FLAMEPROOF SWITCHES

SPECIFIER'S GUIDE FOR

- PRESSURE SWITCHES
- PRESSURE DIFFERENCE SWITCHES
- VACUUM SWITCHES
- TEMPERATURE SWITCHES

Orion® INSTRUMENTS

FC

Baseefa APPROVED

Ex

CE

with IECEx CoC

PESO approved

KLPL approved

FE

PESO approved

KLPL approved

Bulletin No. KA170615

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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.

Catalogue Purpose :

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

This section on "How to use this section" (Page No. 10 and 11) 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 distinguishing factors of FC and FE switches are given on page 3. It will help for selection of right product for your application.
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” (Page No. 8 and 9) 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.

   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, hysterisis, electrical ratings etc.

   Ordering information

   Some applications

   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 72)

   Turn to page 72 for the definitions and terminology. This will help you familiarise with the terms used throughout the catalogue.
5. Need information on Accessories? (see page 71)

   Turn to page 71 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 73)

   A logical procedure on page 73 will help you to consider most of the important factors when selecting a pressure switch.

Brief Classification

FC 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.

Advantages over FE switches:

- Large spring for accurate setpoint
- Better accuracy
- External scale for visible setpoint
- ATEX and IECEx approvals, which makes them usable almost throughout the world.

FE 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.

Advantages over FC switches:

- Double diaphragm seal
- Cost effective
- Certifications & Approvals for Indian market -
  KLPL
  PESO

International Certifications for FC series

APPROVED

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

Certificate No: IECEx BAS 07.0060X Issue No: 3

Status: Current

Date of Issue: 2016-06-17 Page 1 of 4

Applicant: Kusatulsha Udyog
7, Panchaya Society
1000/6D
Navi Path
Pune 411 030
India

Equipment: FC Series Flameproof Switch
Optional accessory:

Type of Protection: Ex d, Ex tD

Marking: Ex db IIC T6 Gb,
Ex db IIC T85°C Db (-20°C ≤ Ta ≤ +60°C) IP66

Approved for issue on behalf of the IECEx Certification Body: R S Sindar

Position: Technical Manager

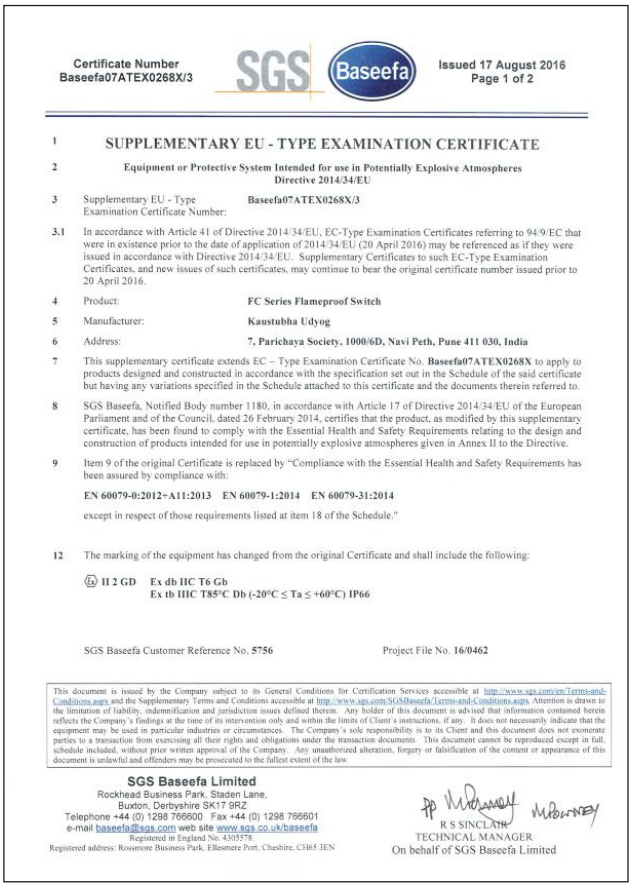
Signature: (for printed version)

Date: 17/6/16

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:
SGS Baseefa Limited
Rockhead Business Park
Staden Lane
Buxton, Derbyshire, SK17 9RZ
United Kingdom

International Certifications for FC series



Certificate Number
Baseefa07ATEX0268X/3

Issued 17 August 2016
Page 1 of 2

1 **SUPPLEMENTARY EU - TYPE EXAMINATION CERTIFICATE**

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU**

3 Supplementary EU - Type Examination Certificate Number: **Baseefa07ATEX0268X/3**

3.1 In accordance with Article 41 of Directive 2014/34/EU, EC-Type Examination Certificates referring to 94/9/EC that were in existence prior to the date of application of 2014/34/EU (20 April 2016) may be referenced as if they were issued in accordance with Directive 2014/34/EU. Supplementary Certificates to such EC-Type Examination Certificates, and new issues of such certificates, may continue to bear the original certificate number issued prior to 20 April 2016.

4 Product: **FC Series Flameproof Switch**

5 Manufacturer: **Kaustubha Udyog**

6 Address: **7, Parichaya Society, 1000/6D, Navi Peth, Pune 411 030, India**

7 This supplementary certificate extends EC – Type Examination Certificate No. **Baseefa07ATEX0268X** to apply to products 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.

8 SGS Baseefa, Notified Body number 1180, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that the product, as modified by this supplementary certificate, has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

9 Item 9 of the original Certificate is replaced by "Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012+A11:2013 EN 60079-1:2014 EN 60079-31:2014

except in respect of those requirements listed at item 18 of the Schedule."

12 The marking of the equipment has changed from the original Certificate and shall include the following:

⟨Ex⟩ **II 2 GD Ex db IIC T6 Gb**
Ex tb IIIC T85°C Db (-20°C ≤ Ta ≤ +60°C) IP66

SGS Baseefa Customer Reference No. **5756** Project File No. **16/0462**

This document is issued by the Company subject to its General Conditions for Certification Services accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx and the Supplementary Terms and Conditions accessible at http://www.sgs.com/SGSBaseefa/Terms-and-Conditions.aspx Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. It does not necessarily indicate that the equipment may be used in particular industries or circumstances. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, schedule included, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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Registered in England No. 4305578.
Registered address: Rossmore Business Park, Ellesmere Port, Cheshire, CH65 3EN

R S SINCLAIR
TECHNICAL MANAGER
On behalf of SGS Baseefa Limited

Certificate Number
Baseefa07ATEX0268X/3

Issued 17 August 2016
Page 2 of 2

13 **Schedule**

14 **Certificate Number Baseefa07ATEX0268X/3**

15 **Description of the variation to the Product**

Variation 3.1

To confirm that the Flameproof Pressure Switch covered by this certificate has been reviewed against the requirements of EN 60079-0:2012+A11:2013, EN 60079-1:2014 and EN 60079-31:2014 in respect of the differences from the standards to which this certificate was issued; none of these differences affect this equipment, other than the code marking requirements which have been addressed.

Variation 3.2

The equipment type model has been amended from Flameproof Switch to FC Series Flameproof Switch.

16 **Report Number**

SGS Baseefa Report Number: - GB/BAS/ExTR16.0207/00

17 **Specific Conditions of Use**

None additional to those listed previously

18 **Essential Health and Safety Requirements**

Compliance with the Essential Health and Safety Requirements is affected as follows.

Clause	Subject	Compliance
1.2.7	LVD type requirements	Directive requires a manufacturer declaration.
1.2.8	Overloading of equipment (protection relays, etc.)	Covered by installation rules and manufacturer's instructions
1.4.1	External effects	The Purchaser should make the manufacturer aware of such issues. Covered in Instructions
1.4.2	Aggressive substances, etc.	The Purchaser should make the manufacturer aware of such issues. Covered in Instructions

19 **Drawings and Documents**

Number	Sheet	Issue	Date	Description
A24BF 001	1 to 4	3	27/07/2016	General Assembly Drawing

These drawings are common to this certificate and IECEx BAS 07.0096X and are held with the latter.

Indian Certifications for FC series

KLPL Test Certificate

Karandikar Laboratories

TYPE EXAMINATION REPORT
Electrical Apparatus for Explosive Atmospheres

TE Report Number: KLPL/Ex/R/10-006X Dated. 29th December 2010

Electrical Apparatus: Flameproof Pressure / Temperature Switch (ORION Brand – Model PC / PA / PM)

Manufacturer: Kaustubha Udyog.

Address: 7, Pelicanya Society, 1203/61, Navi Peth, Pune 411 030, India.

This equipment and any acceptable variation thereto are specified in the schedule to this TE 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 recertification based on the compliance already established by ERTL(E) for compliance to IS 12349, 2004 & IS 2148-2004, vide their test report no. ERTL (E) / TES / K065 / 0084 / 02-08 dated 25-02-2009 for gas groups I, IIA, IIB, IIC.

This TE Report was issued as verification that a suitable, representative of production, was examined 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 60529:2001

The Evaluation and Test results are recorded in KLPL's confidential report No. KLPL / Ex / R / KU-19/084 Dated 29th December 2010.

The sign 'X' if placed after the TE Report number, indicates that the equipment is subject to special conditions of safe use specified at the schedule to this TE Report.

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

The marking of the Equipment shall include the following:

Exd I IIC T6 IP66 Gb Ta (-20°C to +60°C)

Page 1 of 4

R.K. Paranjpe - Director

Karandikar Laboratories Pvt. Ltd.

Baseefa

PESO Certificate

Government of India
Ministry of Commerce & Industry
Petroleum & Explosives Safety Organisation (PESO)
5th Floor, A-Block, CGO Complex, Seminary Hills,
Nagpur - 440006

स्पीड पोस्ट
SPEED POST

E-mail : explosives@explosives.gov.in
Phone/Fax No : 0712 -2510248, Fax-2510577

Approval No : A/P/HQ/MH/104/5613 (P400233) Dated : 24/05/2017

To,
M/s. KAUSTUBHA UDYOG,
SurveyNo.36/1/1,
S. No. 36/1/1, Sinhgad Road, Vadgaon Khurd, Pune city,
Pune City,
Taluka: Haveli,
District: PUNE,
State: Maharashtra,
PIN: 411041

26 MAY 2017

Sub : Aproval of Flame Proof Type Electrical Equipments under Petroleum Rules 2002- Regarding.

Sir(s),

Please refer to your letter No. **OIN97301** dated **19/01/2017** on the subject.

The following Ex electrical equipment(s) manufactured by you according to **IS/ IEC 60079-0 : 2004, IS/ IEC 60079-1 : 2007,** standards and covered under **Karandikar Laboratories** Test reports mentioned below is/are approved for use in **Zone 1** of Gas **IIA/IIB/IIC** hazardous areas coming under the the Petroleum Rules, 2002 administered by this Organization.

Sr. No	Description	Safety Protection	Equipment reference Number	Test Agency			Drawing no
				Name	Certificate No.	Certificate Date	
1	Flameproof Pressure and Temperature Switch Model (Orion Brand - Model PC/PA/PM)	Ex d IIC T6 Gb	P400233/1	Karandikar Laboratories	KLPL/Ex/R/10-006X	29/12/2010	A24 KI 001

This Approval is granted subject to observance of the following conditions :-

1)The design and construction of the equipment shall be strictly in accordance with description, condition and drawings as mentioned in the Test Reports referred to above.
2)The equipment shall be used only with approved type of accessories and associated apparatus.
3) Each equipment shall be marked either by raised lettering cast integrally or by plate attached permanently 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 Karandikar Laboratories applicable to the equipment.
(d) Equipment reference number of this letter by which use of apparatus is approved.
(e) BIS approval number.
(f) Protection level.
4) A certificate to the effect that the equipment has been manufactured strictly in accordance with the drawing referred to in the Test report and is identical with the one tested and certified at Testing agency shall be furnished with each equipment.
5) The customer shall be supplied with a copy of this letter, an extract of the conditions and maintenance schedule, if any, recommended by Karandikar Laboratories and copy of instructions booklet detailing operation & maintenance of the equipment so as to maintain its safe characteristics.
6) The IS/IEC 60079-17 and IS/IEC 60079-19 shall be followed for maintenance and repair of overhaul of the subject equipments.

Conditions of the Approval:-
This approval supersedes the earlier approval issued for the subject equipments vide letter No. A/P/HQ/MH/104/1755 (P228266).
To submit renewed & valid BIS licence No. CM/L-7775906 after its expiry on 31/08/2018.

This approval also covers the permissible variations as approved under the Karandikar Laboratories test reports referred above. This approval is liable to be cancelled if any of the conditions of the approval is violated or not complied with. The approval may also be amended or withdrawn at any time, if considered necessary in the interest of safety.

The field performance report from actual users/your customers of the subject equipment may please be collected and furnished to this office for verification and record on annual basis.

The Approval is Valid upto **31/12/2021**

Yours faithfully,

(Nirad Dattaram Gawade)
Dy. Controller of Explosives
For Chief Controller of Explosives
Nagpur

Copy to:
1. Jt. Chief Controller of Explosives, West Circle, MUMBAI
2.M/s. KAUSTUBHA UDYOG,SurveyNo.36/1/1, S. No. 36/1/1, Sinhgad Road, Vadgaon Khurd, Pune city,Pune City, Taluka: Haveli, District: PUNE, State: Maharashtra, PIN: 411041

for Chief Controller of Explosives

(For more information regarding status,fees and other details please visit our website http://peso.gov.in)

Note:- Please submit the revalidation application one month before the date of Expiry of approval otherwise approval will be treated as cancelled and a fresh application for approval will be considered for the approval.

BIS License

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

Pune Branch Office

Address:Plot No. 657 to 668,MADE Building, Market Yard, Gultekdi, Pune-411037.
Phone : 020-24274043,4,5,6,7
Fax : 020-24268299
E-Mail : punebo@bis.org.in
web : http://www.bis.org.in

ATTACHMENT TO LICENCE NO. CM/L- 7775906

CM/L NO	NAME OF THE LICENSEE WITH THE ADDRESS	NAME OF THE PRODUCT	IS NO.
7775906	KAUSTUBHA UDYOG 36/1/1/1 NO. 1 SINHGAD ROAD VADGAON KH. Dist : Pune	Electrical equipment for use in explosive atmospheres part 1 equipment protection by flameproof enclosures "d"	IS/IEC 60079-1:2007

ENDORSEMENT NO. 12 Dated. 14 oct 2016

Renewed for a further period of two years from **First September Two Thousand and Sixteen** to **Thirty First August Two Thousand and Eighteen**

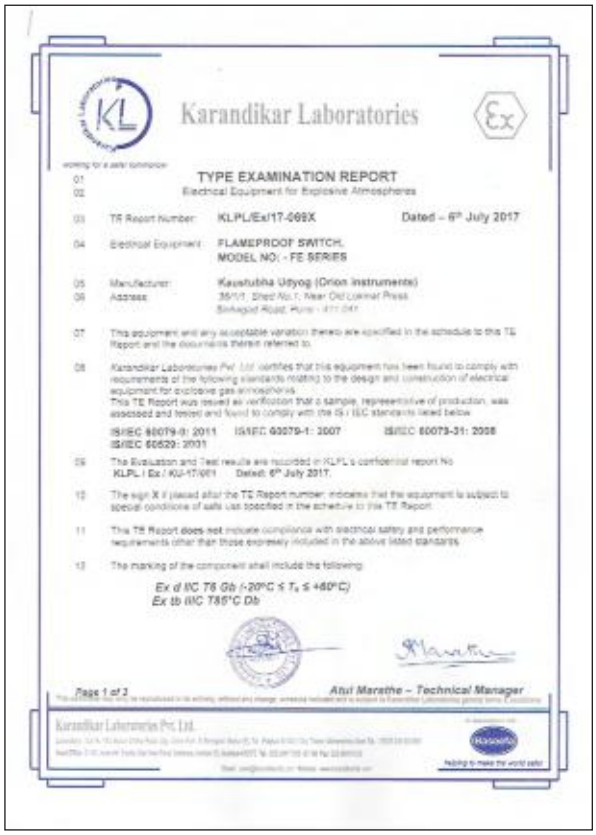
This supersedes our earlier endorsement no : 11

Other terms and conditions of Licence remain the same

(S S Magdi)
Sc. E

Indian Certifications for FE series

KLPL Test Certificate



Karandikar Laboratories

TYPE EXAMINATION REPORT
Electrical Equipment for Explosive Atmospheres

TR Report Number: KLPL/Ex/17-069X Dated – 6th July 2017

Electrical Equipment: FLAMEPROOF SWITCH,
MODEL NO: - FE SERIES

Manufacturer: Kaustubha Udyog (Orion Instruments)
Address: 35/1/1, Shed No.1, Near Old Laxmar Press
Sinhagad Road, Pune - 411 041

This equipment and any acceptable variation thereto are specified in the schedule to this TE 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 equipment for explosive gas atmospheres.
This TE Report was issued as verification that a sample, representative of production, was assessed and tested and found to comply with the IS / IEC standards listed below.

