Pressure switch
Models S21, S24

WIKA data sheet PV 35.62

Applications

- Power generation
- Waste water management
- Oil and gas
- Petrochemical industries

Special features

- Internal Switch point adjustment for critical applications
- Stainless steel case option for corrosive environment
- Switch point repeatability of ±1% of FSR for reliable switching
- Sealed piston mechanism for overpressure protection

Fig. Left: Pressure switch, model S24, GK flameproof
Fig. Right: Pressure switch, model S21, GM weatherproof

Description

The model S21 & S24 mechanical pressure switch has been designed for control and monitoring applications. The stainless steel case option enables the pressure switch to perform in harsh operating conditions of the process industry.

The switch point repeatability to ±1% enables reliable switching in critical operating conditions.

High static pressure with diaphragm sealed sensor elements enable to meet a variety of applications in oil, gas, power, steel and petrochemical industries.

This wide setting range is often needed for the on/off control mode of cyclic applications.

The switch point can be specified on site, with internal adjustment options. Depending on the application, the appropriate variant for the contact version and the electrical connection can be selected. For example, hermetically sealed micro switches are suitable for hazardous ambient conditions.

Smart in sensing

Specifications

Basic information	
Switch enclosure	■ GM style aluminium pressure die cast weatherproof to IP66 with nitrile gasket ■ GA style CF8 (304 SS) casting, weatherproof to IP66, fit for off shore ■ GA6 style CF8M (316 SS) casting, weatherproof to IP66, fit for off shore ■ GK style (Type-2) aluminium pressure die cast, weatherproof and flameproof to group IIC as per IS/IEC 60079-1

Wetted parts	
Diaphragm housing	■ 304 SS standard ■ 316 SS optional ■ Monel® optional
Seal	■ Nitrile standard ■ EPDM optional ■ Teflon optional ■ Viton® optional
'O' ring	■ Buna-N 90°C ■ EPDM 125°C ■ Teflon 250°C ■ Viton 205°C
Sensor	■ 316L SS diaphragm sealed piston ■ Monel optional

Output signal	
Ranges	Several ranges from –1 ... +700 bar. Refer range table 1
Switching differential	Fixed; Refer switching differential table 2 & 3
Repeatability (note 3)	± 1.0% of FSR
Maximum working pressure	Refer table 2 & 3
Response time	<1 second
Switching element (note 10 & 11)	Instrument quality SPDT microswitch

Operating condition	
Permissible ambient temperature	–10°C ... +60°C
Permissible maximum temperature (note 4)	■ -20 ... +80°C (except B048, B049, B050, B051) ■ -20 ... +60°C (B048, B049, B050, B051)
Ingress protection	IP66
Process connection	1/4" NPT(F) per ASME B1.20.1 direct Other connections through adaptor
Electrical connection	1/2" NPT(F) per ASME B1.20.1 single entry standard Dual entry on request
Mounting	■ Direct ■ Wall ■ 2" pipe
Mounting material	■ Mild steel ■ 304 SS ■ 316 SS

Ordering matrix

Sample model number ☐ --- ☐ --- ☐ --- ☐ --- ☐ --- ☐ --- ☐ ---

Switch enclosure

GM style aluminium pressure die cast weatherproof to IP66 with nitrile gasket — **GM**

GA style CF8 (304 SS) casting, weatherproof to IP66, fit for off shore — **GA**

GA style CF8M (316 SS) casting, weatherproof to IP66, fit for off shore — **GA6**

GK style (Type-2) aluminium pressure die cast, weatherproof and flameproof to group IIC as per IS/IEC 60079-1 — **GK**

Model

Fixed differential with maximum working pressure upto 155 bar as per table '2' — **S21**

Fixed differential with maximum working pressure upto 1000 bar as per table '3' — **S24**

