Differential pressure switches

Diaphragm sensor
Weatherproof
Flameproof

Series 310

● Very low ranges ● Clean rooms ● Filter blockage ●
● Air purge systems ● Fan failure ● Fan exhaust ●
● Refrigeration coils ● Drying ovens ●

Model 310 in GN Weatherproof Enclosure

Model 310 in GM Weatherproof Enclosure

Series 310 differential pressure switches are specially designed for sensing very low differential pressure in mmWC / mbar ranges for reliable setting in varied applications.

A precision contoured synthetic elastomer diaphragm senses low differential pressures applied to either side of it and actuates a snap-acting microswitch when the input differential pressure is slightly above or below the pre-set value.

The switch mechanism and the set point adjustment are external to the sensing chamber and completely isolated from contact with the process medium.

While Style GN housing offers limited very low ranges and microswitches to meet OEM requirements, Style GM & GK versions offer more ranges, microswitch options and wideband adjustment facility.

A scale is provided for approximate switch setting.

General specifications

Enclosure	
GN	GN style Aluminium die cast, weatherproof to IP66
GM	GM style aluminium pressure die cast, weatherproof to IP66
GK	GK style aluminium pressure die cast, weatherproof to IP66 and flameproof to group IIC as per IS/ IEC 60079 ***(Note 1)***
Ranges	Refer Table
Sensor	Neoprene Diaphragm std. Nitrile, EPDM & Silicone are optional
Wetted Parts	Aluminum std.
Mounting	Vertical only
Repeatability	± 2 % FSR ***(Note 4)***
Scale Accuracy	± 5 % FSR ***(Note 6)***
Ambient Temp.	– 10°C to + 60°C ***(Note 12)***
Max. Working Pr.	0.5 bar for all ranges
Max. Working Temp.	95°C for Neoprene, 110°C for Nitrile, 130°C for EPDM and 200°C for Silicone ***(Note 13)***
Switching	
Element	Instrument quality snap-acting SPDT microswitch ***(Note 10)***
Differential	
GN–310	Fixed, 1 SPDT switch only
GM / GK–310	Fixed
GM / GK–313	Wideband adjustable. Refer tables A, B & C for values
Process Connection	1/4" NPTF standard Others through Adaptors
Electrical Connection	1/2" NPTF standard Dual entry on request.
Conformity	Generally to BS:6134:1991

Ordering matrix

ENCLOSURE

GN style aluminium die cast, weatherproof to IP66. ——— **GN**

GM style aluminium pressure die cast, weatherproof to IP66 ——— **GM**

GK Style aluminium pressure die cast, weatherproof to IP66 and flameproof to group IIC as per IS/IEC 60079 ——— **GK**

MODEL

Basic Differential Pressure Switch meant for low / ultra low range spans having very low fixed switching differential. ——— **310**

Same as 310 but with auxiliary mechanism providing adjustment of switching differential between 6 to 10% minimum to 60% maximum of FSR (not available in GN enclosure). ——— **313**

SENSOR AND WETTED PARTS

Neoprene diaphragm and cast Aluminium wetted parts ——— **N5**

Silicone diaphragm and cast Aluminium wetted parts ——— **S5**

EPDM diaphragm and cast Aluminium wetted parts ——— **E5**

Nitrile diaphragm and cast Aluminium wetted parts ——— **B5**

RANGE CODE : Refer Table–1 ——— ☐

SWITCH CODE AND RATING : Refer Table–2 ——— ☐

ELECTRICAL ENTRY CODE : Refer Table–3 ——— ☐

OPTION

Blow out disc ——— **S8**

CE conformity ——— **CE**

Pressure conversion table

bar	Kgf / Cm²	lbf / in²	atm.	in H_2O	m H_2O	In Hg	torr (mm Hg)
1	1.01972	14.5038	0.9869	401.864	10.1972	29.530	750.062
0.98067	1	14.2233	0.96784	394.094	10	28.959	735.56
0.06895	0.07031	1	0.06805	27.71	0.70307	2.0360	51.715
1.01325	1.03323	14.6959	1	407.189	10.3323	29.9213	760
0.00249	0.00254	0.0361	0.00246	1	0.0254	0.0734	1.87
0.09807	0.1	1.422	0.0968	39.41	1	2.896	73.356
0.03386	0.03453	0.4911	0.03342	13.609	0.3453	1	25.4
0.00133	0.00136	0.01934	0.00132	0.5358	0.0136	0.03937	1