IS/IEC 60079-0: 2011 IS/IEC 60079-1: 2007 IS/IEC 60079-31: 2008
IS/IEC 60529: 2001

The Evaluation and Test results are recorded in KLPL's confidential report No
KLPL / Ex / KU-17/061 Dated: 6th July 2017.

The sign 'X' placed after the TE Report number, indicates that the equipment is subject to special conditions of safe use specified in the schedule to this TE Report.

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

The marking of the component shall include the following:

Ex d IIC T6 Gb (-20°C ≤ Ta ≤ +60°C)
Ex tb IIIC T85°C Db

Page 1 of 3

Atul Marathe – Technical Manager

Karandikar Laboratories Pvt. Ltd.

Helping to make the world safer

PESO Certificate

स्पीड पोस्ट SPEED POST

Government of India
Ministry of Commerce & Industry
Petroleum & Explosives Safety Organisation (PESO)

स्पीड पोस्ट SPEED POST

13 JUN 2017

Please refer to your letter No. A44/CCOE/01 dated 14/01/2017 on the subject.

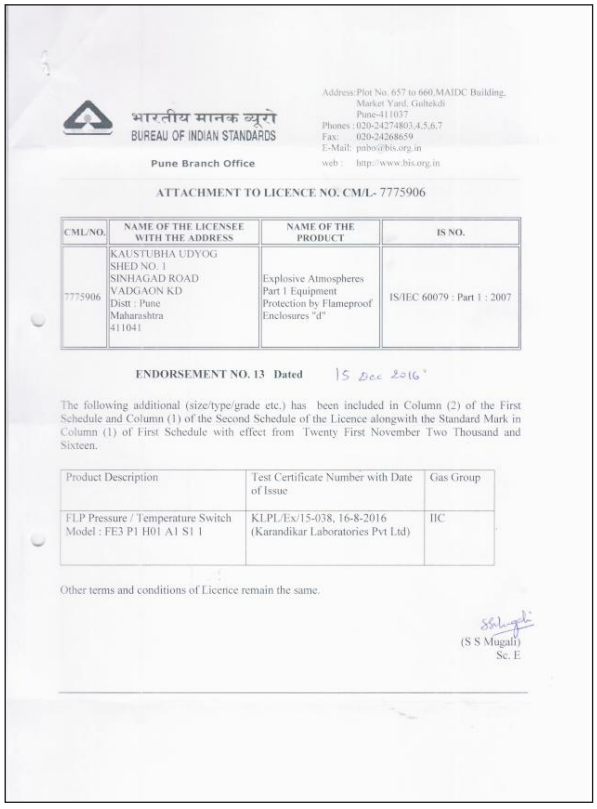
The following Ex electrical equipment(s) manufactured by you according to IS/ IEC 60079-0 : 2007, IS/ IEC 60079-1 : 2007, IS/IEC 60079-31 : 2008, standards and covered under Karandikar Laboratories Test reports mentioned below is/are approved for use in Zone 1,Zone 2 of Gas IIC Hazardous areas coming under the the Petroleum Rules, 2002 administered by this Organization.

Sr. No.	Description	Safety Protection	Equipment reference Number	Test Agency			Drawing no
				Name	Certificate No.	Certificate Date	
1	Flameproof Pressure/Temperature Switches Model FE3 P1 H01 A1 S11	Ex d IIC T5 Gb	P/GE/17/1011	Karandikar Laboratories	KLPL/Ex/15-038	16/08/2016	As per test report

The approval is granted subject to observance of the following conditions:

Note : Please submit the revalidation application one month before the date of expiry of approval otherwise approval will be treated as cancelled and a fresh application for approval will be considered for the approval.

BIS License



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

Pune Branch Office

Address:Plot No. 657 to 660,MAIDC Building, Market Yard, Gultekdi Pune-411037
Phones : 020-24274803,4,5,6,7
Fax: 020-24268659
E-Mail: pabo@bis.org.in
web : http://www.bis.org.in

ATTACHMENT TO LICENCE NO. CM/L- 7775906

CML/NO.	NAME OF THE LICENSEE WITH THE ADDRESS	NAME OF THE PRODUCT	IS NO.
7775906	KAUSTUBHA UDYOG SHED NO. 1 SINHAGAD ROAD VADGAON KD Distt : Pune Maharashtra 411041	Explosive Atmospheres Part 1 Equipment Protection by Flameproof Enclosures "d"	IS/IEC 60079 : Part 1 : 2007

ENDORSEMENT NO. 13 Dated 15 Dec 2016

The following additional (size/type/grade etc.) has been included in Column (2) of the First Schedule and Column (1) of the Second Schedule of the Licence alongwith the Standard Mark in Column (1) of First Schedule with effect from Twenty First November Two Thousand and Sixteen.

Product Description	Test Certificate Number with Date of Issue	Gas Group
FLP Pressure / Temperature Switch Model : FE3 P1 H01 A1 S1 1	KLPL/Ex/15-038, 16-8-2016 (Karandikar Laboratories Pvt Ltd)	IIC

Other terms and conditions of Licence remain the same.

(S S Mugali)
Sc. E

FC Pictorial Index

PRESSURE SWITCHES

HIGH RANGE

Page No. 12

HIGH PROOF HIGH RANGE

Page No. 16

BELLOWS

Page No. 20

LOW RANGE

Page No. 24

HYDRAULIC RANGE*

Page No. 28

FLANGED

Page No. 32

PRESSURE DIFFERENCE SWITCHES

HIGH RANGE

Page No. 36

HIGH PROOF HIGH RANGE

Page No. 40

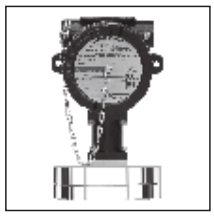
HIGH RANGE DP

Page No. 44

LOW RANGE

Page No. 48

LOW ΔP HIGH PROOF



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VACUUM SWITCHES

Page No. 56

COMPOUND SWITCHES

Page No. 60

TEMPERATURE SWITCHES

Page No. 64

*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.

FE Pictorial Index

PRESSURE SWITCHES

HIGH RANGE

Page No. 13

HIGH PROOF HIGH RANGE

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BELLOWS

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LOW RANGE

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HYDRAULIC RANGE*

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FLANGED

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PRESSURE DIFFERENCE SWITCHES

HIGH RANGE

Page No. 37

HIGH PROOF HIGH RANGE

Page No. 41

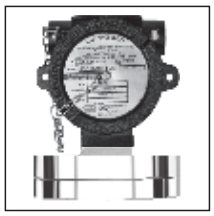
HIGH RANGE DP

Page No. 45

LOW RANGE

Page No. 49

LOW ΔP HIGH PROOF



Page No. 53

VACUUM SWITCHES

Page No. 57

COMPOUND SWITCHES

Page No. 61

TEMPERATURE SWITCHES

Page No. 65

*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 sectio

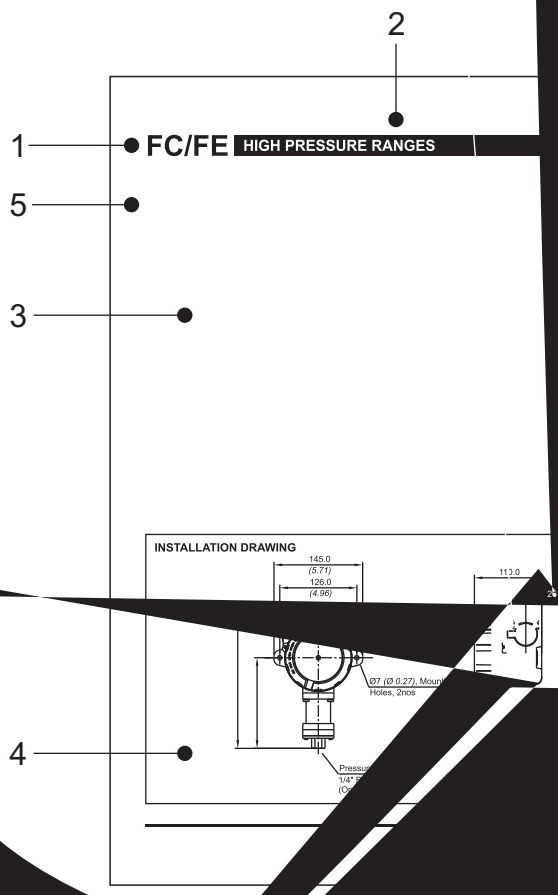
Due to the variety in product types and th
features, catalogue page formats may vary. Bu
the following format is adhered to.

Elements appearing on each page will be:

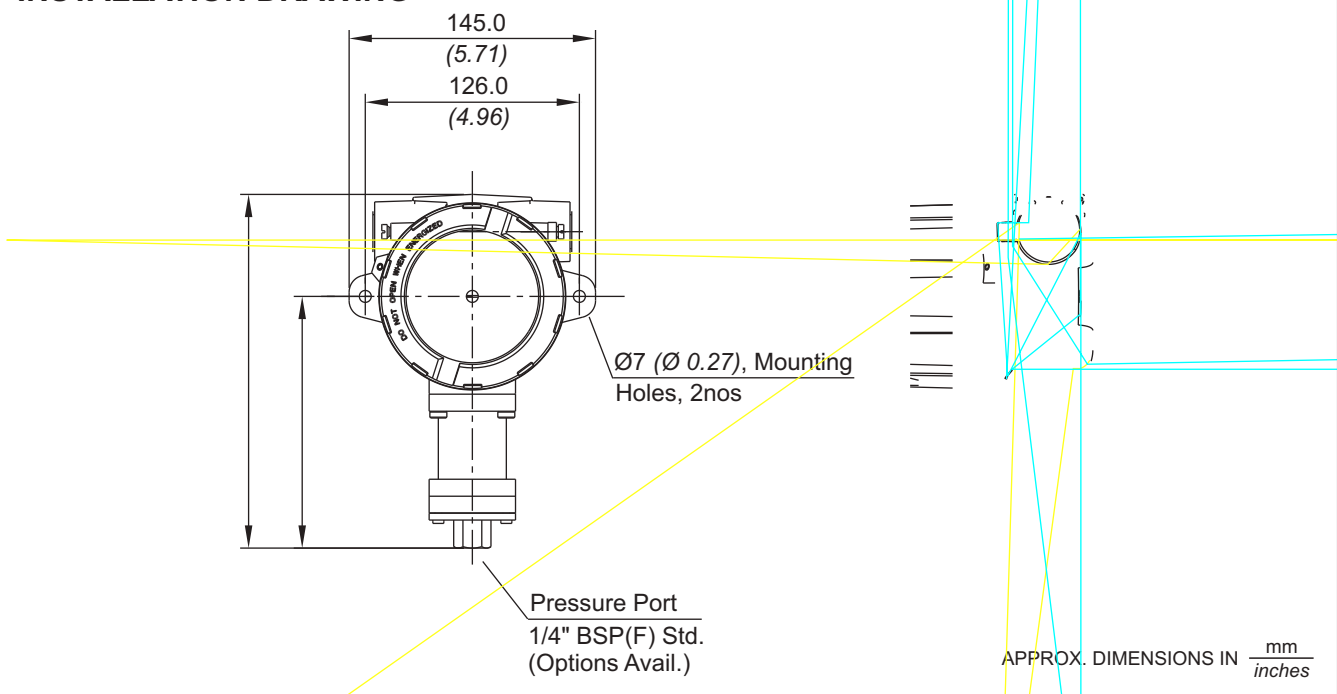
1. Product family / series - A product family /
appear on the outside page corner, depending
right hand page, and will be in large bold type.

2. Product section - will appear immediately fol
product family / series at top of the page and wil
type.

3. Pressure capsule details - will show the cons
the pressure capsule and all it's internal pa
process / working medium is variable, the wette
be mentioned in italics. If the wetted parts are u
material of construction (MOC) will be
alongside in brackets. Where the material of co
is not specified, it will vary and the options
selected by the user considering the compatib
process / working medium. Modifications can b



INSTALLATION DRAWING

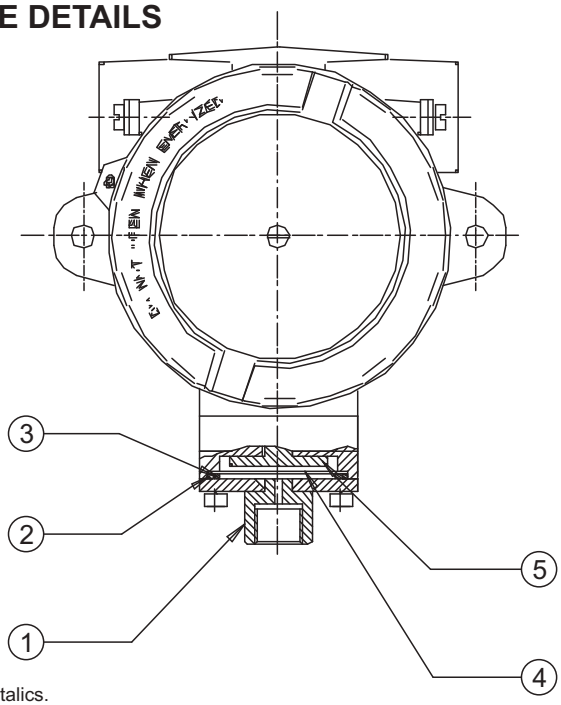


APPROX. DIMENSIONS IN mm / *inches*

Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

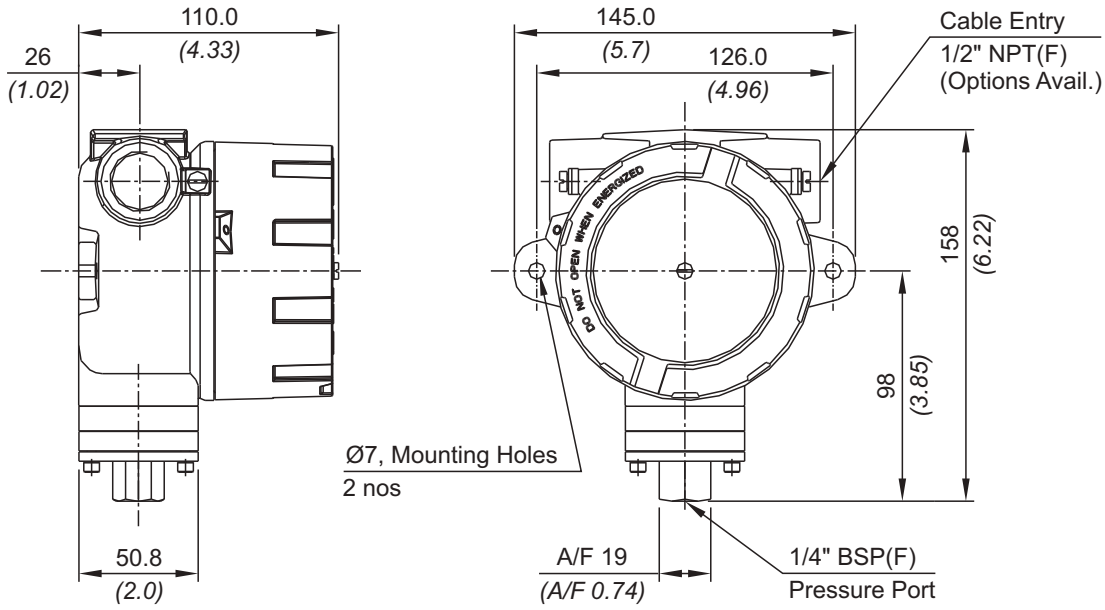


No. Description

1. *High Pressure Port*
2. *Teflon® O-Ring*
3. *SS 316 Ring*
4. *Diaphragm*
5. Conical Plunger

Note : *wetted parts* are mentioned in italics.

