



# DIFFERENTIAL PRESSURE SWITCHES

306  
386

- VERY LOW RANGES ● GOOD REPEATABILITY ●
- TAMPERPROOF SET POINT ADJUSTER WITH LOCKING DEVICE ●
- WEATHERPROOF OR FLAMEPROOF HOUSING ● RUGGED DESIGN ●



STYLE 306 IN GK FLAMEPROOF ENCLOSURE



STYLE 306 IN GM WEATHERPROOF ENCLOSURE

Series 300 Pressure Difference Switches are designed and made to the latest standards to comply with current international philosophy of process instrumentation. The series is compact, easy to install and features high sensitivity over the entire adjustable range together with high static

pressure capability. The sensing element is mounted external to the switch mechanisms which are of stainless steel for arduous atmospheres and high humidity. Enclosures, sensing element and switching modes can be combined to offer the variety needed to suit the different applications.

## GENERAL SPECIFICATIONS

<b>Enclosure</b>		<b>Switching Differential</b>	Fixed; refer Tables 'A' & 'B'.
<b>GM</b>	Aluminium pressure die cast weatherproof to IP:66	<b>Max. Working Pressure</b>	Refer Table-4
<b>GA</b>	304 / 316 SS, investment cast, weatherproof to IP:66	<b>Ambient Temperature</b>	(-)25°C to (+)60°C
<b>GK</b>	Aluminium die cast, weatherproof to IP:66 & flameproof to Gr.IIA, IIB or IIC (Note 1)	<b>Max. Process Temp.</b>	70°C. For higher temperatures use longer impulse lines (Note 15)
<b>Ranges</b>	Several standard ranges between (-)0.6 mbar to 4 bar		Ask for piping nomogram #441184-4
<b>Sensor</b>	Nitrile Diaphragm	<b>Connection</b>	
<b>Wetted Parts</b>	Aluminium std.	<b>Process</b>	1/4" NPTF Std. Others through Adaptor
	Optional - 304 SS / 316 SS for B3D, B6D & C6D ranges only	<b>Electrical</b>	3/4" ETF Std. 1/2" NPTF optional. Dual entry on request.
<b>Repeatability</b>	± 1% FSR (Note 4)	<b>Mounting</b>	Back panel/wall/Field. Vertical position only
<b>Scale Accuracy</b>	± 5% FSR (Note 6)	<b>Conformity</b>	Generally to BS 6134:1991
<b>Switching Element</b>	Instrument quality SPDT microswitch (Notes 10 & 11)		

# ORDERING MATRIX

## ENCLOSURE

Aluminium pressure die cast weatherproof to IP:66 with Nitrile gasket. — **GM**

304 / 316 SS investment cast weatherproof to IP:66 with overall size as style GM – for aggressive atmospheres. Fit for offshore. — **GA**

Aluminium die cast flameproof cum weatherproof. CIMFR approved to Gr.IIA, IIB & IIC of IS:2148:2004 for flameproofness and IP:66 for weatherproofness. — **GK**

## MODEL

This is the basic differential pressure switch having close, fixed non-adjustable switching differential actuated by a non-metallic diaphragm. — **306**

A variant of series 306, employs twin levers each operating a SPDT microswitch actuated by a single sensor through a unique linkage there by providing two independent adjustable set points, each with its own setting scale, spring and switch. Minimum separation between setpoints must be more than sum of on-off differentials or 10% of FSR whichever is higher. — **386**

## MATERIALS OF WETTED PARTS

Nitrile diaphragm with Aluminium wetted parts — **B5**

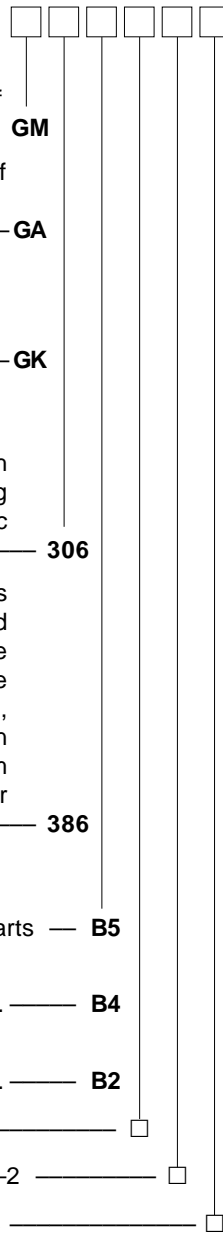
Nitrile diaphragm with 304 SS pressure chambers. (Ranges B3D, B6D & C6D only). — **B4**

