PRESSURE SWITCHES

WEATHERPROOF
FLAMEPROOF

S20 / 920 SERIES

● DIAPHRAGM-SEALED PISTON SENSOR ● HIGH STATIC PRESSURE ●
● FIELD ADJUSTABLE SETPOINT ● RUGGED DESIGN ●

MODEL 924 IN GH
WEATHERPROOF ENCLOSURE

MODEL S21 IN GM
WEATHERPROOF ENCLOSURE

MODEL S24 IN GK
WEATHERPROOF ENCLOSURE

Rugged in construction, supreme in performance the S20 and 920 series pressure switches are designed as cost effective solutions to meet a variety of applications in the oil, gas, power, steel, Nuclear energy and petrochemical industries.

The sensing element consists of a time-proven diaphragm sealed piston affording high integrity, reliable switching and a very high overload protection. Variety of combinations in features are available to make it versatile.

GENERAL SPECIFICATIONS

Enclosure	
GM	Aluminium pressure die cast weatherproof to IP:66
GA4	304SS investment cast weather-proof to IP:66
GA6	316SS investment cast weather-proof to IP:66
GK	Aluminium die cast, weatherproof to IP:66 and flameproof to Gr.IIA, IIB or IIC ***(Note 1)***
GH	Aluminium pressure die cast weatherproof to IP:66
Ranges	(–)1 to 700 bar -several std. ranges. Refer Table–1
Sensor	316L SS Diaphragm-sealed piston std. Monel optional
Wetted Parts	
Diaphragm Housing	304 SS Standard 316 SS & Monel® – Optional
Diaphragm Seals	Nitrile – Std ; EPDM /Teflon / Viton® – Optional
Repeatability	± 1 % FSR ***(Note 4)***
Scale Accuracy	± 5 % FSR (for GH only) ***(Note 6)***
Mounting	Direct or Wall
Max. Working Pr.	Refer tables 'A' & 'B'
Max. Working Temp.	– 20 to + 80°C for all ranges except – 20 to + 60°C for ranges U7, V7, W7 & Y4 ***(Note 14)***
Switching	
Element	Instrument quality snap-acting SPDT microswitch
Differential	Fixed; for values refer tables 'A' & 'B'
Connection	
Process	1/4" NPTF Std., 1/2" NPTF on request others through Adaptor
Electrical	
GM / GA4 / GA6	3/4" ETF std; 1/2" NPTF optional. Dual entry on request.
GK	1/2" NPTF std. Dual entry on request.
GH	3/4" ET Nylon cable gland std.
Conformity	Generally to BS : 6134 : 1991

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ORDERING MATRIX

ENCLOSURE

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

304 SS investment cast weatherproof to IP:66 with overall size as style GM for aggressive atmospheres ideal for offshore. ——— **GA4**

316 SS investment cast weatherproof to IP:66 with overall size as style GM for aggressive atmospheres ideal for offshore. ——— **GA6**

Aluminium die cast flameproof cum weatherproof. CIMFR approved to Gr.IIA IIB & IIC of IS/IEC 60079–1:2007 for flame-proofness and IP:66 for weatherproofness. **GK**

Aluminium pressure die cast compact housing. Weatherproof IP:66. ——— **GH**

MODEL

S20 Series

(available in Style GM, GA4, GA6 & GK enclosures only)

Fixed differential with maximum working pressures upto 155 bar as per table 'A'. ——— **S21**

Fixed differential with maximum working pressures upto 1000 bar as per table 'B'. ——— **S24**

920 Series

(available in Style GH enclosure only)

Fixed differential with maximum working pressures upto155 bar as per table 'A'. ——— **921**

Fixed differential with maximum working pressures upto1000 bar as per table 'B'. ——— **924**

MATERIALS OF WETTED PARTS

316L SS diaphragm, Nitrile 'O' ring and 304 SS wetted parts. ——— **04**

316L SS diaphragm, Nitrile 'O' ring and 316 SS wetted parts. ——— **02**

316L SS diaphragm, Nitrile 'O' ring and 316 SS wetted parts. ——— **0L**

316L SS diaphragm, Viton 'O' ring and 316 SS wetted parts for NACE MR–01–75. ——— **0N**