INSTALLATION DRAWING



APPROX. DIMENSIONS IN mm / *inches*

FC/FE 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 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.

Note: Welded diaphragm also available as shown

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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**P 1** = pressure switch, fixed differential without scale ***P2** = pressure switch, fixed differential with scale in bar ***P3** = pressure switch, fixed differential with scale in psi * Not available in FE series	**LP** = (0.067 - 0.213) **LP5** = (0.1 - 0.5) **H01** = (0.1 - 1.0) **H02** (0.1 - 1.5) **H03** = (0.2 - 2.6) **H04** = (0.2 - 3.6) **H07** = (0.5 - 7.0) **H10** = (0.5 - 10.0) **H15** = (1.0 - 15.0) **H30** = (5.0 - 25.0)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) **S3** = SS316 / 1" BSP(M) **H1** = Hastelloy C / ¼" BSP(F) **H2** = Hastelloy C / ¼" NPT(F) **N1** = Monel / ¼" BSP(F) **N2** = Monel / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options	**0** = Neoprene **1** = Teflon **2** = SS 316L **3** = Hastelloy C **4** = Monel **5** = Titanium **6** = Tantalum **7** = 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 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

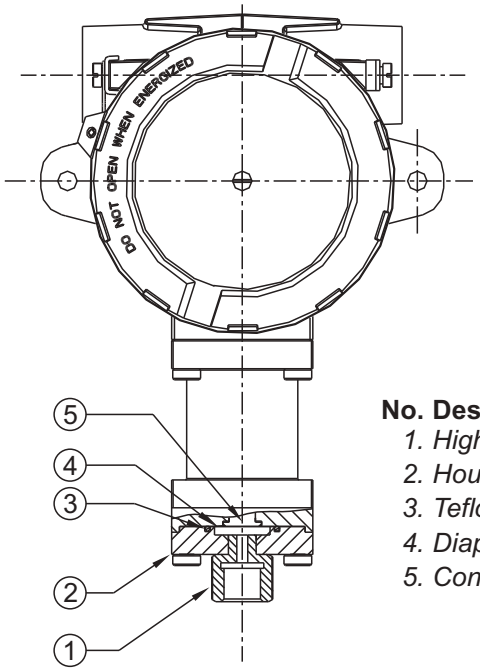
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
☐	FC	1	P1	H01	A1	S1	0

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.

Bulletin No. KA170615

FC

PRESSURE CAPSULE DETAILS

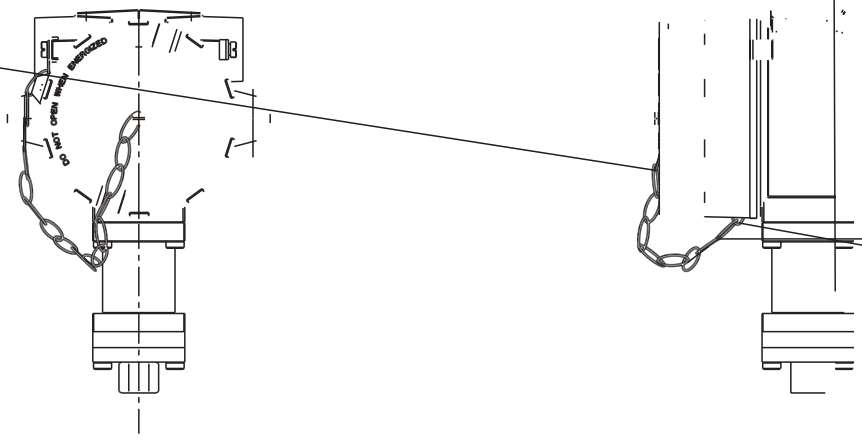


No. Description

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

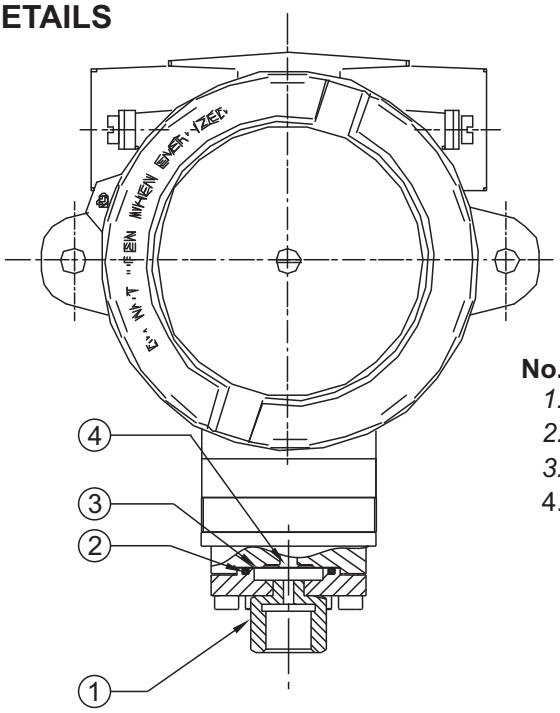


APPROX. DIMENSIONS IN mm / *inches*

Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

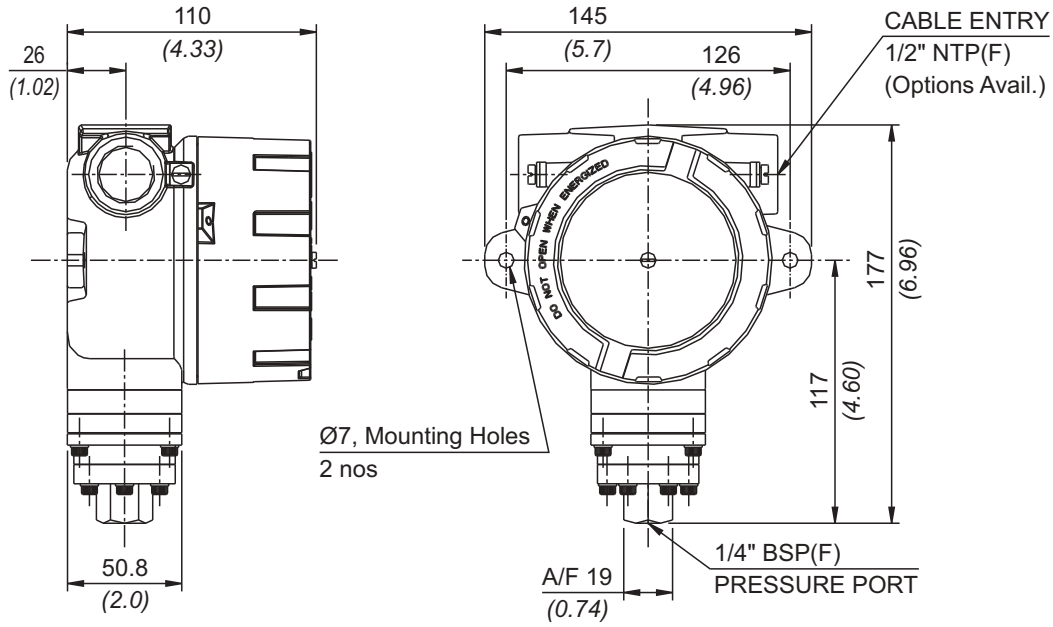


No. Description

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

Note : *wetted parts* are mentioned in italics.

INSTALLATION DRAWING



APPROX. DIMENSIONS IN mm / *inches*

FC/FE HYDRAULIC RANGES

RANGE SELECTION TABLE

Range Code	Range bar *(psi)*	Differential* bar *(psi)*	Maximum Working Pressure bar *(psi)*
		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)*
H7H	70 - 700 *(1015.00 - 10150.00)*	100 *(1450.00)*	1000 *(14500.00)*

* 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 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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**P 1** = pressure switch, fixed differential without scale **P2** = pressure switch, fixed differential with scale in bar **P3** = pressure switch, fixed differential with scale in psi	**H1T** = (0.5 - 10) **H2T** = (2 - 20) **H4T** = (5 - 40) **H1H** = (10 - 100) **H2H** = (7 - 200) **H4H** = (40 - 400) **H7H** = (70 - 700)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A8** = General purpose microswitch rated at 5 A; 250 VAC ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options	**0** = Neoprene **1** = Teflon **2** = SS 316L **3** = Hastelloy C **4** = Monel **5** = Titanium **6** = Tantalum **7** = Inconel

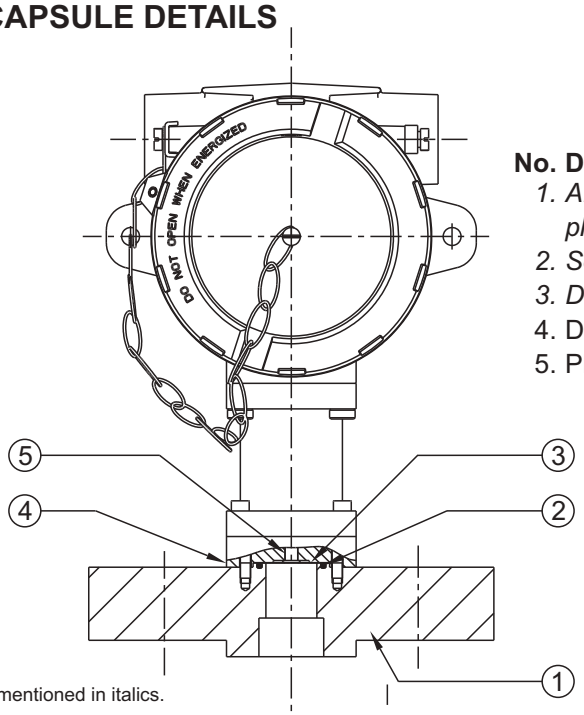
eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, having 5 bar to 40 bar pressure range, with 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & SS316L diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
☐	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

