated enclosure and are recommended for panel mounting or outdoor service, based on the type of enclosure opted for. The on-off differential can be varied in this switch, within the limits specified. The repeat accuracy is better than  $\pm 2\%$  FSR. A separate terminal block is provided for electrical wiring. Pressure ports are  $\frac{1}{4}$ " BSPF standard.

## FEATURES :

- Compact
- Separate chamber for working parts
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC (res.)
- High pressure port :  $\frac{1}{4}$ " BSPF
- Low pressure port :  $\frac{1}{4}$ " BSPF
- Can be used for ?p between +ve +ve, -ve +ve & -ve -ve pressure/vacuum

**Some Applications :** Used in bag filter operations requiring cutin/cutoff to stop and start air purging cycles, etc.

## Range Selection Table

Range Code	Range (? p) mm wc ("wc) (falling)	* Adjustable Differential mm wg ("wc)	Maximum Working Pressure bar (psi)
L05	100 - 500 (3.937 - 19.685)	100 - 400 (3.937 - 15.748)	0.5 (7.252)

\* Maximum differential increases with setpoint. (Graphs available on request)

Other ranges can be provided on request.

## How to order PA low range pressure difference switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
PA - Pressure Difference Switch (Adjustable Differential)	L - Low Pressure Range	U - Uncalibrated C - Calibrated	M - Mild Steel	0 - Neoprene	0 - Standard (IP 54) 1 - IP 65 as per IS 2147

Eg. A pressure difference switch (Adjustable Differential), low range pressure from 100 to 500 mm WC in calibrated style with mild steel pressure housing and neoprene diaphragm as wetted parts, with standard enclosure shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
PA	L05	C	M	0	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

## Introduction

These are the items which are used in most general purpose applications. These switches cannot be configured and are generally intended for stock and sell.

As such, many of them are picked from all the above categories, and can be ordered by part numbers. These will generally have minimum order quantities, and would be available off the shelf.

### APPLICATIONS

- Power Generation
- Burners and Furnaces
- Glass and Metal Industries
- Chemical Industries
- Steel Industry
- Hydraulic, Steam and Gas Turbines
- Boilers & Compressors
- Machine tools
- Water treatment
- Sugar and Paper Mills
- Fire protection
- Surgical gas, Breweries, Milk industries
- Tyre Industry

### PRODUCT SPECIFICATIONS:

- Storage temperature : Atmospheric temperature
- Operating ambient temperature : - 20° C to + 60° C
- Media temperature : for rubber diaphragms 80° C max
- Can be offered for higher temperatures with other capsule combinations
- Setpoint repeatability :  $\pm 1\%$  of FSR
- Enclosure : IP rating varies as per model selected
- Switch output : SPDT
- Process connection :  $\frac{1}{4}$  "BSP standard,
- Approximate weight : 1 kg

### FEATURES

- Low cost
- Easily available
- Reliable accurate microswitches for long life switching
- Customized arrangements for switching values on request
- Easy safe wiring options
- Accuracy  $\pm 1\%$  FSR
- Warranty : 2 years

\*Accuracy changes with switch configuration

# 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

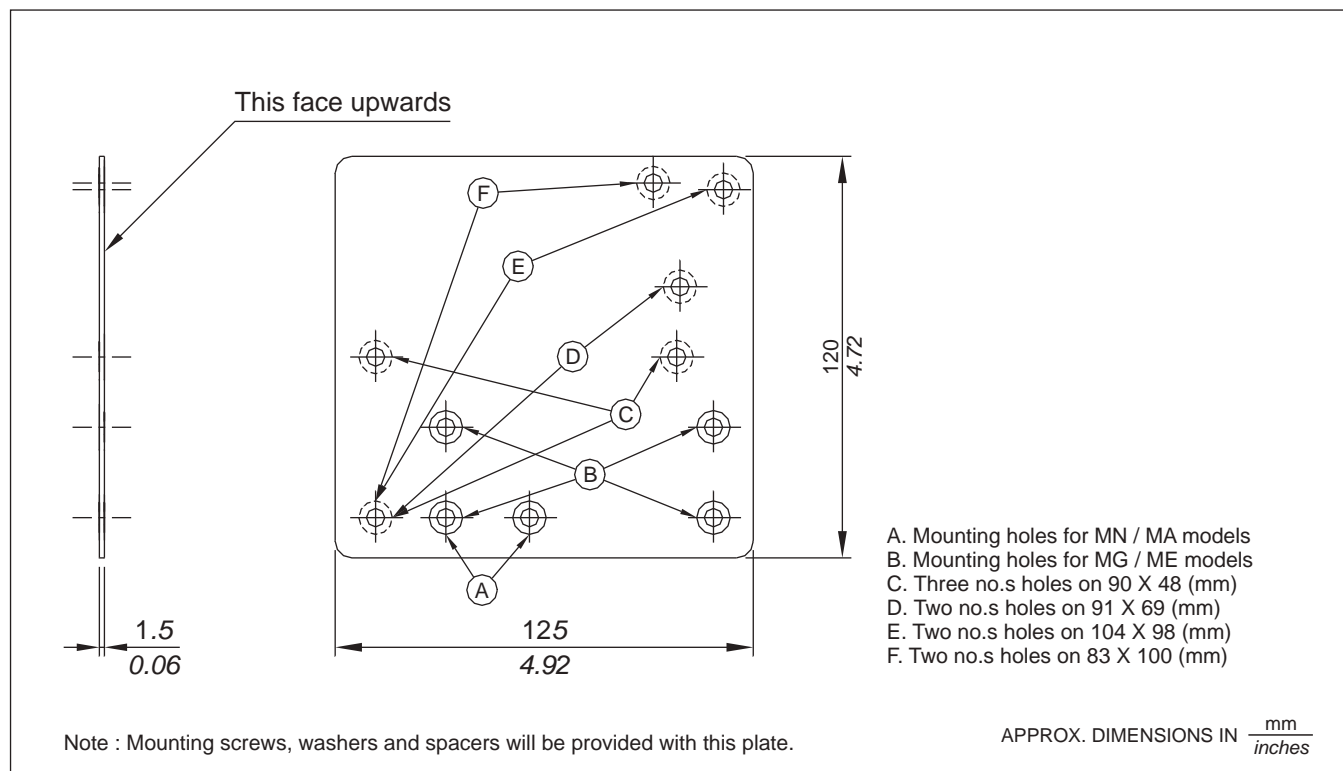
mounting plates to suit other makes on the market

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

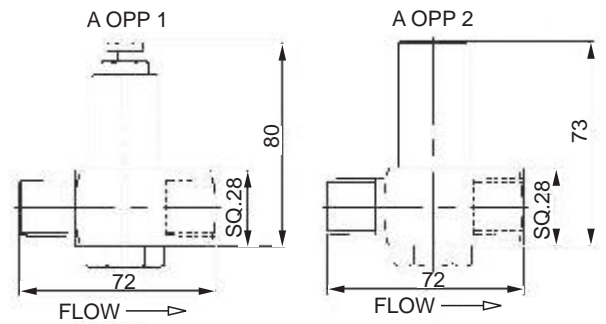


# ACCESSORIES

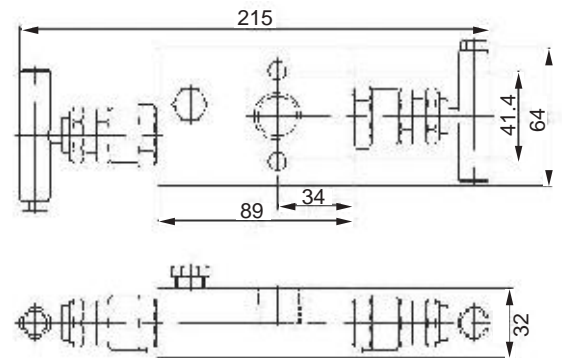
## Gauge Saver



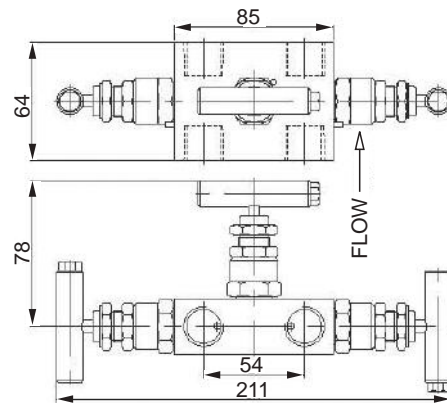
A OPP 1 = Set Pressure: 0.6 to 2.0 bar  
A OPP 2 = Set Pressure: 2.5 to 200 bar



## 2 Valve Manifold



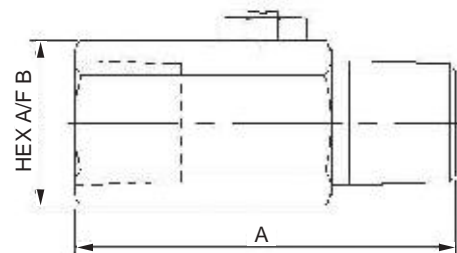
## 3 Valve Manifold



## Snubber



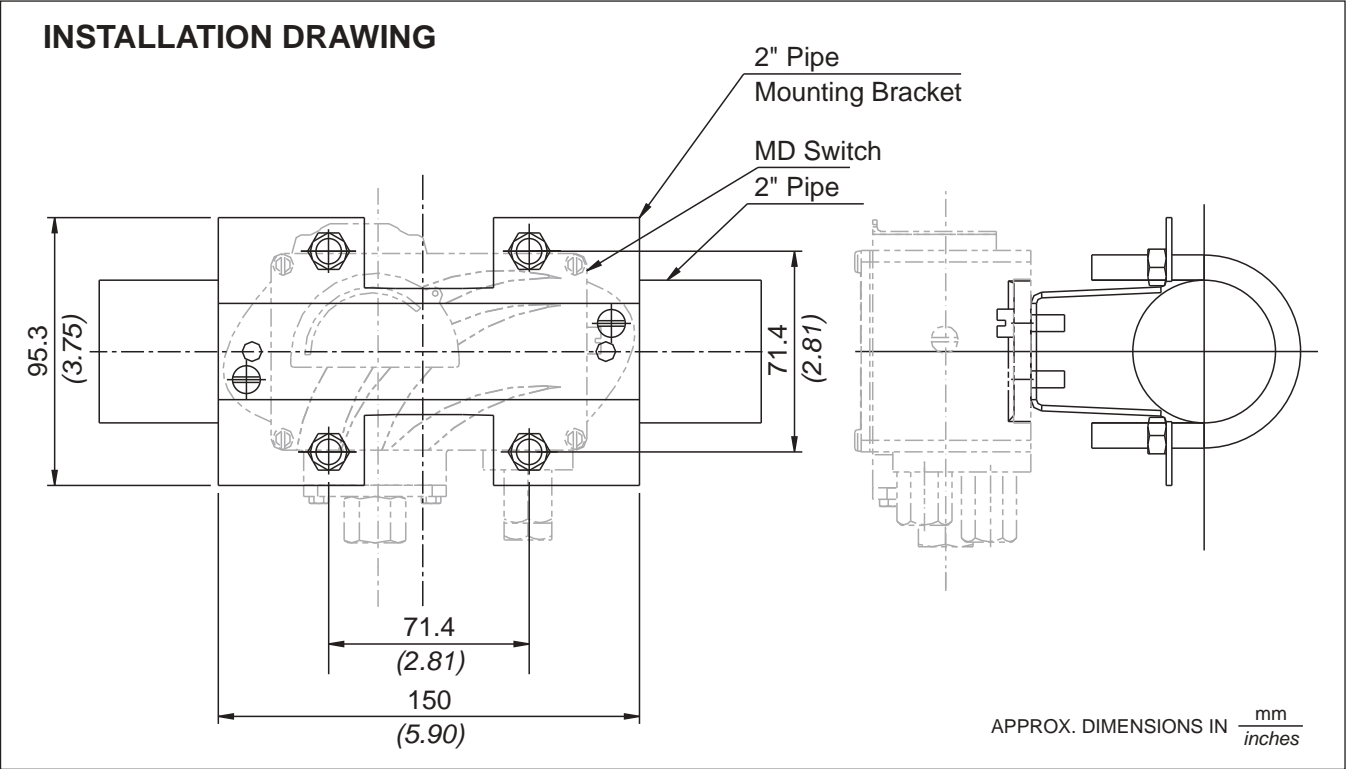
SIZE	A	B
1/4"NPT	55	25
3/8"NPT	55	25
1/2"NPT	63	28
G1/2"	63	28



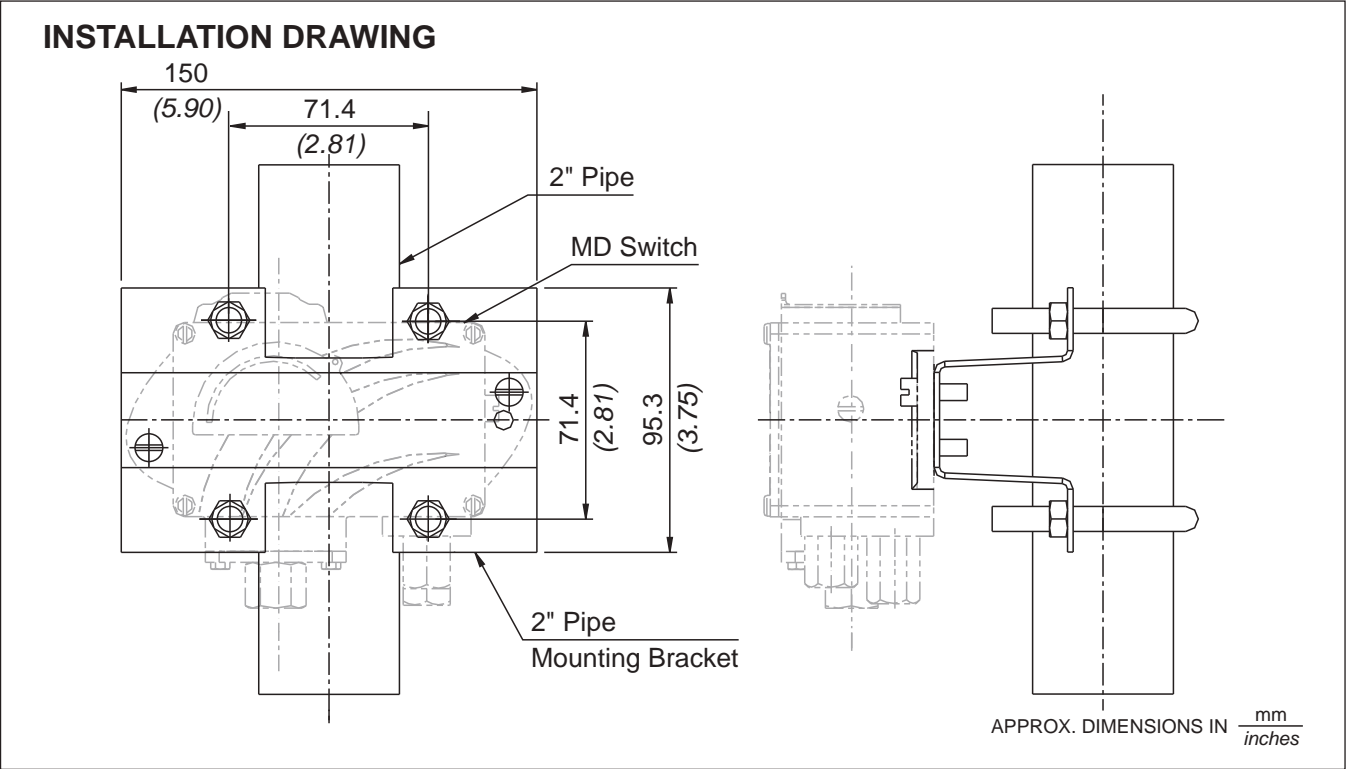


# ACCESSORIES

## PARALLEL MOUNTING MD SWITCH



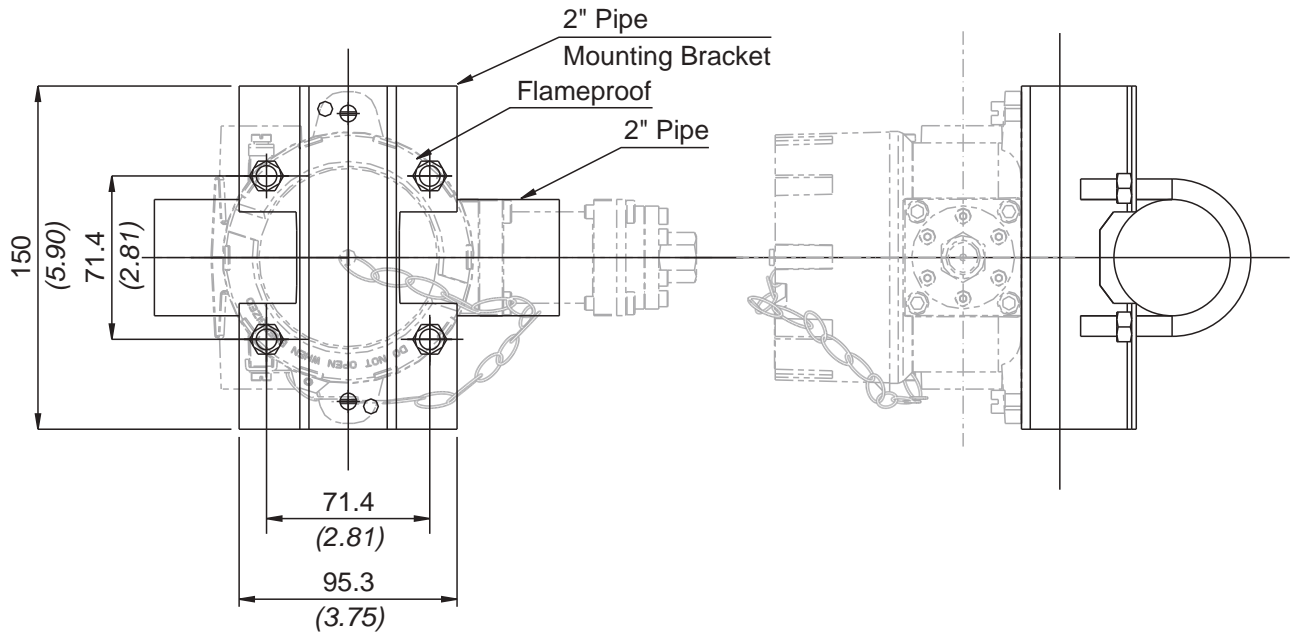
## PERPENDICULAR MOUNTING MD SWITCH



# ACCESSORIES

## PARALLEL MOUNTING FLAMEPROOF SWITCH

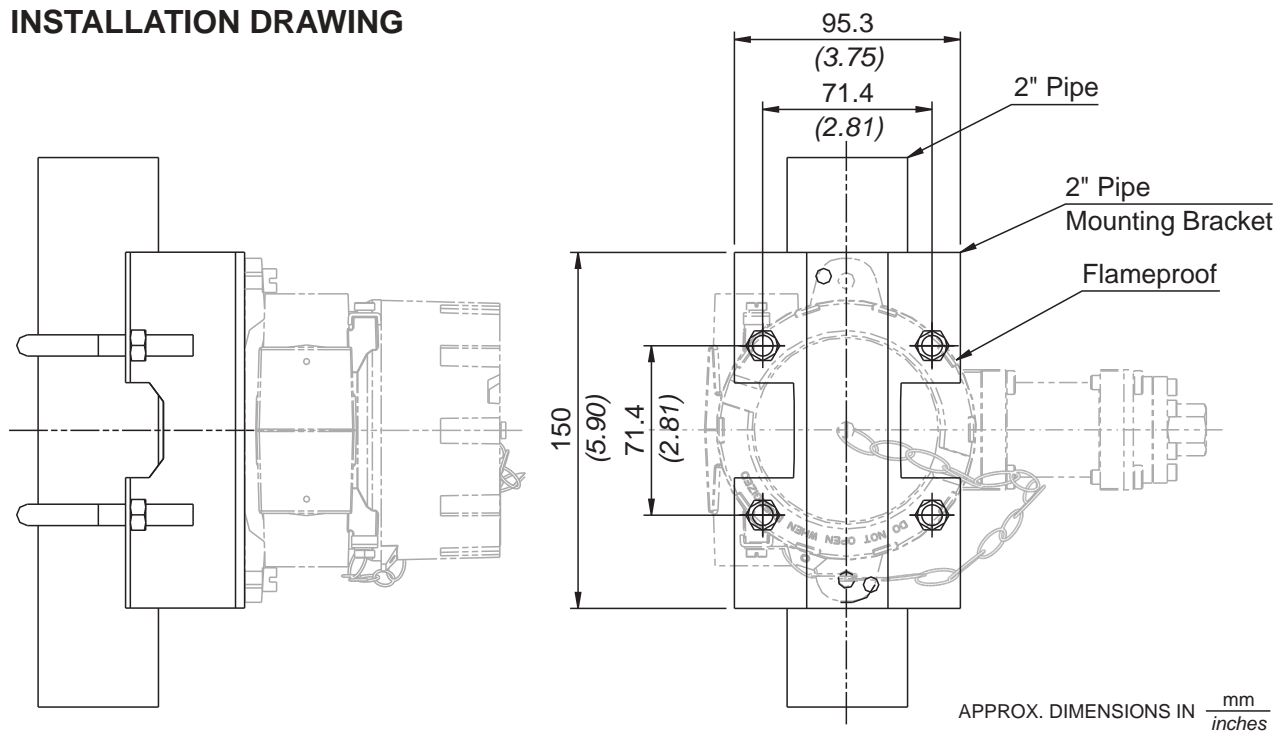
### INSTALLATION DRAWING



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

## PERPENDICULAR MOUNTING FLAMEPROOF SWITCH

### INSTALLATION DRAWING



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

# 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:

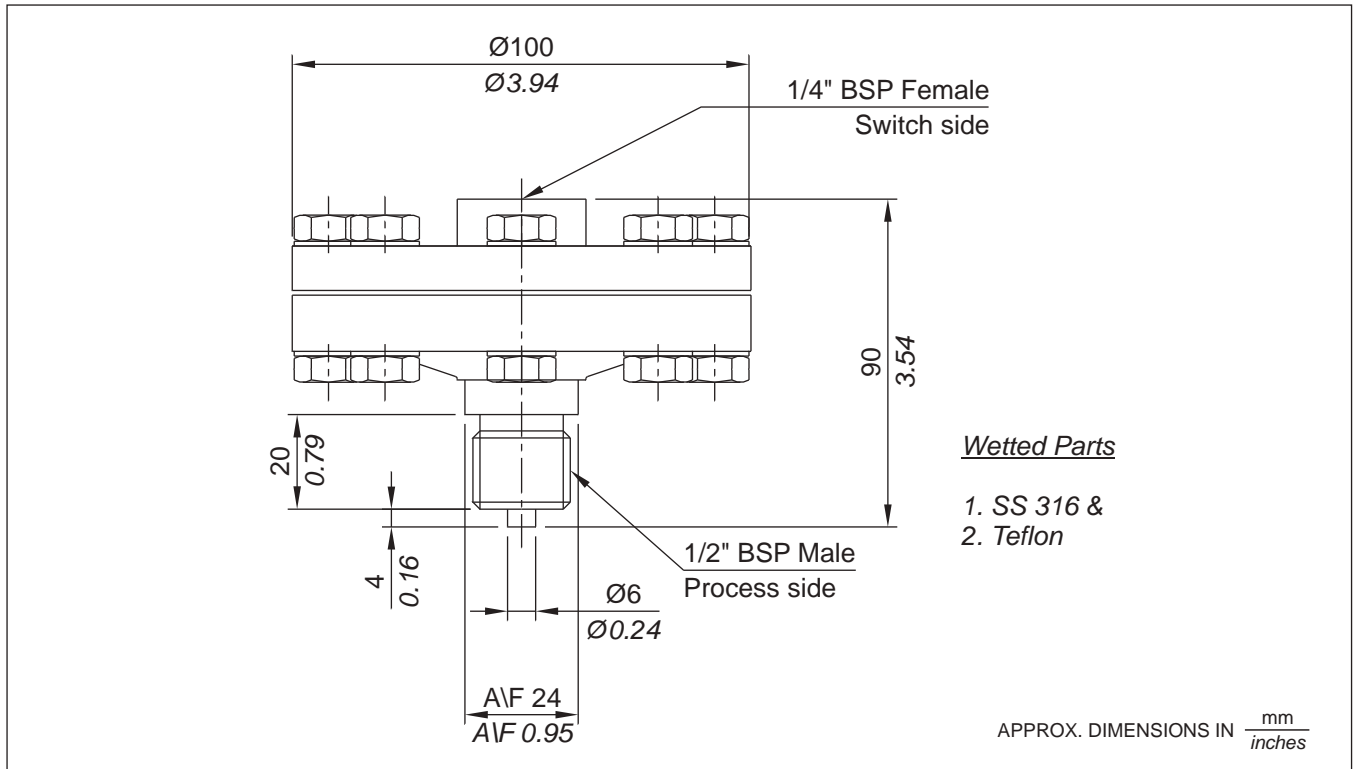
- |                     |                   |             |
|---------------------|-------------------|-------------|
| • HASTELLOY B2      | • MONELALLOY 400  | • TITANIUM  |
| • HASTELLOY C4      | • MONELALLOY K500 | • ZIRCONIUM |
| • HASTELLOY C22     | • NICKEL          | • SILVER    |
| • HASTELLOY 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.