Monel diaphragm, Nitrile 'O' ring and 316 SS wetted parts. ——— **M2**

Monel diaphragm, Viton 'O' ring and Monel wetted parts for NACE MR–01–75. ——— **0M**

316L SS diaphragm and 316 SS wetted parts – Welded* construction. ——— **W2**

RANGE CODE : Refer Table–1 ——— □

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

ELECTRICAL ENTRY : Refer Table–3 ——— □

* For reduced risk against leakage under extreme or exceptional conditions the diaphragm is welded to the pressure housings eliminating the 'O' ring.

Table – 1 : RANGE CODE & AVAILABILITY

RANGE CODE	RANGE (in bar)	MODELS			
		S21	S24	921	924
G3	(–)1 to (+) 1.5	✓	×	✓	×
DB	0.25 to 1.6	✓	×	✓	×
DC	0.4 to 2.5	✓	✓	✓	✓
DE	1 to 6	✓	✓	✓	✓
EA	1.6 to 10	✓	✓	✓	✓
EB	2.5 to 16	✓	✓	✓	✓
EC	4 to 25	✓	✓	✓	✓
ED	10 to 40	✓	✓	✓	✓
FA	10 to 100	✓	✓	✓	✓
U7	7 to 160	×	✓	×	✓
V7	25 to 250	×	✓	×	✓
W7	50 to 400	×	✓	×	✓
Y4	100 to 700	×	✓	×	✓

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

SWITCH CODE (SPDT)	AC RATING	DC RATING IN AMPS						AVAILABILITY OF SPDT AND 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	S21, S24, 921 & 924
H	10A 250 / 125V	0.2	0.4	2.0	0.02	0.03	1.0	S21, S24, 921 & 924
3	15A 250 / 125V	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	S21, S24, 921 & 924
4	1A 125V	N.A.	0.5	0.5	N.A.	0.25	0.25	S21, S24, 921 & 924
5	5A 250 / 125V	0.2	0.4	4.0	0.2	0.4	3.0	S21, S24, 921 & 924
6	0.1A 125V	N.R.	N.R.	0.1	N.R.	N.R.	N.A.	S21, S24, 921 & 924
7	N.R.	N.R.	N.R.	1.0	N.R.	N.R.	0.5	S21, S24, 921 & 924
8	5A 250 / 125V	N.A.	N.A.	5.0	N.A.	N.A.	3.0	S21, S24, 921 & 924
J	5A 250V / 125V	N.A.	N.A.	5.0	N.A.	N.A.	3.0	S21, S24, 921 & 924
K	1A 250V / 125V	N.A.	N.A.	1.0	N.A.	N.A.	0.5	S21, S24, 921 & 924
S	5A 250 / 125V	0.25	0.5	3.0	0.1	0.2	2.0	S21, S24, 921 & 924
R	0.1A 250V	N.R.	N.R.	N.A.	N.R.	N.R.	N.A.	S21, S24, 921 & 924

Codes D & H – General purpose– AC & DC rating.
Code 3 – General purpose – only AC rating.
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 contact.
Code J – Hermetically sealed, inert gas filled with Silver contact.
Code K – Hermetically sealed, inert gas filled with Gold plated contact.
Code S – IP:67 sealed microswitch with silver Alloy contact.
Code R – IP:67 sealed microswitch with gold plated contact

For DPDT, change switch code to "DD", "33", etc., while ordering

N.A. – Not Available **N.R. –** Not Recommended

Table 3 : ELECTRICAL ENTRY

Size ✶	Single Entry			Dual Entry		
	GM/GA	GK	GH	GM/GA	GK	GH
3/4" ETF	A	---	---	M	---	M
1/2" NPTF	B	B	B	N	N	N
3/4" NPTF ✶✶	C	---	C	O	---	O
M20 × 1.5 ✶✶	D	D	D	P	P	P
M16 × 1.5 ✶✶	E	---	E	Q	---	Q
Through Connector – Plug and Socket in MS						
3 pin plug	2	---	2	---	---	---
7 pin plug	3	---	3	---	---	---
9 pin plug	4	---	4	---	---	---

✶ Cable gland available on request.
✶✶ Through adaptor except for GK housing.