Sensor material

316L SS diaphragm — **3**

Monel diaphragm — **M**

Wetted part

304 SS — **4**

316L SS — **3**

316 SS — **2**

Monel — **M**

316 SS Welded * — **W**

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

Range code

Refer table-1 — ☐

Switch code and rating

Refer table-4 — ☐

Electrical entry code

Refer table-5 — ☐

For available other options in page 6

Table 1: Range code and availability

Range code		Range	Model	
bar	Kg / Cm^2	bar / Kg/Cm^2	S21	S24
B002 *	K078 *	– 1 ... 1.5	✓	×
B042	K072	0.25 ... 1.6	✓	×
B043	K066	0.4 ... 2.5	✓	✓
B044	K067	1 ... 6	✓	✓
B045	K061	1.6 ... 10	✓	✓
B046	K068	2.5 ... 16	✓	✓
B037	K077	4 ... 25	✓	✓
B039	K076	10 ... 40	✓	✓
B047	K069	10 ... 100	✓	✓
B048	K070	7 ... 160	×	✓
B049	K071	25 ... 250	×	✓
B050	K080	50... 400	×	✓
B051	K081	100 ... 700	×	✓

* Welded constructin is not possible

Table 2: Switching differential for model S21

Range code	Range bar / Kg/CM^2	On-off differential in bar				Maximum working pressure (bar)
		D, 3	4	5	9, G	
B002	– 1 ... 1.5	0.05	0.06	0.25	0.45	15
B042	0.25 ... 1.6	0.05	0.06	0.07	0.15	
B043	0.4 ... 2.5	0.05	0.06	0.07	0.15	27
B044	1 ... 6	0.10	0.12	0.35	0.40	
B045	1.6 ... 10	0.20	0.25	0.50	0.50	70
B046	2.5 ... 16	0.25	0.30	0.60	0.60	
B037	4 ... 25	0.75	0.80	1.20	2.30	110
B039	10 ... 40	1.20	1.25	1.70	3.50	
B047	10 ... 100	2.25	2.30	3.50	7.00	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 achieved differential will be within the values shown in above table until midscale of range. It will be within twice the differential value at maximum scale range.

Table 3: Switching differential for model S24

Range code	Range bar / Kg/CM^2	On-off differential in bar				Maximum working pressure (bar)
		D, 3	4	5	9, G	
B043	0.4 ... 2.5	0.30	0.35	0.50	0.50	600
B044	1 ... 6	0.45	0.50	0.70	0.75	
B045	1.6 ... 10	0.60	0.65	1.00	1.20	
B046	2.5 ... 16	0.60	0.65	1.20	1.20	
B037	4 ... 25	1.00	1.10	2.00	2.30	
B039	10 ... 40	1.80	1.85	2.60	3.50	
B047	10 ... 100	3.50	3.60	5.70	5.00	
B048	7 ... 160	5.25	5.80	9.00	10.0	1000
B049	25 ... 250	9.00	9.50	10.0	22.0	
B050	50... 400	15.0	16.0	20.0	30.0	
B051	100 ... 700	20.0	22.0	25.0	45.0	

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 achieved differential will be within the values shown in above table until midscale of range. It will be within twice the differential value at maximum scale range.

Table 4: Switch code, rating and availability (note 9)

Switch code		Contact version	AC rating	DC rating in Ampere						Availability of SPDT and DPDT in models
				Resistive			Inductive			
SPDT	DPDT			250V	125V	30V	250V	125V	30V	
D	DD	General purpose	15A 250 / 125V	0.2	0.4	2.0	0.02	0.03	1.0	S21 & S24
3	33	General purpose	15A 250 / 125V	-	-	-	-	-	-	S21 & S24
4	44	With Gold alloy contact.	1A 125V	-	0.5	0.5	-	0.25	0.25	S21 & S24
5	55	General purpose with good DC rating.	5A 250 / 125V	0.2	0.4	4.0	0.2	0.4	3.0	S21 & S24
9	99	Hermetically sealed, inert gas filled with Silver alloy contact.	1A 115V 400 Hz.	-	-	3.0 *	-	-	1.0 *	S21 & S24
G	GG	Hermetically sealed, inert gas filled with Gold plated contact.	-	-	-	1.0 *	-	-	0.25 *	S21 & S24

