



Differential pressure switches

306
386

- **Very low ranges** ● **Good repeatability** ●
- **Set point adjuster with locking device** ●
- **Weatherproof or flameproof housing** ● **Robust design** ●



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

Enclosure		Repeatability	±1% FSR, except range code W188. (Note 4)
GM	GM style aluminium pressure die cast, weatherproof to IP66		±2% FSR for range code W188.
GA	GA style 304 stainless steel casting, weatherproof to IP66	Scale Accuracy	± 5% FSR (Note 6)
GA6	GA style 316 stainless steel casting, weatherproof to IP66	Switching Element	Instrument quality SPDT microswitch (Notes 10 & 11)
GK	GK style aluminium pressure die cast, weatherproof to IP66 and flameproof to group IIC as per IS/IEC 60079 (Note 1)	Switching Differential	Fixed; refer Tables A, B & C.
GR	GR style aluminium pressure die cast, weatherproof to IP66 and flameproof to Gr.IIC (Note 1)	Max. Working Pressure	Refer Table-4
Ranges	Several standard ranges between (-)0.6 mbar to 4 bar	Ambient Temperature	(-)25°C to (+)60°C
Sensor	Buna-NDiaphragm	Max. Process Temp.	110°C For higher temperatures use longer impulse lines (Note 15)
Wetted Parts	Aluminium std. Optional – 304 SS / 316 SS for model 306	Process Connection	1/4" NPTF Std. Others through Adaptor
		Electrical Connection	1/2" NPTF standard Dual entry on request
		Mounting	Back panel/wall/Field. Vertical position only
		Conformity	Generally to BS 6134:1991

Ordering matrix

ENCLOSURE

GM style aluminium pressure die cast, weatherproof to IP66	_____	GM
GA style 304 stainless steel casting, weatherproof to IP66	_____	GA
GA style 316 stainless steel casting, weatherproof to IP66	_____	GA6
GK style aluminium pressure die cast, weatherproof to IP66 and flameproof to group IIC as per IS/IEC 60079	_____	GK
GR style aluminium pressure die cast, weatherproof to IP66 and flameproof to group IIC as per IS/IEC 60079	_____	GR

MODEL

Basic differential pressure switch having 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 thereby 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. (Not available with GR enclosure)	_____	386

SENSOR MATERIAL

Buna-N diaphragm	_____	B
EPDM (available only in range code W161, W162, W163 & W188)	_____	E

WETTED PART

Aluminium	_____	5
304 SS	_____	4
316 SS	_____	2

RANGE CODE : Refer Table-1 _____

SWITCH CODE AND RATING : Refer Table-2 _____

ELECTRICAL ENTRY : Refer Table-3 _____

MOUNTING TYPE

Panel	_____	P
Wall	_____	W
2" Pipe	_____	2
Universal	_____	U

MOUNTING MATERIAL

Mild steel	_____	C
316 SS	_____	2

CE CONFORMITY

Non CE conformity	_____	ZZ
CE conformity (not applicable for GR enclosure)	_____	CE

The below "Options" are available, consult sales

- Ammonia service (EPDM 'O' ring mandatory)
- Blow out disc
- Seal 'O' ring – EPDM (MWT 130°C, not available in Buna-N)
- Optional scale accuracy ±2% (not available in GR)

Table-1 : RANGE CODE & AVAILABILITY

RANGE CODE	RANGE	306	386
M009 §	(-)2.5 to (+)2.5 mbar	✓	✗
M012 §	0 to 5 mbar	✓	✗
M040	3 to 25 mbar	✓	✗
M042	5 to 120 mbar	✓	✓
M048	50 to 350 mbar	✓	✓
B023	0.1 to 1.5 bar	✓	✓
B028 / K051	0.2 to 4 bar / Kg/Cm ²	✓	✓
W161 *	(-)30 to 150 mmWC	✓	✗
W162 *	(-)120 to (+)120 mmWC	✓	✗
W163 *	(-)40 to 10 mmWC	✓	✗
W188 §§	(-)30 to +250 mmWC	✗	✓

