

# PRESSURE SWITCHES

**WEATHERPROOF  
FLAMEPROOF**

## SERIES 200

- **GOOD REPEATABILITY**
- **TAMPERPROOF SET POINT ADJUSTER WITH LOCKING DEVICE**
- **OVERTRAVEL STOP**
- **RUGGED DESIGN**



**Model 201 in GK Flameproof Enclosure**



**Model 204 in GM Weatherproof Enclosure**

Series 200 Pressure Switches is a SWITZER mainstream product range for switching upto 75 bar and includes models for vacuum, compound and millibar ranges and high overload protection. Precision mechanisms are of stainless steel for arduous atmospheres and high humidity. Enclosures, sensing elements and switching modes can be combined to offer the

variety needed to suit the demands of rapidly expanding industrial processes. Precise and accurate operation is obtained by using time proven seamless hydraulically formed bellows or diaphragm. Setpoint is continuously adjustable over the instrument range. A scale is provided for approximate switch setting.

## GENERAL SPECIFICATIONS

### Enclosure

<b>GM</b>	Aluminium Pressure die cast weatherproof to IP:67.
<b>GA</b>	304 / 316 SS, investment cast weatherproof to IP:66
<b>GK</b>	Aluminium die cast, weatherproof to IP:66 & flameproof to Gr.IIA, IIB or IIC ( <i>Note 1</i> )
<b>Ranges</b>	Several std. ranges, from full vac. to 75 bar.
<b>Sensor</b>	Phosphor Bronze / 316L SS bellows or 316L SS diaphragm.
<b>Wetted Parts</b>	Refer page 2.
<b>Repeatability</b>	± 0.5% FSR for 201 & 203 ± 1.0% FSR for 204, 208, 209, 281 ( <i>Note 4</i> )
<b>Scale Accuracy</b>	± 5% FSR ( <i>Note 6</i> )
<b>Switching Element</b>	Instrument quality SPCO (SPDT) Microswitch. ( <i>Notes 10 &amp; 11</i> )
<b>Differential</b>	Fixed or wideband adjustable. For exact values ask for Differential Tables.

<b>Max. Working Temperature</b>	170°C for SS bellows; 110°C for PB bellows & 316L SS diaphragm. ( <i>Note 15</i> )
<b>Ambient Temp.</b>	(-) 10°C to (+)60°C ( <i>Note 14</i> )
<b>Connection</b>	
<b>Process</b>	1/4" NPT(F) direct for 201, 203 & 281. 1/4" or 1/2" NPT(F) direct for 204. Other sizes through Adaptor. Flanged connection for 208 & 209. For details refer ordering matrix.
<b>Electrical</b>	3/4" ET(F) standard & 1/2" NPT(F) optional. Dual Entry on request
<b>Mounting</b>	Back panel / wall / field
<b>Conformity</b>	Generally to BS 6134 : 1991.

# ORDERING MATRIX

## ENCLOSURE

Aluminium pressure die cast weatherproof to IP:67 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/IEC 60079-1:2007 for flameproofness and IP:66 for weatherproofness ————— **GK**

## MODEL

This is the basic pressure switch actuated by a seamless bellows having close fixed non-adjustable switching differential. ————— **201**

Same as 201, but with auxiliary mechanism permitting switching differential adjustment between 8–15% min. to 60% max. without disturbing the set point. ————— **203**

A variant of series 200, employs twin levers each operating a SPCO microswitch actuated by a single sensor through a unique linkage thereby providing two independent adjustable setpoints, each with its own setting scale, spring & switch. Min. separation between setpoints must be more than sum of on-off differentials; or 10% of FSR whichever is higher. ————— **281**

Designed to operate in similar ranges as 201, except actuation is by a 316L SS diaphragm which withstands overpressures upto 100 bar. For overpressure upto 200 bar consult factory. ————— **204**

Similar to 204 but with ANSI 1½" #300 RF or 2" #150 or 300 RF flange. Direct actuation by a 316L SS diaphragm. More responsive than using a chemical seal filled system and suitable for Viscous media. ————— **208**