Note : * For Codes 9, 99, G, GG; DC Rating of Resitive and Inductive is 28V

Table 5: Electrical entry

Size *	Single entry		Dual entry	
	GM / GA	GK	GM / GA	GK
1/2" NPT(F) per ASME B1.20.1	A	A	N	N
3/4" NPT(F) per ASME B1.20.1 through adaptor	L	-	O	-
M20 × 1.5 per ISO724 **	E	E	EB	EB
7 pin plug through connector ***	C	-	-	-
9 pin plug through connector	D	-	-	-

* Cable gland available on request
** Possible in GK enclosure as direct. Others through adaptor.
*** Possible only in GM enclosure.

Options

- Ammonia service
- Oxygen service
- Nuclear grade cleaning
- Special repeatability
- Chemical seal (possible only in welded construction code 'W')
- Seal ‘O’ ring – Viton
- Seal ‘O’ ring – EPDM
- Seal ‘O’ ring – Teflon
- PVC cover for armour

NOTES

1. 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 while installation.

2. Intrinsic Safety (Exi) — Pressure switches are classified as simple apparatus as they neither generate nor store energy. Hence pressure switches in weatherproof (GM/GA) 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.

3. 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.

4. 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.

5. A 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.

6. 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.

7. For switching differential values refer differential tables. Switching differentials furnished are nominal values under test conditions at mid-scale and will vary with range settings and operating conditions.

8. On and off settings should not exceed the upper or lower range value.

9. DPDT action is achieved by two SPDT switches synchronised to practical limits i.e., ±2% of FSR. (Synchronisation is applicable at Setpoint only. Not applicable at Reset points). Deadband for DPDT contacts are higher than that of SPDT as force required to actuate the contacts are more. Please refer respective range table for exact values.

10. 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.

11. Switching differentials for Instruments with chemical seal — Apply a Multiplication factor of 1.3 for SPDT and 1.5 for DPDT to values given in Range Table for GM / GA housings and apply a multiplication factor of 1.2 for SPDT and 1.5 for DPDT to values of Differential Table for GK housings.

12. All models of S20 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 (–) 50°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.

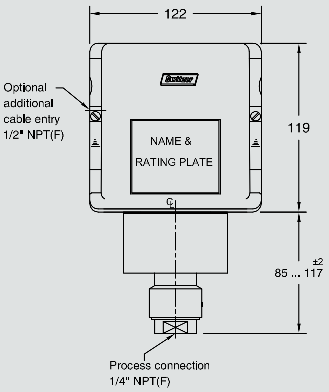
15. Ensure that impulse pipework applies no stress on sensing element housing and use spanners to hold pressure port/housing when connections are made.

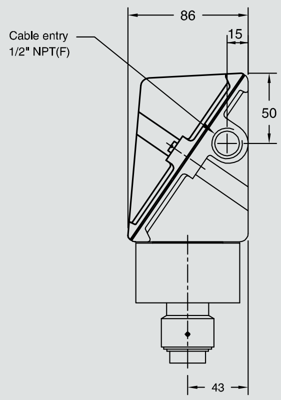
16. Accuracy figures are exclusive of test equipment tolerance on the claimed values.