* Available only with 304SS / 306SS wetted parts with 'D' and 'DD' code micro switches in GM / GA enclosures only.
 § W058 is equivalent range code for range ±25 mmWC
 W069 is equivalent range code for range 0 to 50 mmWC
 §§ Available in GM, GA enclosure only

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
5	5A 250 / 125V	0.2	0.4	4.0	0.2	0.4	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
9	1A115V; 400 Hz	N.A.	N.A.	3.0	N.A.	N.A.	1.0	306	306
G	N.R.	N.R.	N.R.	1.0	N.R.	N.R.	0.25	306	306

Codes 3 & D - For General purpose usages. Code 5 - For General purpose withDC rating. Code J - Argon sealed micro switch with silver contact. Code K - Argon sealed micro switch with gold contact. Code 9 - Hermetically sealed, inert gas filled with silver alloy contact. Code G - Hermetically sealed, inert gas filled with gold plated contact.
 For DPDT, change switch code '3' to '33', '5' to '55', etc., while ordering
 N.A. - Not Available N.R. - Not Recommended

Table 3 : ELECTRICAL ENTRY CODE

Size *	Single Entry		Dual Entry	
	GM / GA	GK / GR	GM / GA	GK / GR
1/2" NPTF	A	A	N	N
3/4" NPTF **	L	---	O	---
M20 x 1.5 **	E	E	EB	EB

Through Connector

Through Connector	GM / GA	GK / GR	GM / GA	GK / GR
7 pin plug #	C	---	---	---
9 pin plug #	D	---	---	---

* Cable gland available on request.
 ** Cable entry is optional through adaptor.
 # Available only in GM enclosure.

Table 4 : MAXIMUM WORKING PRESSURE RATING

Range Codes	Wetted Parts	MWP (bar)
M009, M012, M040	Aluminium	1
M042, M048, B023, B028	Aluminium	15
M009, M012, M040 M042, M048, B023, B028	304 / 316 SS	15
W161, W188	304 / 316 SS	15
W162, W163	304 / 316 SS	7

Switching differential data

TABLE : A — GM / GA Enclosures

Range Code	Range	On-off Differential in mbar					
		Fixed					
		Models 306					Model 386
		3	D	5	J / K	9 / G	D / 3
M009	(-)2.5 to (+)2.5 mbar	0.8	0.9	1.5	---	---	---
M012	0 to 5 mbar	0.4	0.6	1.4	---	1.0	---
M040	3 to 25 mbar	0.8	**	**	---	**	---
M042	5 to 120 mbar	12	12	12	---	30	30
M048	50 to 350 mbar	20	20	25	60	45	60
B023	0.1 to 1.5 bar	70	70	90	250	135	150
B028	0.2 to 4 bar	250	300	600	700	675	500
W161	-30 to 150 mmWC	---	1	---	---	---	---
W162	-120 to +120 mmWC	---	1	---	---	---	---
W163	-40 to 10 mmWC	---	1.2	---	---	---	---
W188	-30 to +250 mmWC	---	---	---	---	---	1

● 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	D	5	J / K	9 / G	D / 3
M009	(-)2.5 to (+)2.5 mbar	1.4	1.6	2.5	---	---	---
M012	0 to 5 mbar	0.8	1.0	2.4	---	1.7	---
M040	3 to 25 mbar	1.0	**	**	---	**	---
M042	5 to 120 mbar	20	20	16	---	50	40
M048	50 to 350 mbar	35	35	40	100	75	85
B023	0.1 to 1.5 bar	120	120	150	425	230	240
B028	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.

TABLE : C — GR Enclosure

Range Code	Range	On-off Differential in mbar			
		Model 306			
		D / 3	5	J / K	9 / G
M009	0 to 5 mbar	0.7	2.0	1.4	1.4
M012	3 to 25 mbar	1.0	**	**	**
M040	5 to 120 mbar	16	15	35	35
M042	50 to 350 mbar	25	35	60	60
M048	0.1 to 1.5 bar	100	130	190	190
B023	0.2 to 4 bar	375	700	1000	1000