Similar to 208 but having 2" nut and Silicone gasket connection to BS 4825 Part 4 for the food industry, free of cavities of crevices for hygiene purposes. ————— **209**

## MATERIALS OF WETTED PARTS

### Models 201, 203 & 281

Phosphor Bronze Bellows with brass wetted parts. ————— **01**

316L SS Bellows with 316 SS wetted parts. ————— **02**

316L SS Bellows with 316 SS wetted parts to NACE MR-01-75. ————— **0N**

### Models 204, 208 & 209

316L SS Diaphragm with 304 SS wetted parts and Nitrile 'O' Ring. ————— **04**

316L SS Diaphragm with 316 SS wetted parts and Nitrile 'O' Ring. ————— **02**

316L SS Diaphragm with 316 SS wetted parts and Viton 'O' ring to NACE MR-01-75. ————— **0N**

Monel Diaphragm with Monel wetted Parts and Nitrile 'O' ring. ————— **0M**

316LSS Diaphragm with 316 SS wetted parts of welded construction. ————— **W2**

### Model 204 only

316L SS Diaphragm + 304 SS wetted parts + Teflon® 'O' Ring and backup Sheathing for special services. ————— **T4**

316L SS Diaphragm + 316 SS wetted parts + Teflon® 'O' Ring and backup Sheathing for special services. ————— **T2**

### Model 208 only

316L SS Diaphragm + 304 SS wetted parts with Teflon® Insert and Sheathing for Chlorine service. ————— **T4**

**RANGE CODE** : Refer Table-1

**SWITCH CODE AND RATING** : Refer Table-2

**ELECTRICAL ENTRY** : Refer Table-3

**Table-1 : RANGE CODE & AVAILABILITY**

RANGE CODE	RANGE	201	203	204 / 208 / 209	281
A1K	- 1 to 0 bar	✓	✓	204 Only	✗
A2K	- 0.5 to +0.5 bar	✓	✓	204 Only	✗
COK	- 1 to +1.5 bar	✓	✓	✗	✗
D4C	5 to 50 mbar	✓	✗	✓	✗
D5C	7.5 to 75 mbar	✓	✗	✗	✗
D8D	10 to 100 mbar	✓	✗	✓	✗
A3B	5 to 200 mbar	✓	✗	✗	✗
A3C	5 to 250 mbar	✓	✗	✗	✗
A3K	0.05 to 0.16 bar	✓	✓	✗	✗
A4K	0.08 to 0.4 bar	✓	✓	✓	✓
A5K	0.2 to 1 bar	✓	✓	✗	✓
C1K	0.1 to 1.1 bar	✓	✓	✗	✓
C2K	0.2 to 2 bar	✓	✓	✗	✓
A6K	0.4 to 4 bar	✓	✓	✓	✓
C3K	0.6 to 6 bar	✓	✓	✗	✓
A7K	1 to 10 bar	✓	✓	✗	✓
A8K	1.6 to 16 bar	✓	✓	✗	✓
A9K	2 to 20 bar	✓	✓	✗	✓
C4K	8 to 32 bar	✓	✓	✗	✓
B1K	10 to 40 bar	✓	✓	✗	✓
B2K	10 to 60 bar	✓	✓	✗	✓
B3K	15 to 75 bar	✓	✓	✗	✗
B4K	0.3 to 1.6 bar	✗	✗	✓	✗
B7K	0.7 to 7 bar	✗	✗	✓	✗
P8B	1.5 to 15 bar	✗	✗	✓	✗
D3B	2.5 to 25 mbar	✗	✗	✓	✗
X8K	-1000 to 0 mmWc	✗	✗	204 only	✗
X9K	-200 to +200 mmWc	✗	✗	204 only	✗