SWITCHING DIFFERENTIAL DATA

TABLE – A

Range Code	Range (bar)	On–off Differentials in bar					MWP (bar)
		S21 / 921					
		3/D/6	4	5	J / K	7/8/S	
G3	–1 to 1.5	0.05	0.06	0.25	0.45	0.40	15
DB	0.25 to 1.6	0.05	0.06	0.07	0.15	0.20	27
DC	0.4 to 2.5	0.05	0.06	0.07	0.15	0.20	
DE	1 to 6.0	0.10	0.12	0.35	0.40	0.25	
EA	1.6 to 10	0.20	0.25	0.50	0.50	0.90	70
EB	2.5 to 16	0.25	0.30	0.60	0.60	1.00	
EC	4 to 25	0.75	0.80	1.20	2.30	1.80	110
ED	10 to 40	1.20	1.25	1.70	3.50	3.00	
FA	10 to 100	2.25	2.30	3.50	7.00	6.00	155

Since the force required to operate the microswitches is higher in DPDT arrangement, for DPDT switching apply a multiplication factor of 1.6 on the differential values with SPDT arrangement. The above stated differentials are at midscale. It would be twice at maximum range and half at minimum range.

TABLE – B

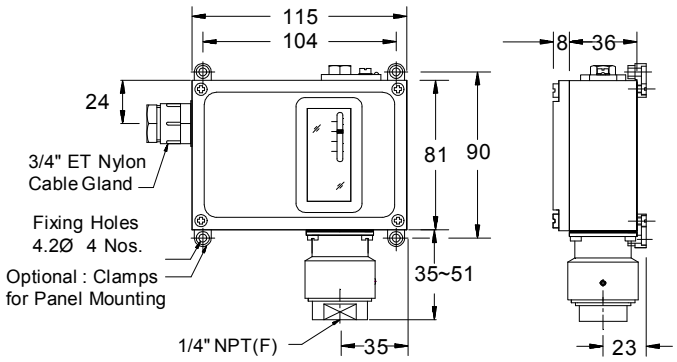
Range Code	Range (bar)	On–off Differentials in bar					MWP (bar)
		S24 / 924					
		3/D/6	4	5	J / K	7/8/S	
DC	0.4 to 2.5	0.30	0.35	0.50	0.50	0.50	600
DE	1.0 to 6.0	0.45	0.50	0.70	0.75	0.70	
EA	1.6 to 10	0.60	0.65	1.00	1.20	0.70	
EB	2.5 to 16	0.60	0.65	1.20	1.20	0.70	
EC	4 to 25	1.00	1.10	2.00	2.30	0.90	
ED	10 to 40	1.80	1.85	2.60	3.50	2.20	
FA	10 to 100	3.50	3.60	5.70	5.00	4.50	
U7	7 to 160	5.25	5.80	9.00	10.0	8.00	1000
V7	25 to 250	9.00	9.50	10.0	22.0	25.0	
W7	50 to 400	15.0	16.0	20.0	30.0	35.0	
Y4	100 to 700	20.0	22.0	25.0	45.0	50.0	