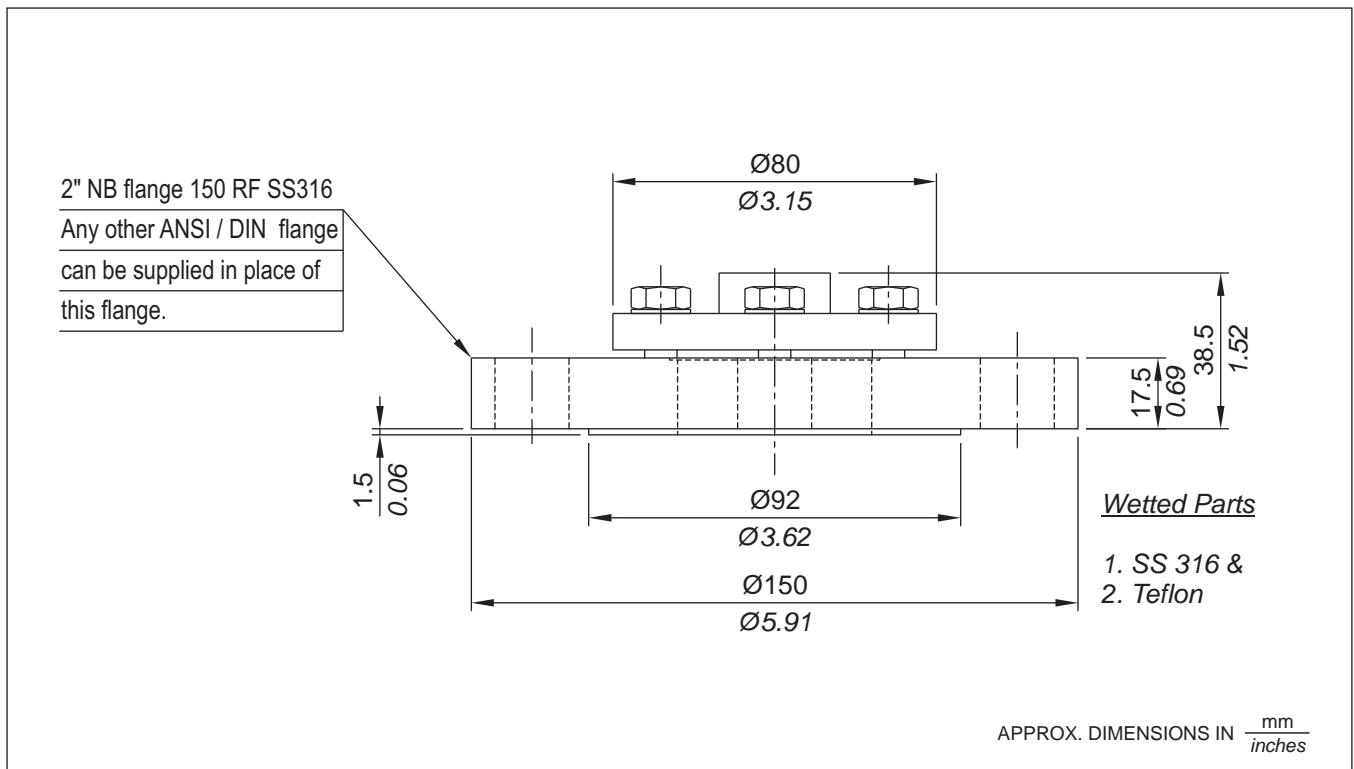
While ordering, customer's are requested to specify all the process parameters including ambient conditions, operating conditions, the process to be sensed and response times allowable, temperature of the seal under sensing conditions and temperature outside the measuring / sensing sequences (e.g as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

# ACCESSORIES

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

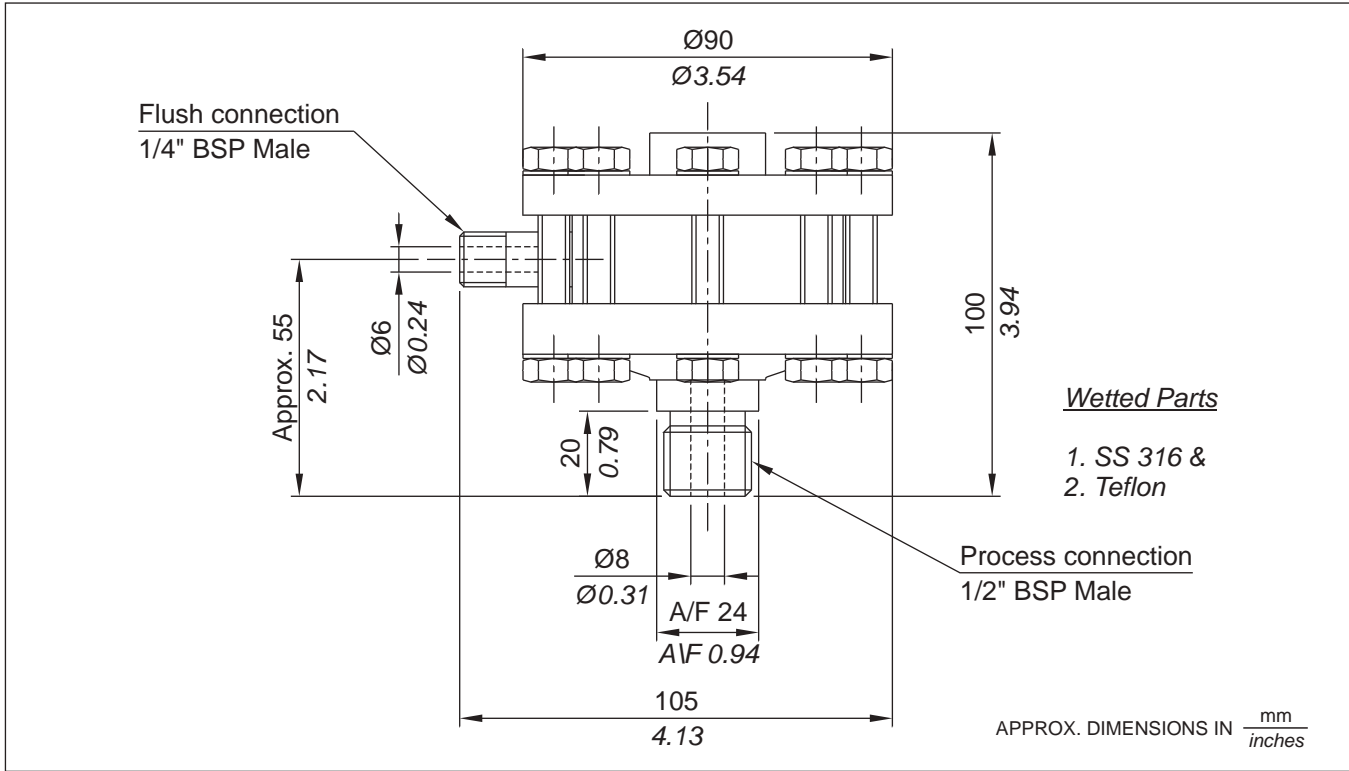


## CHEMICAL SEAL SUITABLE FOR VARIABLE FLANGED CONNECTION : (Type B)



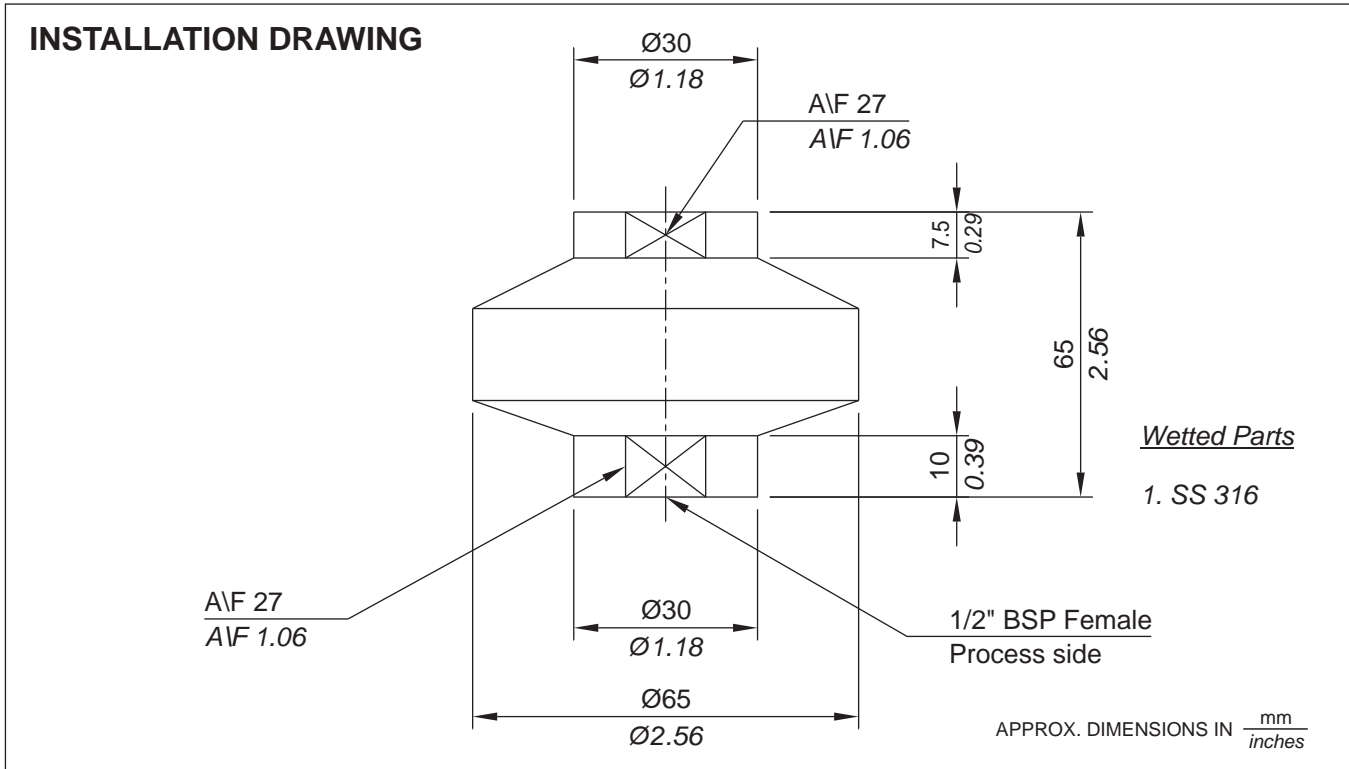
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## FLUSH TYPE CHEMICAL SEAL (Type C)



## FULL WELDED CHEMICAL SEAL (Type D)

## INSTALLATION DRAWING



## 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.

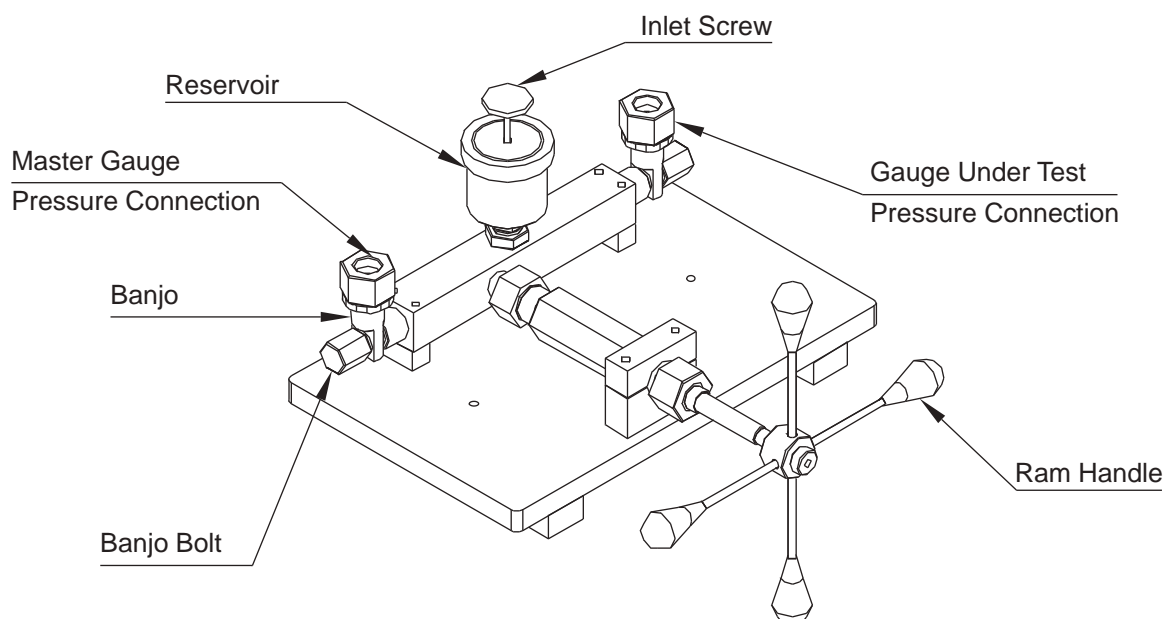
**Environment.** The environment in which the pressure switch will operate is very important. Orion pressure switches can be supplied in weatherproof enclosures for outdoor service. For use of pressure switches in hazardous areas Orion pressure switches can be supplied in flameproof enclosures.



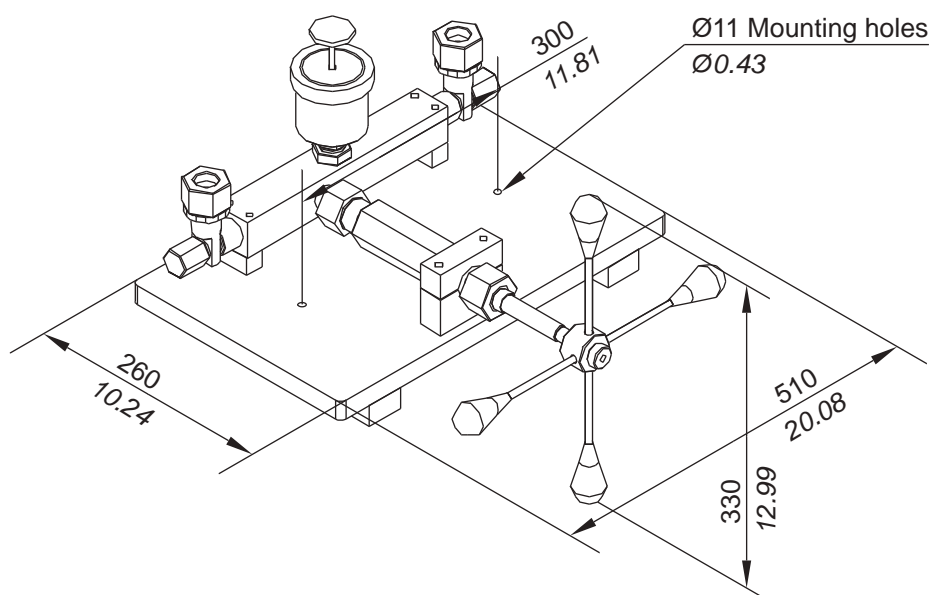
# TR COMPARISON TEST PUMP



## USER END DETAILS



## INSTALLATION DRAWING



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

## General information:

A comparison test pump is a device by which pressure gauges can be calibrated in comparison with master pressure gauges. These can also be used for comparison of master gauges with normal use pressure gauges after periodic intervals to detect a drift in calibration. The unit is portable and comes in handy during pressure gauge calibration verification in ISO 9000 companies. Standard process connection provided is 3/8" BSP female. Adaptors to suit individual pressure gauges can be provided as accessories

## Features:

- Portable
- Lightweight
- Suitable for both bottom and back connection pressure gauges

## Range Selection Table

Range Code	Range bar (psi)
TR 400 MD	0 - 400 (0 - 5714.29)
TR 700 MD	200 - 700 (2857 - 10000)

## Testing procedure for comparing pressure gauges

Mount the master pressure gauge on the left hand side adaptor and gauge under test on right hand side adaptor. Fill the reservoir with kerosene.

To fill the system with kerosene proceed as follows:

1. Unscrew the inlet screw of reservoir
2. Take the ram out by rotating the ram handle anticlockwise to the extreme end. This will fill the system with kerosene.
3. To remove any air trapped inside the system, turn the ram handle clockwise to the extreme end. The presence of air is established if bubbles appear in the reservoir.

Repeat steps 2 and 3 till no bubbles appear in the reservoir.

Take the ram handle fully out and tighten the inlet screw. When the ram handle is rotated clockwise, the pressure in the system starts increasing and the two pressure gauges can be compared with each other.

The gauges can be tilted to a convenient angle by loosening the bolt and rotating the banjos as per requirement, before the system is pressurized. The banjo bolt has to be tightened after attaining the desired angle. This facility is particularly useful in pressure gauges with back connection.

The pressurizing fluid used should be kerosene (not supplied with the equipment). The *wetted parts are mild steel, nitrile, and teflon*. As such, only pressure gauges used on process fluids compatible with kerosene and the wetted parts can be / should be checked / compared using the comparison test pump.

## Please Note:

A comparison test pump is only a device to generate pressure. As such, it has no accuracy and no such certificate of accuracy can be provided for these devices.

## How to order Parus comparison test pumps.

Specify the model by choosing the item code in the range selection table. Give the details of accessories needed, if any, in text.

Ex MARKING GUIDE

IEC	US (NEC 505)	US (NEC 500)	CENELEC (Directive 76/117/EEC)
<div><div>Ex d [ia] IIC T5</div><div>Explosion Protected</div><div>Method of Protection</div><div>I. S. Output</div><div>Gas Group</div><div>Temperature Class</div></div>	<div><div>Class I, Zone 1, A Ex d [ia] IIC T5</div><div>Permitted Class</div><div>American National Standard</div><div>Method of Protection</div><div>Group</div><div>Temperature Class</div><div>Permitted Zone</div><div>Explosion Protected</div><div>I. S. Output</div><div>Gas Group</div></div>	<div><div>Explosionproof with I.S. Outputs, Class I, Division 1, Groups A, B, C, D, T5</div><div>Permitted Division (Optional except for Division 2)</div><div>Permitted Gas Group</div><div>Temperature Class (T5 &amp; T6 optional)</div><div>Method of Protection (Optional except for I.S.)</div><div>Permitted Class</div></div>	<div><div>E Ex d [ia] IIC T5</div><div>European Standard</div><div>Method of Protection</div><div>Explosion Protected</div><div>I. S. Output</div><div>Gas Group</div><div>Temperature Class</div></div>

Refer to the "Marking" block for additional marking to the ATEX Directive (94/9/EC)

## PROTECTION CONCEPTS

Method of Protection	Code	Permitted Use	Standard	Protection Principle
Increased Safety	AEx e	Class I, Zone 1,2	FM 3600* (ISA S12.16.01)	No arcs, sparks or hot surfaces
	EEx e	Zone 1,2	EN 50 019	
Non-incendive	Ex e	Zone 1,2	IEC 60079-7	
Non-sparking	(NI) Ex nA	Class I, Div 2 Zone 2	FM3611 IEC 60079-15	
Explosionproof Flameproof	(XP) AEx d EEx d Ex d	Class I, Division 1,2 Class I, Zone 1,2 Zone 1,2 Zone 1,2	FM 3615 FM 3600* (ISA S 12.22.01) EN 50 018 IEC 60079-1	Contain the explosion and quench the flame
Powder Filled	A Ex q EEx d Ex q	Class I, Zone 1,2 Zone 1,2 Zone 1,2	FM 3600* (ISA S12.25.01) EN 50 017 IEC 60079-5	
Enclosed Break	Ex nC	Zone 2	IEC 60079-15	
Intrinsic Safety	(IS) AEx ia AEx ib EEx ia EEx ib Ex ia Ex ib	Class I, Div 1,2 Class I, Zone 0,1,2 Class I, Zone 1,2 Zone 0,1,2 Zone 1,2 Zone 0,1,2 Zone 1,2	FM 3610 † FM 3610 † FM 3610 † EN 50 020/39 EN 50 020/39 IEC 60079-11 IEC 60079-11	
Limited Energy	Ex nA	Zone 2	IEC 60079-15	Limit energy of sparks and suface temperature
Pressurized	Type X Type Y Type Z EEx p Ex p	Class I, Div 1 Class I, Div 1 Class I, Div 2 Zone 1 Zone 1	FM 3620 FM 3620 FM 3620 EN 50 016 IEC 60079-2	Keep Dlamnable gas out
Restricted Breaching	Ex nR	Zone 2	IEC 60079-15	
Encapsulation	AEx m EEx m Ex m	Class I, Zone 1,2 Zone 1,2 Zone 1,2	FM 3600*(ISA S12.23.01) EN 50 028 IEC 60079-18	
Oil Immersion	AEx o EEx o Ex o	Class I, Zone 1,2 Zone 1,2 Zone 1,2	FM 3600*(ISA S12.26.01) EN 50 015 IEC 60079-6	
*Also shall comply with ISA S12.0.01 † Based on ISA S12.2.01				

## AREA CLASSIFICATION

	Flammable Material Present		
	Continuously	Intermittently	Abnormally
IEC/ CENELEC	Zone 0 (Zone 20 - dust)	Zone 1 (Zone 21 - dust)	Zone 2 (Zone 22 - dust)
US NEC 505	Zone 0	Zone 1	Zone 2
US NEC 500	Division 1		Division 2

IEC Classification per IEC 60079-10

CENELEC classification per EN 60079-10

US classification per ANSI/NFPA 70 National Electric Code (NEC) Article 500 or Article 505

## APPARATUS GROUPING

Typical Gas/dust/fibre	US (NEC 505) IEC CENELEC	US (NEC 500)
Acetylene Hydrogen Ethylene Propane Methane Metal Dust Coal Dust Grain Dust Fibres	Group IIC (Group IIB + H <sub>2</sub> ) Group IIB Group IIA Group I* None None None None	Class I/Group A Class I/Group B Class I/Group C Class I/Group D Mining* Class II/Group E Class II/Group F Class II/Group G Class III

\*Not within scope of NEC. Under jurisdiction of MSHA

MSHA - Mine Safety & Health Administration

## T-CODES

Maximum Surface Temperature	US (NEC 505) IEC CENELEC	US (NEC 505)
450°C	T1	T1
300°C	T2	T2
280°C	-	T2A
260°C	-	T2B
230°C	-	T2C
215°C	-	T2D
200°C	T3	T3
180°C	-	T3A
165°C	-	T3B
160°C	-	T3C
135°C	T4	T4
120°C	-	T4A
100°C	T5	T5
85°C	T6	T6

## Reference Data

### ENVIRONMENTAL RATINGS FOR ENCLOSURES BASED ON "NEMA" TYPE DESIGNATIONS

Enclosure Type Designation	Intended Use and Description
1	Indoor use primarily to provide a degree of protection against limited amounts of falling dirt.
2	Indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.
3	Outdoor use primarily to provide a degree of protection against rain, sleet, wind blown dust and damage from external ice formation.
3R	Outdoor use primarily to provide a degree of protection against rain, sleet, and damage from external ice formation.
3S	Outdoor use primarily to provide a degree of protection against rain, sleet, windblown dust and to provide for operation of external mechanisms when ice laden.
4	Indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation.
4X	Indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water, and damage from external ice formation.
5	Indoor use primarily to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids.
6	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, and the entry of water during occasional temporary submersion at a limited depth and damage from external ice formation.
6P	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth and damage from external ice formation.
7	Indoor use in locations classified as Class I, Division 1, Groups A, B, C or D hazardous locations as defined in the National Electric Code (NFPA 70) (Commonly referred to as explosion-proof).
8	Indoor or outdoor use in locations classified as Class I, Division 2, Groups A, B, C or D hazardous locations as defined in the National Electric Code (NFPA 70) (commonly referred to as oil immersed).
9	Indoor use in locations classified as Class II, Division 1, Groups E, F and G hazardous locations as defined in the National Electric Code (NFPA 70) (commonly referred to as dust-ignition proof).
10	Intended to meet the applicable requirements of the Mine Safety and Health Administration (MSHA).
12 and 12K	Indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids.
13	Indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.