**Note : For On-off Differential values ask for respective Differential table**

**Table-2 : SWITCH CODE, RATING & AVAILABILITY (Note 10)**

SWITCH CODE (SPCO)	AC RATING	DC RATING IN AMPS						AVAILABILITY OF SPCO IN MODELS	AVAILABILITY OF DPCO IN MODELS
		RESISTIVE			INDUCTIVE				
		220V	110V	24V	220V	110V	24V		
2	5A 250 / 125V	0.25	0.5	5.0	0.10	0.25	3.0	201 & 281	201
D	15A 250 / 125V	0.2	0.4	2.0	0.02	0.03	1.0	201, 281, 204, 208 & 209	201, 204, 208 & 209
3	15A 250 / 125V	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	201, 281, 204, 208 & 209	201, 204, 208 & 209
W	15A 250 / 125V	0.3	0.5	6.0	0.05	0.1	4.0	203	203
4	1A 125V	N.A.	0.5	0.5	N.A.	0.25	0.25	201, 281, 204, 208 & 209	201, 204, 208 & 209
5	5A 250 / 125V	0.2	0.4	4.0	0.2	0.4	3.0	201, 281, 204, 208 & 209	201, 204, 208 & 209
6	0.1A 125V	N.R.	N.R.	0.1	N.R.	N.R.	N.A.	201, 281, 204, 208 & 209	201, 204, 208 & 209
7	N.R.	N.R.	N.R.	1.0	N.R.	N.R.	0.5	201, 281, 204, 208 & 209	201, 204, 208 & 209
8	5A 250 / 125V	N.A.	N.A.	5.0	N.A.	N.A.	3.0	201, 281, 204, 208 & 209	201, 204, 208 & 209
S	5A 250 / 125V	0.25	0.5	3.0	0.1	0.2	2.0	201, 281, 204, 208 & 209	201, 204, 208 & 209
J	5A 250V	N.A.	N.A.	5.0	N.A.	N.A.	3.0	201, 281, 204, 208 & 209	201, 204, 208 & 209
K	1A 125V	N.A.	N.A.	1.0	N.A.	N.A.	0.5	201, 281, 204, 208 & 209	201, 204, 208 & 209
A	N.A.	3.0	10.0	15.0	1.5	6.0	10.0	201 & 203	201
E	15A 250 / 125V	0.3	0.75	15.0	0.2	0.4	10.0	201, 204, 208 & 209	---
F	15A 250 / 125V	0.3	0.75	15.0	0.2	0.4	10.0	201, 204, 208 & 209	---

**Codes 2, 3, D & W** – For General purpose usages.  
**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 alloy contact.  
**Code J** – Hermetically sealed, inert gas filled with Silver alloy contact.  
**Code K** – Hermetically sealed, inert gas filled with Gold plated contact.  
**Code A** – High DC rated microswitch.  
**Codes E & F** – Manual reset switch. Auto change over on rising and falling pressure respectively. Resetting is Manual.  
**Code S** – IP:67 sealed microswitch with silver – Nickel contact.  
 For DPCO, change switch code to "22", "33", etc., while ordering  
**N.A.** – Not Available      **N.R.** – Not Recommended

**Table 3 : ELECTRICAL ENTRY**

Size *	Single Entry		Dual Entry	
	GM/GA	GK	GM/GA	GK
3/4" ETF	A	---	M	---
1/2" NPTF	B	B	N	N
3/4" NPTF	C	---	O	---
M20 x 1.5 **	D	D	P	P
M15 x 1.5	E	---	Q	---
<b>Through Connector</b>				
3 pin plug	2	---	---	---
7 pin plug	3	---	---	---
9 pin plug	4	---	---	---
* Cable gland available on request.				
** Cable Entry is optional. Available on request.				