NOTES

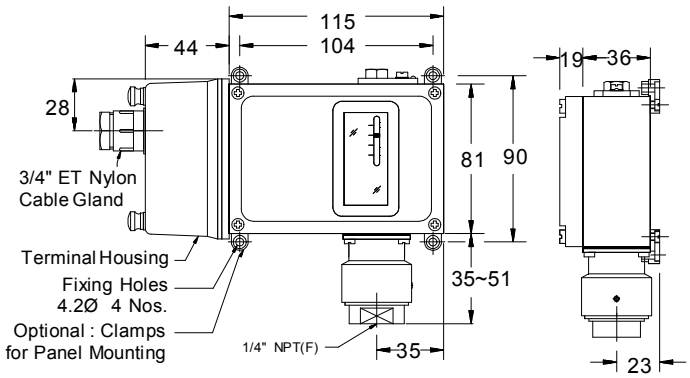
1. Gr.IIA & IIB of IS:2148 is equivalent to NEC CL.1, Gr.C & D. Gr.IIC of IS:2148 is equivalent to NEC CL.1, DIV.1, Gr.A & B.
2. Style GM / GA4 / GA6 / GH is weatherproof only if all entries and joint faces are properly sealed. Style GK is weatherproof only if cover 'O' ring is retained in position and 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) — Pressure Switches are classified as simple apparatus as they neither generate nor store energy. Hence pressure switches in weatherproof (GM / GA4 / GA6) enclosures also may be used in intrinsically safe systems without certification provided the power source is certified IS. 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 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. Ranges above 1 bar will not experience this shift.
6. A pressure switch is a switching device and not a measuring instrument — eventhough it has a scale to assist setting in GH only. 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.
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 models of S20 and 920 series pressure switches can withstand full vacuum.
13. 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.
14. Fluid Temperature: A 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.
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. **Accuracy figures are exclusive of test equipment tolerance on the claimed values.**
17. **All performance data are guaranteed to ±5%.**

MOUNTING DIMENSIONS

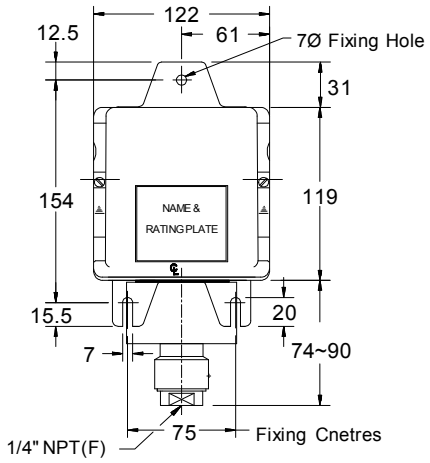
'GH' Enclosure

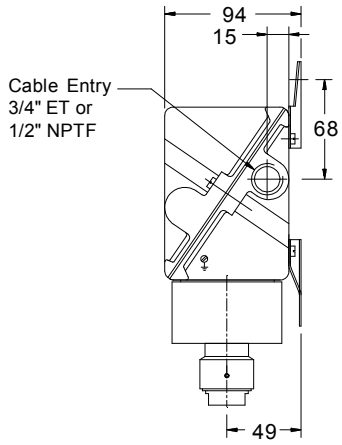


'GH' Enclosure with External Terminal Housing

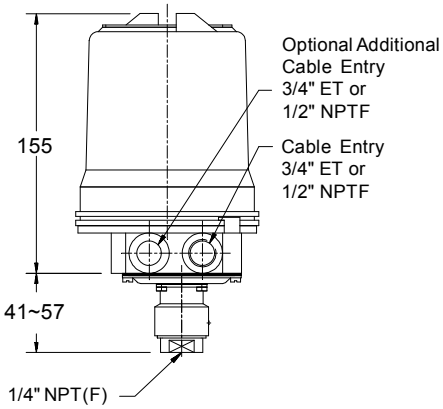


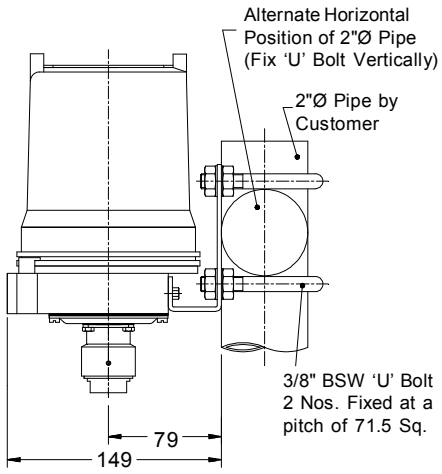
'GM / GA' Enclosure





'GK' Enclosure





All dimensions are in mm