### GROUP OF ENCLOSURE SUITABLE FOR PARTICULAR FLAMMABLE GAS / VAPOUR

Group of enclosure	Gas or Vapour
I	Methane ( firedamp)
IIA	Ammonia Industrial Methane * Blast Furnace Gas Carbon monoxide Propane Butane Pentane hexane Heptane Iso-Octane Decane Benzene Xylene Cyclohexane Acetone Ethyl methyl ketone Methyl acetate Ethyl acetate n-Propyl acetate n-Butyl acetate Amyl acetate Chloroethylene Methanol Ethanol Iso-butanol n-Butanol Amyl alcohol Ethyl nitrite
IIB	"1, 3-Butadiene" Ethylene Dethyl ether Ethylene oxide Town gas # Coke-oven gas
IIC	Hydrogen
<p>* Industrial methane includes methane mixed with not more than 10 percent by volume of Hydrogen.</p> <p># Town gas may contain not more than 57 percent by volume of hydrogen and not more than 16 percent by volume of carbon monoxide, the remainder being a small mixture of paraffin, hydrocarbons and inert gas.</p>	

## Thermal Engineering Data

ENERGY						
	kW hour	kCal	Joule	HP Hour	MW Hour	BTU
kW hour	1	859.8452	3600000	1.341022	0.001	3412.142
kCal	0.001163	1	4186.8	0.001559609	1.163e-006	3.968321
Joule	2.777778e-007	0.0002388459	1	3.725061e-007	2.777778e-010	0.0009478171
HP Hour	0.7456999	641.1865	2684520	1	0.0007456999	2544.434
MW Hour	1000	859845.2	3.6e+009	1341.022	1	3412142
BTU	0.0002930711	0.2519958	1055.056	0.0003930148	2.930711e-007	1

POWER & HEAT	
1 Btu	776 ft-lb 0.293 Watt-hr 252 cal
1 cal	0.003968 Btu 0.0011619 Watt-hr
1 Btu/h	0.293 Watt 4.2 cal/min
1 Watt	3.413 Btu/h
1 Watt-h	3.413 Btu
1 kW (1000 Watts)	3413 Btu/h
1 kW-hr	3413 Btu
1hp	0.746 kW 2544.65 Btu/h 33,000 ft-lb./min
1 Bohn <sup>a</sup>	9.809kW 33,479 Btu/h 34.5 lb of steam per hour

a Boiler output Horsepower is the equivalent of the heat required to evaporate 34.5 lb of water per hour in to dry, saturated steam at 212 F.

COMMONLY USED THERMAL UNITS	
1 BTU	= 0.252 kcal
1 BTU	= 107.7 kgm
1BTU/sec	= 1.055 kW
1 BTU/lb	= 0.5556 kcal/kg
1 BTU/ft <sup>3</sup>	= 8.9 kcal/m <sup>3</sup>
1 BTU/ft <sup>2</sup> -hr	= 2.71 kcal/m <sup>2</sup> h
1 BTU/ft <sup>2</sup> -hr-°F	= 4.886 kcal/m <sup>2</sup> -hr-°C
1 BTU/ft-hr-°F	= 1.49 kcal/m-hr-°C
1 BTU in/ ft <sup>2</sup> -hr-°F	= 0.124 kcal/m-hr-°C
1 BTU/lb-°F	= 1 kcal/kg-°C
1 BTU/ft <sup>3</sup> -°F	= 16.2 kcal/m <sup>3</sup> -°C
1 kcal	= 3.968 BTU
1 kgm	= 0.0093 BTU
1 kW	= 0.948 BTU/sec
1 kcal/kg	= 1.80 BTU/lb
1 kcal/m <sup>3</sup>	= 112 BTU/ft <sup>3</sup>
1 kcal/m <sup>2</sup> -hr	= 0.369 BTU/ft <sup>2</sup> -hr
1 kcal/m <sup>2</sup> -hr °C	= 0.205 BTU/ft <sup>2</sup> -hr-°F
1 kcal/m-hr-°C	= 0.67 BTU/ft-hr-°F
1 kcal/m <sup>3</sup> -°C	= 0.0624 BTU/ft <sup>3</sup> -°F
1 kcal	= 4.187 kJ

PROPERTIES OF COMMONLY USED INDUSTRIAL FUELS			
	Specific Gravity	Calorific Value	
Furnace Oil	0.89-0.95	10200	kcal/kg
Low Sulphur Heavy Stock (LSHS)	0.88-0.98	10300	kcal/kg
Heavy Petroleum stock (HPS)	0.85-0.98	9500	kcal/kg
Light Diesel Oil (LDO)	0.85-0.87	10300	kcal/kg
Husk	--	3360	kcal/kg
Wood	--	4700	kcal/kg
Bagasse	--	3850	kcal/kg
Blast Furnace Gas	1.0	850	kcal/Nm <sup>3</sup>
Coke Oven Gas(Mixed)	0.38	4200	kcal/Nm <sup>3</sup>
Coal Gas	0.42	5000-6000	kcal/Nm <sup>3</sup>
LD Gas	--	1600	kcal/Nm <sup>3</sup>
LPG (50% Propane+50% Butane)	2.1	24500	kcal/Nm <sup>3</sup>
Natural Gas	0.570	8900	kcal/Nm <sup>3</sup>
Producer Gas	0.87	1500	kcal/Nm <sup>3</sup>

Notes :

Lined area for notes.



Notes :

Lined area for notes.



## Kaustubha Udyog

S. No. 36/1/1, Sinhgad Road, Vadgaon Khurd, Near Lokmat Press, Pune 411 041 INDIA  
Tel.: +91-(0) 20-64700835 / 64700836 Telefax : +91-(0) 20-25460486 / 24393577  
Email : pressure@vsnl.com Website : <http://www.orion-instruments.com>

### ORDER/ENQUIRY FORM FOR PRESSURE SWITCHES

DEALER/AGENT CODE :

Please fill up the following parameters :

#### Technical:

- Maximum working pressure = \_\_\_\_\_ bar / mm wg  
(including surges)
- Set point 1  
**For single pressure switch**  
Increasing \_\_\_\_\_ bar/mm wg  
Decreasing \_\_\_\_\_ bar/mm wg  
**For adj. diff. Models**  
(lower) cut-in pressure \_\_\_\_\_ bar  
(upper) cut-out pressure \_\_\_\_\_ bar  
**For pressure diff. Models**  
Pmax (HP side) \_\_\_\_\_  
Pmax (LP side) \_\_\_\_\_  
? p desired = \_\_\_\_\_ bar/mm wg  
rising / falling
- Set point 2 (for 2SPDT switches)  
**For single pressure switch**  
Increasing \_\_\_\_\_ bar/mm wg  
Decreasing \_\_\_\_\_ bar/mm wg  
**For adj. diff. Models**  
(lower) cut-in pressure \_\_\_\_\_ bar  
(upper) cut-out pressure \_\_\_\_\_ bar  
**For pressure diff. Models**  
Pmax (HP side) \_\_\_\_\_  
Pmax (LP side) \_\_\_\_\_  
? p desired = \_\_\_\_\_ bar/mm wg  
rising / falling
- Working medium \_\_\_\_\_  
Compatible with  

<b>Pressure housing</b>	<b>Diaphragm</b>
<input type="checkbox"/> Aluminium	<input type="checkbox"/> Neoprene / Nitrile
<input type="checkbox"/> Brass	<input type="checkbox"/> Teflon
<input type="checkbox"/> S. S.	
- Max. temperature of working medium \_\_\_\_\_ °C
- Electrical rating : 5 A / 250 VAC 0.2 A / 250 VDC or Other
- Enclosure : IP 40 / IP 54 / IP 65 / Flameproof I, II A, II B / Flameproof II C
- Please specify any other details in text: - \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Model suggested \_\_\_\_\_

#### Commercial :

Annual Consumption \_\_\_\_\_ nos. \_\_\_\_\_  
Expected target price Rs. / USD \_\_\_\_\_ Ex works / FOB \_\_\_\_\_  
Expected date of first sample \_\_\_\_\_

**Customer details :** Name \_\_\_\_\_  
Address \_\_\_\_\_  
Contact Person \_\_\_\_\_ Designation \_\_\_\_\_  
Tel. No. (O) \_\_\_\_\_ (R) \_\_\_\_\_  
Fax No. \_\_\_\_\_ Email \_\_\_\_\_  
Weekly off \_\_\_\_\_

#### Pressure switches presently used :

Make	Model	Quantity
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Salesman's  
Signature :

Customer's  
Signature :

Affix  
Stamp  
Here

To,

**KAUSTUBHA UDYOG**

S. No. 36/1/1, Sinhgad Road, Vadgaon Khurd,  
Near Lokmat Press, Pune 411 041 INDIA

Tel.: +91-(0) 20-64700835 / 64700836

Telefax : +91-(0) 20-24393577 / 25460486

Email : [pressure@vsnl.com](mailto:pressure@vsnl.com)

Website : <http://www.orion-instruments.com>

# OEM SWITCHES

## SPECIFIER'S GUIDE FOR

### PRESSURE SWITCHES

### PRESSURE DIFFERENCE SWITCHES



## Using the section

This section on “How to use this catalogue “ helps you make a logical choice in selecting the best product for a particular application. It allows a user familiar with our product line to locate the exact page the product is listed on. For those not familiar with our products, a logical sequence is given to help the user pick the best product for their need.

By taking a few minutes to familiarise yourself with the catalogue organization, you will find it very easy to locate the product / information you need.

1. The contents page lists the broad outline in which the catalogue is organized, and will help the user familiar with products to select the page on which the product or other useful information is listed.

2. Need Product Selection help ?

Product selection help will start with the “Pictorial Index” on Page 291, where the products are broadly classified. A brief description of each product group , a typical photo of the product within the group and the page number on which it is listed are given.

If the user is not familiar with the products, a product selection guide is provided on pages 294 through 298, where photos for each product and important specifications are given to help determine and select the best product for the application.

By evaluating and comparing these parameters, a logical selection can be made. Turn to the page on which the product information for the selected product is listed, for :

Capsule Construction details

Physical sizes

Special features

Ranges, hysteresis, electrical ratings etc.

Ordering information

The organisation of each of these pages is demonstrated on pages 292 and 293, of this section “How to use this catalogue”.

In many cases, more than one product may work. For the most cost effective solution, compare prices and consider alternatives. Remember, the end cost includes initial product price, plus the installation, plus the service.

3. Need the terminology explained? (see page 330)

Turn to page 330 for the definitions and terminology. This will help you familiarize with the terms used throughout the catalogue.

4. Need information on Accessories? (see page 322)

Turn to page 322 for information on important accessories. These will give information on only important accessories, and information needed, when these are to be supplied with our products.

5. Need selection guidance? (see page 331)

A logical procedure on page 331 will help you to consider most of the important factors when selecting a pressure switch.

6. Need other products ? (see page 332)

Products other than those listed in this catalogue are referenced on these pages. Separate catalogues for these products are available.

## Pictorial Index

### SC SUBMINIATURE



Page No. 300

### SM



Page No. 302

### SA



Page No. 304

### EZ/EX



Page No. 306

### EZ\_A/EX\_A



Page No. 308

### MZ/MX



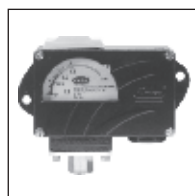
Page No. 310

### MZ\_A



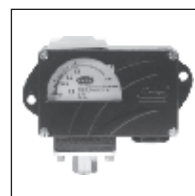
Page No. 312

### MD



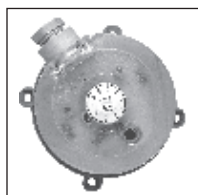
Page No. 314

### MD\_A



Page No. 316

### CF



Page No. 318

### CS12



Page No. 320

### OTHER PRODUCTS

#### TR



Page No. 332

# HOW TO USE this section

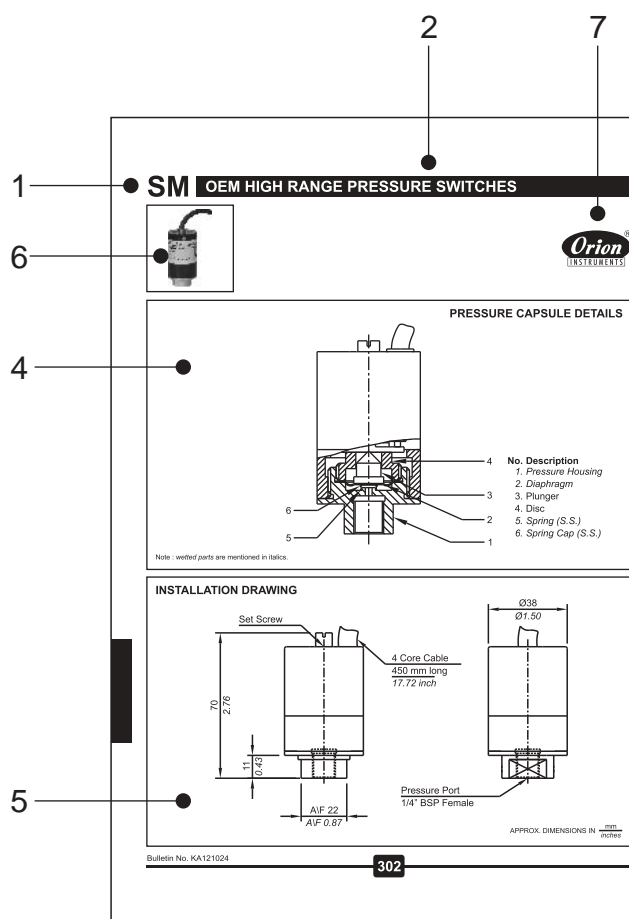
Due to the variety in product types and their salient features, catalogue page formats may vary. But generally the following formats are adhered to.

Elements appearing on each page will be:

1. Product family / series - A product family / series will appear on the outside page corner, depending on the left / right hand page, and will be in large bold type.
2. Product section - will appear immediately following the product family / series at top of the page and will be in bold type.
3. Features - will appear next to product description & will enlist only the major attributes.
4. Pressure capsule details - will show the construction of the pressure capsule and all it's internal parts. If the process / working medium is variable, the wetted parts will be mentioned in italics. If the wetted parts are unique, the material of construction (MOC) will be mentioned

alongside in brackets. Where the material of construction is not specified, it will vary and the options are to be selected by the user considering the compatibility of the process / working medium. Modifications can be made to suit any particular medium, if the answer for your needs is not in the standard MOC listed. Products for which process / working medium is predefined, pressure capsule details are not provided (e.g as in case of comparison test pump). Pressure capsule details of accessories are not given.

5. Installation drawing - will show the typical installation dimensions of products as they exist in their standard forms. The dimensions are mentioned in millimetres and also in inches to facilitate the user. The dimensions of accessories will have to be added to these to arrive at any particular general arrangement (GA) drawings. The dimensions are approximate and for precise dimensions, where mounting space is restricted, the user may contact the nearest sales office. Installation drawings of only fast moving accessories are given.



## OEM HIGH RANGE PRESSURE SWITCHES SM

### General information:

SM series pressure switches have a cast aluminium enclosure, intended for inhouse use. These are generally used where size is a constraint. The repeat accuracy is better than  $\pm 2\%$  FSR. A core cable 450 mm long with CNOING contacts is provided for wiring. Pressure port is 1/4" BSPF standard.

### Features:

- Compact
- Lightweight
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC(res.)
- Choice of wetted parts to suit working media
- Proof pressure available can be 4 times MWP (optional)
- Pressure port : 1/4" BSPF

### Range Selection Table

Range Code	Range (rising pressure) bar (psi)	*Approximate Maximum Differential (fixed) bar (psi)	Maximum Working Pressure bar (psi)
H01	0.2 - 1.0 (2.90 - 14.50)	0.2 (2.90)	12 (174.05)
H03	0.2 - 2.8 (2.90 - 37.71)	0.3 (4.35)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.52)	0.3 (4.35)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.53)	0.5 (7.25)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	1.0 (14.50)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.56)	1.5 (21.75)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	2.50 (36.26)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

### How to order SM Series High Range Pressure Switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
SM - Fixed Differential Pressure switch	H-High range pressure switch	U-Uncalibrated	A-Aluminium B-Brass S-SS316	0-Neprene 1-Teflon	0-IP 54 as per IS 2147

eg. A single pressure switch, high pressure range from 0.1-1.0 bar in uncalibrated style with brass pressure housing & a teflon diaphragm in a standard enclosure shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
SM	H01	U	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, switches with standard wetted parts will be supplied.

Bulletin No. KA121024





## Product Selection Guide



Page No. 300



Page No. 302



Page No. 304

Model	SC	SM	SA
Switch type	Subminiature	OEM (High Pr.)	OEM (High Pr.)
Differential type	Fixed	Fixed	Fixed
Repeatability (% FSR)	± 2	± 2	± 2
Range covered	0.1 bar to 25 bar	0.2 bar to 25 bar	0.2 bar to 25 bar
Enclosure Protection			
Enclosure Standard Optional	Cast aluminium	Cast aluminium to IP 54 as per IS 2147	
sensing element Standard Optional	Diaphragm nylon reinforced neoprene diaphragm teflon, SS316Lteflon		
Pressure housing Standard Optional	SS 316 mild steel	Aluminium Brass/SS316	
Other Wetted Parts			
Optional wetted parts through chem. seal			
Temp. of working medium	80°C maximum. For higher temperature, please use impulse tubing/chemical seals.		
Switching element	SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office		

Accessories can be supplied with most of the switches. Please consult sales office.

## Product Selection Guide



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Page No. 308

EZ	EX	EZ_A	Model
OEM (High Pr.)	OEM (High Pr.)	OEM (High Pr.)	Switch type
Fixed	Adjustable	Fixed	Differential type
$\pm 1.5$	$\pm 1.5$	$\pm 1.5$	Repeatability (% FSR)
0.2 bar to 25 bar	0.5 bar to 25 bar	3 psi to 350 psi	Range covered
Pressed steel enclosures IP 40 as per IS 2147			Enclosure Protection
			Enclosure Standard Optional
Diaphragm Teflon			sensing element Standard Optional
SS316			Pressure housing Standard Optional
			Other Wetted Parts
			Optional wetted parts through chem. seal
80°C maximum. For higher temperature, please use impulse tubing/chemical seals.			Temp. of working medium
SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office			Switching element

WETTED PARTS

Accessories can be supplied with most of the switches. Please consult sales office.

## Product Selection Guide



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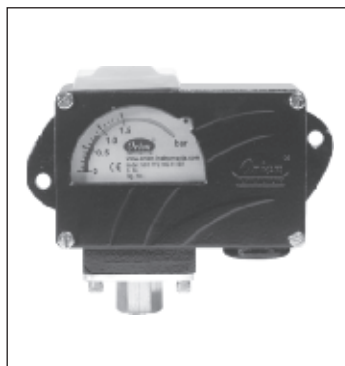
Model	EX_A	MZ	MX
Switch type	OEM (High Pr.)	OEM (High Pr.)	OEM (High Pr.)
Differential type	Adjustable	Fixed	Adjustable
Repeatability (% FSR)	± 1.5	Various	
Range covered	7 psi to 350 psi	0.1 bar to 25 bar	0.5 bar to 25 bar
Enclosure Protection		IP 66	
Enclosure Standard Optional	Pressed steel enclosures IP 40 as per IS 2147	Tough transparent polycarbonate	
sensing element Standard Optional	Teflon	Various	
Pressure housing Standard Optional	SS 316		
Other Wetted Parts		Teflon, SS 316	
Optional wetted parts through chem. seal			
Temp. of working medium	80°C maximum. For higher temperature, please use impulse tubing/chemical seals.		
Switching element	SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office		

Accessories can be supplied with most of the switches. Please consult sales office.

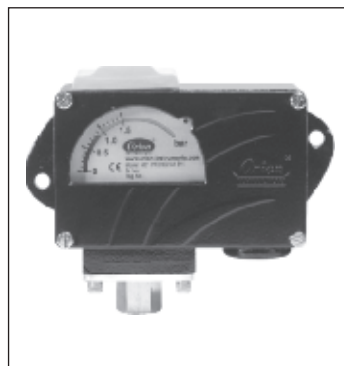
## Product Selection Guide



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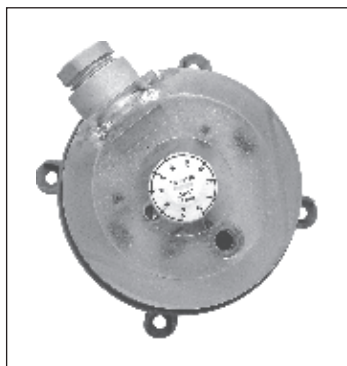
Page No. 316

MZ__A	MD		MD__A	Model
OEM (High Pr.)	OEM (High Pr.)		OEM (High Pr.)	Switch type
Fixed	Fixed			Differential type
Various	± 2			Repeatability (% FSR)
1.5 psi to 350 psi	0.1 bar to 25.0 bar		1.5 psi to 350 psi	Range covered
IP 66				Enclosure Protection
Tough transparent polycarbonate	Die-cast aluminium			Enclosure Standard Optional
Diaphragm nylon reinforced neoprene diaphragm teflon				sensing element Standard Optional
SS 316				Pressure housing Standard Optional
Teflon, SS316				Other Wetted Parts
				Optional wetted parts through chem. seal
80°C maximum. For higher temperature, please use impulse tubing/chemical seals.				Temp. of working medium
SPDT Snap action switch A8 : General purpose rated at 5A, 250 VAC, 0.2 A, 250 VDC resistive. For other switching elements please contact sales office			Maximum 1.0 A (.4A) / 250 VAC	Switching element

WETTED PARTS

Accessories can be supplied with most of the switches. Please consult sales office.

## Product Selection Guide



Page No. 318



Page No. 320

Model		CF	CS12
Switch type		OEM (Ultra-low Range)	OEM
Differential type		Adjustable	Adjustable
Repeatability (% FSR)			
Range covered		20 Pa to 4000 Pa	2 bar to 12 bar
Enclosure Protection		IP 54	IP44
Enclosure Standard Optional		Body of PA 6.6 and Cover of PS	Non-metallic cover
sensing element Standard Optional			Nitrile rubber
Pressure housing Standard Optional		Industrial Plastic	Mild Steel
Other Wetted Parts			
Optional wetted parts through chem. seal			
Temp. of working medium		80°C maximum	
Switching element		Maximum 1.0 A (.4A) / 250 VAC	16 Amp, 500 VAC

Accessories can be supplied with most of the switches. Please consult sales office.

# Subminiature Switches



Pressure Ranges from 0.1 bar to 25 bar

Please refer page no. 300 for Subminiature Switch details

# SC SUBMINIATURE SWITCHES



## General information:

SC series subminiature pressure switches are low cost options. They are generally used where size is a constraint. Typical applications are to sense oil pressure in power packs. Can also be used for several automation applications.

## Features:

- Compact
- Lightweight (Approx. 0.13 Kg.)
- Normally closed (NC) or normally open (NO)
- Electrical rating: 5A, 250VAC; 0.2A, 250 VDC (res.)
- Switching point easy to adjust
- Body material : Aluminium
- Wetted parts : MS/SS, Neoprene, SS316L, Teflon
- Pressure port : 1/4" BSP(M), other sizes available

## Range Selection Table

Range Code	Range bar (psi)	Differential bar (psi)	Maximum Working Pressure bar (psi)
H01	0.1 - 1.0 (1.45 - 14.50)	0.2 (2.9)	35 (507.6)
H10	0.5 - 10.0 (7.14 - 142.86)	0.5 (7.25)	35 (507.6)
H30	2.0 - 25.0 (29.00 - 362.6)	1.5 (21.76)	35 (507.6)

## How to order SC Series Subminiature Switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non Standard Allocation	Model	Terminal Type	Switch Type	Range Code	Operating Type	Pressure Port Material / Size	Diaphragm
<input type="checkbox"/> Reserved for non-standard options not mentioned in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	<b>SC</b> = Subminiature Type	<b>1</b> = Plug Type	<b>PFO</b> = Pressure Switch Fixed Differential	<b>H01</b> = (0.1 - 1.0) <b>H10</b> = (0.5 - 10.0) <b>H30</b> = (2.0 - 25.0)	<b>A1</b> = With Silver Contact <b>NC</b> <b>A2</b> = With Silver Contact <b>NO</b> <b>A3</b> = With Silver Contact <b>SPDT</b>	<b>M3</b> = Mild Steel / 1/4" BSPM <b>S3</b> = SS316L / 1/4" BSPM	<b>0</b> = Neoprene <b>1</b> = Teflon

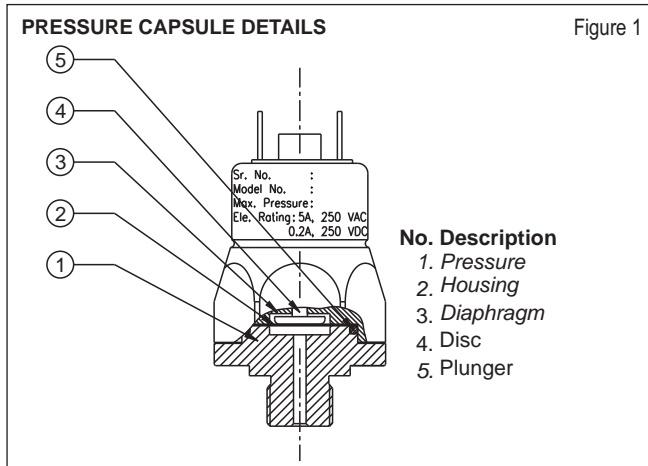
e.g.: A single subminiature switch, high pressure range from 0.1 - 1.0 bar in uncalibrated style with mild steel pressure port & a neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
<input type="checkbox"/>	SC	1	PFO	H01	A1	M3	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, switches with standard wetted parts will be supplied.