**Table 4 : MAXIMUM WORKING PRESSURE RATING (Note 13)**

RANGE CODE	MAX. PR. RATING (in Bar)		
	201, 203 & 281		204
	Element Code		
	01	02	02 / 04
A1K	4	4	100
A2K	4	4	100
COK	4	4	--
D4C	2	2	100
D5C	2	2	--
D8D	2	2	100
A3B	2	2	--
A3C	2	2	--
A3K	4	4	--
A4K	4	4	100
A5K	4	4	--
C1K	4	4	--
C2K	4	4	--
A6K	8	8	100
C3K	9	9	--
A7K	15	15	--
A8K	25	25	--
A9K	25	25	--
C4K	36	36	--
B1K	--	50	--
B2K	--	80	--
B3K	--	80	--
B4K	--	--	100
B7K	--	--	100
P8B	--	--	100
D3B	--	--	100
X8K	--	--	100
X9K	--	--	100

**Notes :**  
 1) For Model 208 MWP restricted to Flange rating; for Model 209, MWP is 20 Bar.  
 2) Model 204 available with MWP of 200 bar on request.

**NOTES**

- Gr.IIA & IIB of IS/IEC 60079-1:2007 is equivalent to NEC CL.1, Gr.C & D. Gr.IIC of IS/IEC 60079-1:2007 is equivalent to NEC CL.1, DIV.1, Gr.A & B.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- For switching differential values please ask for **Differential** table. Switching differentials furnished are nominal values under test conditions at mid-scale and will vary with range settings and operating conditions.
- On and off settings should not exceed the upper or lower range value.
- DPCO action is achieved by two SPCO switches synchronised to practical limits i.e., ±2% of FSR. Deadband for DPCO contacts are higher than that of SPCO as force required to actuate the contacts are more. Please refer respective range table for exact values.
- 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.
- In model 201 Pneumatic air switch can be incorporated instead of standard microswitch. In "L" code switch air output turns "ON" on falling pressure and in "M" code switch air output turns "ON" on rising pressure. These switches can be connected to an air source of rating 7 bar maximum. Please consult factory for availability.
- Higher Maximum Working Pressure is available on request for some ranges; but ON-OFF differentials will be higher.
- 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.
- 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.
- Ensure that impulse pipework applies no stress on sensing element housing and use spanners to hold pressure port / housing when connections are made.
- For pressure above 75 bar, Switzer S20/920 Series and 930 Series (Bourdon Tube operated version) are available. Complementary instrumentation for differential pressure is available in Series 300.
- Custom built instruments are available for special service requirements under Special Engineering Category.
- For models 204 & 208, select proper 'O' Ring material compatible with process medium.
- Accuracy figures are exclusive of test equipment tolerance on the claimed values.**
- All performance data are guaranteed to ±5%.**

**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.

**DIAPHRAGM CHEMICAL SEALS**

Diaphragm chemical seals can be provided as optional extra either direct mounted or remote with capillary and threaded/flanged connection, duly evacuated and filled with suitable filling liquid. This device permits the use of pressure switches with bellows element with viscous / aggressive fluids and permits higher process temperatures. Switching lag will be present, when pressure changes rapidly.

While ordering it is important to specify ambient and process temperatures, setpoint, maximum process pressure, relative elevation between connection and switch head, nature of process medium

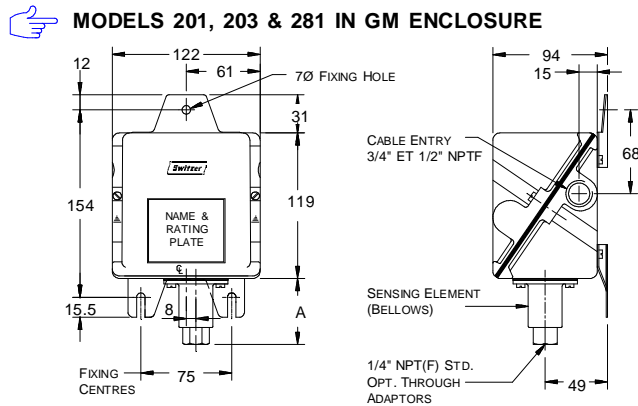
and whether reactive to common filling liquids should the diaphragm seal leak into the process.