PRESSURE CAPSULE DETAILS

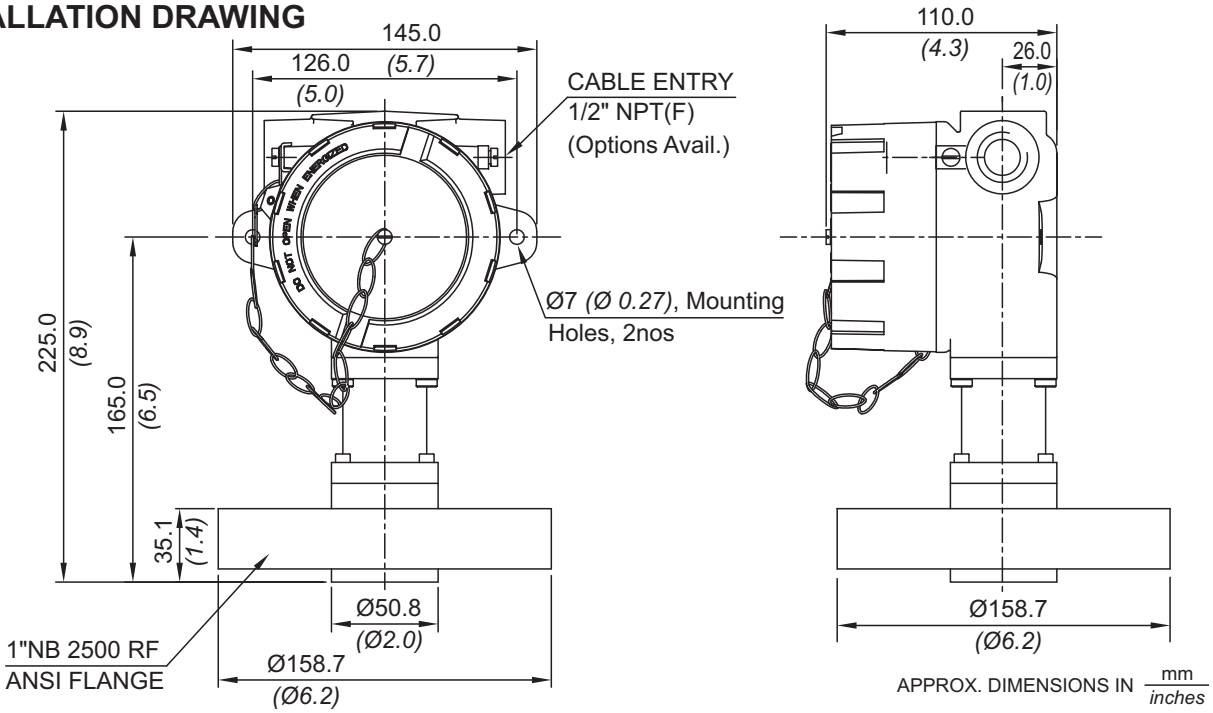


No. Description

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

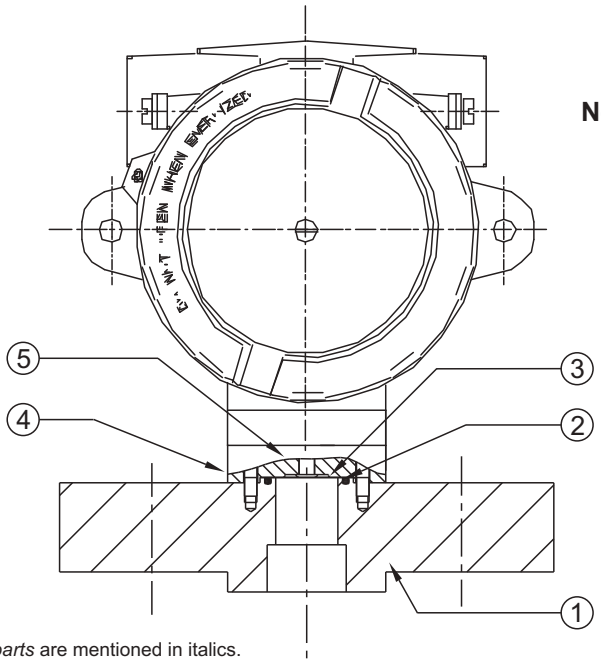


APPROX. DIMENSIONS IN mm / *inches*

Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

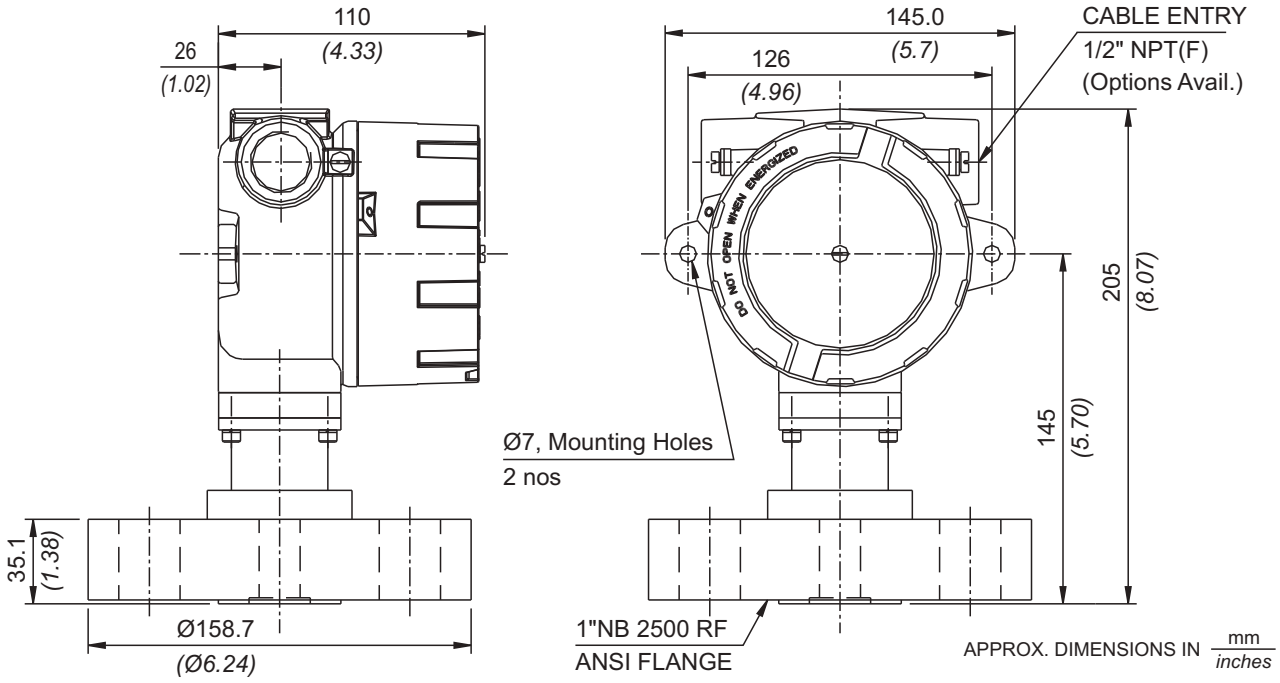


No. Description

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/FE FLANGED PRESSURE SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar *(psi)*	Differential* bar *(psi)* Approximate Maximum for "A1" microswitch	Maximum Working Pressure bar *(psi)*
H01	0.1 - 1.0 *(1.45 - 14.50)*	0.10 *(1.45)*	As per the class of flange
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)*	Please consult Sales Office in case you need clarification on availability of maximum working pressure for a particular range.
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 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.

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*
150 #										
1" NB	AC	BS	DI	EY	GO	IE	JU	LK	NA	OQ
2" NB	AF	BV	DL	FB	GR	IH	JX	LN	ND	OT
300#										
1" NB	AI	BY	DO	FE	GU	IK	KA	LQ	NG	OW
2" NB	AL	CB	DR	FH	GX	IN	KD	LT	NJ	OZ
2500#										
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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**A1** = ANSI Flanged pressure switch, fixed differential without scale **A2** = ANSI Flanged pressure switch, fixed differential with scale in bar **A3** = ANSI Flanged pressure switch, fixed differential with scale in psi	**H01** = 0.1 - 1.0 **H02** = 0.1 - 1.5 **H03** = 0.2 - 2.6 **H04** = 0.2 - 3.6 **H07** = 0.5 - 7.0 **H10** = 0.5 - 10.0 **H15** = 1.0 - 15.0 **H30** = 5.0 - 25.0 **H4T** = 5 - 40 **H1H** = 10 - 100 **H2H** = 7 - 200	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please contact Sales Office for more microswitch options * Please refer note under Range Selection Table	Please select as per Flange Code Table	**0** = Neoprene **1** = Teflon **2** = SS316L **3** = Hastelloy C **4** = Monel 400 **5** = Titanium **6** = Tantalum

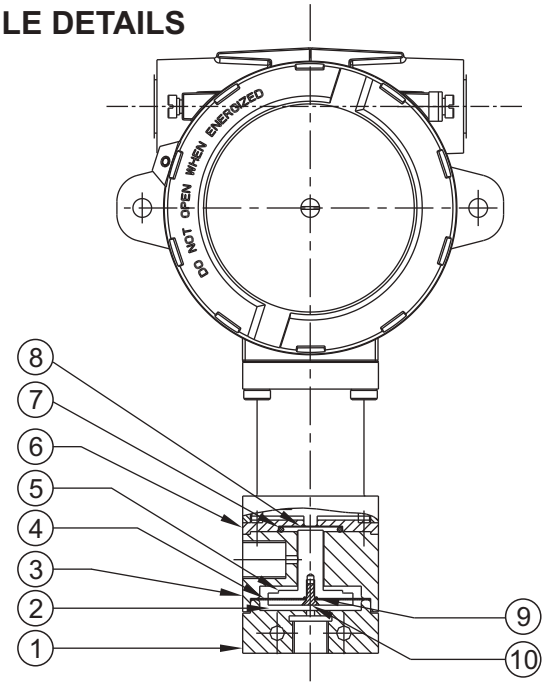
eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing with an ANSI flange, having 0.5 bar to 7 bar pressure range, with 15 Amp. microswitch, 1" NB 150# RF SS316L flange & SS316L diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
☐	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

PRESSURE CAPSULE DETAILS

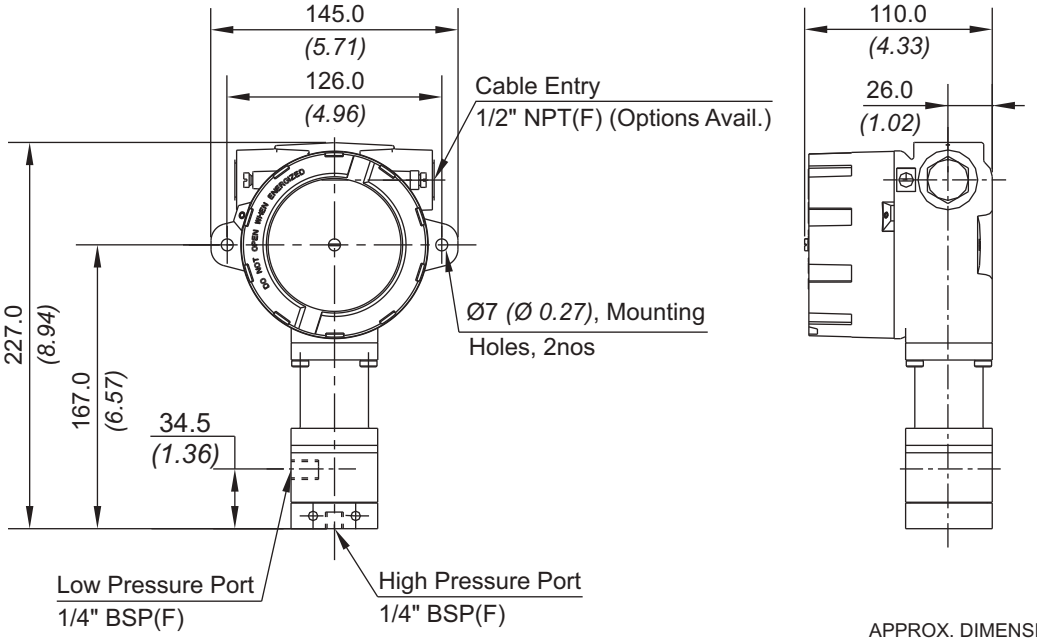


No. Description

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

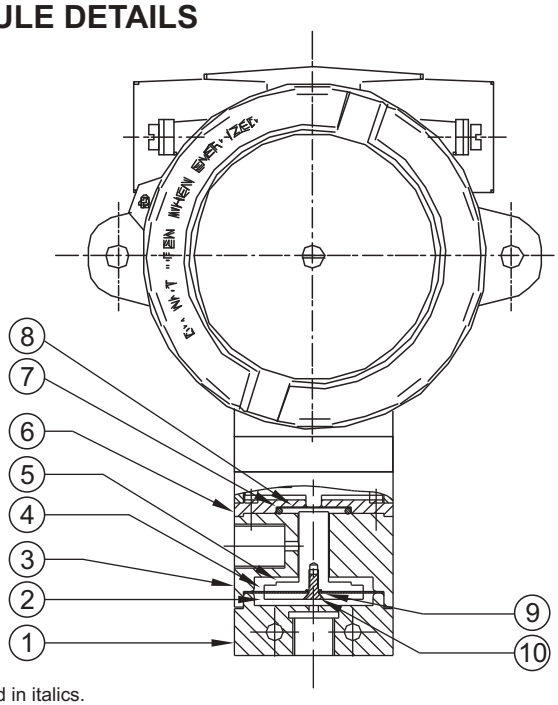


APPROX. DIMENSIONS IN mm / *inches*

Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

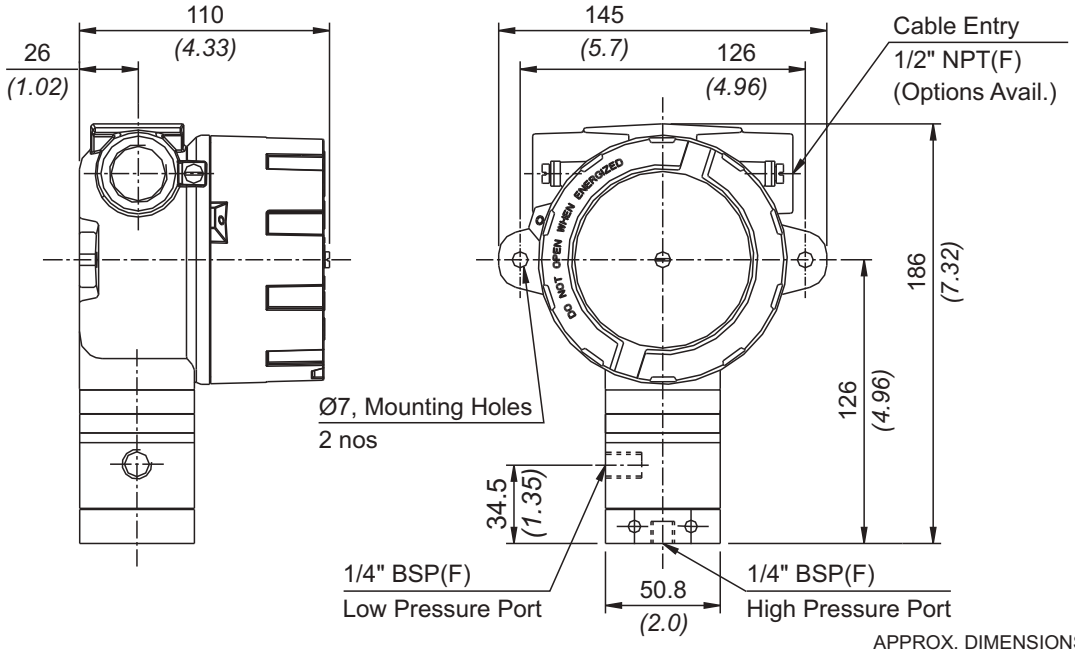


No. Description

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 mm / *inches*

FC/FE HIGH RANGE PRESSURE DIFFERENCE 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)*	0.12 *(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 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 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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**D1** = pressure difference switch, fixed differential without scale **D2** = pressure difference switch, fixed differential with scale in bar **D3** = pressure difference switch, fixed differential with scale in psi	**H01** = (0.1 - 1.0) **H02** = (0.1 - 1.5) **H03** = (0.2 - 2.6) **H04** = (0.2 - 3.6)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options For additional wetted parts please contact Sales Office	**0** = Neoprene **1** = Teflon

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 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
☐	FC	1	D1	H01	A1	S1	0

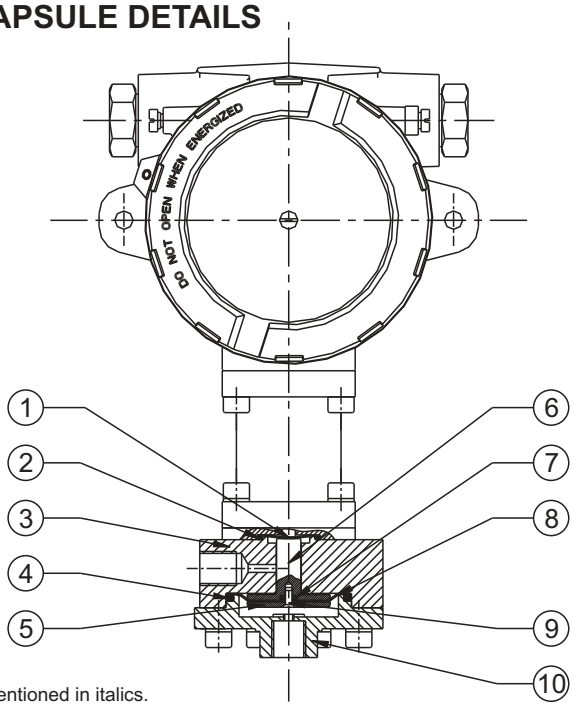
Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