Nitrile diaphragm with 316 SS pressure chambers. (Ranges B3D, B6D & C6D only). — **B2**

**RANGE CODE :** Refer Table-1

**SWITCH CODE AND RATING :** Refer Table-2

**ELECTRICAL ENTRY CODE :** Refer Table-3



**Table-1 : RANGE CODE & AVAILABILITY**

RANGE CODE	RANGE	306	386
B2D	(-)0.6 to (+)0.6 mbar	✓	✗
B3D	(-)2.5 to (+)2.5 mbar	✓	✗
B6D	0 to 5 mbar	✓	✗
C6D	3 to 25 mbar	✓	✗
E1D	5 to 120 mbar	✓	✓
E8D	50 to 350 mbar	✓	✓
G5B	0.1 to 1.5 bar	✓	✓
J0B	0.2 to 4 bar	✓	✓

**Table-2 : SWITCH CODE, RATING & AVAILABILITY**

SWITCH CODE (SPDT)	AC RATING	DC RATING IN AMPS						AVAILABILITY OF SPDT IN MODELS	AVAILABILITY OF DPDT IN MODELS
		RESISTIVE			INDUCTIVE				
		220V	110V	24V	220V	110V	24V		
D	15A 250 / 125V	0.2	0.4	2.0	0.02	0.03	1.0	306 & 386	306
3	15A 250 / 125V	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	306 & 386	306
4	1A 125V	N.A.	0.5	0.5	N.A.	0.25	0.25	306 & 386	306
5	5A 250 / 125V	0.2	0.4	4.0	0.2	0.4	3.0	306	306
6	0.1A 125V	N.R.	N.R.	0.1	N.R.	N.R.	N.A.	306 & 386	306
7	N.R.	N.R.	N.R.	1.0	N.R.	N.R.	0.5	306	306
8	5A 250 / 125V	N.A.	N.A.	5.0	N.A.	N.A.	3.0	306	306
J	5A 250V	N.A.	N.A.	5.0	N.A.	N.A.	3.0	306	306
K	1A 125V	N.A.	N.A.	1.0	N.A.	N.A.	0.5	306	306
E	15A 250 / 125V	0.30	0.75	15.0	0.2	0.4	10.0	306	---
F	15A 250 / 125V	0.30	0.75	15.0	0.2	0.4	10.0	306	---
S	5A 250 / 125V	0.25	0.5	3.0	0.1	0.2	2.0	306	306

Codes 3 & D - For General purpose usages. Code 4 - With Gold alloy contact. Code 5 - For General purpose with good DC rating. Code 6 - With Gold alloy contact (Low Rating) Code 7 - Environmentally sealed switch with Gold plated contact. Code 8 - Environmentally sealed switch with Silver alloy contact. Code J - Hermetically sealed, inert gas filled with Silver alloy contact. Code K - Hermetically sealed, inert gas filled with Gold plated contact. Codes E & F - Manual reset switch. Auto change over on rising and falling pressure respectively. Resetting is Manual. Code S - IP:67 sealed microswitch with silver Nickel contact.

For DPDT, change switch code '3' to '33', '4' to '44', etc., while ordering

N.A. - Not Available N.R. - Not Recommended

**Table 3 : ELECTRICAL ENTRY CODE**

Size *	Single Entry		Dual Entry	
	GM/GA	GK	GM/GA	GK
3/4" ETF	A	A	M	M
1/2" NPTF	B	B	N	N
3/4" NPTF	C	---	O	---
M20 x 1.5 **	D	D	P	P
M16 x 1.5	E	---	Q	---
Through Connector				
3 pin plug	2	---	---	---
7 pin plug	3	---	---	---
9 pin plug	4	---	---	---

\* Cable gland available on request.  
\*\* Cable Entry is optional. Available on request.

