



# PRESSURE SWITCHES

**HIGH RANGE  
WEATHERPROOF  
FLAMEPROOF**

## SERIES 931

- **BOURDON OPERATED** ● **316 SS WETTED PARTS** ●
- **MULTI SETTINGS** ● **HIGH REPEATABILITY** ●



**MODEL 931 IN GM ENCLOSURE**



**MODEL 931 IN GK ENCLOSURE**

SWITZER series 931 Pressure Switches are the latest addition to the main stream. These are very simple in construction, employing time proven German 'C' and coiled bourdon of 316 SS (Ti) material. One or two microswitches are directly operated by the

bourdon tube. The pressure is set by the range adjustment screw for each microswitch and the setting adjustments are independent. The instrument is available both in weatherproof and flameproof enclosures.

## GENERAL SPECIFICATIONS

<b>Enclosure</b>		<b>No. of Switches</b>	1 or 2 independently adjustable Possible settings for 2 switches :
<b>GM</b>	Aluminium Pressure die cast Weatherproof to IP:66		<b>a)</b> High & Low; <b>b)</b> Very Low & Low;
<b>GA</b>	304 / 316 SS, investment cast weatherproof to IP:66		<b>c)</b> High & Very High
<b>GK</b>	Aluminium die cast, weatherproof to IP:66 & flameproof to Gr.IIA, IIB or IIC ( <i>Note 1</i> )		<b>d)</b> Synchronised within practical limits to act at same point on falling or rising signal to provide DPDT action.
<b>Ranges</b>	0 – 1.6 to 0 – 600 bar. Refer table	<b>Max. Working Pressure</b>	Refer table
<b>Sensor</b>	SS 316 (Ti) Bourdon Tube	<b>Max. Temperature</b>	
<b>Wetted Parts</b>	SS 316	<b>Process</b>	200°C ( <i>Note 11</i> )
<b>On-off Diff.</b>	Fixed. Refer table	<b>Ambient</b>	0 to 60°C ( <i>Note 10</i> )
	Adjustable differential optional via Power Relay. Refer page 3.	<b>Connection</b>	
<b>Repeatability</b>	±1% FSR ( <i>Note 4</i> )	<b>Process</b>	Standard 1/4" NPT(F). Other connections through adaptors.
<b>Setting</b>	Internal adjustment with locking	<b>Electrical</b>	3/4" ET(F) Std. 1/2" NPT(F) optional. Dual Entry on request
<b>Switching</b>	Instrument quality snap acting SPDT microswitch	<b>Mounting</b>	Direct on-line
		<b>Conformity</b>	Generally to BS: 6134:1991

## ORDERING INFORMATION

### 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

Basic Pressure Switch with fixed differential operated by Bourdon tube. Setpoint field adjustable over full range. — **931**

### MATERIALS OF WETTED PARTS

316 SS (Titanium stabilised) Bourdon tube and 316 SS process connection — **6**

### RANGE CODE AND SWITCHING DIFFERENTIAL

Refer Table – 1

### SWITCH CODE RATING AND AVAILABILITY

Refer Table – 2

### ELECTRICAL ENTRY CODE

Refer Table – 3

### No. OF SWITCHES

Single Switch — **N**

Two Switches — **M**

### DIFFERENTIAL OPTION

Fixed on-off differential — **0**

Relay \* unit in independent weatherproof housing for adjustable switching differential — **1**

### NOTE:

\* The simplified design with minimal moving components allows each of the two microswitches to be independently adjusted over the entire range. But it does not provide for switching differential adjustment.

However two switches can be set at two different points and interlocked using an auxiliary relay to provide wideband differential feature.

Switzer can supply the relay unit "Power Relay – Model 150", if specified while ordering. Refer page 3 for details.

## OPTIONS / ACCESSORIES

- Damping coil for minimising process pulsations — increases instrument's life many times.
- Blow out protection for weatherproof and flameproof enclosures.
- Snubbers, pigtail syphons, over-range protectors.
- Brass / 316 SS double compression cable glands to suit cable OD of 1/2", 15 mm & 17 mm.
- Degreasing for Oxygen service & special parts for Ammonia service.
- Provision of line fault monitoring.