## Construction :

The pressure switch is housed in a diecast aluminium enclosure. The pressure capsule, at the bottom of the switch, comprises a pressure housing (either M.S. Or S.S.), a disc, a diaphragm (Neoprene, Teflon or SS316L) and a plunger. This is a plug type switch with NO (Normally Open) or NC (Normally Closed) contacts. The electrical terminations are standard Push On type. Figure 1.



## Principle of Operation :

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

## Materials of Construction :

Housing : Die-Cast Aluminium

Diaphragm : Neoprene / Teflon / SS316L

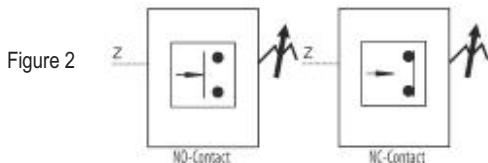
## Mounting :

- The SC series subminiature switches have stem type mounting and can be mounted in any direction.
- The pressure port size is generally 1/4" BSP(M), unless specifically ordered otherwise. Other sizes can be obtained via adaptors for small quantities. For larger quantities, customized thread ends can be provided.

**CAUTION :** Tightening torque should not exceed by 4kg-m.

## Electrical Connections :

These pressure switches will generally have NO (Normally Open) or NC (Normally Closed) contact terminals. Figure. 2.



## Wiring :

Connect the wires to the contact terminals as per your wiring diagram.

## Set Point Adjustment :

- The switching point can be easily adjusted by turning the setting screw located in between the contacts. Figure. 3.
- Apply the desired cutin (lower) / cutout (higher) pressure to the pressure switch.
- Increase the pressure setting by turning the setting screw till contacts changeover.
- 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.

**Tip :** The pressure switches are factory set at half the set point range (unless otherwise specified in a Purchase Order).

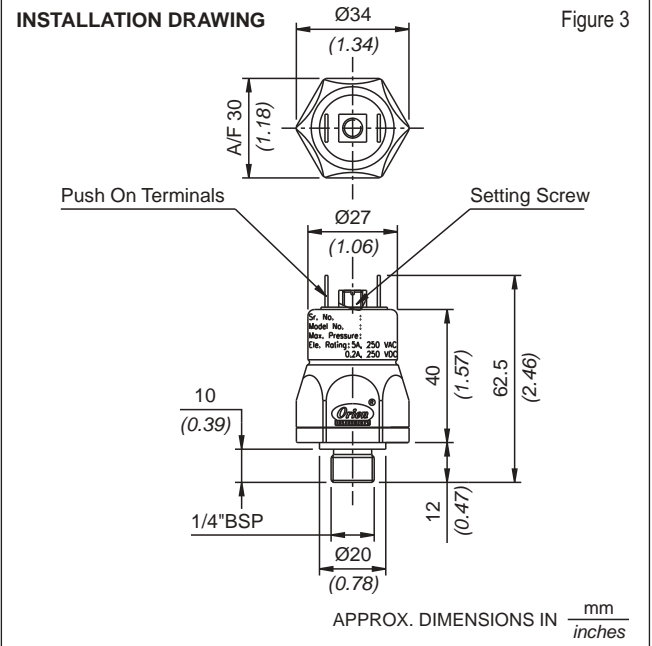
## Trouble Shooting Tips

Generally no problems are observed if the pressure switch selection, wiring and the setpoint is proper. For a pressure switch selection procedure please consult our sales office.

For properly selected pressure switches, if following symptoms are observed, the likely causes and remedies are as stated below:

### Symptom 1: Switch does not operate

- Check if the NO and NC contacts operate properly.
- Pressure does not reach the pressure port.

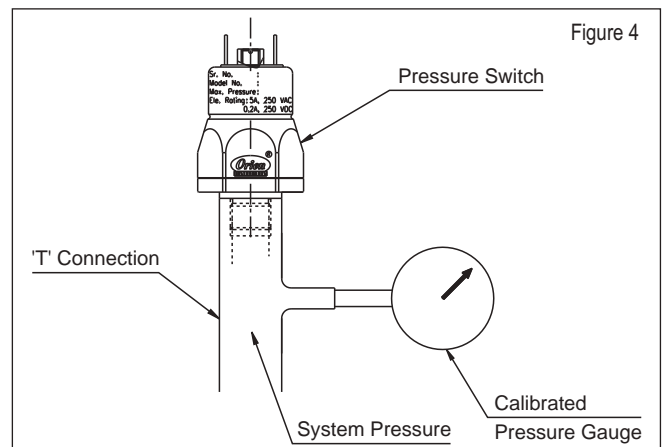


- Check if the entry to the pressure capsule is not blocked by frozen process or scales or impurities in the process.
  - If this is the case, try freeing the blocked path by a blunt tool in case of scales or impurities in the process.

### DO NOT OPEN THE PRESSURE CAPSULE IN ANY EVENT

If the cause is none of the above mentioned probabilities, proceed as per the following steps.

- Check the system pressure and 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 or exceeding the cutout point.
  - Use 'T' connection and connect calibrated pressure gauge to the 'T' connection as shown in Figure 4.
  - Adjust the setpoint such that the system pressure is greater than the cut-out point of the pressure switch.



### Symptom 2 : Leakage

In case leakage is observed, pictures of pressure switch with wetted parts clearly visible, be mailed to [service@orion-instruments.com](mailto:service@orion-instruments.com). Please ensure to include a picture showing model no. and serial no. of the switch. Check for the following likely causes and use a new switch taking proper precautions.

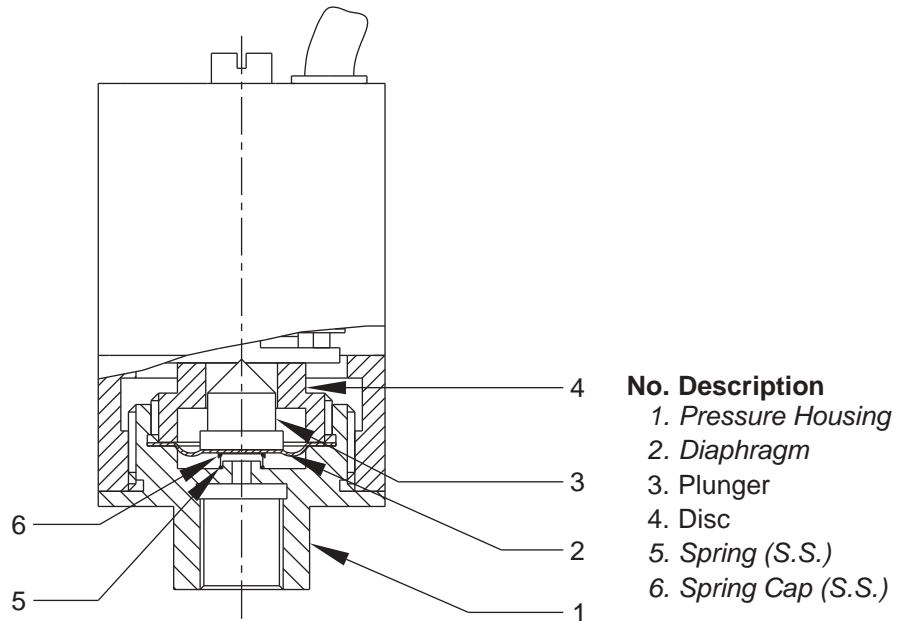
- System pressure is greater than working pressure : Use an overrange protector or a switch with greater maximum working pressure.
- Incompatible wetted parts : The working medium may not be compatible with wetted parts, which damages the sealing of the process from working parts. Please choose proper compatible wetted parts.
- Excessive process temperature : Process temperature may exceed maximum allowable temperature, which in turn damages the diaphragms. Use an impulse tube to cool down process temperature.



# SM OEM HIGH RANGE PRESSURE SWITCHES

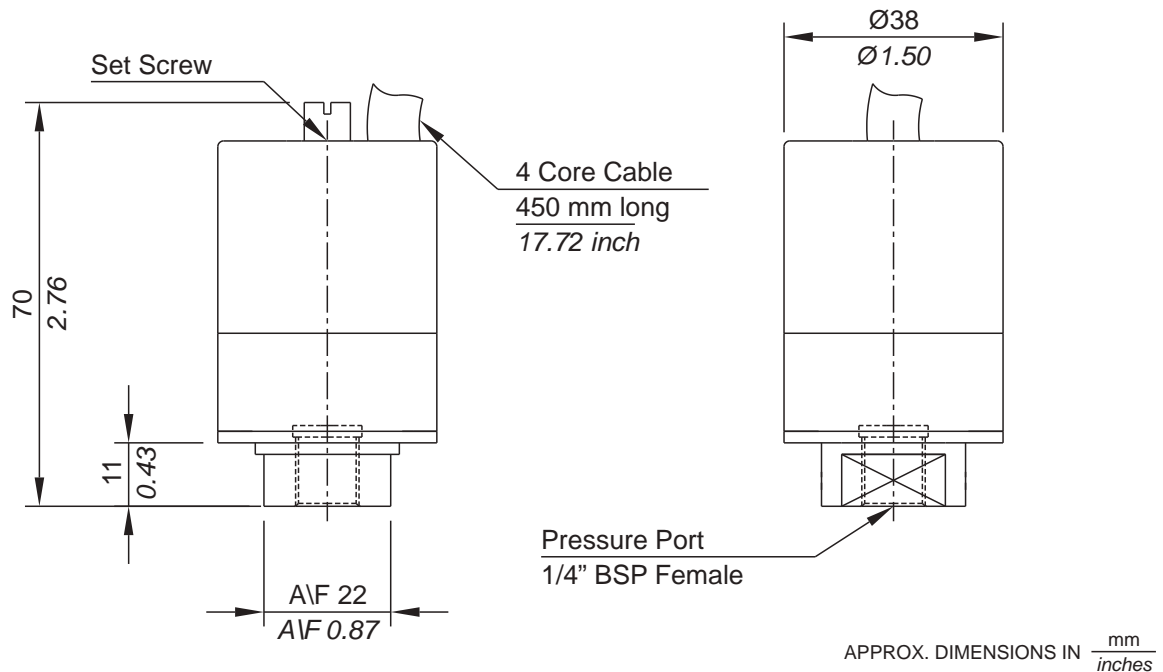


## PRESSURE CAPSULE DETAILS



Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# OEM HIGH RANGE PRESSURE SWITCHES

# SM

## General information:

SM series pressure switches have a cast aluminium enclosure, intended for inhouse use. These are generally used where size is a constraint. The repeat accuracy is better than  $\pm 2\%$  FSR. A core cable 450 mm long with C/NO/NC contacts is provided for wiring. Pressure port is  $\frac{1}{4}$ " BSPF standard.

## Features:

- Compact
- Lightweight
- Electrical rating : 5A, 250VAC; 0.2A, 250 VDC(res.)
- Choice of wetted parts to suit working media
- Proof pressure available can be 4 times MWP (optional)
- Pressure port :  $\frac{1}{4}$ " BSPF

## Range Selection Table

Range Code	Range (rising pressure) bar (psi)	*Approximate Maximum Differential (fixed) bar (psi)	Maximum Working Pressure bar (psi)
H01	0.2 - 1.0 (2.90 - 14.50)	0.2 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.3 (4.35)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.52)	0.3 (4.35)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.53)	0.5 (7.25)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	1.0 (14.50)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.56)	1.5 (21.76)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	2.50 (36.26)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

## How to order SM Series High Range Pressure Switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
SM - Fixed Differential Pressure switch	H - High range pressure switch	U - Uncalibrated	A - Aluminium B - Brass S - SS316	0 - Neoprene 1 - Teflon	0 - IP 54 as per IS 2147

eg. A single pressure switch, high pressure range from 0.1-1.0 bar in uncalibrated style with brass pressure housing & a teflon diaphragm in a standard enclosure shall be specified by

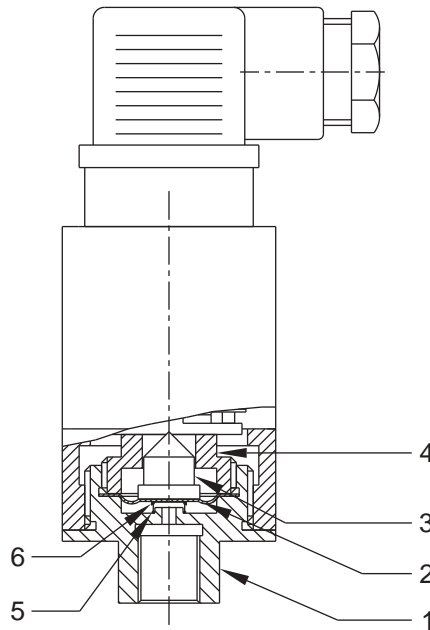
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
SM	H01	U	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, switches with standard wetted parts will be supplied.

# SA OEM HIGH RANGE PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS

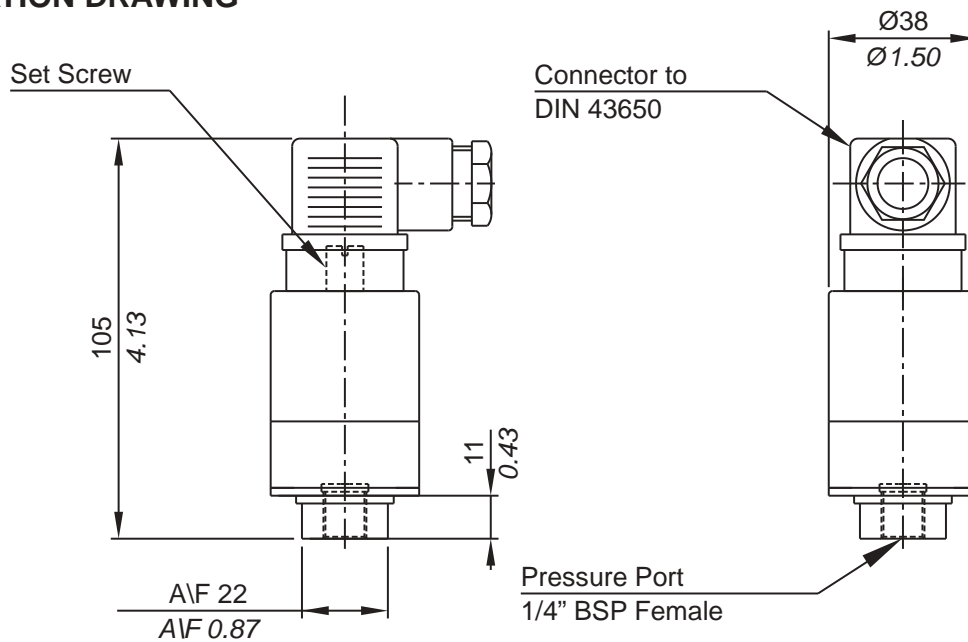


### No. Description

1. Pressure Housing
2. Diaphragm
3. Plunger
4. Disc
5. Spring (S.S.)
6. Spring Cap (S.S.)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# OEM HIGH RANGE PRESSURE SWITCHES

# SA

## General information:

SA series (a variant of SM series) pressure switches have a cast aluminium enclosure, intended for inhouse use. These are generally used where size is a constraint. The repeat accuracy is better than  $\pm 2\%$  FSR. A connector to DIN 43650 is provided for wiring. Pressure port is 1/4" BSPF standard.

## Features:

- Compact
- Lightweight
- Electrical rating : 5A, 250 VAC; 0.2 A, 250 VDC (res.)
- Choice of wetted parts to suit working media
- Proof pressure available can be 4 times MWP (optional)
- Pressure port: 1/4 " BSPF

## Range Selection Table

Range Code	Range (rising pressure) bar (psi)	*Approximate Maximum Differential (fixed) bar (psi)	Maximum Working Pressure bar (psi)
H01	0.2 - 1.0 (2.90 - 14.50)	0.2 (2.90)	12 (174.05)
H03	0.2 - 2.6 (2.90 - 37.71)	0.3 (4.35)	12 (174.05)
H04	0.2 - 3.6 (2.90 - 52.21)	0.3 (4.35)	12 (174.05)
H07	0.5 - 7.0 (7.25 - 101.53)	0.5 (7.25)	12 (174.05)
H10	0.5 - 10.0 (7.25 - 145.04)	1.0 (14.50)	25 (362.6)
H15	1.0 - 15.0 (14.50 - 217.76)	1.5 (21.76)	25 (362.6)
H30	5.0 - 25.0 (72.52 - 362.6)	2.50 (36.26)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

## How to order SA high range pressure switches

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Model	Range Code	Range Scale	Pressure Housing	Diaphragm	Enclosure
SA - Fixed Differential Pressure switch	H - High range pressure Switch	U - Uncalibrated	A - Aluminium B - Brass S - SS316	0 - Neoprene 1 - Teflon	0 - IP 65 as per IS 2147

eg. A single pressure switch, high pressure range from 0.2 - 2.6 bar in uncalibrated style with brass pressure housing & a teflon diaphragm in a standard enclosure shall be specified by

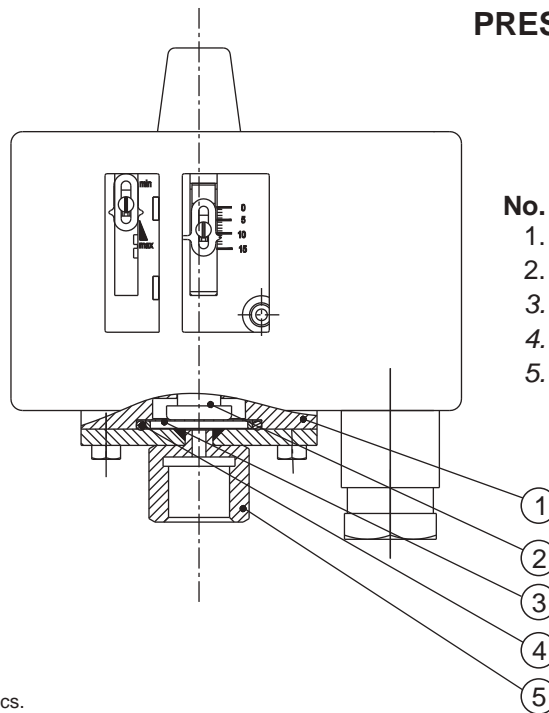
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
SA	H03	U	B	1	0

Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, switches with standard wetted parts will be supplied.

# EZ / EX OEM HIGH RANGE PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS

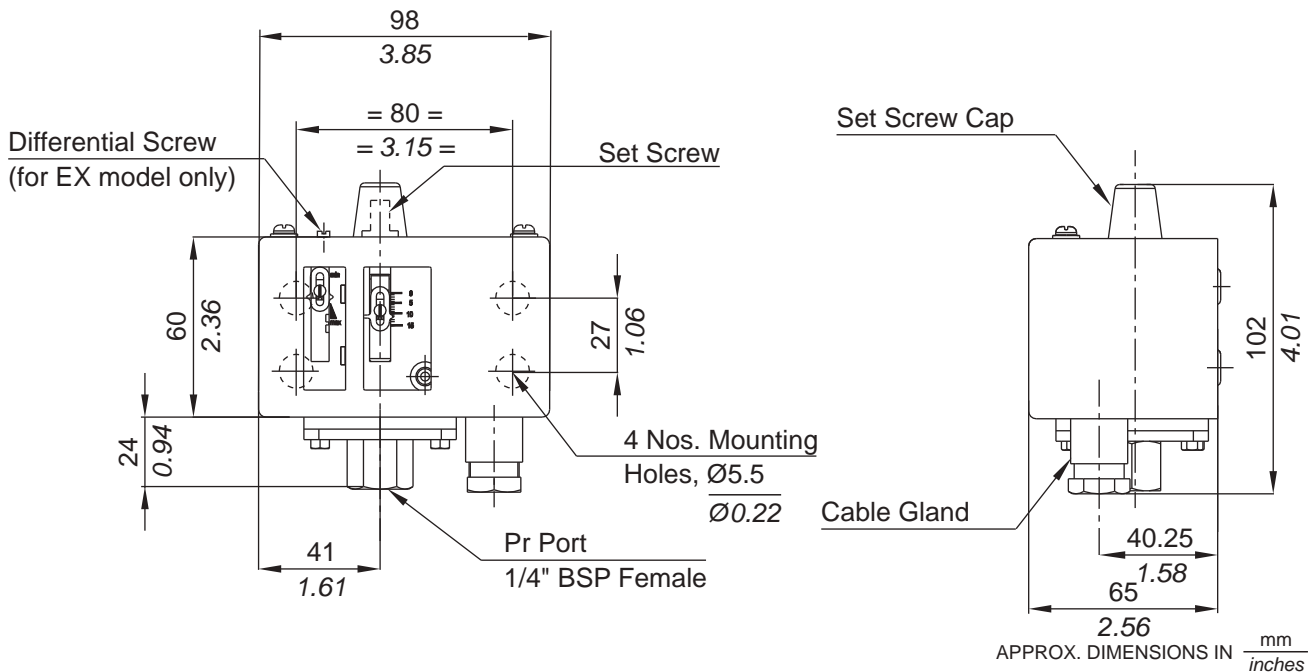


### No. Description

1. Disc
2. Plunger
3. Diaphragm (Teflon)
4. O ring (Teflon)
5. Pressure Housing (SS 316)

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



# OEM HIGH RANGE PRESSURE SWITCHES

# EZ / EX

## General information:

EZ /EX series pressure switches are housed in pressed steel powder coated enclosure and are recommended for panel mounting or indoor service. The repeat accuracy is better than  $\pm 1.5\%$  FSR. A 3/8" cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure port is 1/4" BSPF standard.

## Features:

- Compact
- SS316 & Teflon as standard wetted parts
- Electrical rating : 5A, 250 VAC; 0.2 A, 250VDC (res.)
- Pressure port: 1/4" BSPF

**Range Selection Table**

Model Code	† Range bar (psi)	*Approximate Maximum Differential bar (psi)	* Adjustable Differential bar (psi)	Maximum Working Pressure bar (psi)
EZ4	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	-	12 (174.05)
EZ7	0.5 - 7.0 (7.25 - 101.52)	0.40 (5.80)	-	12 (174.05)
EZ15	1.0 - 15.0 (14.50 - 217.71)	0.60 (8.70)	-	25 (362.6)
EZ30	5.0 - 25.0 (72.52 - 362.6)	1.00 (14.50)	-	35 (507.63)
EX7	0.5 - 7.0 (7.25 - 101.52)	-	0.8 - 6.0 (11.60 - 87.02)	12 (174.05)
EX15	1.0 - 15.0 (14.50 - 217.71)	-	1.5 - 10.0 (21.76 - 145.04)	25 (362.6)
EX30	5.0 - 25.0 (72.52 - 362.6)	-	2.5 - 10.0 (36.26 - 145.04)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

† rising pressure for EZ series; falling pressure for EX series

## HOW TO ORDER EZ/EX OEM HIGH RANGE PRESSURE SWITCHES

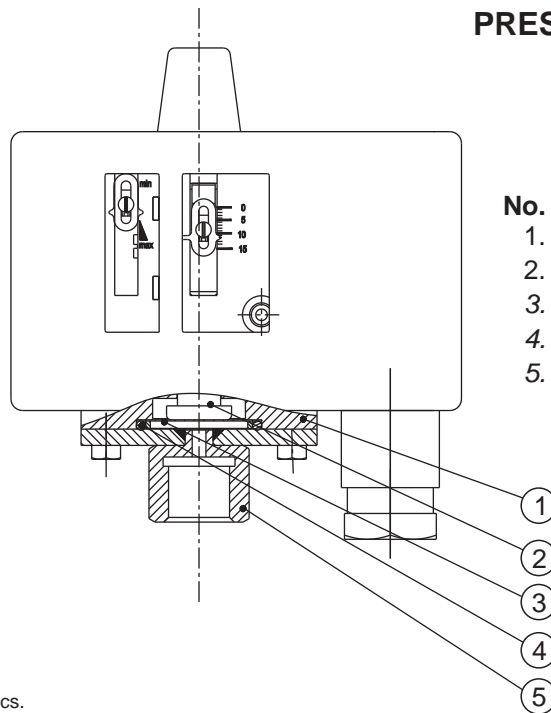
Please specify model code as per range selection table above.