Bulletin No. KA170615

FC/FE HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE SWITCHES

FC

PRESSURE CAPSULE DETAILS

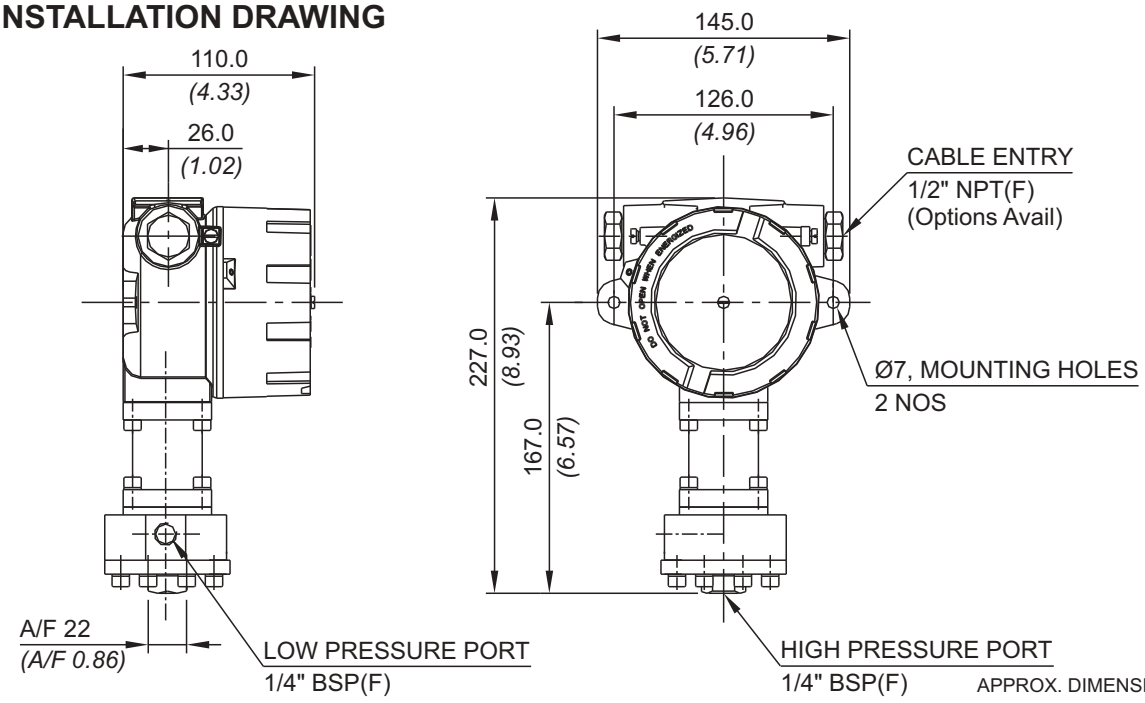


No. Description

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

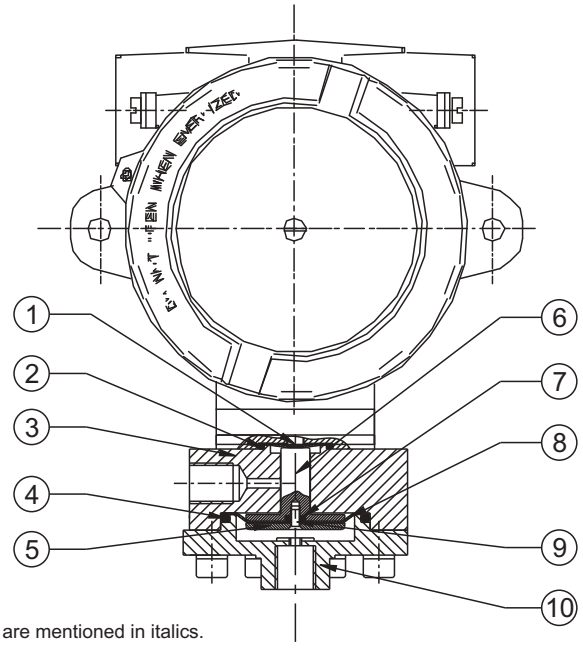


APPROX. DIMENSIONS IN mm / *inches*

Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

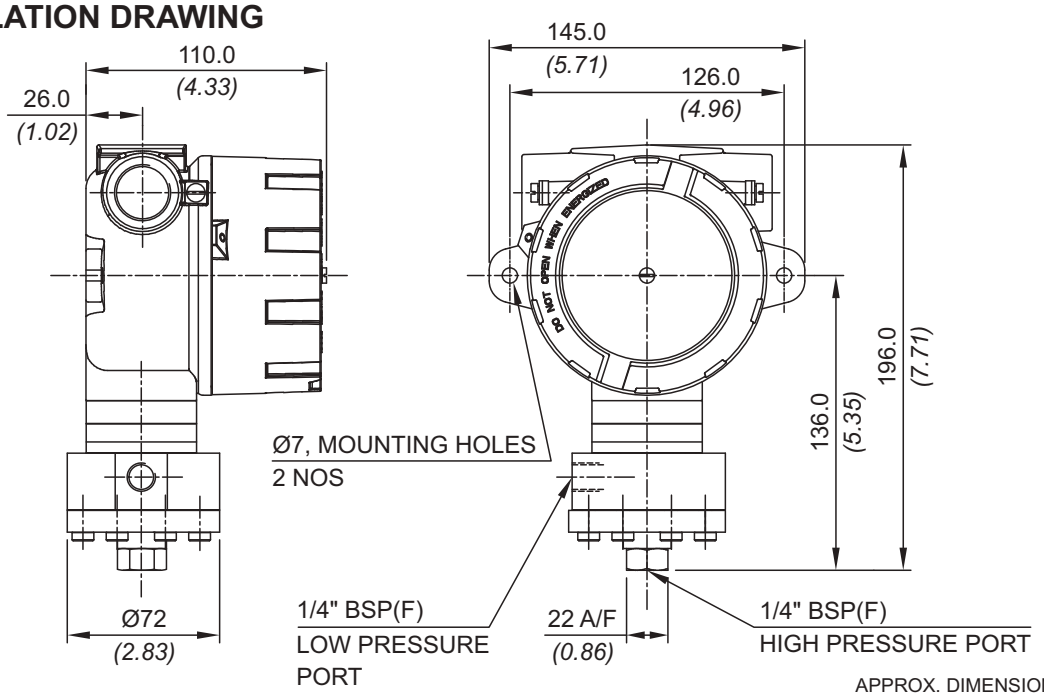


No. Description

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



APPROX. DIMENSIONS IN mm / *inches*

FC/FE HIGH PROOF HIGH RANGE PRESSURE DIFFERENCE 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)*	0.24 *(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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**D1** = pressure difference switch, fixed differential without scale **D2** = pressure difference switch, fixed differential with scale in bar **D3** = pressure difference switch, fixed differential with scale in psi	**P01** = (0.1 - 1.0) **P02** = (0.1 - 1.5) **P03** = (0.2 - 2.6) **P04** = (0.2 - 3.6)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options For additional wetted parts please contact Sales Office	**0** = Neoprene **1** = Teflon

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 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

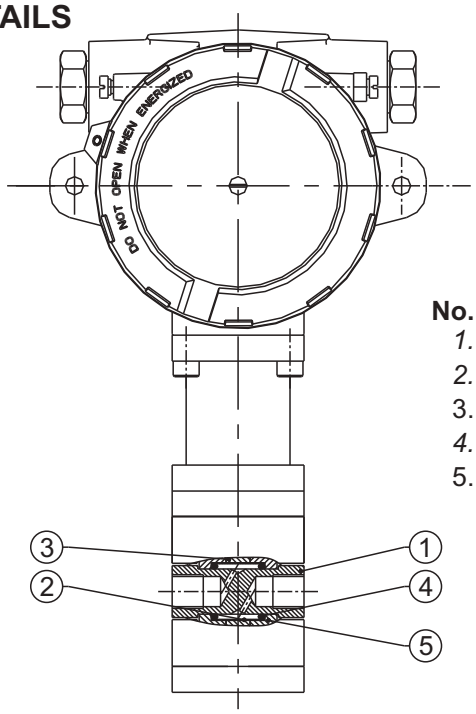
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
☐	FC	1	D1	P01	A1	S1	0

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.

Bulletin No. KA170615

FC

PRESSURE CAPSULE DETAILS

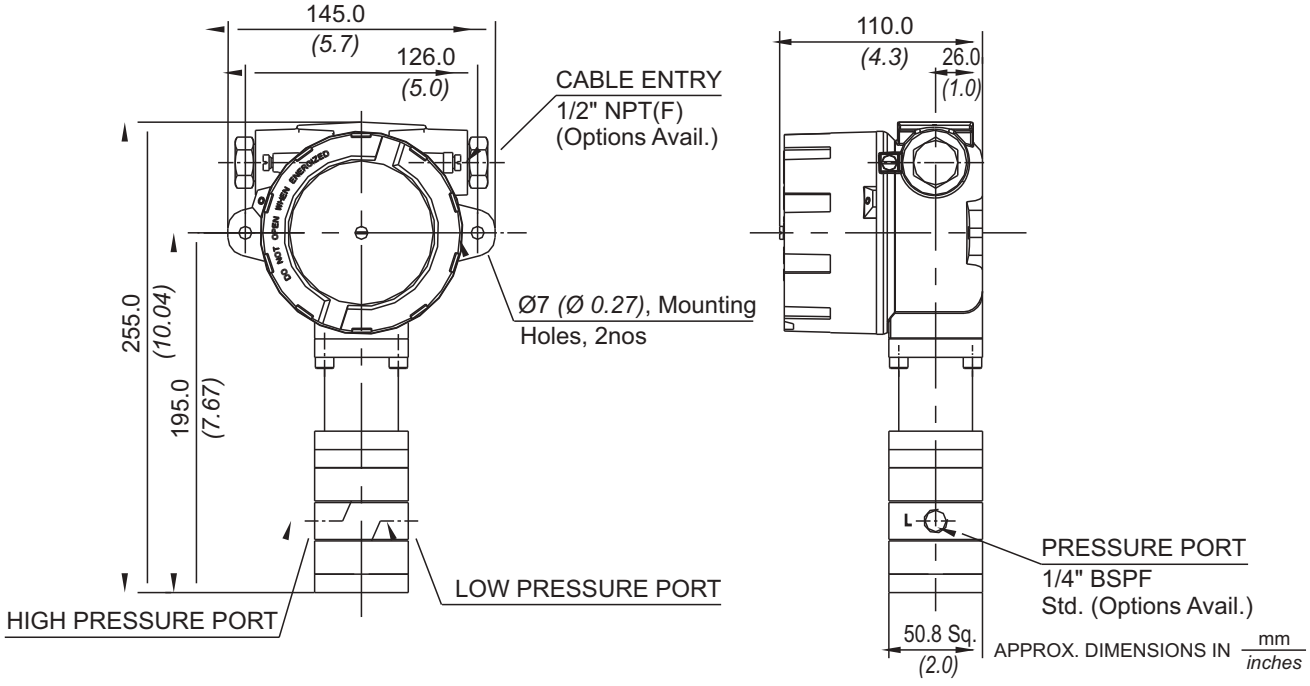


No. Description

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

Note : *wetted parts* are mentioned in italics.

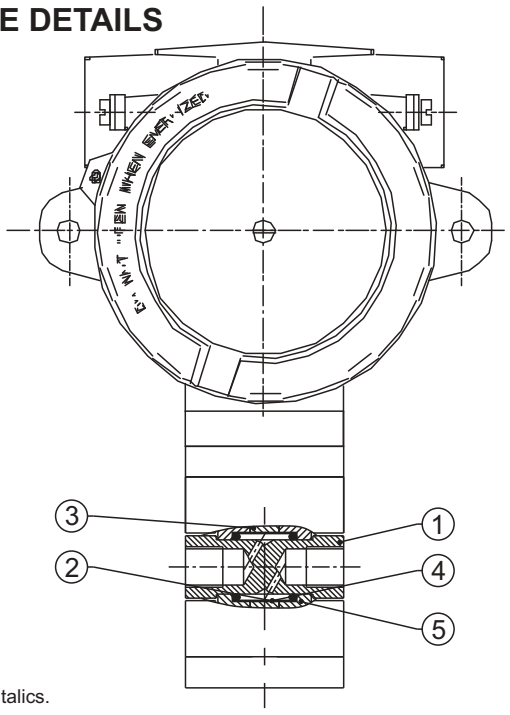
INSTALLATION DRAWING



Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

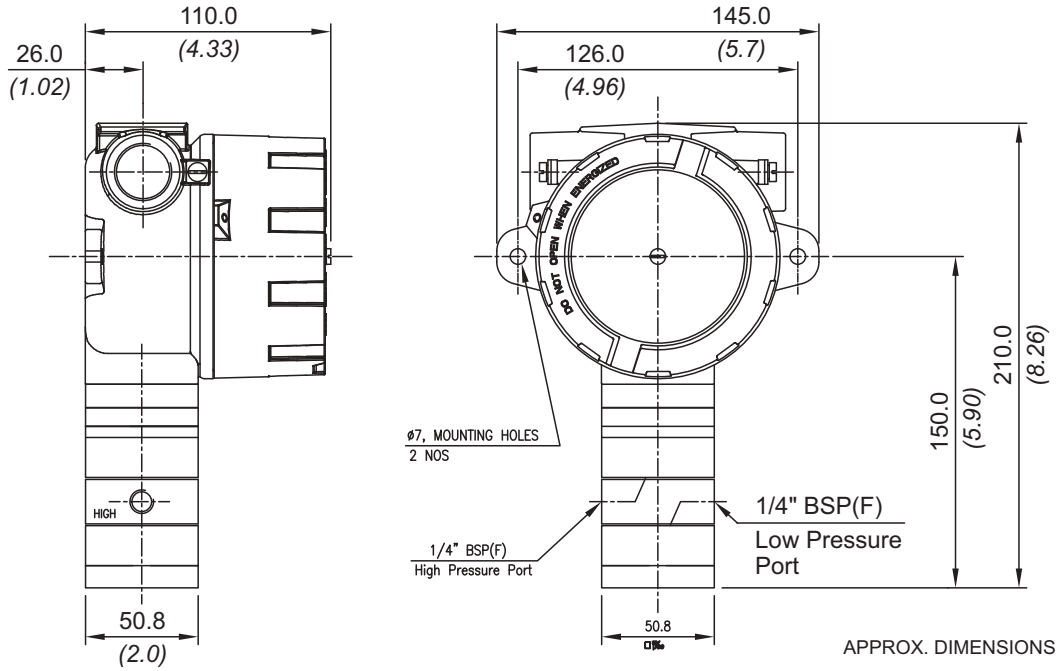


No. Description

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

Note : *wetted parts* are mentioned in italics.

INSTALLATION DRAWING



APPROX. DIMENSIONS IN mm / *inches*

FC/FE 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 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 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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**D1** = pressure difference switch, fixed differential without scale **D2** = pressure difference switch, fixed differential with scale in bar **D3** = pressure difference switch, fixed differential with scale in psi	**D01** = (0.1 - 1.0) **D02** (0.1 - 1.5) **D03** = (0.2 - 2.6) **D04** = (0.2 - 3.6) **D07** = (0.5 - 7.0) **D10** = (0.5 - 10.0) **D15** = (1.0 - 15.0) **D30** = (5.0 - 25.0)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) **N1** = Monel / ¼" BSP(F) **N2** = Monel / ¼" NPT(F) **I1** = Inconel / ¼" BSP(F) **I2** = Inconel / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options For additional wetted parts please contact Sales Office	**0** = Neoprene **1** = Teflon **2** = SS316L **4** = Monel **7** = Inconel

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 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
☐	FC	1	D1	D01	A1	S1	0

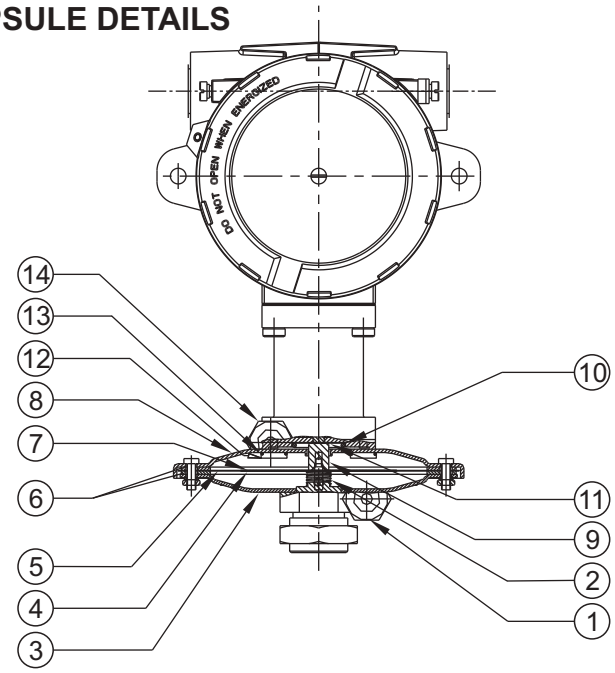
Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