Dimensions in mm

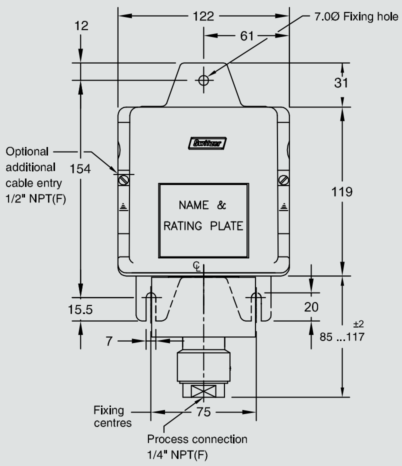
GM enclosure

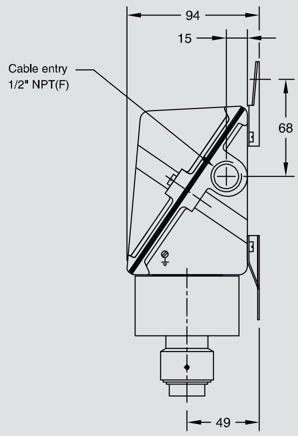
On-line mounting



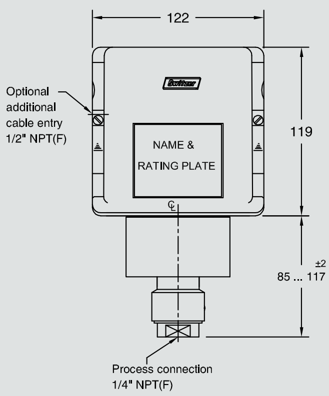


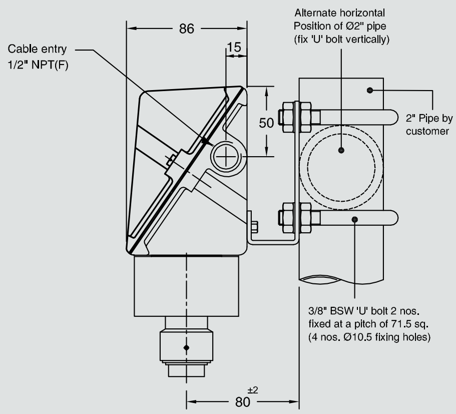
Wall mounting





2" pipe mounting

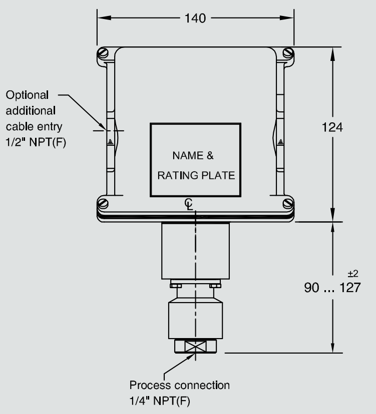


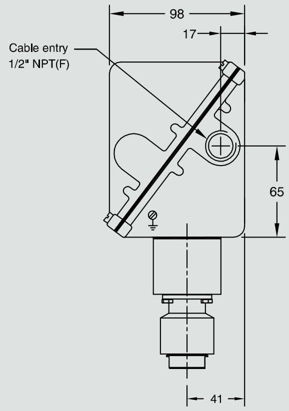


Dimensions in mm

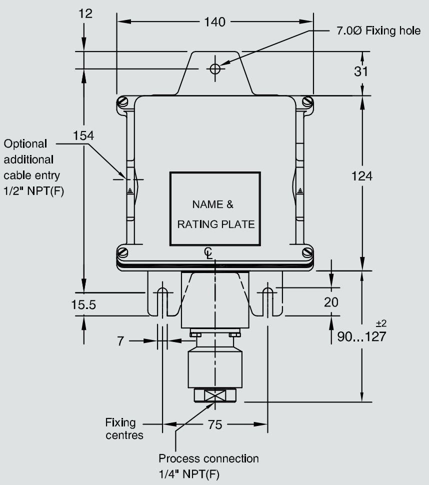
GA enclosure

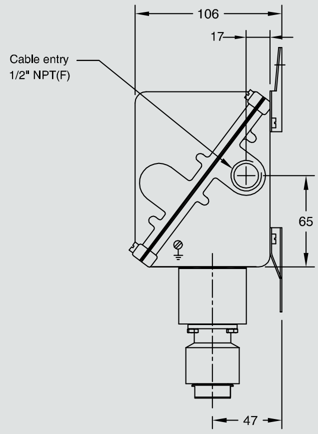
On-line mounting



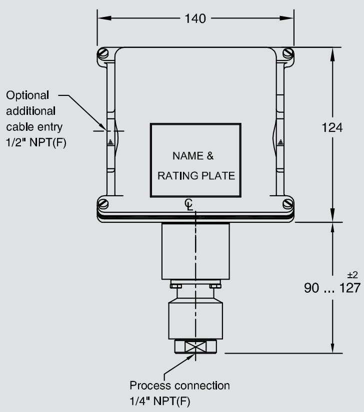


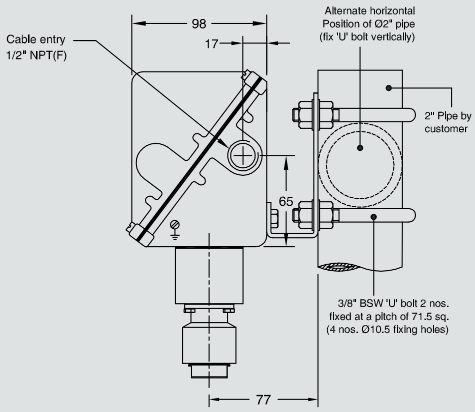