**Table-1 : RANGE CODE & SWITCHING DIFFL.**

RANGE CODE	RANGE (in BAR)	MWP (in BAR)
G5 *	0 to 1.6	2.1
C2 *	0 to 2.5	3.3
A6	0 to 4	5.2
C3	0 to 6	8
A7	0 to 10	13
A8	0 to 16	21
A9	0 to 25	33
B1	0 to 40	52
B2	0 to 60	80
V0	0 to 100	130
U5	0 to 160	210
V5	0 to 250	325
V6	0 to 315	410
W6	0 to 400	520
Y3	0 to 600	780

#### Switching Differential ≤5% FSR

\* For Range Codes G5 & C2 Diff. will be ≤10% FSR

The differential values are at test conditions with code "3" / "D", 15A 230V AC SPDT Microswitches. The switching differentials may vary slightly depending upon operating conditions.

For switching differential with other microswitches, consult factory.

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

SWITCH CODE (SPDT)	AC RATING	DC RATING IN AMPS					
		RESISTIVE			INDUCTIVE		
		220V	110V	24V	220V	110V	24V
D	15A 250 / 125V	0.2	0.4	2.0	0.02	0.03	1.0
3	15A 250 / 125V	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
4	1A 125V	N.A.	0.5	0.5	N.A.	0.25	0.25
6	0.1A 125V	N.R.	N.R.	0.1	N.R.	N.R.	N.A.

**Codes 3 & D** – For General purpose usages.

**Code 4** – With Gold alloy contact.

**Code 6** – With Gold alloy contact (Low Rating)

For DPDT, change switch code to "DD", "33", 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.

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## NOTES

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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/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.
3. 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 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 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. 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. On and off settings should not exceed the upper or lower range value.
8. DPDT action is achieved by two SPDT switches synchronised to practical limits i.e.,  $\pm 2\%$  of FSR. Deadband for DPDT arrangement are higher than that of SPDT as force required to actuate two contacts are more. Please refer Differential table for exact values.
9. 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.
10. Ambient temperature range: All models are suitable for operating within a range of ambient temperature from (-)  $10^{\circ}\text{C}$  to (+)  $60^{\circ}\text{C}$  provided the process does not freeze within this range. Below  $0^{\circ}\text{C}$ , 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 (-)  $50^{\circ}\text{C}$  to (+)  $80^{\circ}\text{C}$ .
11. 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  $100^{\circ}\text{C}$  to  $65^{\circ}\text{C}$  at an ambient temperature of  $50^{\circ}\text{C}$ . Ask factory for piping nomogram #441184-4 for different temperatures.
12. Ensure that impulse pipework applies no stress on sensing element housing and use spanners to hold pressure port/housing when connections are made.
13. Pressure switches are available in Series 200 / GH 900 with bellows / diaphragm sensor and Series S20/920 with diaphragm sealed piston sensor. Complementary instrumentation for differential pressure is available in Series 300.
14. Custom built instruments are available for special service requirements under Special Engineering Category.
15. **Accuracy figures are exclusive of test equipment tolerance on the claimed values.**
16. **All performance data are guaranteed to  $\pm 5\%$ .**

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## POWER RELAY – MODEL 150 — FOR ADJUSTABLE SWITCHING DIFFERENTIAL

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Model 150 Power Relay is used with Switzer Process Control Switches and Differential Pressure Indicating Switches to enhance the contact current rating of primary switching elements or for contact multiplication.

Model 150 Power relay accepts one or two Reed or Microswitch contacts as inputs and provides independent potential free relay contact outputs for each input.

This unit can also be supplied to be used for wideband control applications with interlocked inputs.