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

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

Notes

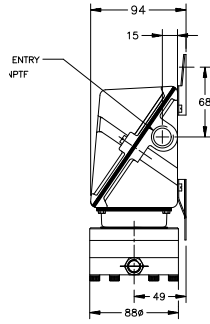
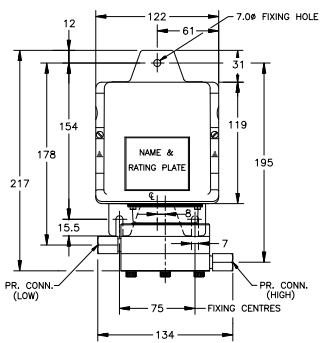
1. Gr.IIC of IS/IEC 60079–1 is equivalent to NEC CL.1, DIV.1, Gr.A & B.
2. Style GM/GA is weatherproof only if all entries and joint faces are properly sealed. Style GK/GR is weatherproof only if cover 'O' ring is retained in position and flameproof only if proper FLP cable gland is used. It is recommended to procure cable glands along with style GK/GR instruments to avoid neglect of it during installation.
3. 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.
4. Accuracy & Repeatability are not different for all blind differential pressure switches. A shift of $\pm 2\%$ may be observed in setpoint when pressure falls from full static pressure. Settings will also shift with varying temperature.
5. 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.
6. A Differential Pressure switch is a switching device and not a measuring instrument — eventhough it has a scale with $\pm 5\%$ 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.
7. 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.
8. 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.
9. On and off settings should not exceed the upper or lower range value.
10. DPDT action is achieved by two SPDT switches synchronised to practical limits i.e., $\pm 2\%$ 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.
11. Contact life of microswitches are 5×10^5 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.
12. 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.
13. 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 .
14. 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.
15. Ensure that impulse pipework applies no stress on sensing element housing and use spanners to hold pressure port / housing when connections are made.
16. Custom built instruments are available for special service requirements under Special Engineering Category.
17. For higher static pressures upto 250 bar stainless steel wetted parts, refer to series 301 Differential Pressure Switches.
18. Complementary instrumentation for pressure is available in 200 series.
19. **Accuracy figures are exclusive of test equipment tolerance on the claimed values.**
20. **All performance data are guaranteed to $\pm 5\%$.**

Dimensions in mm

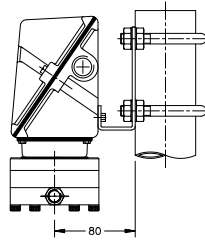
Range Codes : M042, M048, B023 & B028

GM Enclosure

Surface / Wall Mounting

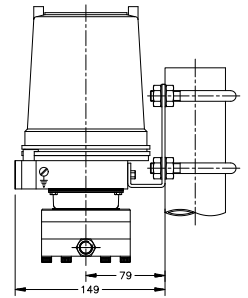
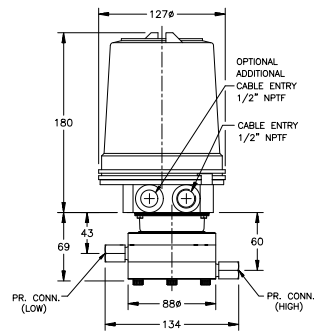


Pipe Mounting



GK Enclosure

Pipe Mounting

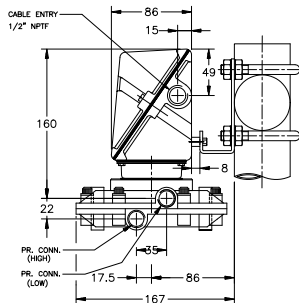
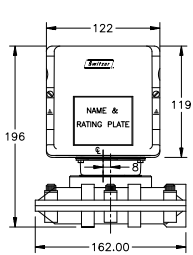


Range Codes : M009, M012 & M040

Pipe Mounting

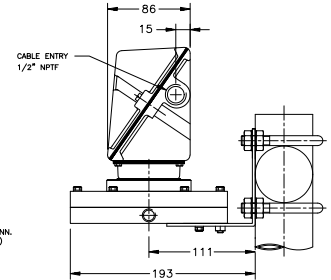
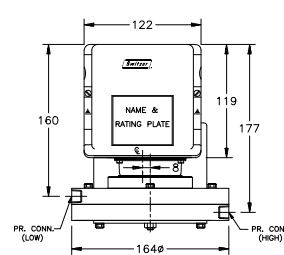
Aluminium Diaphragm Housing