Table–1 : RANGE CODE & AVAILABILITY

RANGE CODE	RANGE mbar	MWP bar	310		313
			GN	GM/GK	GM/GK
B3D	–2.5 to +2.5	0.5	✓	✓	×
B3X	0 to 2.5	0.5	×	✓	×
B5D	0.5 to 5	0.5	✓	✓	✓
B7D	1 to 10	0.5	×	✓	✓
C2D	2.5 to 15	0.5	✓	✓	✓
D3B	2.5 to 25	0.5	✓	✓	✓
D4C	5 to 50	0.5	×	✓	✓
D5C	7.5 to 75	0.5	✓	✓	✓
D8D	10 to 100	0.5	×	✓	✓

Table–2 : SWITCH CODE, RATING & AVAILABILITY *(Note 8)*

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	GN	GM / GK	GN	GM / GK
2 *	5A 250 / 125V	0.25	0.5	5.0	0.1	0.25	3.0	N.A.	310	↑ NOT AVAILABLE ↓	310
D	15A 250 / 125V	0.2	0.4	2.0	0.02	0.03	1.0	310	310		310
3	15A 250 / 125V	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	310	310		310
W	15A 250 / 125V	0.3	0.5	6.0	0.05	0.1	4.0	N.A.	313		313
4	1A 125V	N.A.	0.5	0.5	N.A.	0.25	0.25	310	310		310
5	5A 250 / 125V	0.2	0.4	4.0	0.2	0.4	3.0	N.A.	310		310
J	5A 250V	N.A.	N.A.	5.0	N.A.	N.A.	3.0	N.A.	310		310
K	1A 125V	N.A.	N.A.	1.0	N.A.	N.A.	0.5	N.A.	310		310
9	1A 115V 400 Hz	N.A.	N.A.	3.0	N.A.	N.A.	1.0	N.A.	310		310
G	N.R.	N.R.	N.R.	1.0	N.R.	N.R.	0.25	N.A.	310		310

Codes 2, 3, D & W – For General purpose usages.
Code 4 – Gold Alloy contact.
Code 5 – For General purpose with DC 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 Code '2' Microswitch DPDT option available in selected ranges only – Consult factory

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		
	GN	GM	GK	GN	GM	GK
1/2" NPTF	B	B	B	---	N	N
3/4" NPTF **	---	C	---	---	O	---
M20 × 1.5 **	---	D	D	---	P	P
Through Connector						
7 pin plug #	---	3	---	---	---	---
9 pin plug #	---	4	---	---	---	---

* Cable gland available on request.
** Cable entry is optional through adaptor. M20×1.5 direct is possible in GK/GR.
# Available only in GM enclosure.

Switching differential data

TABLE – A : MODEL GN 310 — FIXED DIFFERENTIAL

Range Code	Range mbar	On–off Differentials in mbar	
		GN 310	
		3 / D	4
B3D	± 2.5	0.5 +Ve 0.8 –Ve	0.5 +Ve 0.8 –Ve
B5D	0.5 to 5	0.8	0.4
C2D	2.5 to 15	1.0	0.5
D3B	2.5 to 25	1.0	0.5
D5C	7.5 to 75	5.0	2.5
DPDT not possible			