Bulletin No. KA170615

FC/FE LOW RANGE PRESSURE DIFFERENCE SWITCHES

FC

PRESSURE CAPSULE DETAILS



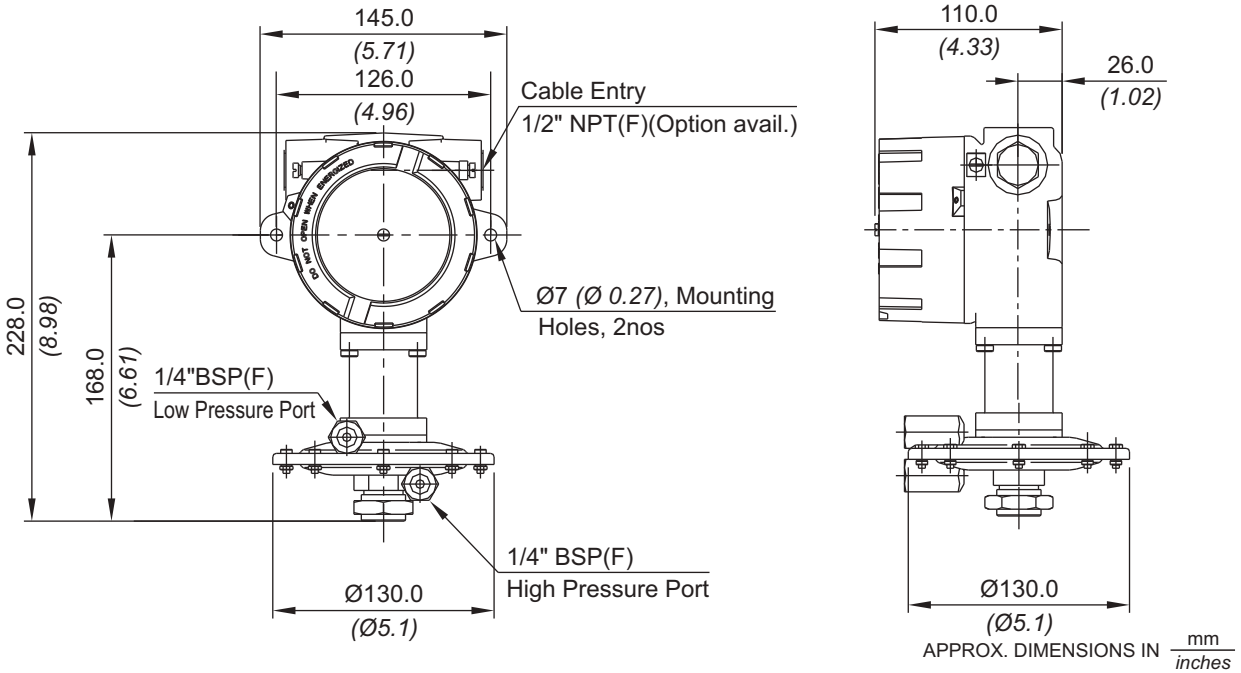
No. Description

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

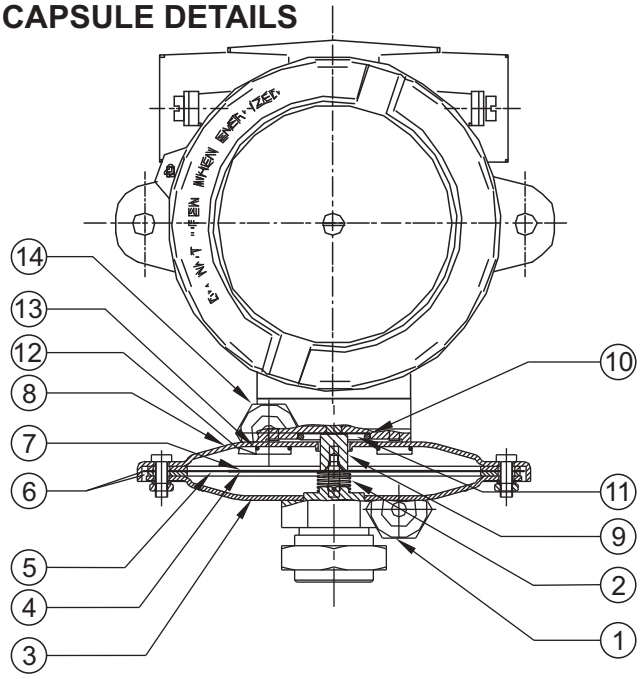


APPROX. DIMENSIONS IN mm / *inches*

Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS



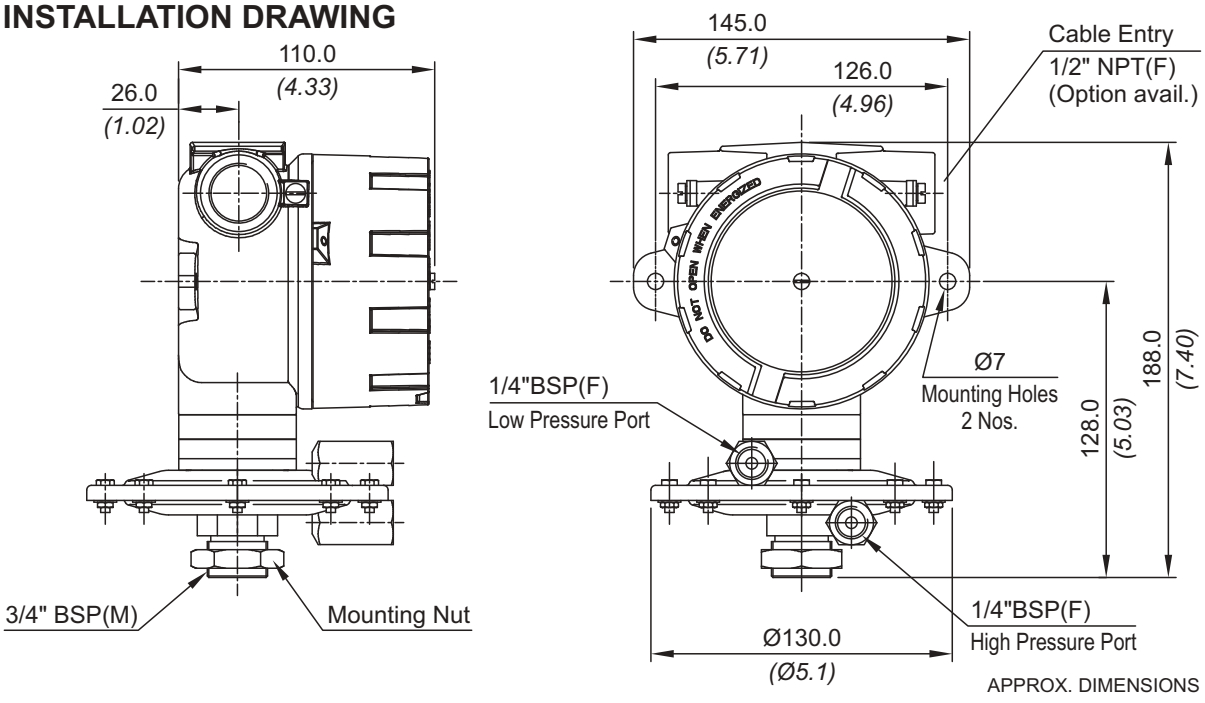
No. Description

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 mm / *inches*

FC/FE 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 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 FLAMEPROOF LOW RANGE PRESSURE DIFFERENCE SWITCHES

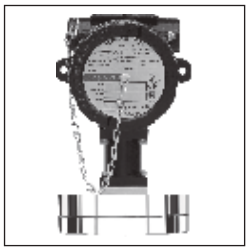
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Non standard allocation	Gas Group Classification	Cable Entry Size	Switch Type	Range Code (values in mbar)	Microswitch Type	Pressure Port Material / Size	Diaphragm
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**D1** = pressure difference switch, fixed differential without scale **D2** = pressure difference switch, fixed differential with scale in mbar **D3** = pressure difference switch, fixed differential with scale in "wc	**L02** = (1.5 - 15) **L03** = (5 - 25) **L05** = (10 - 50) **L10** = (10 - 100) **L15** = (10 - 150) **L25** = (20 - 250) **L35** = (50 - 350)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options For additional wetted parts please contact Sales Office	**0** = Neoprene **1** = Teflon

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, 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
☐	FC	1	D1	L03	A1	S1	0

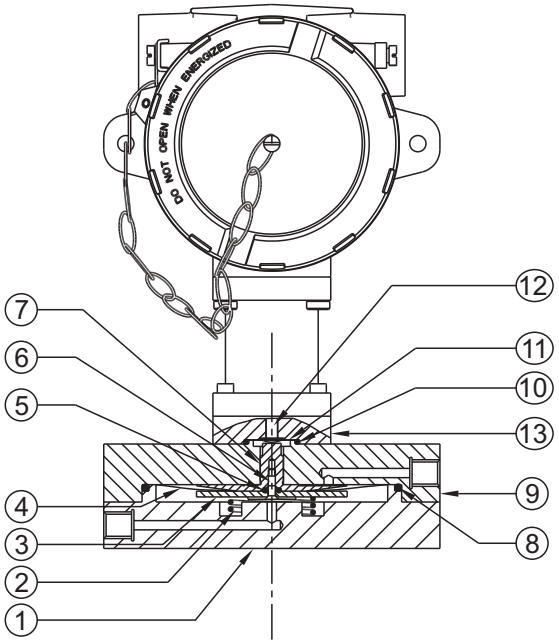
Please specify full model number to avoid ambiguity. If only the first two groups are specified while ordering, uncalibrated switches with standard wetted parts and enclosures will be supplied.

Bulletin No. KA170615



FC

PRESSURE CAPSULE DETAILS

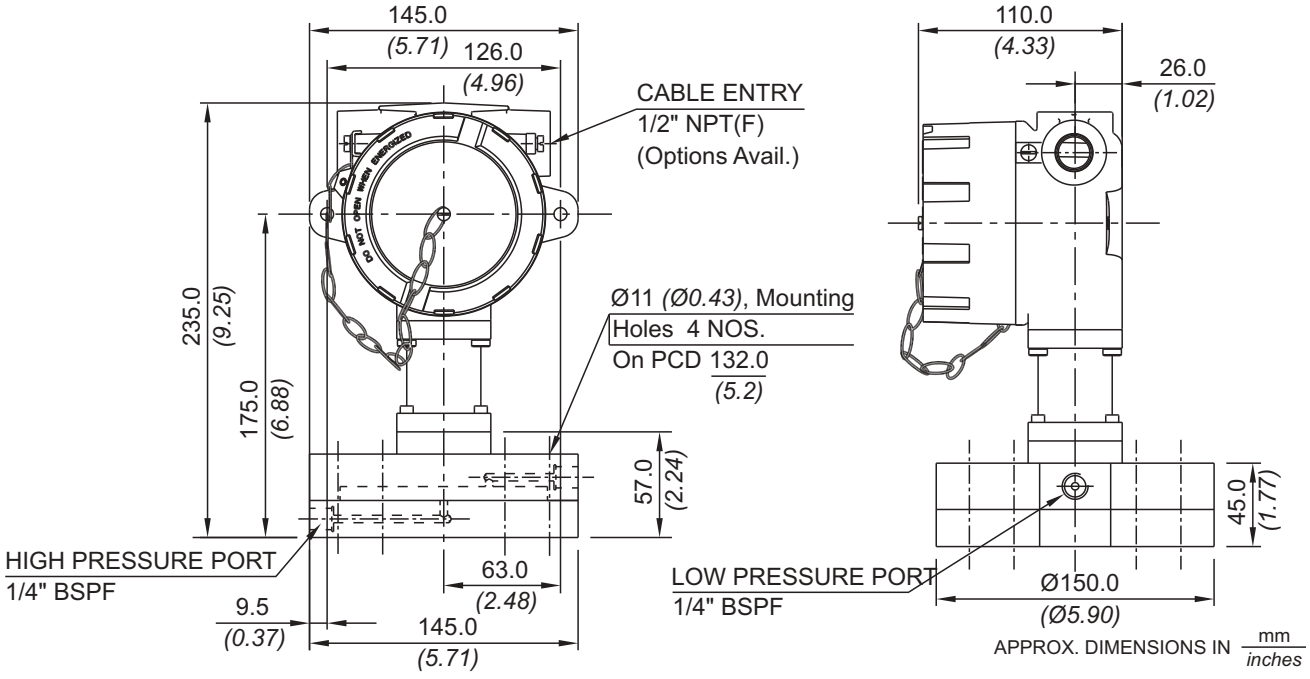


No. Description

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.

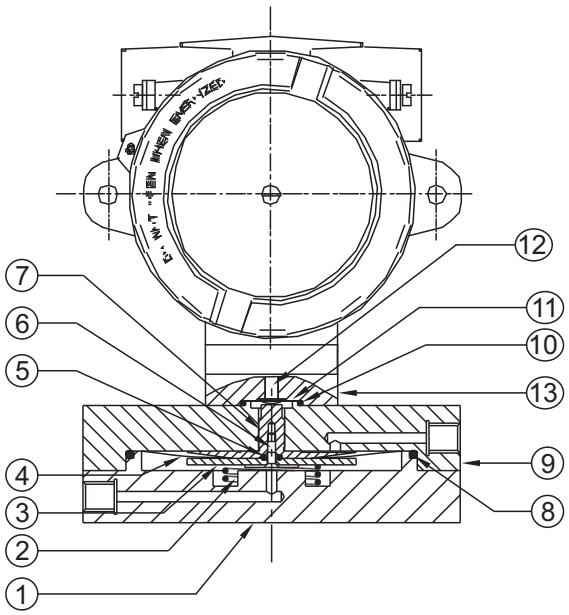
INSTALLATION DRAWING



Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

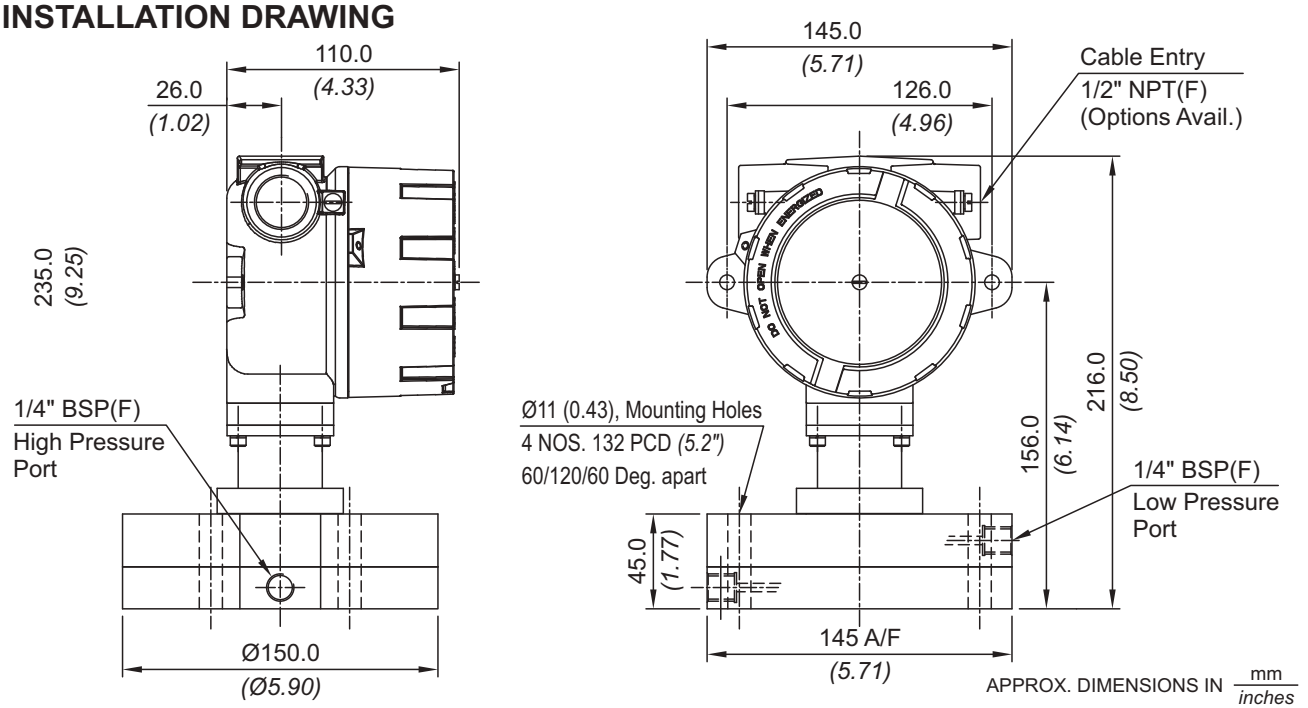


No. Description

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



APPROX. DIMENSIONS IN mm / *inches*

FC/FE LOW ΔP 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 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 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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**D1** = pressure difference switch, fixed differential without scale **D2** = pressure difference switch, fixed differential with scale in mbar **D3** = pressure difference switch, fixed differential with scale in "wc	**M03** = (5 - 25) **M05** = (10 - 50) **M10** = (10 - 100) **M15** = (10 - 150) **M25** = (20 - 250) **M35** = (50 - 350)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options	**0** = Neoprene **1** = Teflon For additional wetted parts please contact Sales Office