# EZ\_\_A / EX\_\_A

## OEM HIGH RANGE PRESSURE SWITCHES



### PRESSURE CAPSULE DETAILS

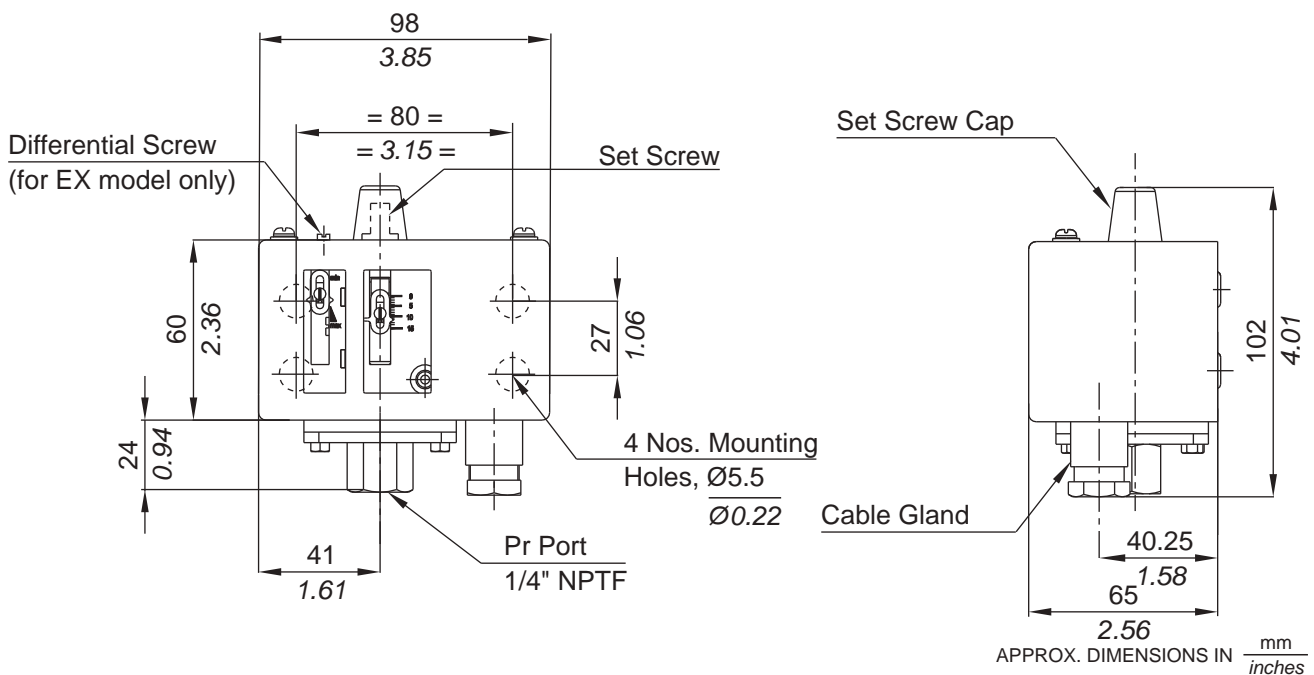


#### No. Description

1. Disc
2. Plunger
3. Diaphragm (Teflon)
4. O ring (Teflon)
5. Pressure Housing (SS 316)

Note : *wetted parts* are mentioned in italics.

### INSTALLATION DRAWING



## OEM HIGH RANGE PRESSURE SWITCHES

# EZ\_\_A / EX\_\_A

### General information:

EZ /EX series pressure switches are housed in pressed steel powder coated enclosure and are recommended for panel mounting or indoor service. The repeat accuracy is better than  $\pm 1.5\%$  FSR. A 3/8" BSP cable entry is provided for cables and a terminal strip suitable for wired ends is provided inside the enclosure. Pressure port is 1/4" NPTF standard.

### Features:

- Compact
- SS316 & Teflon as standard wetted parts
- Electrical rating : 5A, 250 VAC; 0.2 A, 250VDC (res.)
- Pressure port: 1/4" NPTF

**Range Selection Table**

Model Code	† Range psi	*Approximate Maximum Differential psi	* Adjustable Differential psi	Maximum Working Pressure psi
EZ4A	3.0 - 50.0	3.0	-	200.0
EZ7A	7.0 - 100.0	6.0	-	200.0
EZ15A	15.0 - 200.0	6.0	-	350.0
EZ30A	70.0 - 350.0	6.0	-	500.0
EX7A	7.0 - 100.0	-	10.0 - 90.0	200.0
EX15A	15.0 - 200.0	-	20.0 - 150.0	350.0
EX30A	70.0 - 350.0	-	40.0 - 150.0	500.0

\*Minimum differential increases with setpoint (Graphs available on request)

† rising pressure for EZ series; falling pressure for EX series

## HOW TO ORDER EZ\_\_A/EX\_\_A OEM HIGH RANGE PRESSURE SWITCHES

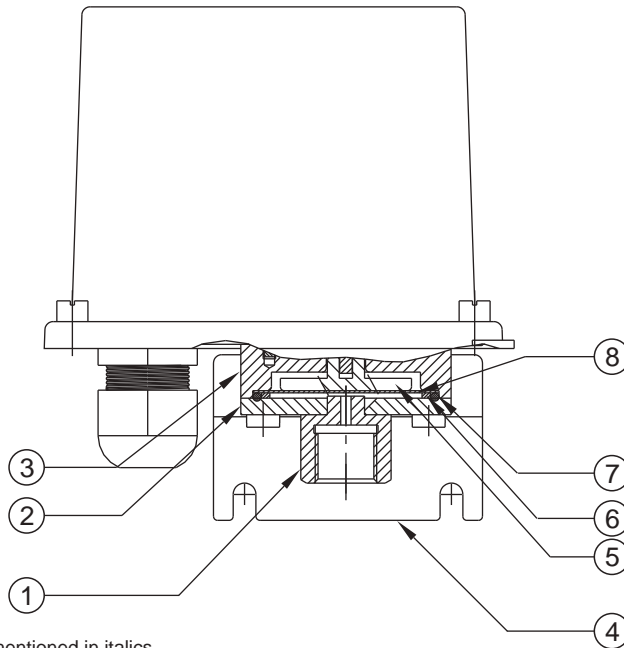
Please specify model code as per range selection table above.



# MZ / MX OEM HIGH RANGE PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS

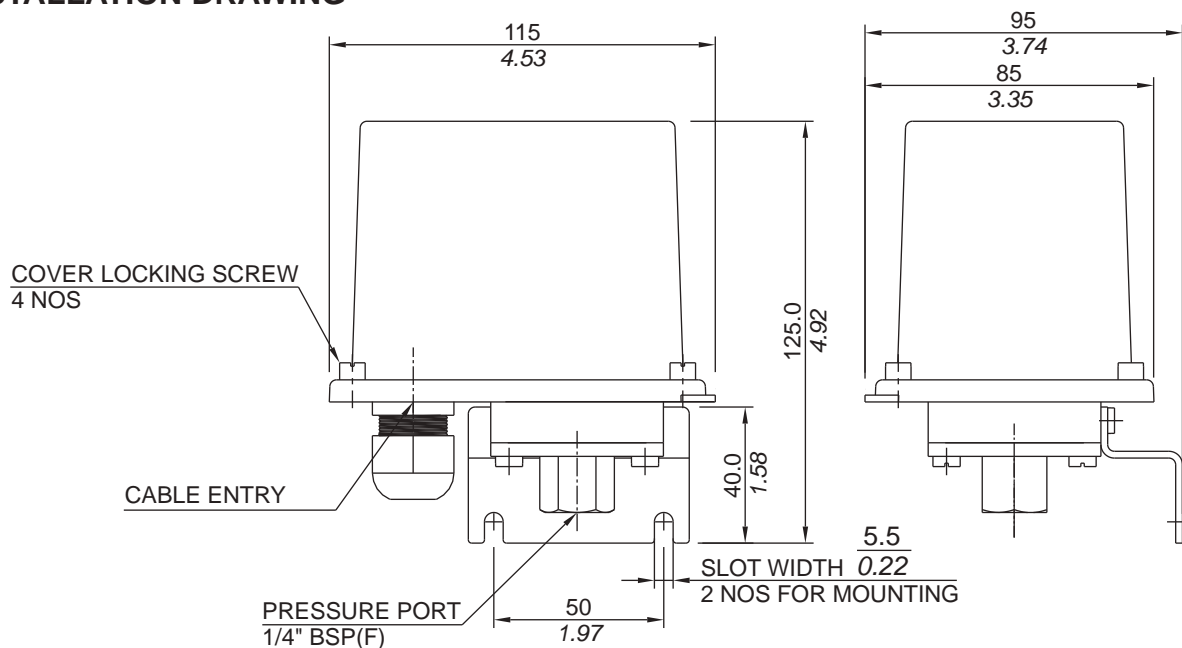


### No. Description

1. *Pressure Port (SS316)*
2. *Housing Plate (SS316)*
3. *Disc*
4. *Mounting Bracket*
5. *Plunger*
6. *Ring (SS316)*
7. *O-Ring (Teflon®)*
8. *Diaphragm (Teflon®)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

# OEM HIGH RANGE PRESSURE SWITCHES MZ / MX

Range Selection Table

Model Code	† Range bar (psi)	*Approximate Maximum Differential bar (psi)	* Adjustable Differential bar (psi)	Maximum Working Pressure bar (psi)
MZ-1	0.1 - 1.0 (1.45 - 14.50)	0.15 (2.18)	-	12 (174.05)
MZ-4	0.2 - 3.6 (2.90 - 52.21)	0.15 (2.18)	-	12 (174.05)
MZ-7	0.5 - 7.0 (7.25 - 101.52)	0.15 (2.18)	-	12 (174.05)
MZ-10	0.5 - 10.0 (7.25 - 145.04)	0.8 (11.60)	-	25 (362.6)
MZ-15	1.0 - 15.0 (14.50 - 217.71)	1.5 (21.76)	-	25 (362.6)
MZ-30	5.0 - 25.0 (72.52 - 362.6)	1.5 (21.76)	-	35 (507.63)
MX-7	0.5 - 7.0 (7.25 - 101.52)	-	0.8 - 2.0 (11.60 - 29.00)	12 (174.05)
MX-10	0.5 - 10.0 (7.25 - 145.04)	-	0.8 - 2.0 (11.60 - 29.00)	25 (362.6)
MX-15	1.0 - 15.0 (14.50 - 217.71)	-	1.0 - 2.0 (14.50 - 29.00)	25 (362.6)
MX-30	5.0 - 25.0 (72.52 - 362.6)	-	1.5 - 2.5 (21.76 - 36.26)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

†Rising pressure for MZ series

†Falling pressure for MX series

## SPECIFICATIONS :

<b>Range</b>	: As per model code
<b>Electrical rating</b>	: 15 Amp, 250 VAC, SPDT snapaction microswitch
<b>Enclosure<sup>#</sup></b>	: IP66 standard, transparent tough polycarbonate cover
<b>Wetted parts</b>	: SS 316 & Teflon
<b>Pressure port</b>	: 1/4" BSPF standard
<b>Cable gland</b>	: M20 x 1.5 standard (polyamide)
<b>Maximum temperature of working medium</b>	: 80° C maximum. Please use impulse tubing for higher temperatures

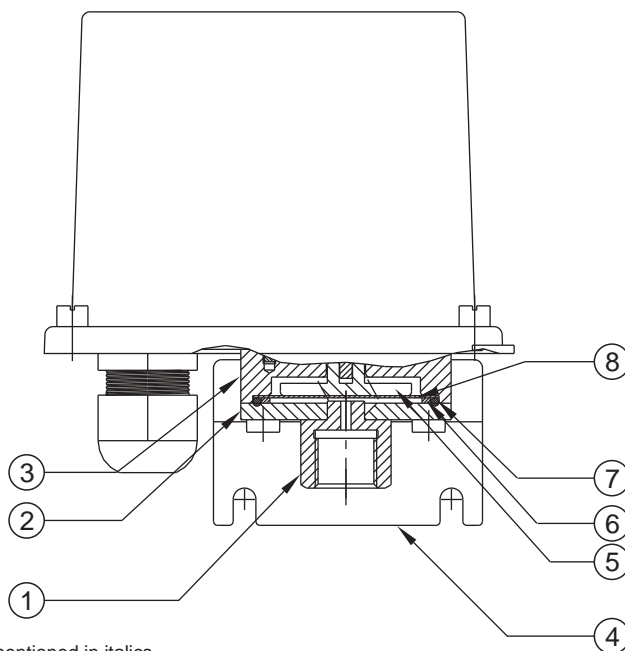
# - IP66 is approximately equivalent to NEMA 4X

## HOW TO ORDER MZ/MX SERIES OEM PRESSURE SWITCHES

Please select model code from Range Selection table



## PRESSURE CAPSULE DETAILS

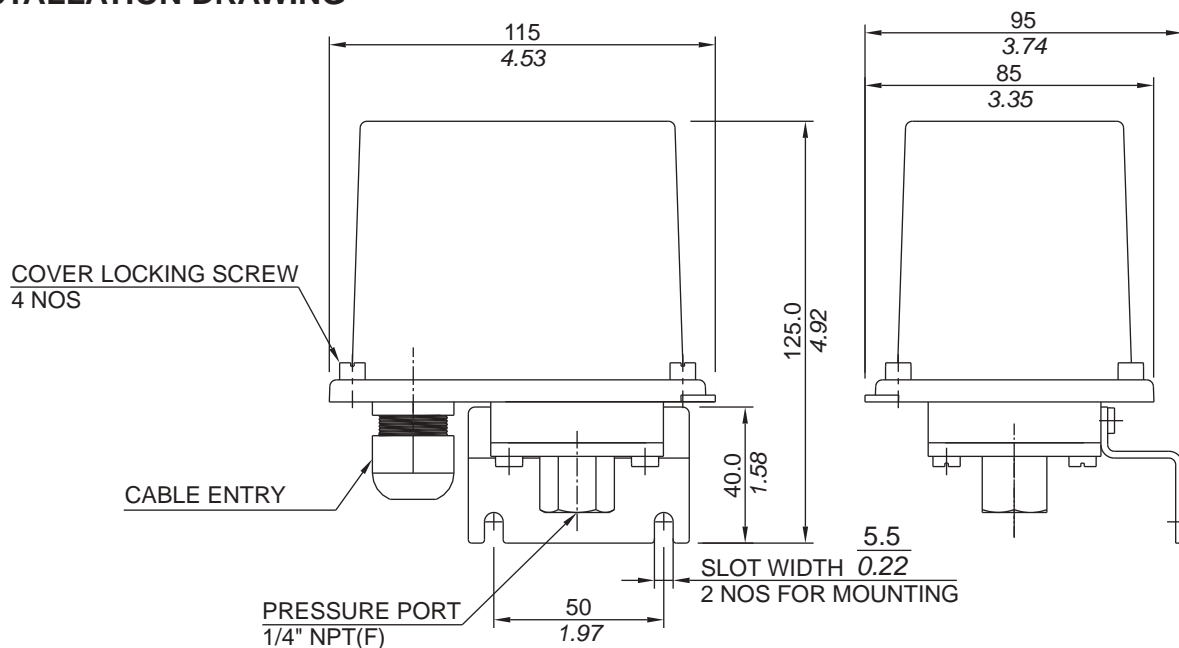


### No. Description

1. *Pressure Port (SS316)*
2. *Housing Plate (SS316)*
3. Disc
4. Mounting Bracket
5. Plunger
6. *Ring (SS316)*
7. *O-Ring (Teflon®)*
8. *Diaphragm (Teflon®)*

Note : *wetted parts* are mentioned in italics.

## INSTALLATION DRAWING



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

## RANGE SELECTION TABLE

Model Code	Range † psi	*Approximate Maximum Differential psi	Maximum Working Pressure psi
MZ-1A	1.5-15.0	2.0	200
MZ-4A	3.0-50.0	3.0	200
MZ-7A	7.0-100.0	6.0	200
MZ-10A	7.0-150.0	12.0	350
MZ-15A	15.0-200.0	20.0	350
MZ-30A	70.0-350.0	20.0	500

\*Minimum differential increases with setpoint (Graphs available on request)

†Rising pressure for MZ series

## SPECIFICATIONS :

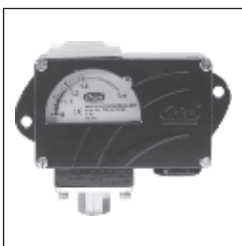
<b>Range</b>	: As per model code
<b>Electrical rating</b>	: 15 Amp, 250 VAC, SPDT snapaction microswitch
<b>Enclosure<sup>#</sup></b>	: IP66 standard, transparent tough polycarbonate cover
<b>Wetted parts</b>	: SS 316 & Teflon
<b>Pressure port</b>	: 1/4" NPTF standard
<b>Cable gland</b>	: M20 x 1.5 standard (polyamide)
<b>Maximum temperature of working medium</b>	: 80° C maximum. Please use impulse tubing for higher temperatures

# - IP66 is approximately equivalent to NEMA 4X

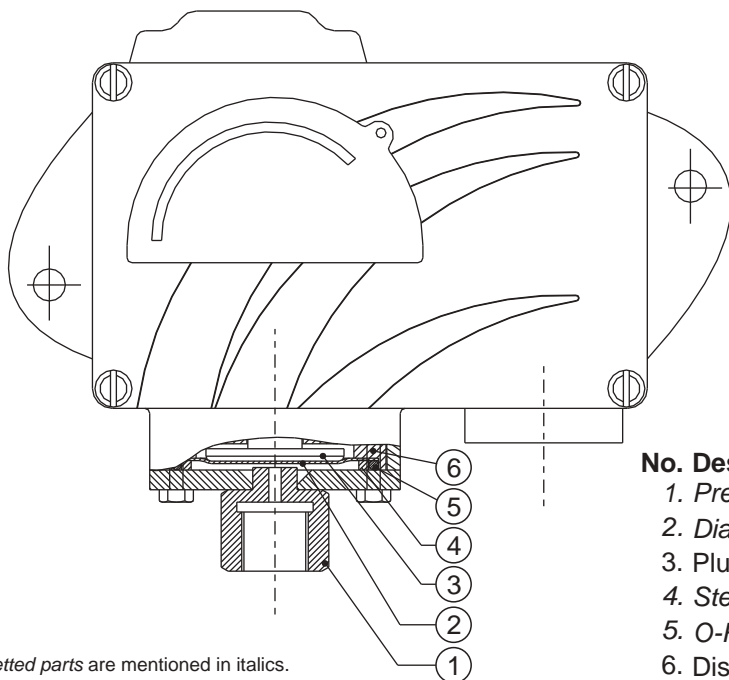
## HOW TO ORDER MZ\_\_A SERIES OEM PRESSURE SWITCHES

Please select model code from Range Selection table

# MD OEM HIGH RANGE PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS

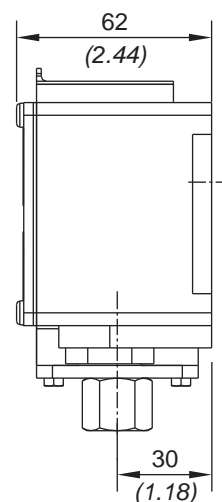
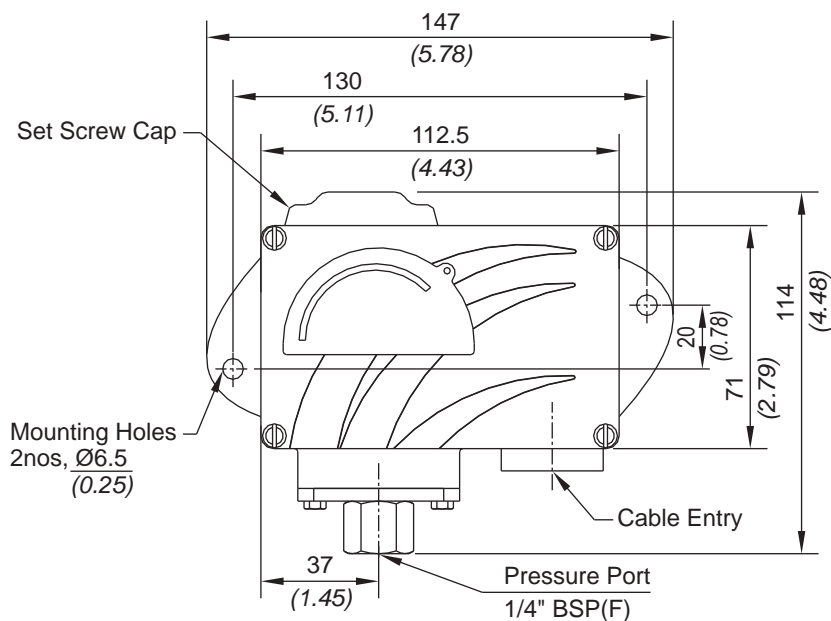


Note : *wetted parts* are mentioned in italics.

### No. Description

1. *Pressure Housing*
2. *Diaphragm (Teflon®)*
3. *Plunger*
4. *Steel Ring (SS316)*
5. *O-Ring (Teflon®)*
6. *Disc*

## INSTALLATION DRAWING



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

## RANGE SELECTION TABLE

Model Code	Range † bar (psi)	*Approximate Maximum Differential bar (psi)	Maximum Working Pressure bar (psi)
MD-1	0.1 - 1.0 (1.45 - 14.50)	0.10 (1.45)	12 (174.05)
MD-4	0.2 - 3.6 (2.90 - 52.21)	0.20 (2.90)	12 (174.05)
MD-7	0.5 - 7.0 (7.25 - 101.52)	0.40 (5.80)	12 (174.05)
MD-10	0.5 - 10.0 (7.25 - 145.04)	0.40 (5.80)	25 (362.6)
MD-15	1.0 - 15.0 (14.50 - 217.71)	0.80 (11.60)	25 (362.6)
MD-30	5.0 - 25.0 (72.52 - 362.6)	0.80 (11.60)	35 (507.63)

\*Minimum differential increases with setpoint (Graphs available on request)

†Rising pressure for MD series

## SPECIFICATIONS :

<b>Range</b>	: As per model code
<b>Electrical rating</b>	: 15 Amp, 250 VAC, SPDT snapaction microswitch
<b>Enclosure<sup>#</sup></b>	: IP66 standard, pressure die-cast aluminium, black powder coated
<b>Wetted parts</b>	: SS 316 & Teflon
<b>Pressure port</b>	: 1/4" BSPF standard
<b>Electrical Conduit</b>	: 1/2" NPT standard
<b>Maximum temperature of working medium</b>	: 80° C maximum. Please use impulse tubing for higher temperatures

# - IP66 is approximately equivalent to NEMA 4X

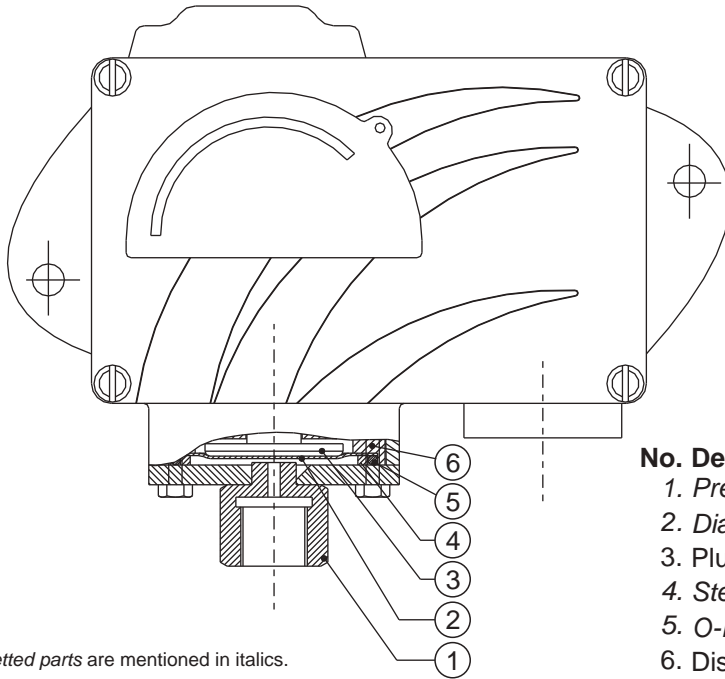
## HOW TO ORDER MD SERIES OEM PRESSURE SWITCHES

Please select model code from Range Selection table

# MD\_\_A OEM HIGH RANGE PRESSURE SWITCHES



## PRESSURE CAPSULE DETAILS

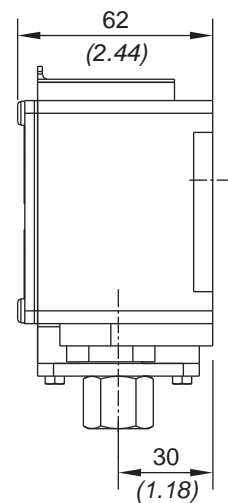
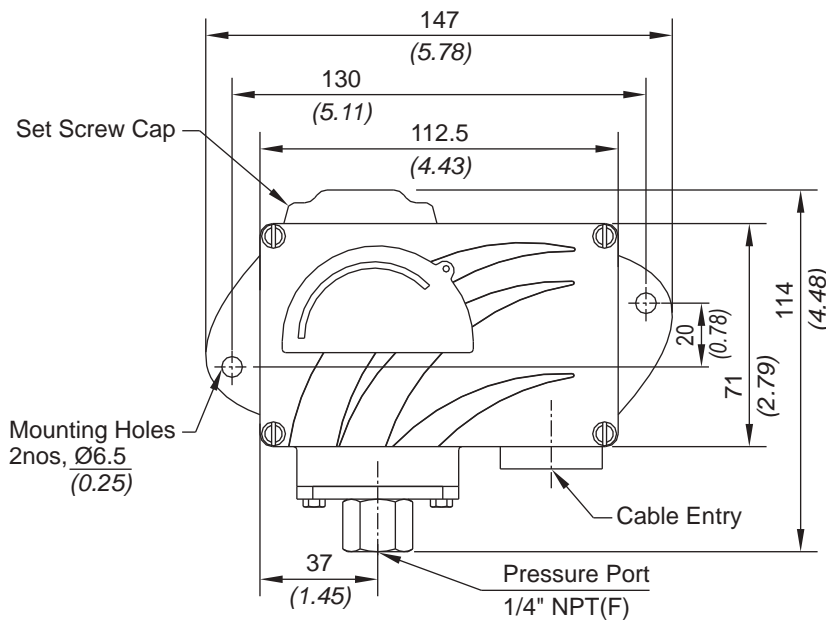


Note : *wetted parts* are mentioned in italics.