TABLE – B : MODEL GM / GK 313 — WIDEBAND DIFFERENTIAL

Range Code	Range mbar	On–off Differentials in mbar	
		GM 313	GK 313
		W	W
B3X	0 to 2.5	×	×
B5D	0.5 to 5	1.7 to 3	2.4 to 3
B7D	1 to 10	1.7 to 6	2.4 to 6
C2D	2.5 to 15	2.0 to 9	2.8 to 9
D3B	2.5 to 25	2.3 to 15	3.1 to 15
D4C	5 to 50	3.5 to 30	4.0 to 30
D5C	7.5 to 75	4.0 to 45	4.6 to 45
D8D	10 to 100	5.5 to 60	6.3 to 60

TABLE – C : MODEL GM / GK 310 — FIXED DIFFERENTIAL

Range Code	Range mbar	On–off Differentials in mbar							
		GM 310				GK 310			
		2	3 / D	4	5	2	3 / D	4	5
B3D	± 2.5	×	0.9 –Ve 0.7 +Ve	0.9 –Ve 0.7 +Ve	×	×	1.6 –Ve 1.1 +Ve	1.6 –Ve 1.1 +Ve	×
B3X	0 to 2.5	0.6	0.4	0.6	0.7	1.0	0.7	1.1	1.3
B5D	0.5 to 5	0.8	0.6	0.8	0.9	1.4	1.1	1.4	1.6
B7D	1 to 10	0.8	0.6	0.8	0.9	1.5	1.2	1.6	1.6
C2D	2.5 to 15	1.5	0.8	1.0	1.3	2.7	1.4	1.8	2.3
D3B	2.5 to 25	1.6	0.9	1.2	1.5	2.7	1.6	2.1	2.7
D4C	5 to 50	3.0	1.3	1.5	2.2	5.4	2.3	2.7	3.9
D5C	7.5 to 75	3.2	1.5	1.7	2.5	5.8	2.7	3.0	4.5
D8D	10 to 100	3.5	2.0	2.2	2.8	6.3	3.6	3.9	5.0

Notes :

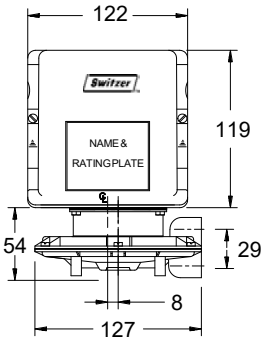
1. For GN310 micro switch codes '3', 'D' and '4' are only possible. DPDT is not available in model GN310.
2. For on-off differential values with switch codes '9', 'G', 'J' and 'K' consult sales.
3. To arrive at differentials for DPDT switching, apply multiplication factor of 1.1 to the above values.
4. Chemical seals are not available
5. 2" pipe mounting is not possible in GN enclosure
6. For B3D range in GM/GK 310 micro switch code '2' & '5' are not available.