**Table 4 : MAXIMUM WORKING PRESSURE RATING**

Range Codes	Wetted Parts	MWP (bar)
B2D	Aluminium	0.5
B3D, B6D, C6D	Aluminium	1
	304 / 316 SS	15
E1D, E8D, G5B, J0B	Aluminium	15

## SWITCHING DIFFERENTIAL DATA

**TABLE : A — GM / GA Enclosures**

Range Code	Range	On-off Differential in mbar						
		Fixed						
		Models 306						Model 386
		3/6	D/4	5	7/8/S	J / K	D/3/4/6	
B2D	(-)0.6 to (+)0.6 mbar	0.4	0.5	0.7	---	---	---	
B3D	(-)2.5 to (+)2.5 mbar	0.8	0.9	1.5	---	---	---	
B6D	0 to 5 mbar	0.4	0.6	1.4	---	1.0	---	
C6D	3 to 25 mbar	0.8	**	**	---	**	---	
E1D	5 to 120 mbar	12	12	12	---	30	30	
E8D	50 to 350 mbar	20	20	25	60	45	60	
G5B	0.1 to 1.5 bar	70	70	90	250	135	150	
J0B	0.2 to 4 bar	250	300	600	700	675	500	

● Multiply values in Table-A by 1.3 for DPDT (2 x SPDT) switching.

\*\* For on-off differential values please consult factory.

**TABLE : B — GK Enclosure**

Range Code	Range	On-off Differential in mbar					
		Fixed					
		Models 306					Model 386
		3/6	D/4	5	7/8/S	J / K	D/3/4/6
B2D	(-)0.6 to (+)0.6 mbar	0.7	0.9	1.2	---	---	---
B3D	(-)2.5 to (+)2.5 mbar	1.4	1.6	2.5	---	---	---
B6D	0 to 5 mbar	0.8	1.0	2.4	---	1.7	---
C6D	3 to 25 mbar	1.0	**	**	---	**	---
E1D	5 to 120 mbar	20	20	16	---	50	40
E8D	50 to 350 mbar	35	35	40	100	75	85
G5B	0.1 to 1.5 bar	120	120	150	425	230	240
J0B	0.2 to 4 bar	425	500	800	1200	1145	680

- Multiply values in **Table-B** by **1.2** for DPDT (2 x SPDT) switching.
- \*\* For on-off differential values please consult factory.