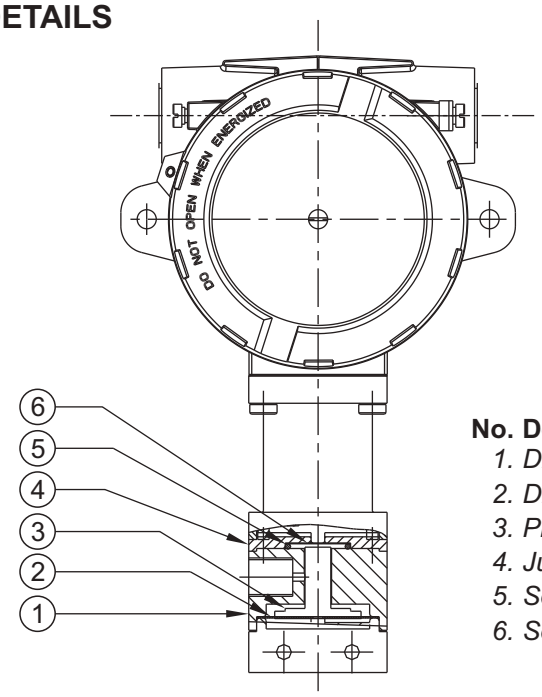
eg. A flameproof switch for gas group IIC, with ½" NPT cable entry in aluminium housing as 1SPDT pressure switch, having 20 mbar to 250 mbar pressure range, with 15 Amp. microswitch, SS316 pressure housing with ¼" BSP port size & neoprene diaphragm shall be specified by

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
☐	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

PRESSURE CAPSULE DETAILS

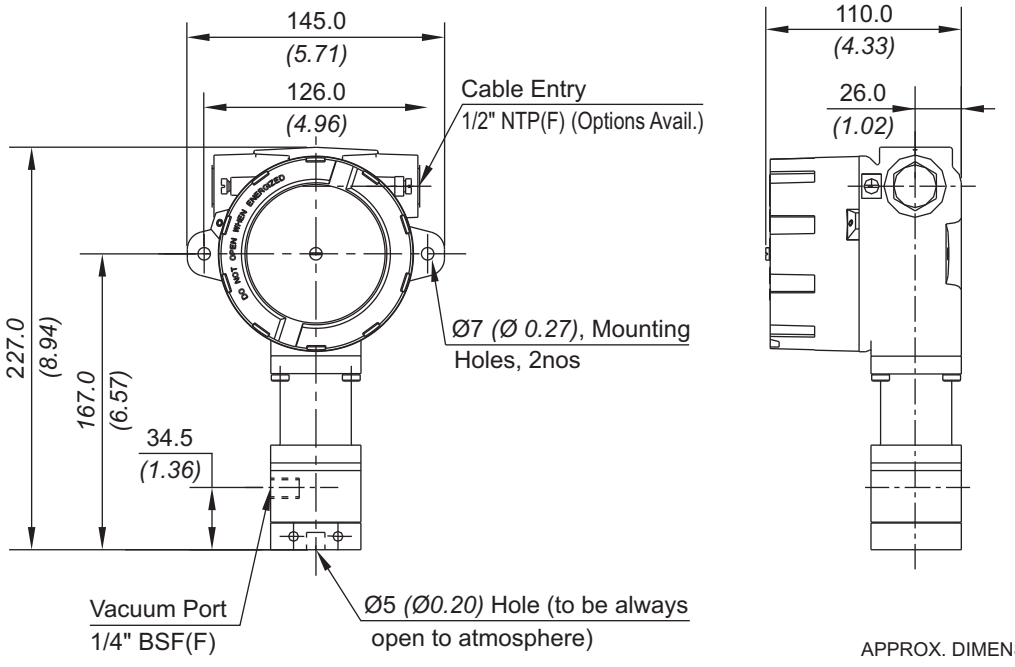


No. Description

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

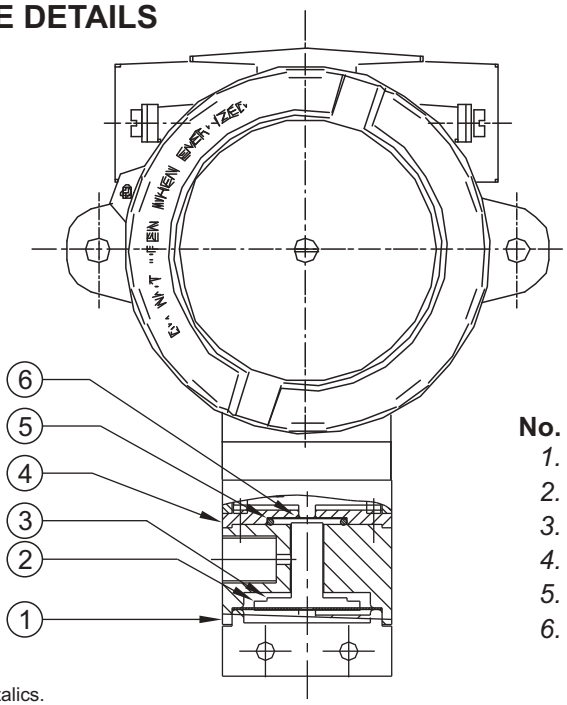


APPROX. DIMENSIONS IN mm / *inches*

Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

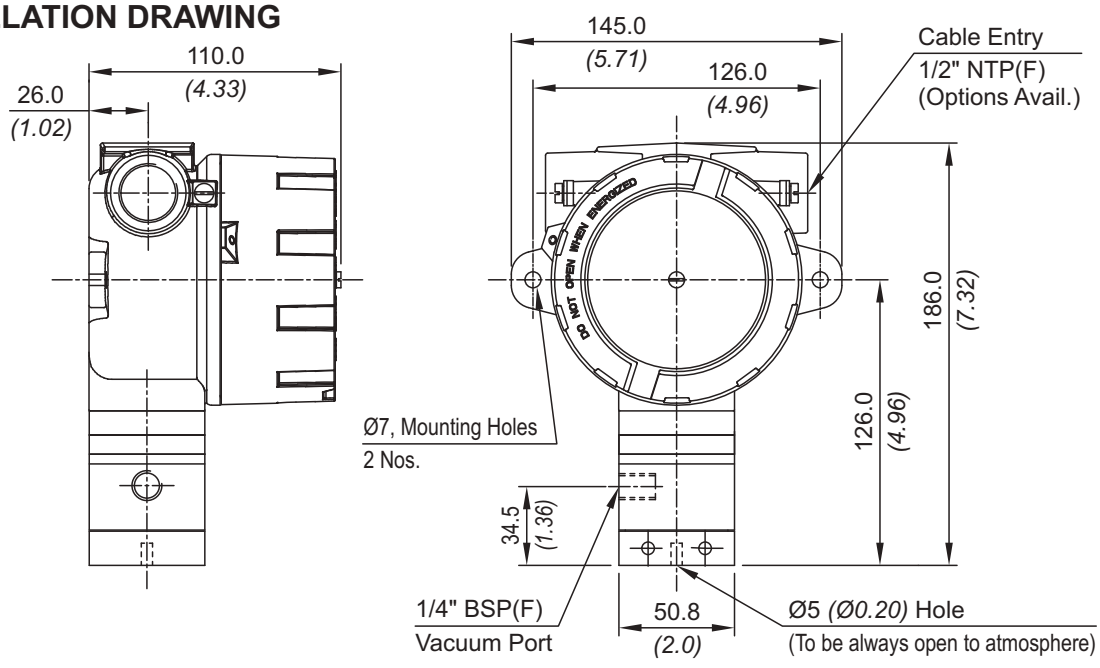


No. Description

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 mm / *inches*

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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**V1** = vacuum switch, fixed differential without scale	**V00** = († 760 - 100)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options For additional wetted parts please contact Sales Office	**0** = Neoprene **1** = Teflon

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

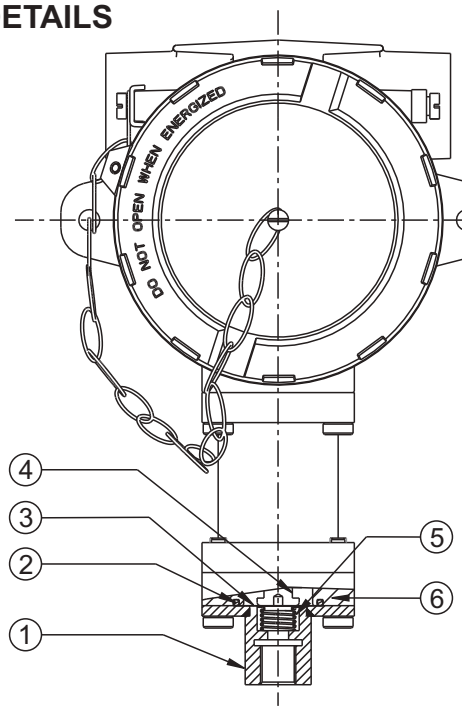
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
☐	FC	1	V1	V00	A1	S1	0

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.

Bulletin No. KA170615

FC

PRESSURE CAPSULE DETAILS

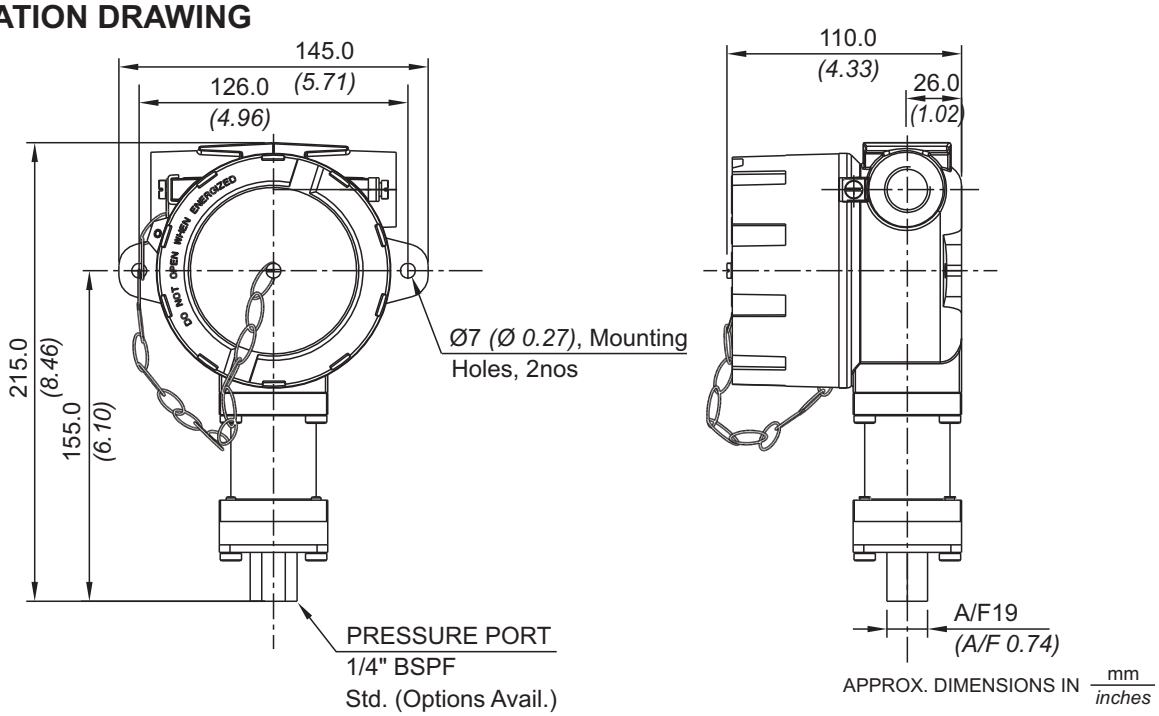


No. Description

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.

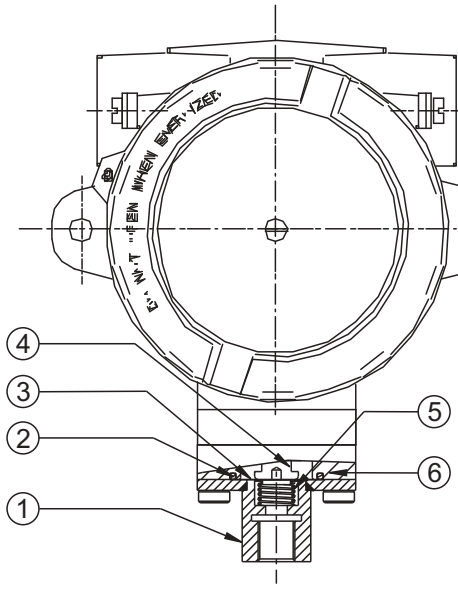
INSTALLATION DRAWING



Orion® INSTRUMENTS

FE

PRESSURE CAPSULE DETAILS

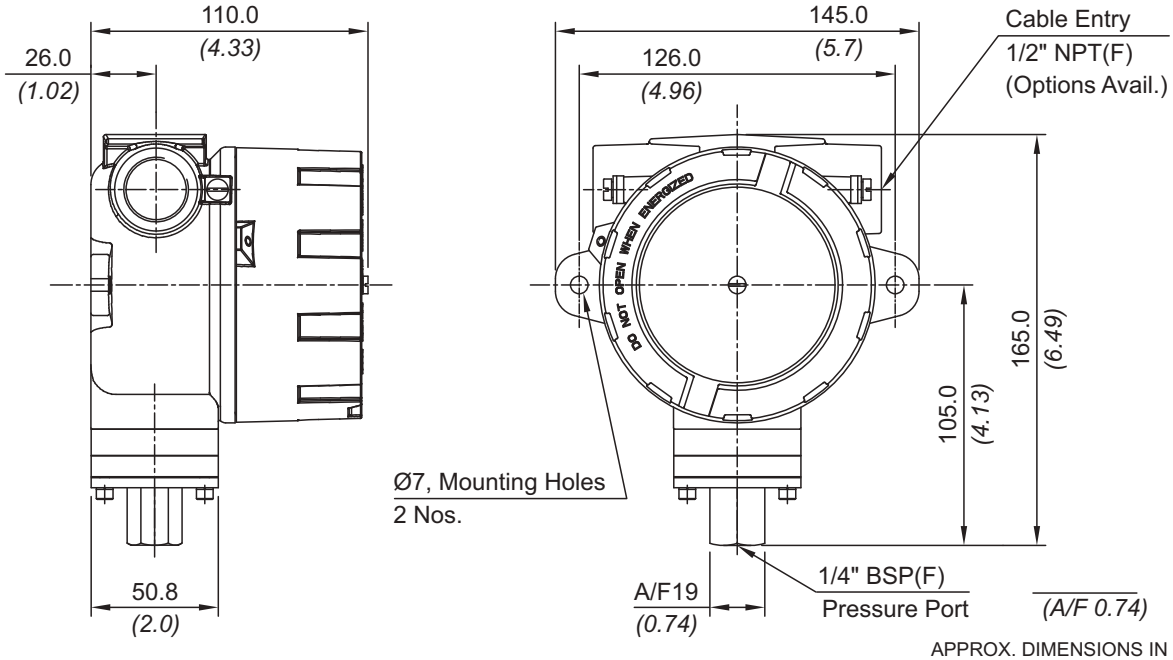


No. Description

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



APPROX. DIMENSIONS IN mm / *inches*

FC/FE HIGH RANGE COMPOUND SWITCHES

RANGE SELECTION TABLE

Range Code	Range bar *(psi)*	Differential* bar *(psi)*	Maximum Working Pressure bar *(psi)*
		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 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 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
☐ Reserved for non-standard options not covered in catalogue. Will be given by manufacturer, only after agreement of supply details with customer.	**FC** = Flameproof pressure switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **4** = Grey CI head ½" NPT threads **5** = Grey CI head ¾" NPT threads **6** = Grey CI head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**C1** = compound switch, fixed differential without scale	**C01** = (-1 to 1.0) **C03** = (-1 to 2.6) **C04** = (-1 to 3.6)	**A1** = General purpose microswitch rated at 15 A; 250 VAC ***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** = 2SPDT switching elements ***A9** = General purpose microswitch rated at 5 A; 250 VAC Please refer Page No. 69 for Microswitch options * Please refer note under Range Selection Table	**S1** = SS316 / ¼" BSP(F) **S2** = SS316 / ¼" NPT(F) Please refer Page No. 68 for Pressure Port options	**0** = Neoprene **1** = 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