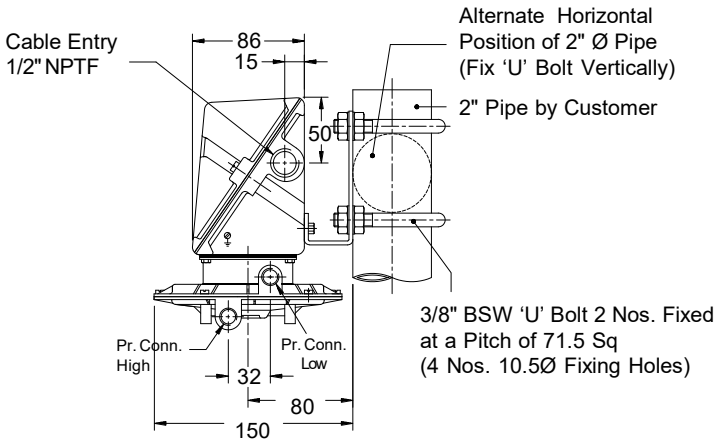
Notes

1. IS/IEC 60079–1 is equivalent to NEC CL.1, DIV.1, Gr.A & B.
2. Style GM / GN 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 while 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) 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 ±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.
6. A differential pressure switch is a switching device and not a measuring instrument — eventhough it has a scale 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., ±2% of FSR. Deadband for DPDT contacts are higher than that of SPDT as force required to actuate the contacts are more.
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. Ambient temperature range: All models are suitable for operating within a range of ambient temperature from (–) 10°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 (–) 25°C to (+) 80°C.
13. 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 e.g., 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.
14. Ensure that impulse pipework applies no stress on sensing element housing and use spanners to hold pressure port / housing when connections are made.
15. **Accuracy figures are exclusive of test equipment tolerance on the claimed values.**
16. **All performance data are guaranteed to ±5%.**

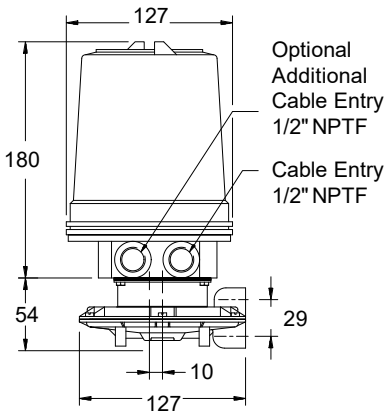
Dimensions in mm

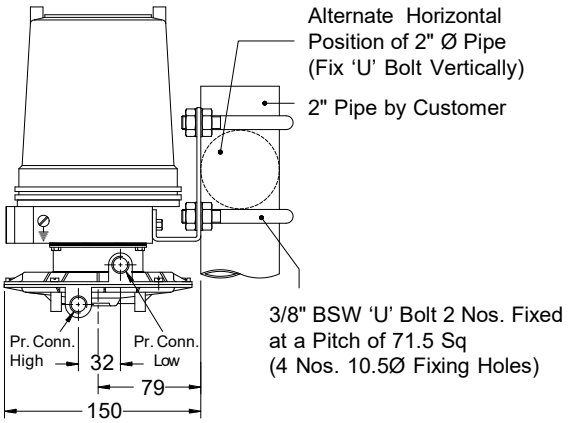
GM – 310 / 313



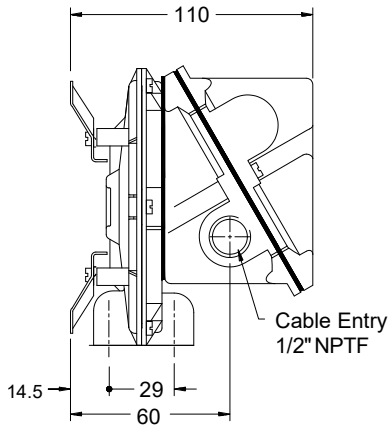


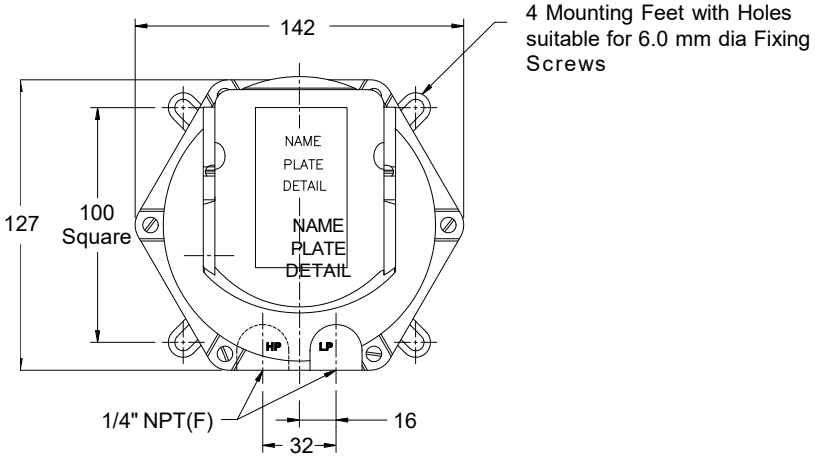
GK – 310 / 313





GN – 310





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