**NOTES**

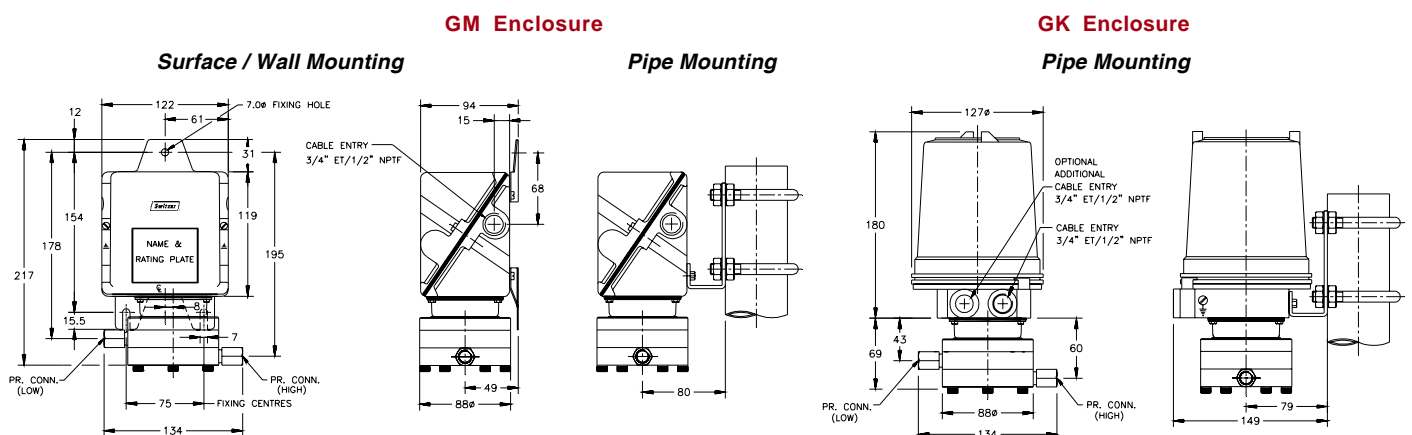
- Gr.IIA & IIB of IS:2148 is equivalent to NEC CL.1, Gr.C & D. Gr.IIC of IS:2148 is equivalent to NEC CL.1, DIV.1, Gr.A & B.
- Style GM/GA is weatherproof only if all entries and joint faces are properly sealed. Style GK is weatherproof only if cover 'O' ring is retained in position and flameproof only if proper FLP cable gland is used. It is recommended to procure cable glands along with GK instruments to avoid neglect of it during installation.
- Intrinsic Safety (Exi) — Differential Pressure switches are classified as simple apparatus as they neither generate nor store energy. Hence differential pressure switches in weatherproof (GM / GA) enclosures also may be used in intrinsically safe systems without certification provided the power source is certified Intrinsically Safe. Because of the low voltages and currents it is recommended to use gold contact and / or sealed contacts.
- Accuracy & Repeatability are not different for all blind differential pressure switches. A shift of ±2% may be observed in setpoint when pressure falls from full static pressure. Settings will also shift with varying temperature.
- The instrument is calibrated in the mounting position depicted in the drawing. Mounting in any other direction will cause a minor range shift, especially in low and compound ranges. Ranges above 1 bar will not experience this shift.
- A Differential Pressure switch is a switching device and not a measuring instrument — even though it has a scale with ±5% FSR accuracy to assist setting. For this reason, Test Certificates will not contain individual ON-OFF switching values at different

scale readings. Maximum differential obtained alone will be declared, besides other specifications.

- Select working range of the instrument such that the set value lies in the mid 35% of the range i.e., between 35% and 70% of range span.
- For switching differential values please refer respective Differential Table. Switching differentials furnished are nominal values under test conditions at mid-scale and will vary with range settings and operating conditions.
- On and off settings should not exceed the upper or lower range value.
- DPDT action is achieved by two SPDT switches synchronised to practical limits i.e., ±2% of FSR. Deadband for DPDT contacts are higher than that of SPDT as force required to actuate the contacts are more. Please refer respective differential table.
- Contact life of microswitches are  $5 \times 10^5$  switching cycles for nominal load. To quench DC sparks, use diode in parallel with inductance, ensuring polarity. A 'R-C' network is also recommended with 'R' value in Ohms equal to coil resistance and 'C' value in micro Farads equal to holding current in Amps.
- All differential pressure switches are calibrated by applying pressure to HI port, venting LO port to atmosphere. Inspection will also be limited to such a practice.
- Ambient temperature range: All models are suitable for operating within a range of ambient temperature from (-) 25°C to (+) 60°C provided the process does not freeze within this range. Below 0°C, precautions should be taken in humid atmospheres to prevent frost formation inside the instrument from jamming the mechanism. Occasional excursions beyond this range are possible but accuracy might be impaired. The microswitch is the limiting factor which should never exceed the limits (-) 50°C to (+) 80°C.
- Fluid Temperature: A Differential Pressure switch when connected to the process is not subjected to through flow and therefore is not fully exposed to the fluid temperature. Use of adequate length of impulse piping will greatly reduce excessive heating of the sensing element. For example connection of 7.5 cm of 12 mm dia impulse piping will reduce water temperature of 100°C to 65°C at an ambient temperature of 50°C. Ask factory for piping nomogram #441184-4 for different temperatures.
- Ensure that impulse pipework applies no stress on sensing element housing and use spanners to hold pressure port / housing when connections are made.
- Custom built instruments are available for special service requirements under Special Engineering Category.
- For higher static pressures upto 250 bar stainless steel wetted parts, refer to series 301 Differential Pressure Switches.
- Complementary instrumentation for pressure is available in 200 series.
- Accuracy figures are exclusive of test equipment tolerance on the claimed values.**
- All performance data are guaranteed to ±5%.**