### No. Description

1. *Pressure Housing*
2. *Diaphragm (Teflon®)*
3. Plunger
4. *Steel Ring (SS316)*
5. *O-Ring (Teflon®)*
6. Disc

## INSTALLATION DRAWING



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

# OEM HIGH RANGE PRESSURE SWITCHES MD\_\_A

## RANGE SELECTION TABLE

Model Code	Range † psi	*Approximate Maximum Differential psi	Maximum Working Pressure psi
MD-1A	1.5 - 15	1.5	200
MD-4A	3.0 - 50.0	3.0	200
MD-7A	7.0 - 100.0	6.0	200
MD-10A	7.0 - 150.0	6.0	350
MD-15A	15.0 - 200.00	12.0	350
MD-30A	70.0 - 350.0	12.0	500

\*Minimum differential increases with setpoint (Graphs available on request)

†Rising pressure for MD series

## SPECIFICATIONS :

<b>Range</b>	: As per model code
<b>Electrical rating</b>	: 15 Amp, 250 VAC, SPDT snapaction microswitch
<b>Enclosure<sup>#</sup></b>	: IP66 standard, pressure die-cast aluminium, black powder coated
<b>Wetted parts</b>	: SS 316 & Teflon
<b>Pressure port</b>	: 1/4" NPTF standard
<b>Electrical Conduit</b>	: 1/2" NPT standard
<b>Maximum temperature of working medium</b>	: 80° C maximum. Please use impulse tubing for higher temperatures

# - IP66 is approximately equivalent to NEMA 4X

## HOW TO ORDER MD\_\_A SERIES OEM PRESSURE SWITCHES

Please select model code from Range Selection table



# CF ULTRA LOW RANGE PRESSURE DIFFERENCE SWITCHES

## Ultra Low Range Pressure Difference Switches with User Adjustable Knob

### Salient Features

#### Easy to See, Easy to Use!

Set Point easily user adjustable with visible scale in Pascal. (no need of pressure gauge).

Differential easily adjustable with just a screwdriver

#### Light Weight!

150 gms

#### Flexible!

Direction of PG 11 cable entry can be rotated in steps of 120°

#### Long Lasting!

10<sup>6</sup> switching operations

#### More Options!

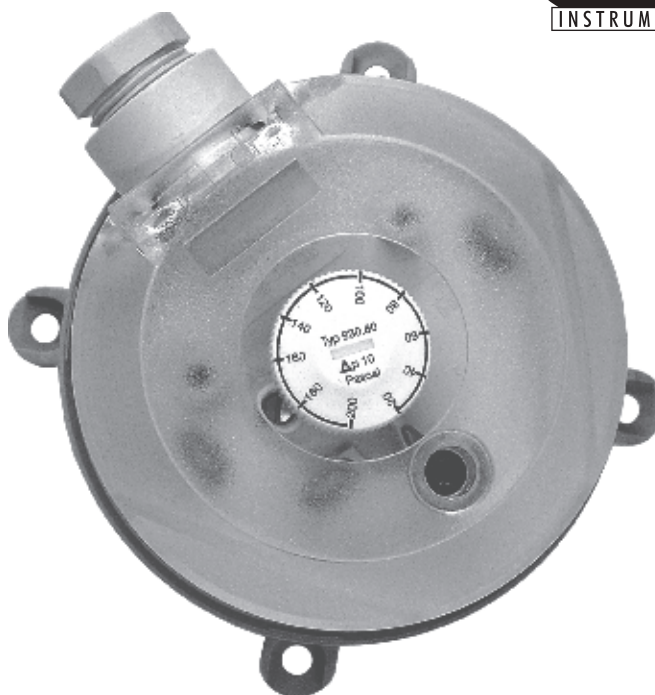
Available in a wide range

#### Trusted all over!

Tested and proven

### Technical Specifications

- Media - Air, non-flammable gases and non-aggressiv gases.
- Housing Material - Body of PA 6.6 and Cover of PS
- Protection category - IP54 with cover.
- Maximum working pressure - 10 Kpa / 1019.74 mm wg.
- Electrical Rating - Maximum 1.0A (.4 A) / 250 VAC.
- Electrical Connection - AMP flat plug 6.3 mm x 0.8 mm in accordance with DIN 462244.
- Cable Entry - PG11
- Mounting Lugs - integrated in bottom Housing.
- High Pressure and Low Pressure port of Outer Diameter 6 mm.



Range Selection Table

Range Code (Orion)	Adjustment range for upper switching pressure Pa (mm wg)	Switching differential set to Pa (mm wg)
CF80	20 ~ 200 (2.039 ~ 20.395)	10 (1.020)
CF81	40 ~ 100 (4.079 ~ 10.197)	20 (2.039)
CF82	40 ~ 200 (4.0479 ~ 20.395)	20 (2.039)
CF83	50 ~ 500 (5.099 ~ 50.987)	20 (2.039)
CF85	200 ~ 1000 (20.395 ~ 101.974)	100 (10.197)
CF86	500 ~ 2500 (50.987 ~ 254.935)	150 (15.296)
CF87	1000 ~ 4000 (101.974 ~ 407.896)	250 (25.494)

### How to order CF series Low Range Pressure Difference Switches

Please specify the Range Code eg. CF82 or CF85

## INSTALLATION AND OPERATING INSTRUCTIONS

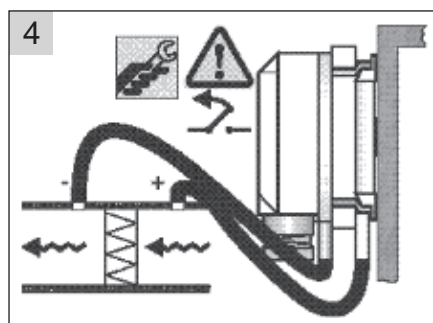
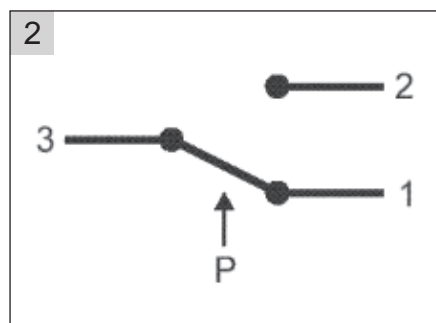
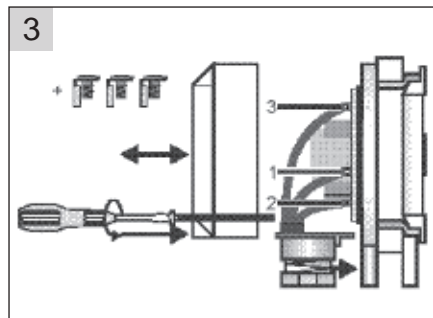
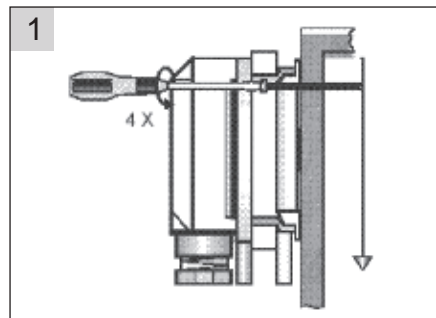
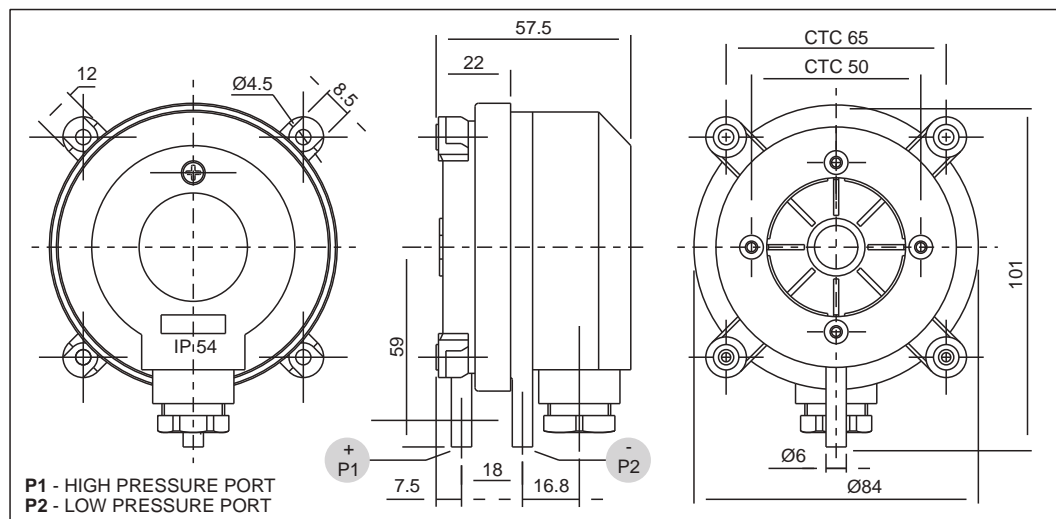
### Principle of Operation

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

The detail mounting dimensions are shown in Fig. 1

Fig. 1



P1 = higher pressure

P2 = lower pressure

\*Use two screws only, for mounting

\*\*Remove transport protection from P2

**Note :** Do not install upside down with trip pressure of less than 50 Pa.

# CS12 COMPRESSOR PRESSURE SWITCHES

The CS12 from Orion offers you Peace of Mind and Unbeatable Features!

## Salient Features

### Ready to Use, Easy to Fit, No Special Mounting

2 Ground Screws enable you to  
"Just Fit it, Set it and Forget it!"

### Corrosion Resistant Non Metallic Cover

Protects and Lasts...

### Non Additional Relays, No Extra Circuitry

Three Phase Pressure Switches can be  
used instead of a motor starter  
pressure switch combination.  
No need for additional relay or  
any other circuitry.

### Manual Cut-Off

Separate an auto-off disconnect lever for  
manual cut off of the compressor.

### Salient Feature

- Available in ready to use condition.
- Special Unloader valve is provided which prevents compressor from starting under load.
- No Special Mounting required.

### Technical Specifications

- Sensing Element - Nitrile Rubber.
- Factory setting 6~ 8 bar.
- Input Pressure Port 1/2" BSP Female
- Relief valve 6 mm dia.
- Cable Leading 11.5 & 14.5 mm diameter.
- Electrical Rating 16 A, 500 V AC
- Protection - IP 44.



Range Selection Table

Range Code (Orion)	Adjustment range (bar)	Switching differential (bar)
CS12	2 - 12	1.5 ~ 4.0

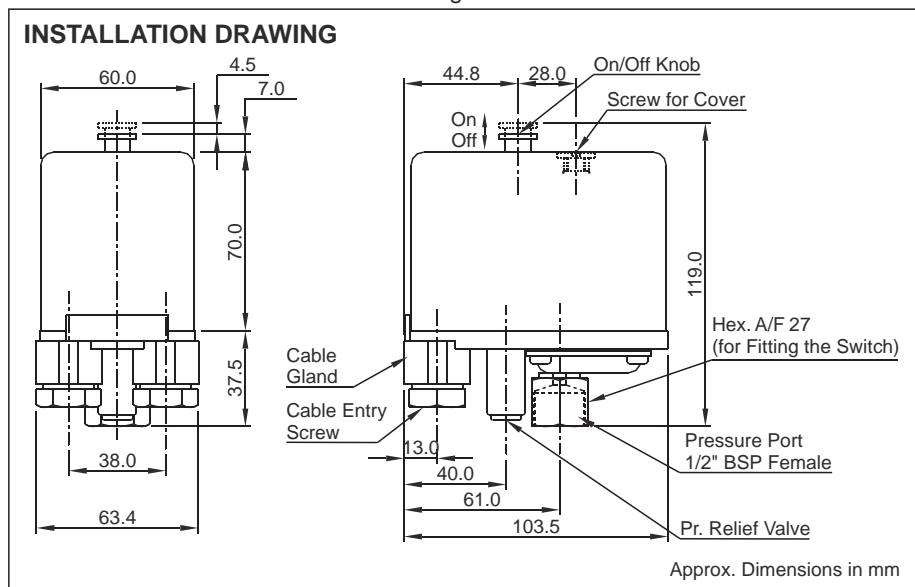
### How to order CS12 Compressor Pressure Switches

Please specify the Range Code as **CS12**

# COMPRESSOR PRESSURE SWITCHES CS12

## INSTALLATION AND OPERATING INSTRUCTIONS

Fig. 1.1



**Mounting** Please refer Fig. 1.1

1. Pressure switches can be mounted directly on process connection 1/2" BSP F nut with external size of 27 mm A/F.
2. In case, any other process connection is required then the same can be achieved using adaptor.
3. Please don't tighten the switch by holding the top cover. Use appropriate spanner for turning the process connection nut.

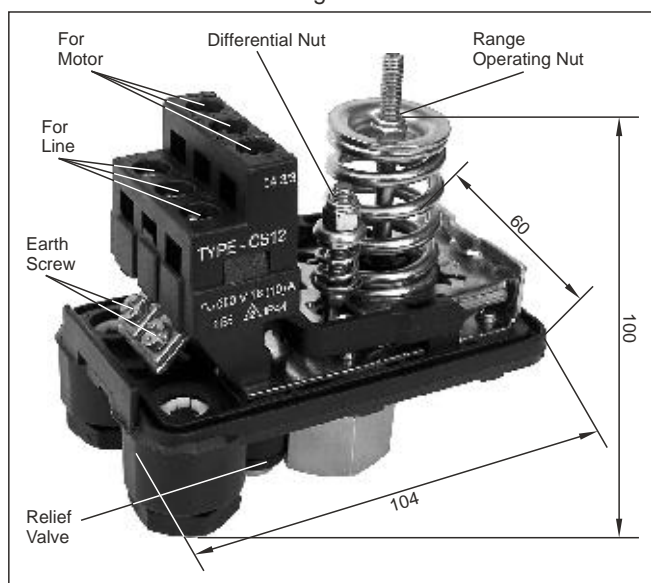


### Electrical Connections & Wiring (Refer fig 1.2)

Wiring is to be carried out only when the switch is mounted and voltage free.

- (a) Remove the top cover by unscrewing the black screw.
- (b) Pass the cable through the cable gland and connect the wiring.
- (c) Basically there are two connection as shown in the figure 1.2 one for Line and another for Motor. Each has three wires for three phase. Please ensure appropriate connection of phase wires. Two earthing screws are provided to connect earthing wires from line and motor.

Fig. 1.2



### Set Point Adjustment: Refer fig 1.2

Adjustment is to be carried out only when the switch is mounted,

under pressure and voltage free

- a. Remove the top cover.
- b. Decide the cut-in (lower) pressure (P1) and cut-out (upper) pressure (P2). (Pressure switch is closed when the pressure is between pressure P1 and P2.)
- c. Turn the Range nut and differential nut to extreme top position.
- d. Apply the desired cut-in pressure (P1) to pressure port.
- e. Turn the Range nut slowly till contacts changeover.
- f. Turn the differential nut to the extreme positive end (bottom position)
- g. Apply the desired cut-out (upper) pressure (P2) to pressure port.
- h. Turn the differential nut till the contacts changeover.
- i. Some minor adjustment will be required to achieve the exact cutin (lower) / output (higher) point, which can be checked with the help of proper pressure measurement device.
- j. Replace the polymer cover after the adjustment of cut-in and cut-out point is achieved.

# 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

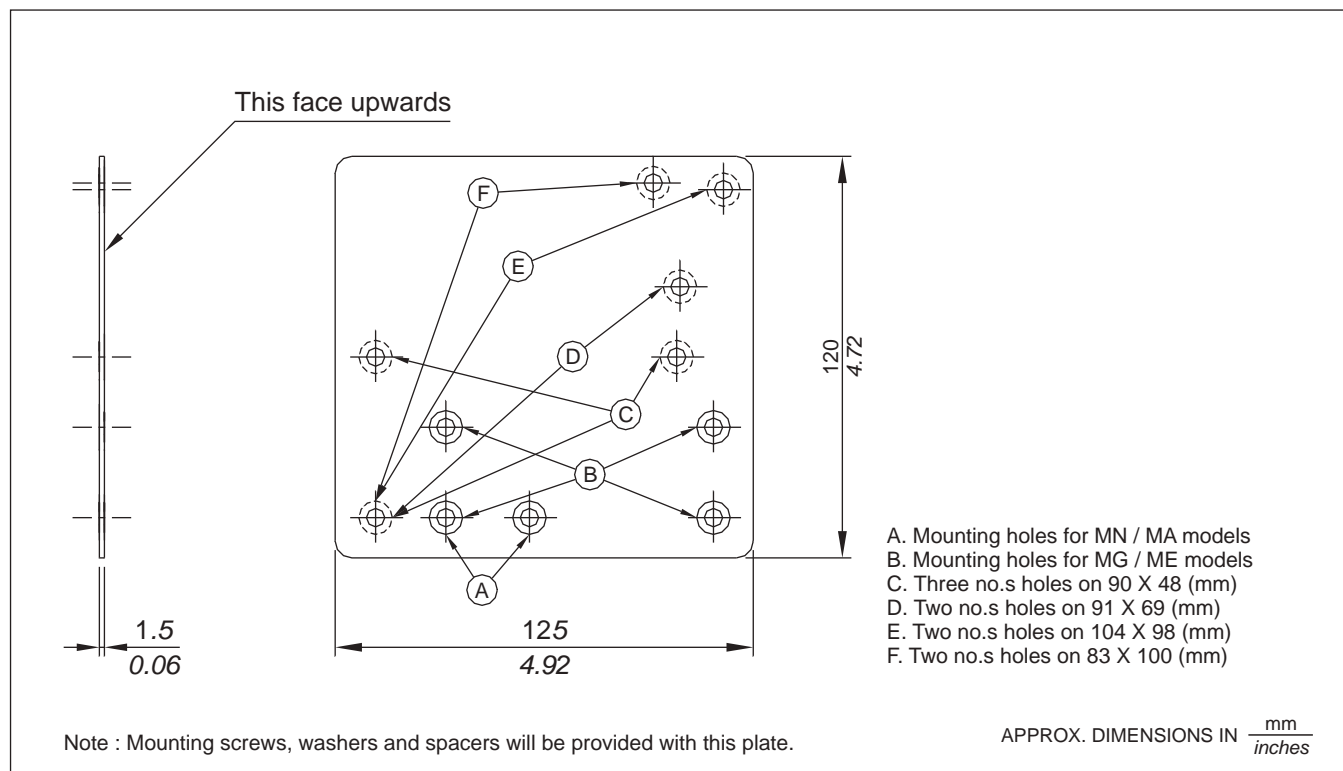
mounting plates to suit other makes on the market

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

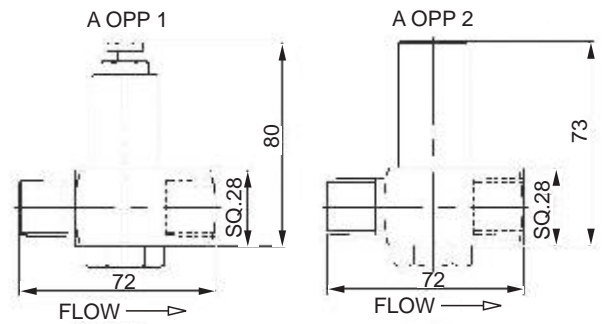


# ACCESSORIES

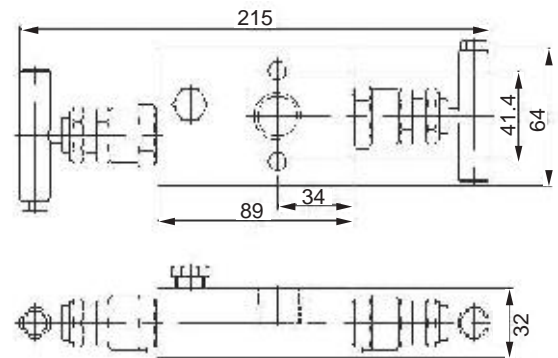
## Gauge Saver



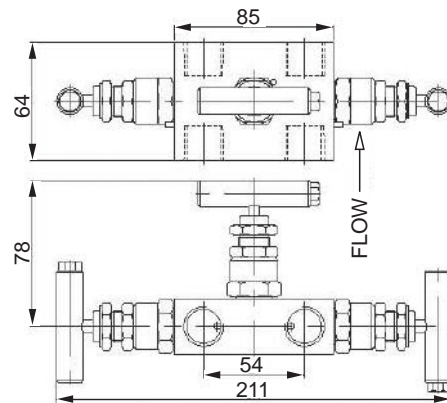
A OPP 1 = Set Pressure: 0.6 to 2.0 bar  
A OPP 2 = Set Pressure: 2.5 to 200 bar



## 2 Valve Manifold



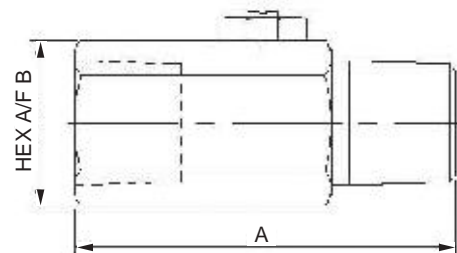
## 3 Valve Manifold



## Snubber



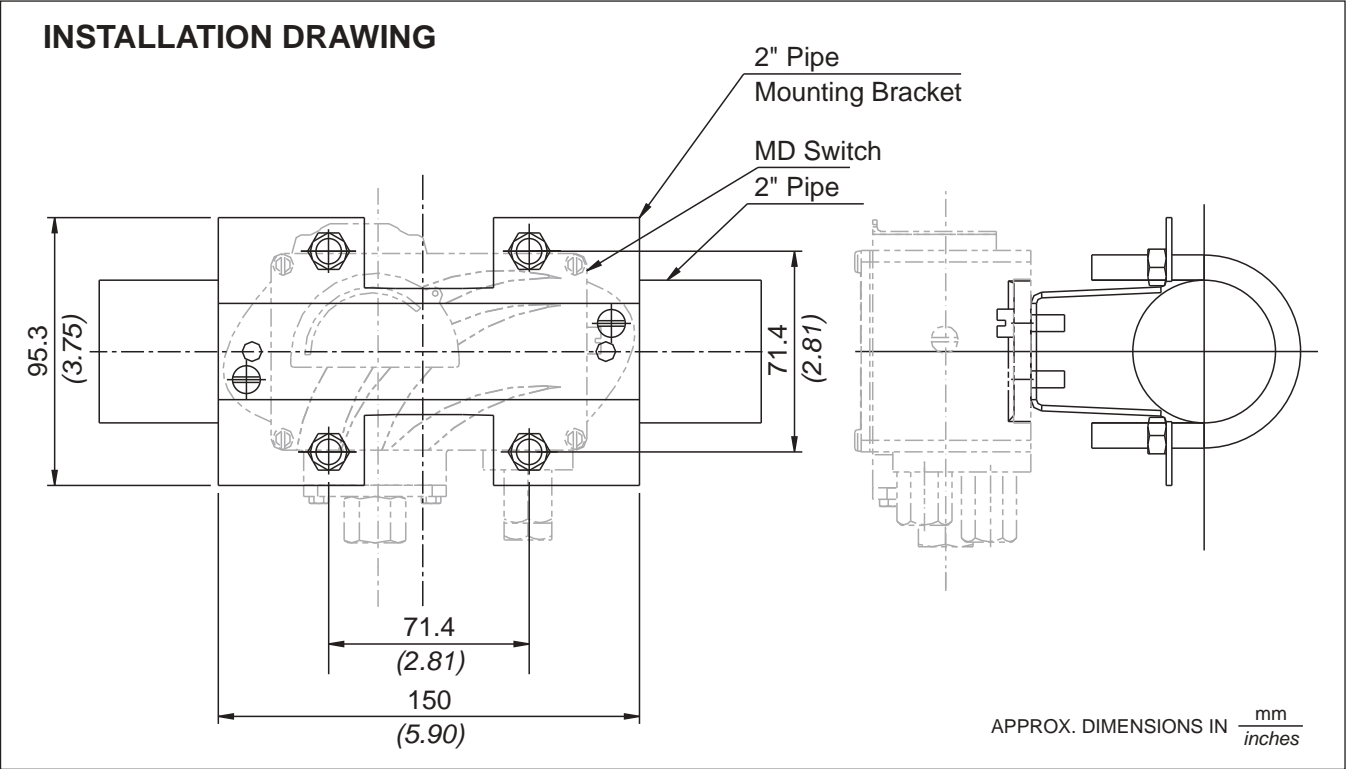
SIZE	A	B
1/4"NPT	55	25
3/8"NPT	55	25
1/2"NPT	63	28
G1/2"	63	28