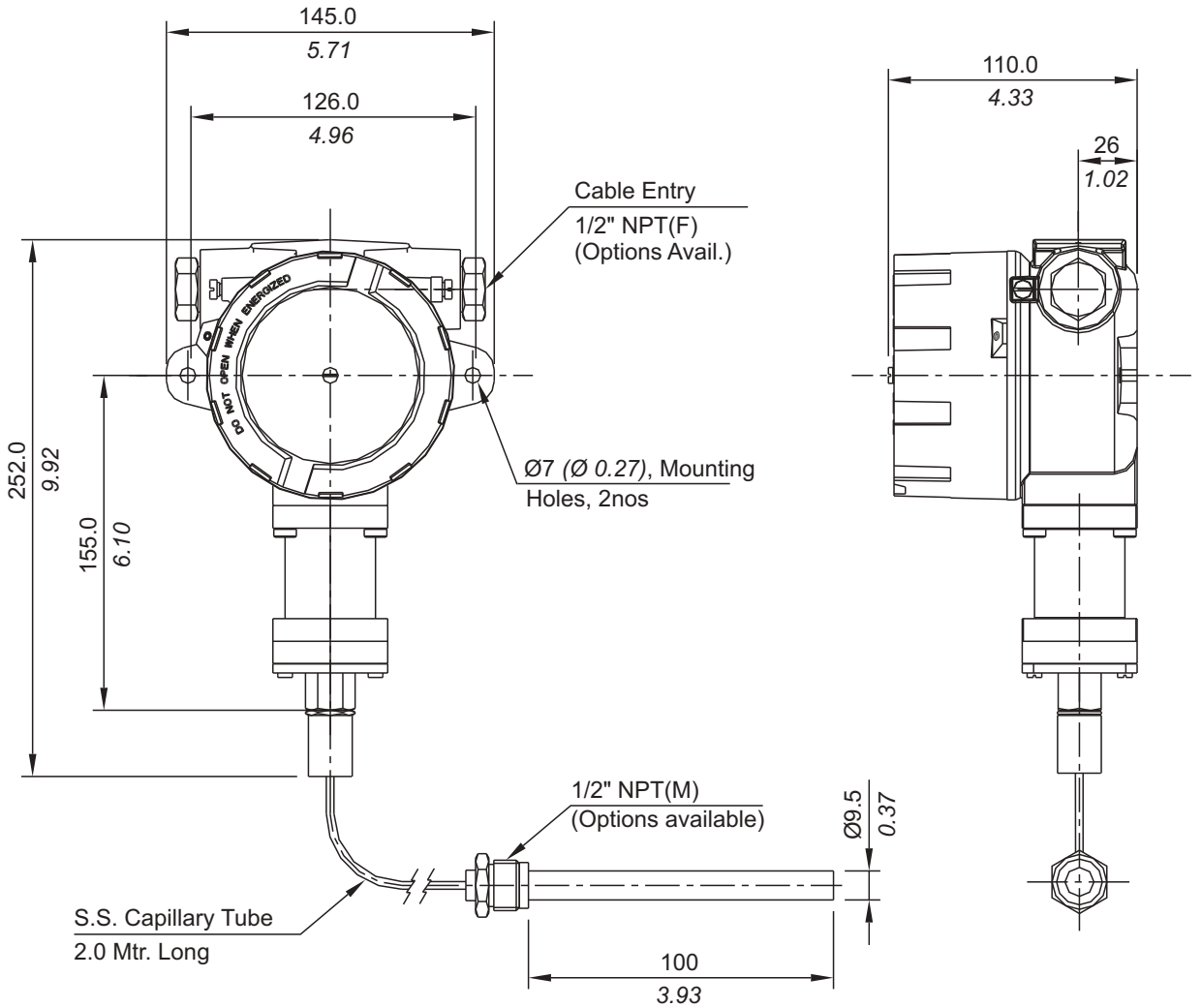
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
☐	FC	1	C1	C01	A1	S1	0

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.

Bulletin No. KA170615

FC

INSTALLATION DRAWING

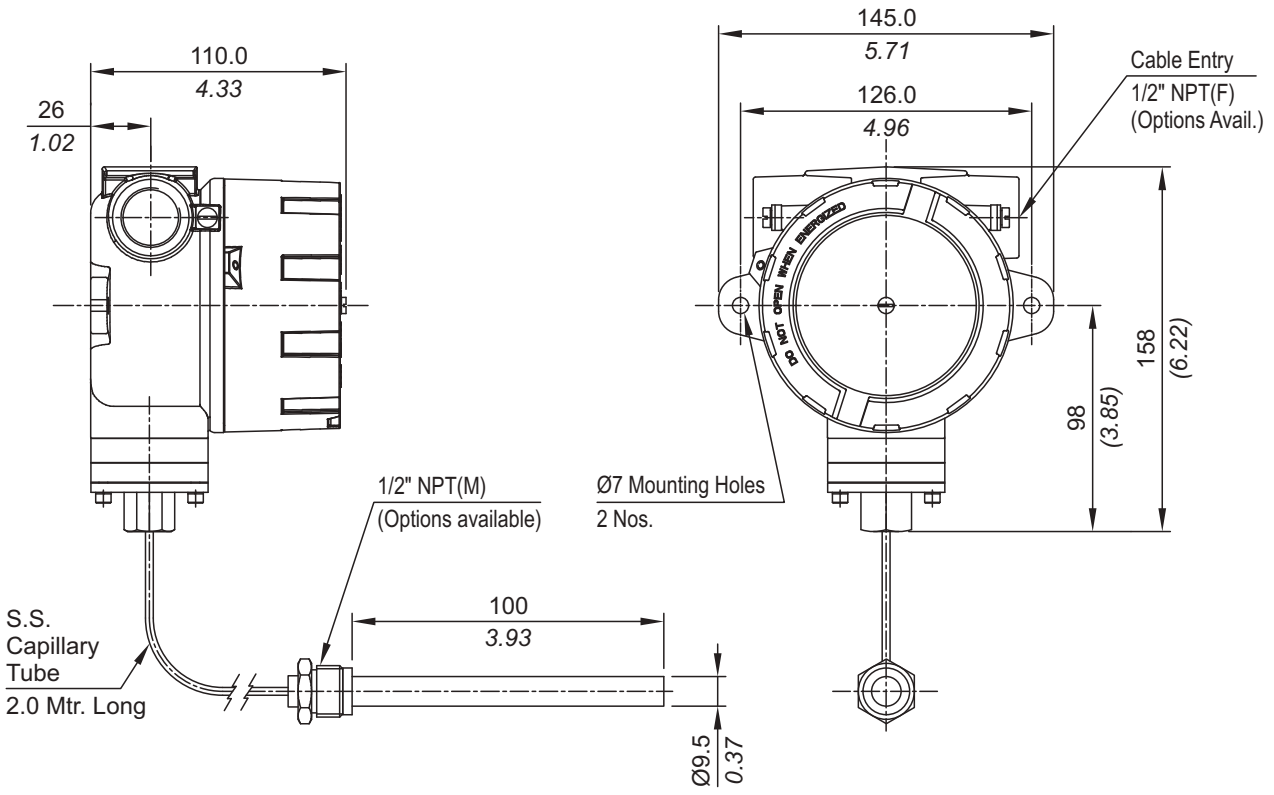


APPROX. DIMENSIONS IN mm / inches

Orion® INSTRUMENTS

FE

INSTALLATION DRAWING



APPROX. DIMENSIONS IN mm / *inches*

FC/FE 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. Diffferentials 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
☐ Reserved for Non-standard Options not covered in Catalogue. Will Be given by Manufacturer, Only after Agreement of Supply details With customer.	**FC** = Flameproof temperature switch, ATEx & IECEx approved, with Aluminium head as per IS/IEC 60079-1 for Gas Gr. IIC **FE** = IP66 Flameproof pressure switch, KLPL approved	**1** = Al. head ½" NPT threads **2** = Al. head ¾" NPT threads **3** = Al. head M20 x 1.5 threads **7** = SS head ½" NPT threads **8** = SS head ¾" NPT threads **9** = SS head M20 x 1.5 threads	**T1** = Temperature Switch, fixed differential without scale **T2** = Temperature Switch, fixed differential with scale in °C	**T1H** = 25 - 90 **T2H** = 70 - 150 **T3H** = 120 - 215	**A1** = General purpose microswitch rated at 15 A; 250 VAC **A6** = Elements with adjustable differential **A7** = 2SPDT switching elements **B6** = Hermetically Sealed Gold Plated contact 2SPDT	**B1** = Brass / Dia. 9.5 mm, 123 mm length, with 3/8" BSP (M) thermowell connection **B2** = Brass / Dia. 9.5 mm, 123 mm length, with 3/8" NPT (M) thermowell connection **B3** = Brass / Dia. 9.5 mm, 123 mm length, with 1/2" NPT (M) thermowell connection	**2** = 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
☐	FC	1	T1	T1H	A1	B1	2

Please specify full model number to avoid ambiguity.

PRESSURE PORT OPTIONS FOR FC/FE

Material	Stainless Steel (SS)			Hastelloy C				
Pressure Port Code	**S3**	**S4**	**S5**	**H1**	**H2**	**H3**	**H4**	**H5**
Size	**1" BSP(M)**	**½" NPT(F)**	**½" NPT(M)**	**¼" BSP(F)**	**¼" NPT(F)**	**1" BSP(M)**	**½" NPT(F)**	**½" NPT(M)**
Flameproof Switches								
FC/FE High Pressure Range	✓	✓	✓	✓	✓	✓	✓	✓
FC/FE High Proof High Range	✗	✓	✓	✓	✓	✗	✓	✓
FC/FE Low Pressure Range	✗	✗	✗	✗	✗	✗	✗	✗
FC/FE Hydraulic Range	✗	✓	✓	✓	✓	✗	✗	✗
FC/FE High Range Pressure Difference	✗	✗	✗	✓	✓	✗	✗	✗
FC/FE High Proof High Range Pressure Difference	✗	✗	✗	✓	✓	✗	✗	✗
FC/FE High Range DP	✗	✗	✗	✗	✗	✗	✗	✗
FC/FE Low Range Pressure Difference	✗	✗	✗	✗	✗	✗	✗	✗
FC/FE Low ΔP High Proof	✗	✗	✗	✗	✗	✗	✗	✗
FC/FE Vacuum Range	✗	✗	✗	✓	✓	✗	✗	✗
FC/FE Compound Range	✗	✗	✗	✓	✓	✗	✗	✗

Material	Monel				
Pressure Port Code	**N1**	**N2**	**N3**	**N4**	**N5**
Size	**¼" BSP(F)**	**¼" NPT(F)**	**1" BSP(M)**	**½" NPT(F)**	**½" NPT(M)**
Flameproof Switches					
FC/FE High Pressure Range	✓	✓	✓	✓	✓
FC/FE High Proof High Range	✓	✓	✗	✓	✓
FC/FE Low Pressure Range	✗	✗	✗	✗	✗
FC/FE Hydraulic Range	✓	✓	✗	✗	✗
FC/FE High Range Pressure Difference	✓	✓	✗	✗	✗
FC/FE High Proof High Range Pressure Difference	✓	✓	✗	✗	✗
FC/FE High Range DP	✓	✓	✗	✗	✗
FC/FE Low Range Pressure Difference	✗	✗	✗	✗	✗
FC/FE Low ΔP High Proof	✗	✗	✗	✗	✗
FC/FE Vacuum Range	✓	✓	✗	✗	✗
FC/FE Compound Range	✓	✓	✗	✗	✗

✓ - Available ✗ - Not Available

MICROSWITCH OPTIONS

Sr. No.	Switch Type	Description	Rating AC			Rating DC		
			Res.	Ind.	Voltage	Res.	Ind.	Voltage
1	A1	General purpose	15	-	125/250/480	-	-	-
2	A2	1SPDT Hermetically sealed Silver	4	-	115	4	2	28
3	A3	Gold plated contacts	1	-	125/250	-	-	-
4	A4	DPDT configuration	10	-	125/250	0.3/0.15	-	125/250
5	A5	High DC rating	-	-	-	10/3	-	125/250
6	A6	Adjustable deadband	15	-	115/250	1	-	24
7	A7	2 SPDT	5	-	250	5	3	28
8	A8	General purpose	5	-	125/250	5	3	28
9	A9	General purpose	15	-	125/250	-	-	-
10	B1	General purpose AC/ DC	15	-	125/250/480	0.25/0.5	-	125/250
11	B2	2SPDT Hermetically sealed Silver	2	2	115	4	2	28
12	B3	2SPDT Gold plated	1	-	125	1	0.5	30
13	B4	Manual reset	15	-	125/250/480	-	-	-
14	B5	1SPDT Hermetically sealed, gold plated contact	-	-	-	1	0.25	28
15	B6	2SPDT Hermetically sealed, gold plated contact	-	-	-	1	0.25	28
16	B7	2 SPDT	15	-	125/250	-	-	-

MICROSWITCH OPTIONS

Sr. No.	Switch Type	Description	Rating AC			Rating DC		
			Res.	Ind.	Voltage	Res.	Ind.	Voltage
17	B9	2 SPDT Adjustable	5	-	125/250	-	-	-
18	C6	1SPDT Adjustable Differential	5	-	250	5	3	28
19	C7	2SPDT Adjustable Differential	5	-	250	5	3	28
20	D1	Orion Hermatically Sealed SPDT 15A	15	-	125/250/480	-	-	-
21	D2	Orion Hermetically sealed Silver 1 SPDT	5	-	125/250	5	3	28
22	D4	Orion Hermetically sealed DPDT config	10	-	125/250	0.3/0.15	-	125/250
23	D5	Orion Hermetically sealed Silver 2 SPDT (Sub miniature)	5	-	125/250	5	3	28
24	D6	Orion Hermetically sealed Gold 2 SPDT (Sub Sub Miniature)	1	-	125	1	0.25	28
25	D7	Orion Hermetically sealed Silver 2SPDT	7	-	250	7	4	28
26	D8	Orion Hermetically sealed Gold plated 1 SPDT	1	-	125	1	0.5	30
27	D9	Orion Hermetically sealed Gold Plated Contact DPDT (Sub miniature)	1		125/250	1	0.5	30

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
- HASTELLOY C4
- HASTELLOY C22
- HASTELLOY C276
- INCONEL ALLOY 600
- MONEL ALLOY 400
- MONEL ALLOY K500
- NICKEL
- PLATINUM
- TANTALUM
- TITANIUM
- ZIRCONIUM
- SILVER
- PTFE

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.

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, Hysterisis):- 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 "hysterisis".

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.

Step1.

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.