**OVERALL AND MOUNTING DIMENSIONS**

**Range Codes : E1D, E8D, G5B & JOB**





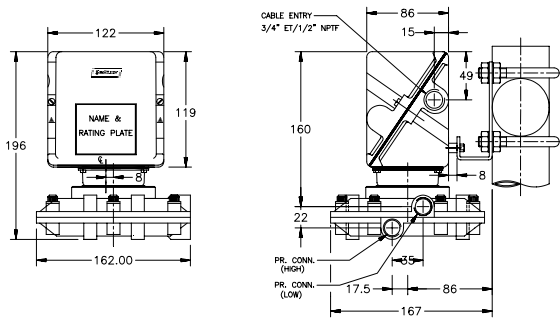
# OVERALL AND MOUNTING DIMENSIONS

Range Codes : B3D, B6D & C6D

## Pipe Mounting

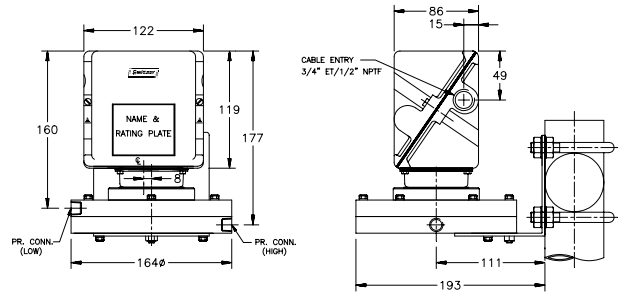
### Alu. Diaphragm Housing

#### GM / GA Enclosure

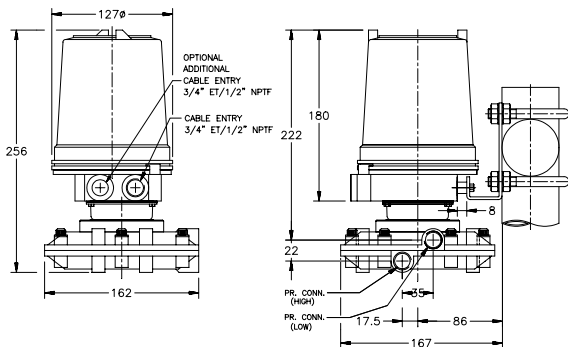


### SS Diaphragm Housing

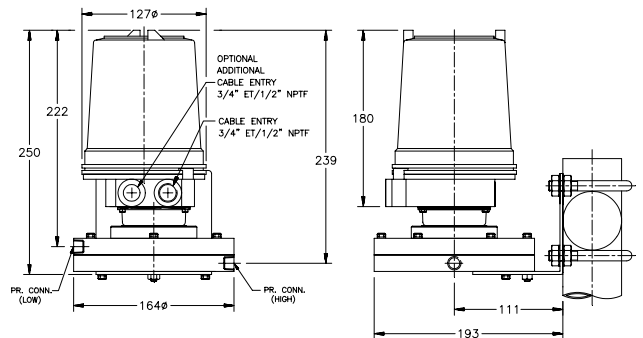
#### GM / GA Enclosure



#### GK Enclosure



#### GK Enclosure



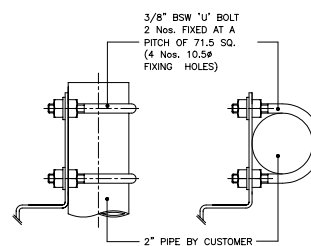
### Notes :

1. Dimensions for **Range Code 'B2D'** is different. Ask for applicable drawing.

2. Pipe mounting bracket can be used for surface / wall mounting also.

Use 2x 3/8" x 25 long screws and nuts for **surface mounting** or coach screws for **wall mounting** instead of 'U' bolts and nuts.

### 2" Pipe Mounting Details



Fixing on Vertical Pipe      Fixing on Horizontal Pipe

All dimensions are in mm

This is not a contractual document. Prior notification of changes in specifications is impracticable due to continuous improvement

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