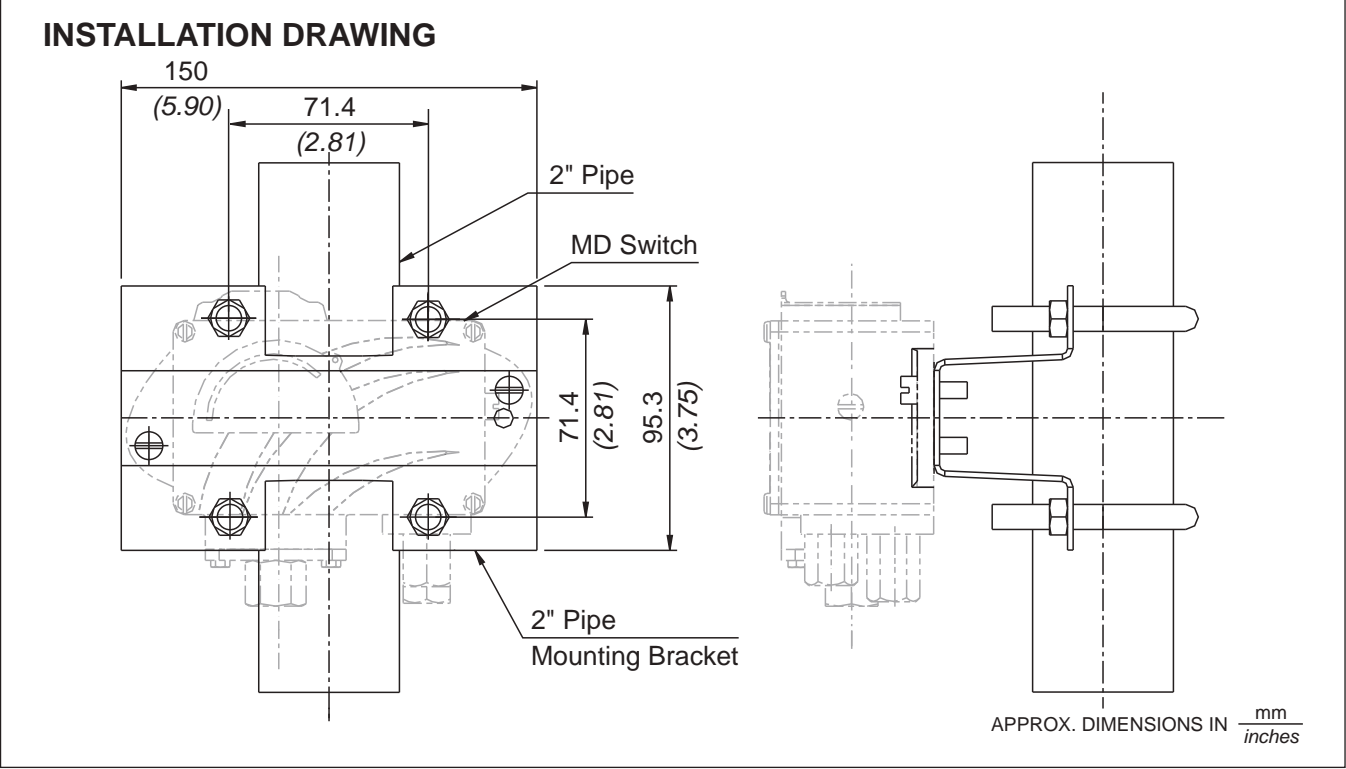


# ACCESSORIES

## PARALLEL MOUNTING MD SWITCH



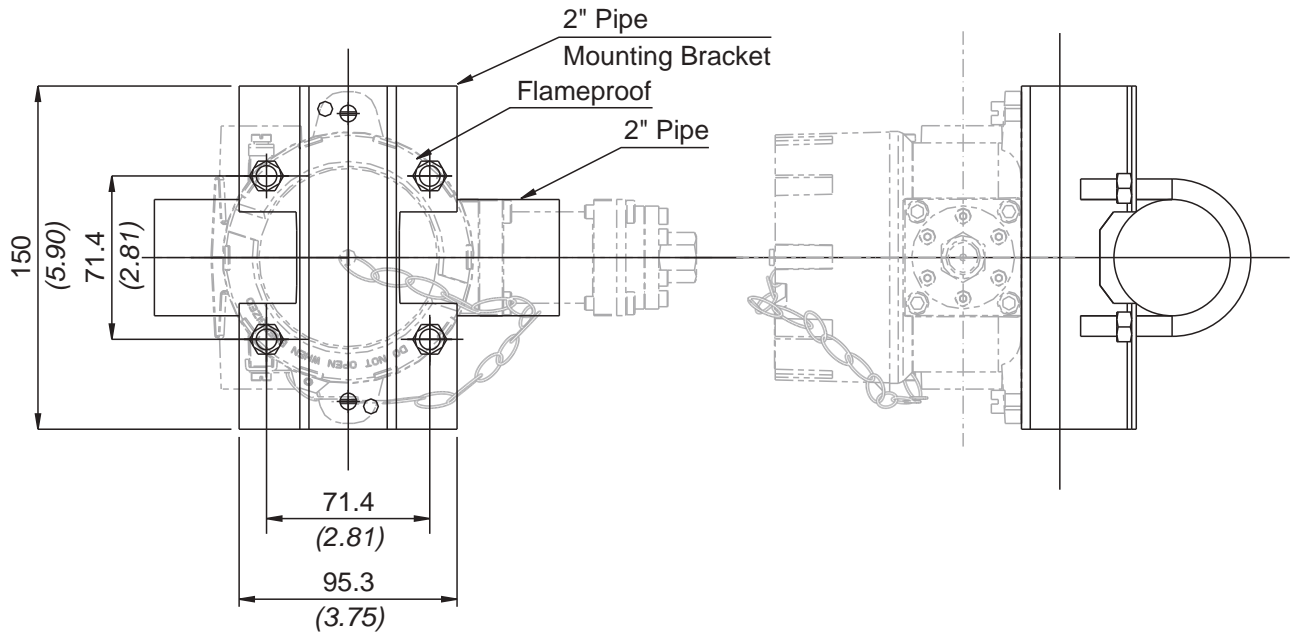
## PERPENDICULAR MOUNTING MD SWITCH



# ACCESSORIES

## PARALLEL MOUNTING FLAMEPROOF SWITCH

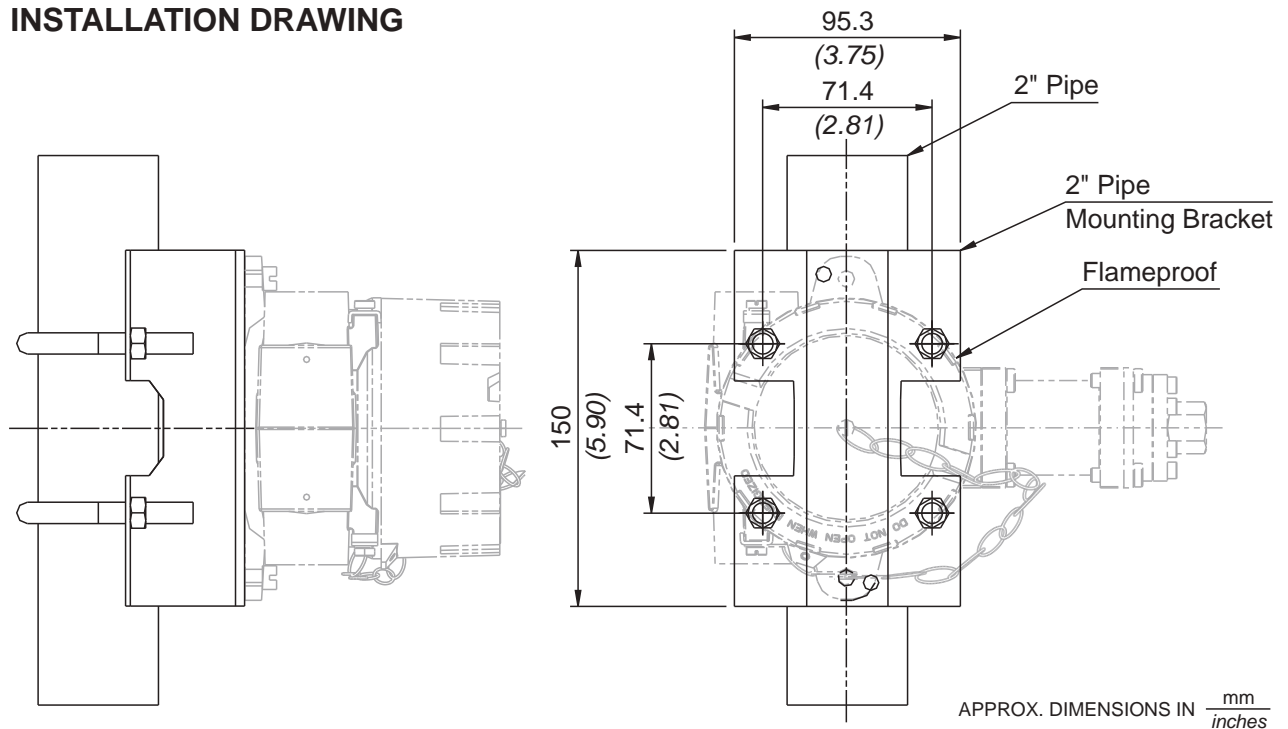
### INSTALLATION DRAWING



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

## PERPENDICULAR MOUNTING FLAMEPROOF SWITCH

### INSTALLATION DRAWING



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



# 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:

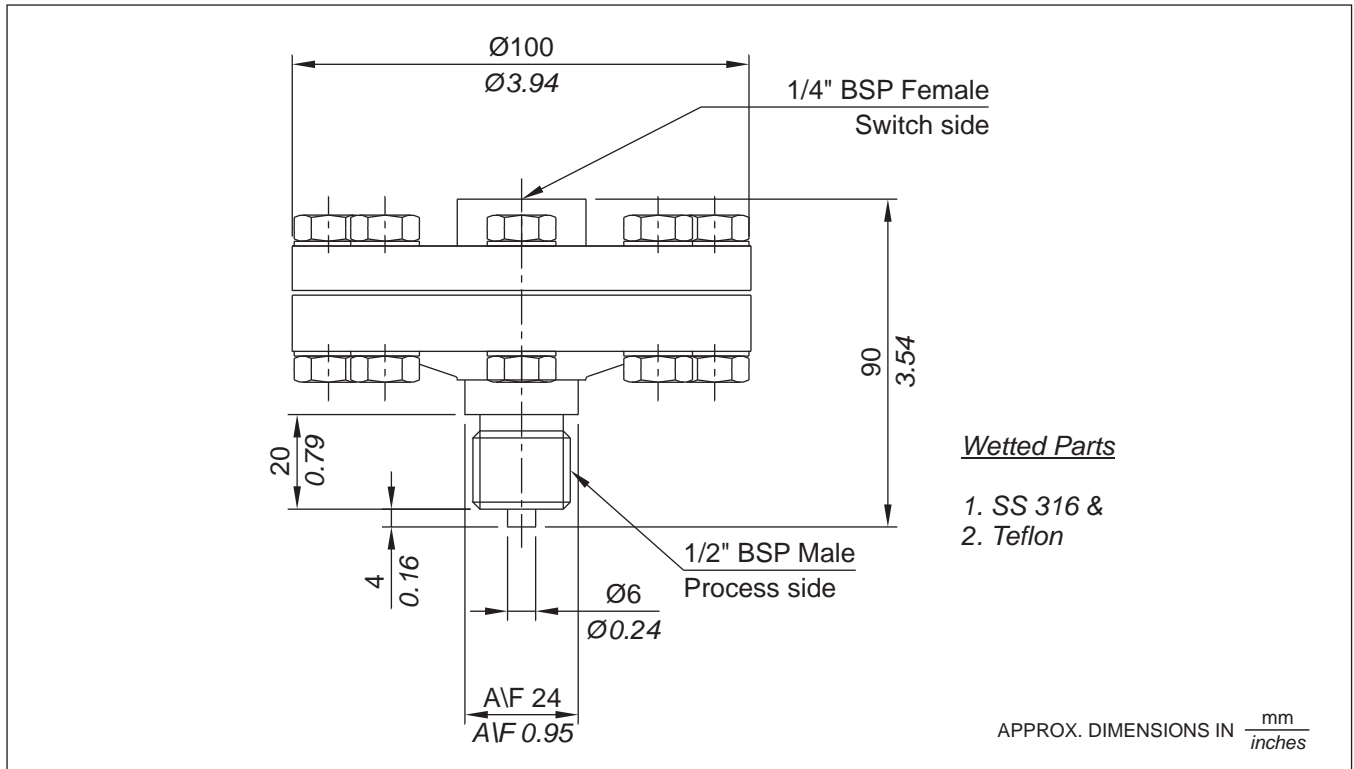
- |                     |                   |             |
|---------------------|-------------------|-------------|
| • HASTELLOY B2      | • MONELALLOY 400  | • TITANIUM  |
| • HASTELLOY C4      | • MONELALLOY K500 | • ZIRCONIUM |
| • HASTELLOY C22     | • NICKEL          | • SILVER    |
| • HASTELLOY 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.

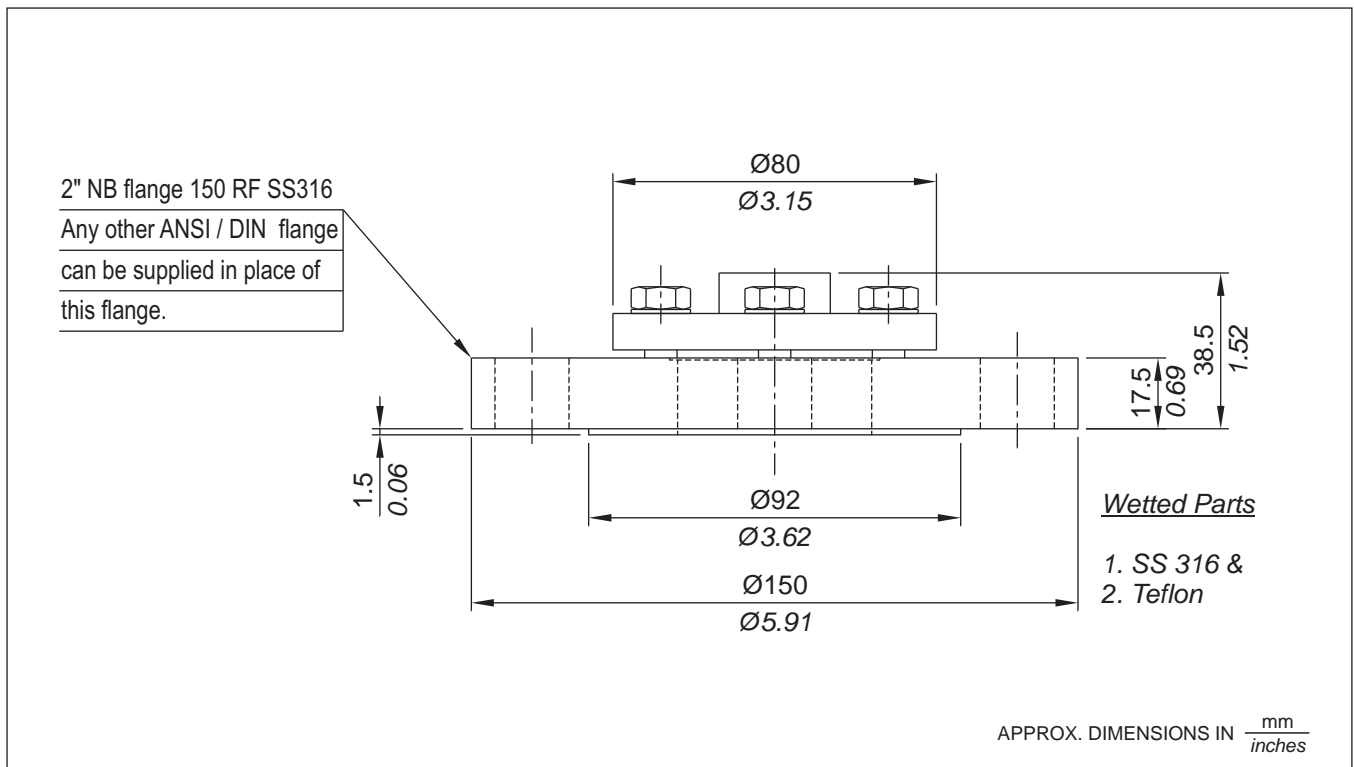
While ordering, customer's are requested to specify all the process parameters including ambient conditions, operating conditions, the process to be sensed and response times allowable, temperature of the seal under sensing conditions and temperature outside the measuring / sensing sequences (e.g as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

# ACCESSORIES

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

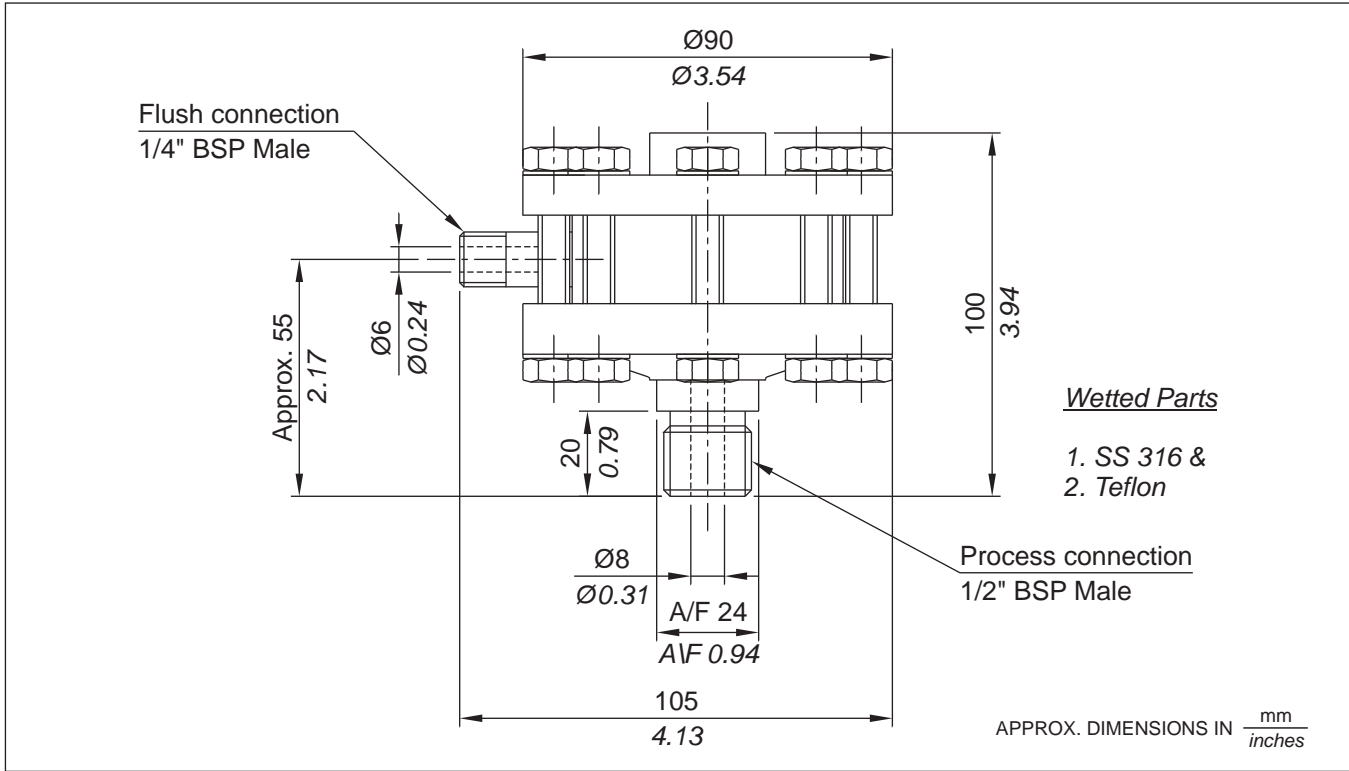


## CHEMICAL SEAL SUITABLE FOR VARIABLE FLANGED CONNECTION : (Type B)



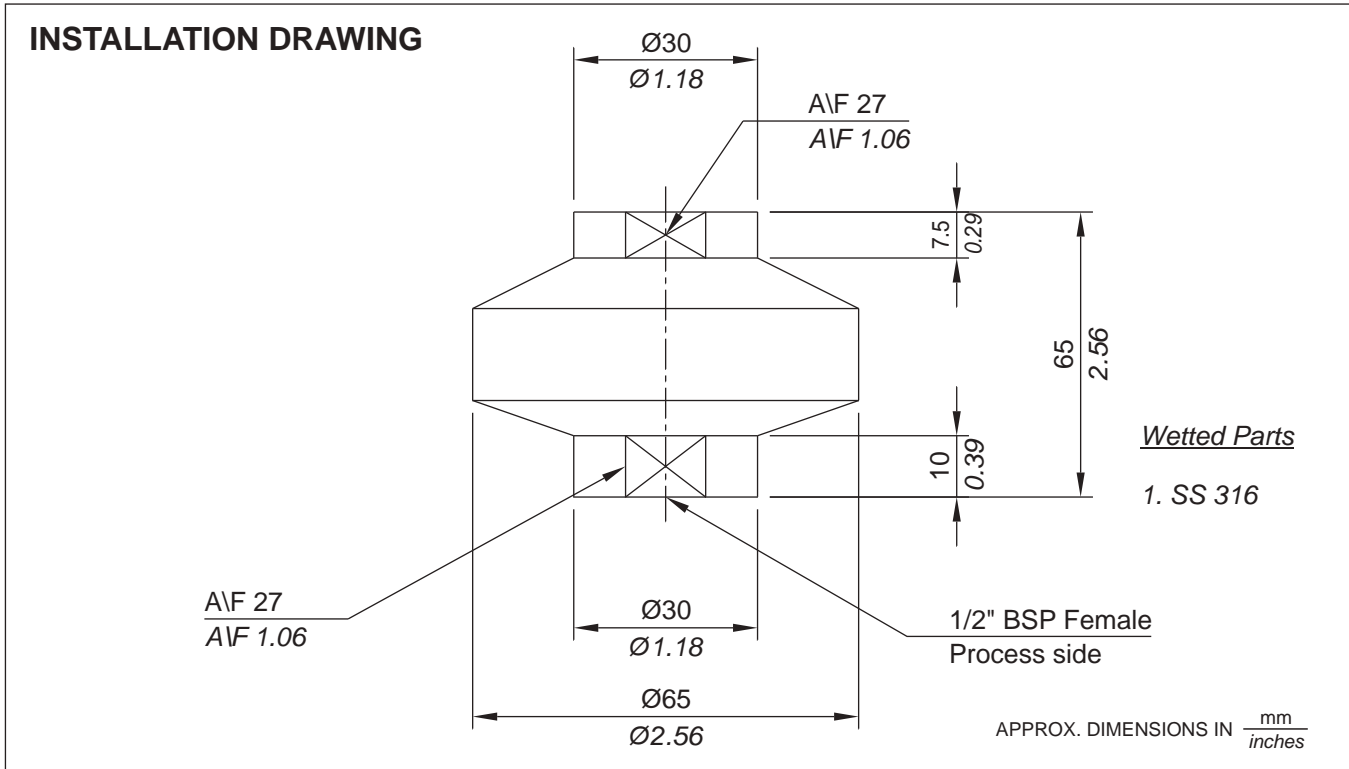
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## FLUSH TYPE CHEMICAL SEAL (Type C)



## FULL WELDED CHEMICAL SEAL (Type D)

## INSTALLATION DRAWING



## 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)

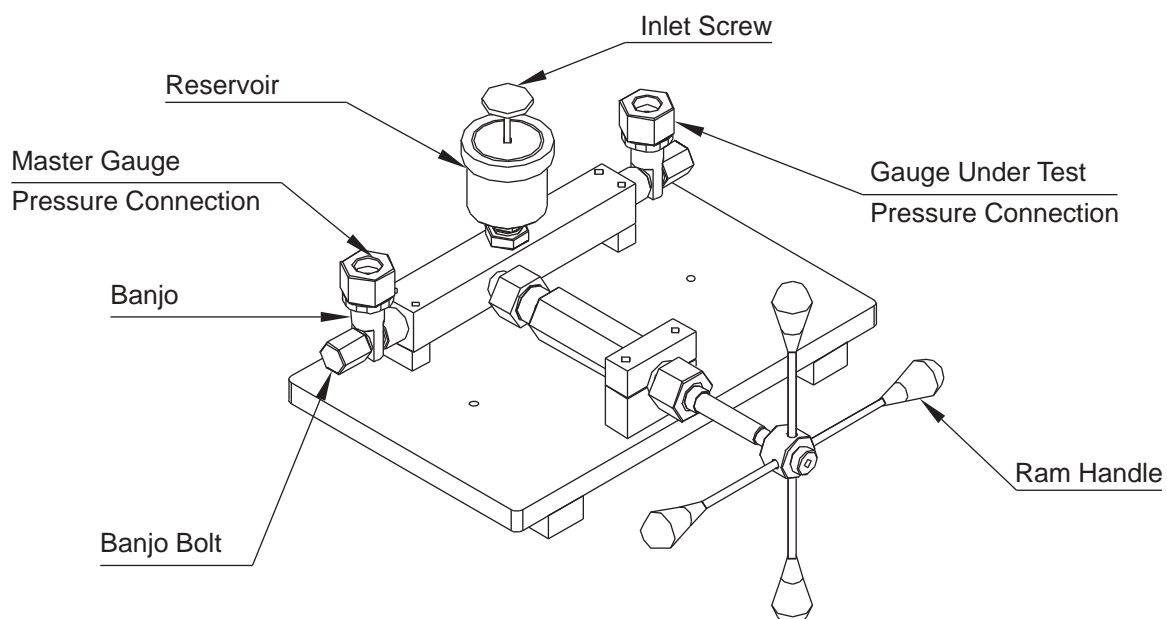
## Step 6.