Wall mounting





2" pipe mounting

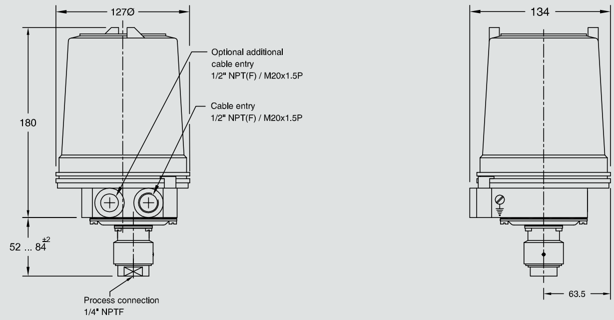




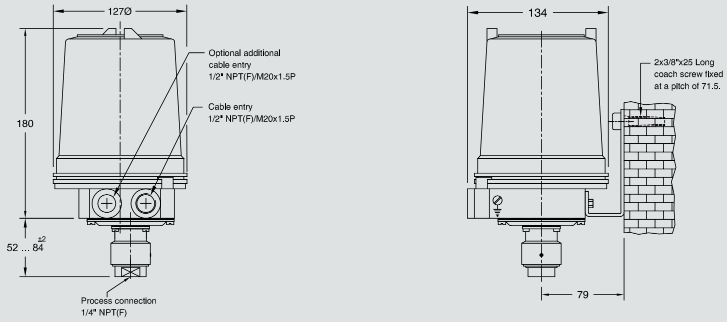
Dimensions in mm

GA enclosure

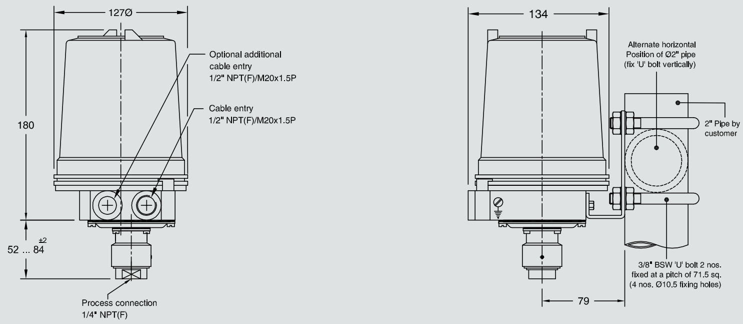
On-line mounting



Wall mounting



2" pipe mounting



Ordering information

Switch enclosure / Model / Sensor material / Wetted part / Range code / Switch code and rating / Electrical entry code

WIKA Instruments India Pvt. Ltd.
128 SIDCO North Phase
Ambattur Industrial Estate, Chennai 600 098
Tel. +91 44 2625 2017 / 2018 / 9840919318
switch.sales@wika.com
www.wika.co.in