GM Enclosure

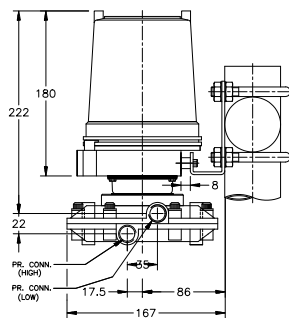
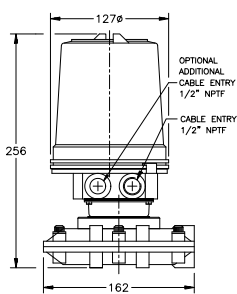


SS Diaphragm Housing

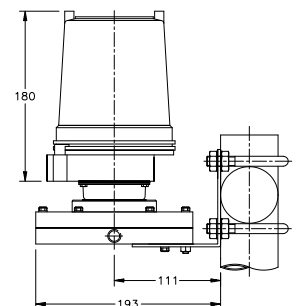
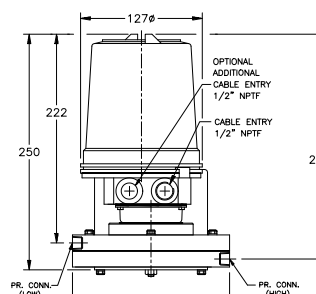
GM Enclosure



GK Enclosure



GK Enclosure

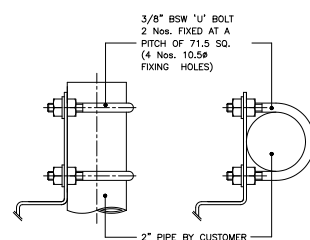


Notes :

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



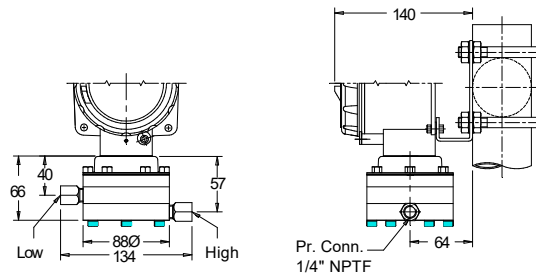
Fixing on Vertical Pipe

Fixing on Horizontal Pipe

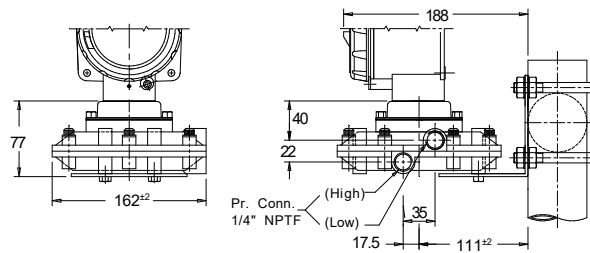
Dimensions in mm contd...

GR Enclosure

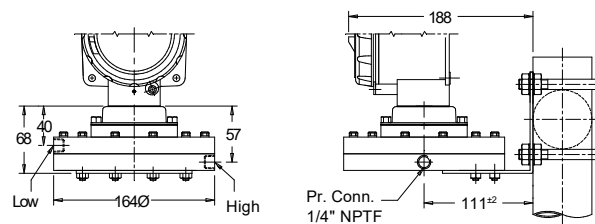
Range Codes : M042, M048, B023, B028



Range Codes : M012, M040 – Aluminium Housing



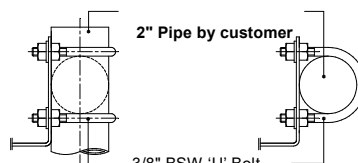
Range Codes : M012, M040 – SS Housing



2" PIPE MOUNTING DETAIL

FIXING ON
VERTICAL PIPE

FIXING ON
HORIZONTAL PIPE



2" Pipe by customer
3/8" BSW 'U' Bolt
2 Nos. Fixed at a
Pitch of 71.5 Sq.
(4 Nos 10.5Ø
Fixing Holes)

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



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