**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.

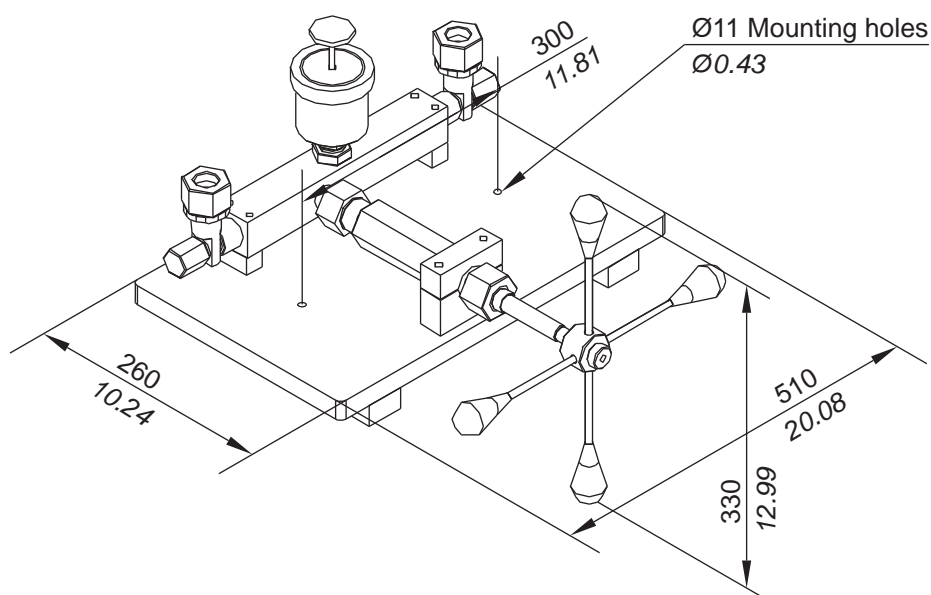
# TR COMPARISON TEST PUMP



## USER END DETAILS



## INSTALLATION DRAWING



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

## General information:

A comparison test pump is a device by which pressure gauges can be calibrated in comparison with master pressure gauges. These can also be used for comparison of master gauges with normal use pressure gauges after periodic intervals to detect a drift in calibration. The unit is portable and comes in handy during pressure gauge calibration verification in ISO 9000 companies. Standard process connection provided is 3/8" BSP female. Adaptors to suit individual pressure gauges can be provided as accessories

## Features:

- Portable
- Lightweight
- Suitable for both bottom and back connection pressure gauges

## Range Selection Table

Range Code	Range bar (psi)
TR 400 MD	0 - 400 (0 - 5714.29)
TR 700 MD	200 - 700 (2857 - 10000)

## Testing procedure for comparing pressure gauges

Mount the master pressure gauge on the left hand side adaptor and gauge under test on right hand side adaptor. Fill the reservoir with kerosene.

To fill the system with kerosene proceed as follows:

1. Unscrew the inlet screw of reservoir
2. Take the ram out by rotating the ram handle anticlockwise to the extreme end. This will fill the system with kerosene.
3. To remove any air trapped inside the system, turn the ram handle clockwise to the extreme end. The presence of air is established if bubbles appear in the reservoir.

Repeat steps 2 and 3 till no bubbles appear in the reservoir.

Take the ram handle fully out and tighten the inlet screw. When the ram handle is rotated clockwise, the pressure in the system starts increasing and the two pressure gauges can be compared with each other.

The gauges can be tilted to a convenient angle by loosening the bolt and rotating the banjos as per requirement, before the system is pressurized. The banjo bolt has to be tightened after attaining the desired angle. This facility is particularly useful in pressure gauges with back connection.

The pressurizing fluid used should be kerosene (not supplied with the equipment). The *wetted parts are mild steel, nitrile, and teflon*. As such, only pressure gauges used on process fluids compatible with kerosene and the wetted parts can be / should be checked / compared using the comparison test pump.

## Please Note:

A comparison test pump is only a device to generate pressure. As such, it has no accuracy and no such certificate of accuracy can be provided for these devices.

## How to order Parus comparison test pumps.

Specify the model by choosing the item code in the range selection table. Give the details of accessories needed, if any, in text.



Ex MARKING GUIDE

IEC	US (NEC 505)	US (NEC 500)	CENELEC (Directive 76/117/EEC)
<div><div>Ex d [ia] IIC T5</div><div>Explosion Protected</div><div>Method of Protection</div><div>I. S. Output</div><div>Gas Group</div><div>Temperature Class</div></div>	<div><div>Class I, Zone 1, A Ex d [ia] IIC T5</div><div>Permitted Class</div><div>American National Standard</div><div>Method of Protection</div><div>Group</div><div>Temperature Class</div><div>Permitted Zone</div><div>Explosion Protected</div><div>I. S. Output</div><div>Gas Group</div><div>Permitted Division (Optional except for Division 2)</div><div>Permitted Gas Group</div><div>Temperature Class (T5 &amp; T6 optional)</div></div>	<div><div>Explosionproof with I.S. Outputs, Class I, Division 1, Groups A, B, C, D, T5</div><div>Method of Protection (Optional except for I.S.)</div><div>Permitted Class</div></div>	<div><div>E Ex d [ia] IIC T5</div><div>European Standard</div><div>Method of Protection</div><div>Explosion Protected</div><div>I. S. Output</div><div>Gas Group</div><div>Temperature Class</div></div>

Refer to the "Marking"  
block for additional marking  
to the ATEX Directive (94/9/EC)

## PROTECTION CONCEPTS

Method of Protection	Code	Permitted Use	Standard	Protection Principle
Increased Safety	AEx e	Class I, Zone 1,2	FM 3600* (ISA S12.16.01)	No arcs, sparks or hot surfaces
	EEx e	Zone 1,2	EN 50 019	
Non-incendive	Ex e	Zone 1,2	IEC 60079-7	
Non-sparking	(NI)	Class I, Div 2	FM3611	
	Ex nA	Zone 2	IEC 60079-15	
Explosionproof	(XP)	Class I, Division 1,2	FM 3615	Contain the explosion and quench the flame
Flameproof	AEx d	Class I, Zone 1,2	FM 3600* (ISA S 12.22.01)	
	EEx d	Zone 1,2	EN 50 018	
	Ex d	Zone 1,2	IEC 60079-1	
Powder Filled	A Ex q	Class I, Zone 1,2	FM 3600* (ISA S12.25.01)	
	EEx d	Zone 1,2	EN 50 017	
	Ex q	Zone 1,2	IEC 60079-5	
Enclosed Break	Ex nC	Zone 2	IEC 60079-15	
Intrinsic Safety	(IS)	Class I, Div 1,2	FM 3610 †	Limit energy of sparks and suface temperature
	AEx ia	Class I, Zone 0,1,2	FM 3610 †	
	AEx ib	Class I, Zone 1,2	FM 3610 †	
	EEx ia	Zone 0,1,2	EN 50 020/39	
	EEx ib	Zone 1,2	EN 50 020/39	
	Ex ia	Zone 0,1,2	IEC 60079-11	
	Ex ib	Zone 1,2	IEC 60079-11	
Limited Energy	Ex nA	Zone 2	IEC 60079-15	
Pressurized	Type X	Class I, Div 1	FM 3620	Keep Dlamnable gas out
	Type Y	Class I, Div 1	FM 3620	
	Type Z	Class I, Div 2	FM 3620	
	EEx p	Zone 1	EN 50 016	
	Ex p	Zone 1	IEC 60079-2	
Restricted Breaching	Ex nR	Zone 2	IEC 60079-15	
Encapsulation	AEx m	Class I, Zone 1,2	FM 3600*(ISA S12.23.01)	
	EEx m	Zone 1,2	EN 50 028	
	Ex m	Zone 1,2	IEC 60079-18	
Oil Immersion	AEx o	Class I, Zone 1,2	FM 3600*(ISA S12.26.01)	
	EEx o	Zone 1,2	EN 50 015	
	Ex o	Zone 1,2	IEC 60079-6	
*Also shall comply with ISA S12.0.01 † Based on ISA S12.2.01				

## AREA CLASSIFICATION

	Flammable Material Present		
	Continuously	Intermittently	Abnormally
IEC/ CENELEC	Zone 0 (Zone 20 - dust)	Zone 1 (Zone 21 - dust)	Zone 2 (Zone 22 - dust)
US NEC 505	Zone 0	Zone 1	Zone 2
US NEC 500	Division 1		Division 2

IEC Classification per IEC 60079-10

CENELEC classification per EN 60079-10

US classification per ANSI/NFPA 70 National Electric Code (NEC) Article 500 or Article 505

## APPARATUS GROUPING

Typical Gas/dust/fibre	US (NEC 505) IEC CENELEC	US (NEC 500)
Acetylene Hydrogen Ethylene Propane Methane Metal Dust Coal Dust Grain Dust Fibres	Group IIC (Group IIB + H <sub>2</sub> ) Group IIB Group IIA Group I* None None None None	Class I/Group A Class I/Group B Class I/Group C Class I/Group D Mining* Class II/Group E Class II/Group F Class II/Group G Class III

\*Not within scope of NEC. Under jurisdiction of MSHA

MSHA - Mine Safety & Health Administration

## T-CODES

Maximum Surface Temperature	US (NEC 505) IEC CENELEC	US (NEC 505)
450°C	T1	T1
300°C	T2	T2
280°C	-	T2A
260°C	-	T2B
230°C	-	T2C
215°C	-	T2D
200°C	T3	T3
180°C	-	T3A
165°C	-	T3B
160°C	-	T3C
135°C	T4	T4
120°C	-	T4A
100°C	T5	T5
85°C	T6	T6

## Reference Data

### ENVIRONMENTAL RATINGS FOR ENCLOSURES BASED ON "NEMA" TYPE DESIGNATIONS

Enclosure Type Designation	Intended Use and Description
1	Indoor use primarily to provide a degree of protection against limited amounts of falling dirt.
2	Indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.
3	Outdoor use primarily to provide a degree of protection against rain, sleet, wind blown dust and damage from external ice formation.
3R	Outdoor use primarily to provide a degree of protection against rain, sleet, and damage from external ice formation.
3S	Outdoor use primarily to provide a degree of protection against rain, sleet, windblown dust and to provide for operation of external mechanisms when ice laden.
4	Indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation.
4X	Indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water, and damage from external ice formation.
5	Indoor use primarily to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids.
6	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, and the entry of water during occasional temporary submersion at a limited depth and damage from external ice formation.
6P	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth and damage from external ice formation.
7	Indoor use in locations classified as Class I, Division 1, Groups A, B, C or D hazardous locations as defined in the National Electric Code (NFPA 70) (Commonly referred to as explosion-proof).
8	Indoor or outdoor use in locations classified as Class I, Division 2, Groups A, B, C or D hazardous locations as defined in the National Electric Code (NFPA 70) (commonly referred to as oil immersed).
9	Indoor use in locations classified as Class II, Division 1, Groups E, F and G hazardous locations as defined in the National Electric Code (NFPA 70) (commonly referred to as dust-ignition proof).
10	Intended to meet the applicable requirements of the Mine Safety and Health Administration (MSHA).
12 and 12K	Indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids.
13	Indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.

### GROUP OF ENCLOSURE SUITABLE FOR PARTICULAR FLAMMABLE GAS / VAPOUR

Group of enclosure	Gas or Vapour
I	Methane ( firedamp)
IIA	Ammonia Industrial Methane * Blast Furnace Gas Carbon monoxide Propane Butane Pentane hexane Heptane Iso-Octane Decane Benzene Xylene Cyclohexane Acetone Ethyl methyl ketone Methyl acetate Ethyl acetate n-Propyl acetate n-Butyl acetate Amyl acetate Chloroethylene Methanol Ethanol Iso-butanol n-Butanol Amyl alcohol Ethyl nitrite
IIB	"1, 3-Butadiene" Ethylene Dethyl ether Ethylene oxide Town gas # Coke-oven gas
IIC	Hydrogen
<p>* Industrial methane includes methane mixed with not more than 10 percent by volume of Hydrogen.</p> <p># Town gas may contain not more than 57 percent by volume of hydrogen and not more than 16 percent by volume of carbon monoxide, the remainder being a small mixture of paraffin, hydrocarbons and inert gas.</p>	

## Thermal Engineering Data

ENERGY						
	kW hour	kCal	Joule	HP Hour	MW Hour	BTU
kW hour	1	859.8452	3600000	1.341022	0.001	3412.142
kCal	0.001163	1	4186.8	0.001559609	1.163e-006	3.968321
Joule	2.777778e-007	0.0002388459	1	3.725061e-007	2.777778e-010	0.0009478171
HP Hour	0.7456999	641.1865	2684520	1	0.0007456999	2544.434
MW Hour	1000	859845.2	3.6e+009	1341.022	1	3412142
BTU	0.0002930711	0.2519958	1055.056	0.0003930148	2.930711e-007	1

POWER & HEAT	
1 Btu	776 ft-lb 0.293 Watt-hr 252 cal
1 cal	0.003968 Btu 0.0011619 Watt-hr
1 Btu/h	0.293 Watt 4.2 cal/min
1 Watt	3.413 Btu/h
1 Watt-h	3.413 Btu
1 kW (1000 Watts)	3413 Btu/h
1 kW-hr	3413 Btu
1hp	0.746 kW 2544.65 Btu/h 33,000 ft-lb./min
1 Bohn <sup>a</sup>	9.809kW 33,479 Btu/h 34.5 lb of steam per hour

<sup>a</sup> Boiler output Horsepower is the equivalent of the heat required to evaporate 34.5 lb of water per hour in to dry, saturated steam at 212 F.

COMMONLY USED THERMAL UNITS	
1 BTU	= 0.252 kcal
1 BTU	= 107.7 kgm
1BTU/sec	= 1.055 kW
1 BTU/lb	= 0.5556 kcal/kg
1 BTU/ft <sup>3</sup>	= 8.9 kcal/m <sup>3</sup>
1 BTU/ft <sup>2</sup> -hr	= 2.71 kcal/m <sup>2</sup> h
1 BTU/ft <sup>2</sup> -hr-°F	= 4.886 kcal/m <sup>2</sup> -hr-°C
1 BTU/ft-hr-°F	= 1.49 kcal/m-hr-°C
1 BTU in/ ft <sup>2</sup> -hr-°F	= 0.124 kcal/m-hr-°C
1 BTU/lb-°F	= 1 kcal/kg-°C
1 BTU/ft <sup>3</sup> -°F	= 16.2 kcal/m <sup>3</sup> -°C
1 kcal	= 3.968 BTU
1 kgm	= 0.0093 BTU
1 kW	= 0.948 BTU/sec
1 kcal/kg	= 1.80 BTU/lb
1 kcal/m <sup>3</sup>	= 112 BTU/ft <sup>3</sup>
1 kcal/m <sup>2</sup> -hr	= 0.369 BTU/ft <sup>2</sup> -hr
1 kcal/m <sup>2</sup> -hr °C	= 0.205 BTU/ft <sup>2</sup> -hr-°F
1 kcal/m-hr-°C	= 0.67 BTU/ft-hr-°F
1 kcal/m <sup>3</sup> -°C	= 0.0624 BTU/ft <sup>3</sup> -°F
1 kcal	= 4.187 kJ

PROPERTIES OF COMMONLY USED INDUSTRIAL FUELS			
	Specific Gravity	Calorific Value	
Furnace Oil	0.89-0.95	10200	kcal/kg
Low Sulphur Heavy Stock (LSHS)	0.88-0.98	10300	kcal/kg
Heavy Petroleum stock (HPS)	0.85-0.98	9500	kcal/kg
Light Diesel Oil (LDO)	0.85-0.87	10300	kcal/kg
Husk	--	3360	kcal/kg
Wood	--	4700	kcal/kg
Bagasse	--	3850	kcal/kg
Blast Furnace Gas	1.0	850	kcal/Nm <sup>3</sup>
Coke Oven Gas(Mixed)	0.38	4200	kcal/Nm <sup>3</sup>
Coal Gas	0.42	5000-6000	kcal/Nm <sup>3</sup>
LD Gas	--	1600	kcal/Nm <sup>3</sup>
LPG (50% Propane+50% Butane)	2.1	24500	kcal/Nm <sup>3</sup>
Natural Gas	0.570	8900	kcal/Nm <sup>3</sup>
Producer Gas	0.87	1500	kcal/Nm <sup>3</sup>

Notes :

Lined area for notes.

Notes :

Lined area for notes.



## Kaustubha Udyog

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Tel.: +91-(0) 20-64700835 / 64700836 Telefax : +91-(0) 20-25460486 / 24393577  
Email : pressure@vsnl.com Website : <http://www.orion-instruments.com>

### ORDER/ENQUIRY FORM FOR PRESSURE SWITCHES

DEALER/AGENT CODE :

Please fill up the following parameters :

#### Technical:

- Maximum working pressure = \_\_\_\_\_ bar / mm wg  
(including surges)
- Set point 1  

<b>For single pressure switch</b>	<b>For adj. diff. Models</b>	<b>For pressure diff. Models</b>
Increasing _____ bar/mm wg	(lower) cut-in pressure _____ bar	Pmax (HP side) _____
Decreasing _____ bar/mm wg	(upper) cut-out pressure _____ bar	Pmax (LP side) _____
		? p desired = _____ bar/mm wg rising / falling
- Set point 2 (for 2SPDT switches)  

<b>For single pressure switch</b>	<b>For adj. diff. Models</b>	<b>For pressure diff. Models</b>
Increasing _____ bar/mm wg	(lower) cut-in pressure _____ bar	Pmax (HP side) _____
Decreasing _____ bar/mm wg	(upper) cut-out pressure _____ bar	Pmax (LP side) _____
		? p desired = _____ bar/mm wg rising / falling
- Working medium \_\_\_\_\_  
Compatible with  

<b>Pressure housing</b>	<b>Diaphragm</b>
<input type="checkbox"/> Aluminium	<input type="checkbox"/> Neoprene / Nitrile
<input type="checkbox"/> Brass	<input type="checkbox"/> Teflon
<input type="checkbox"/> S. S.	
- Max. temperature of working medium \_\_\_\_\_ °C
- Electrical rating : 5 A / 250 VAC 0.2 A / 250 VDC or Other
- Enclosure : IP 40 / IP 54 / IP 65 / Flameproof I, II A, II B / Flameproof II C
- Please specify any other details in text: - \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Model suggested \_\_\_\_\_

#### Commercial :

Annual Consumption \_\_\_\_\_ nos. \_\_\_\_\_  
Expected target price Rs. / USD \_\_\_\_\_ Ex works / FOB \_\_\_\_\_  
Expected date of first sample \_\_\_\_\_

**Customer details :** Name \_\_\_\_\_  
Address \_\_\_\_\_  
Contact Person \_\_\_\_\_ Designation \_\_\_\_\_  
Tel. No. (O) \_\_\_\_\_ (R) \_\_\_\_\_  
Fax No. \_\_\_\_\_ Email \_\_\_\_\_  
Weekly off \_\_\_\_\_

#### Pressure switches presently used :

Make	Model	Quantity
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Salesman's  
Signature :

Customer's  
Signature :



Affix  
Stamp  
Here

To,

**KAUSTUBHA UDYOG**

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## INGRESS PROTECTION (IP) CODES

First Number Protection against solid bodies	Second Number Protection against liquid
0. No protection 1. Object greater than 50 mm 2. Object greater than 12 mm 3. Object greater than 2.5 mm 4. Object greater than 1 mm 5. Dust-protected 6. Dust-tight 7. - 8. -	0. No protection 1. Vertically dripping water 2. 75° to 90° dripping water 3. Sprayed water 4. Splashed water 5. Water jets 6. Heavy seas 7. Effects of immersion 8. Indefinite immersion
Approximate US Enclosure Type Equivalent to IPXX	
Type → IP	Type → IP
1 10	3S 54
2 11	4 & 4X 55
3 54	5 52
3R 14	6 & 6P 67
	12 & 12K 52
	13 54

Source : Factory Mutual Research

## Pressure Conversion Table

	Kg/cm <sup>2</sup>	mmHg	Bar	mbar	mmWc	psi(lb/in <sup>2</sup> )	KPa
Kg/cm <sup>2</sup>	1	735.56	0.9807	980.7	10000	14.2233	98.066
mmHg	0.001359	1	0.00133	1.3332	13.5951	0.01934	0.13332
Bar	1.01972	750.062	1	1000	10197.16	14.5038	102
mbar	1.01972 x10 <sup>-3</sup>	0.7501	0.001	1	10.197	0.0145	0.1
mmWc	0.0001	0.07355	0.000098	0.098	1	0.00142	9.8067 x10 <sup>-3</sup>
psi(lb/in <sup>2</sup> )	0.07031	51.715	0.06895	68.950	703.07	1	6.8947
KPa	0.0101972	7.50062	10 <sup>-2</sup>	10	101.9716	0.145038	1

While every effort has been made to ensure the accuracy of this catalogue at the time of publication, we reserve the right to supply equipment in line with current design specifications. So, we recommend that critical parameters be checked at the order stage.

## WARRANTY :

Our products are warranted against defect in specified material and workmanship under specified normal service conditions for 12 months after being placed in service but not more than 18 months from the date of shipment, provided such items are returned free to our works at PUNE.

Company's liability in respect of defective parts is limited to making good by replacement, or repair defects, to be determined by the company. This is, provided the purchaser has given immediate written notice upon discovery of such defects, but within the time specified above. The replaced / repaired parts will be supplied exworks.

The company will be relieved of it's obligation if any arbitrary attempt to rectify has been undertaken by purchaser/user. This warranty does not cover normal wear and tear and damage due to corrosion or erosion.

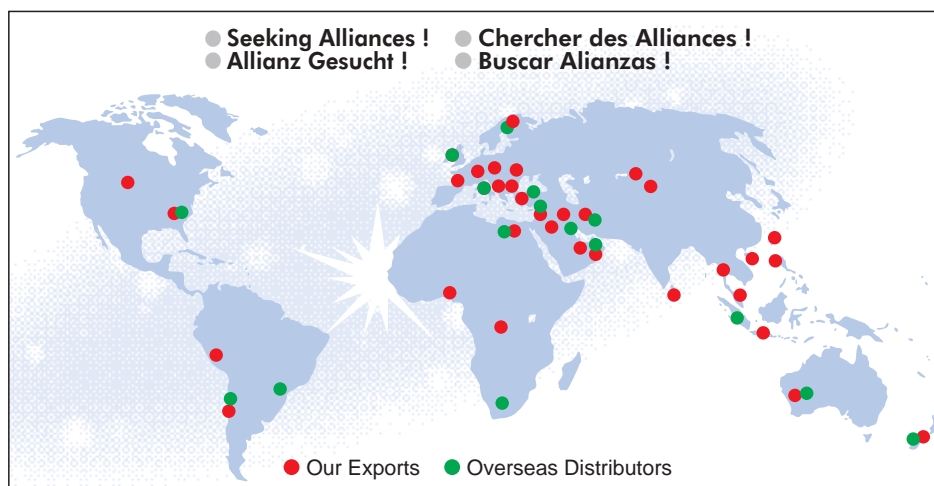
The company's liability is limited to making good the part or parts which are defective and excludes any and every other obligation for loss or damage, direct or consequential.

**The foregoing is in lieu of all other expressed and implied warranties(except of title), including those of merchantability and fitness for a particular purpose.**

Although we provide application assistance, either through our literature or personally, it is the responsibility of the customer to determine the suitability of the product in the application. Customer's interpretation and implementation of application suggestions and recommendation by Kaustubha Udyog, general or specific, transmitted verbally or in writing, published or unpublished, is strictly at the buyer's own risk.

## Your Local Representative

### REPRESENTATIVES



**Note :** As efforts are made constantly to improve both design and method of manufacture, the apparatus supplied may differ in detail from illustration and data printed. Please check the specifications while ordering

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