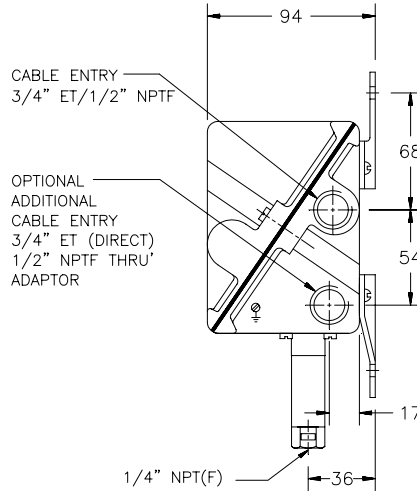
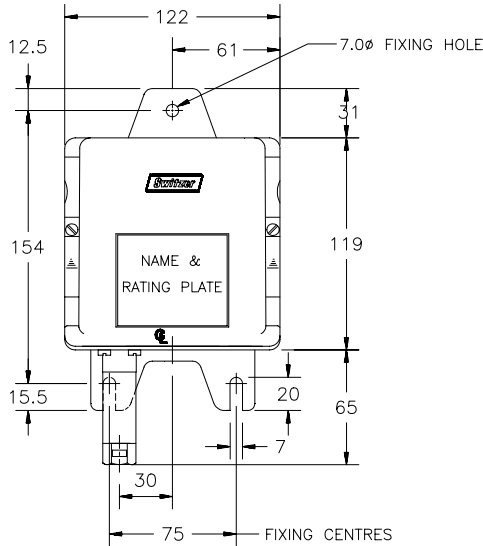
This relay unit is housed in a Cast Aluminium enclosure with plastic cover and is weatherproof to IP:66.



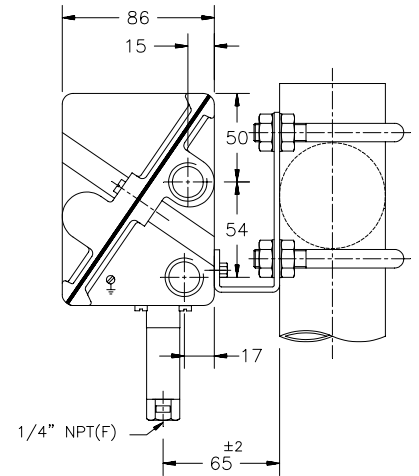
# MOUNTING DIMENSIONS

## GM Housing

### Surface Mounting

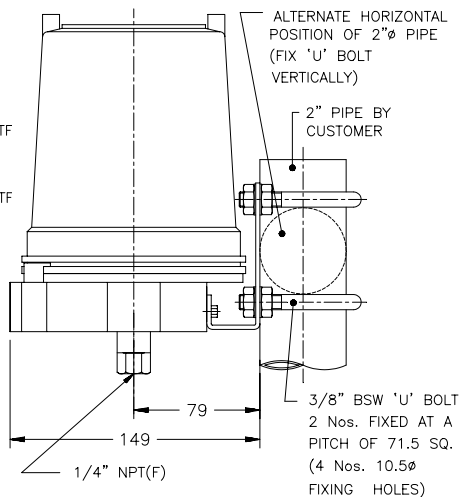
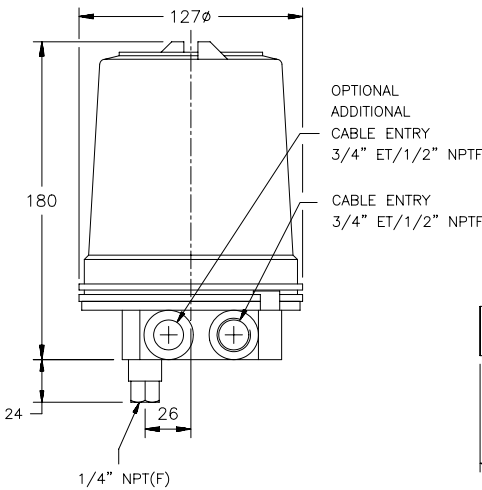


### Pipe Mounting



## GK Housing

### Pipe Mounting



### 2" Pipe Mounting Details

Fixing on Vertical Pipe	Fixing on Horizontal Pipe

3/8" BSW 'U' BOLT  
2 Nos. FIXED AT A  
PITCH OF 71.5 SQ.  
(4 Nos. 10.5φ  
FIXING HOLES)

2" PIPE BY  
CUSTOMER

**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.

All dimensions are in mm

Prior notification of changes in specification is impracticable due to continuous Improvement

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<http://www.switzerinstrument.com/offices.htm>