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

**Chemical seals are not available in certain models and ranges and also for instruments with PB Bellows.**

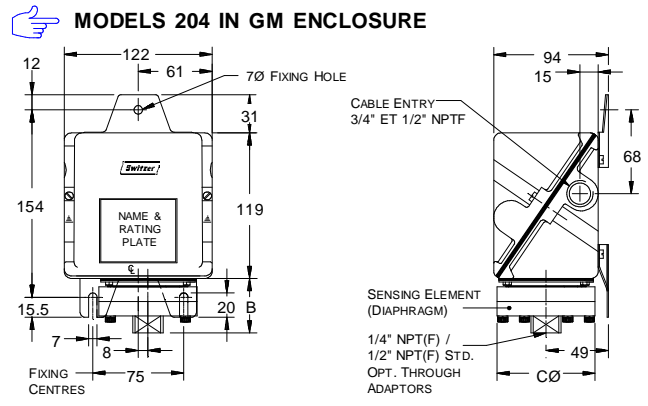
# MOUNTING DIMENSIONS

## BELLOWS VERSION

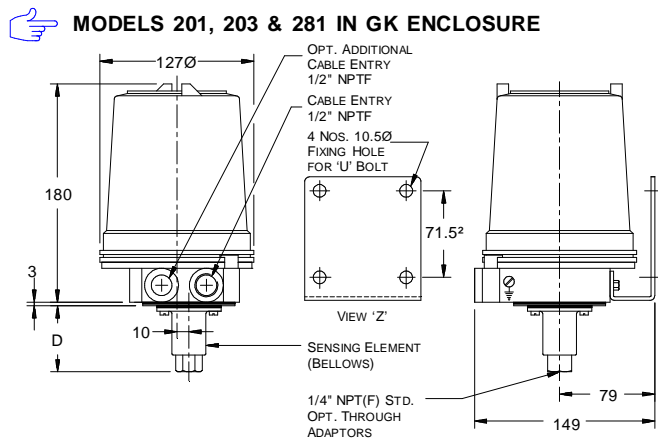


► DIM 'A' VARIES FROM 42 TO 92±2 DEPENDING ON RANGE

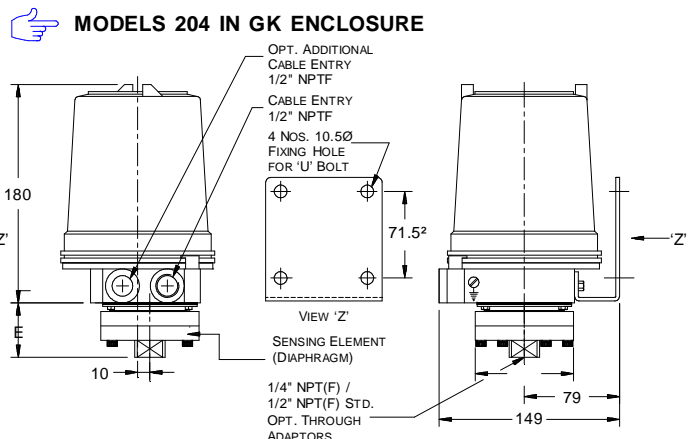
## DIAPHRAGM VERSION



► DIM 'B' VARIES FROM 42 TO 74±2 DEPENDING ON RANGE  
 ► DIM 'CØ' VARIES FROM 66 TO 88 DEPENDING ON RANGE

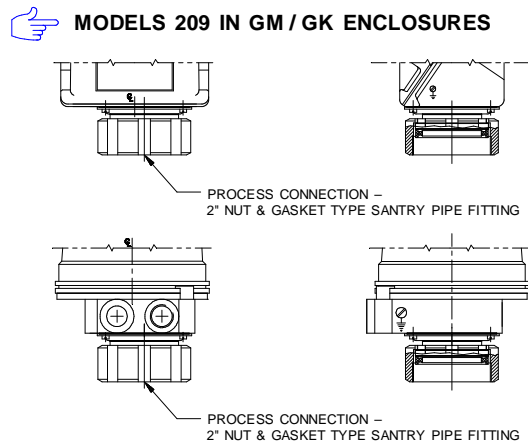
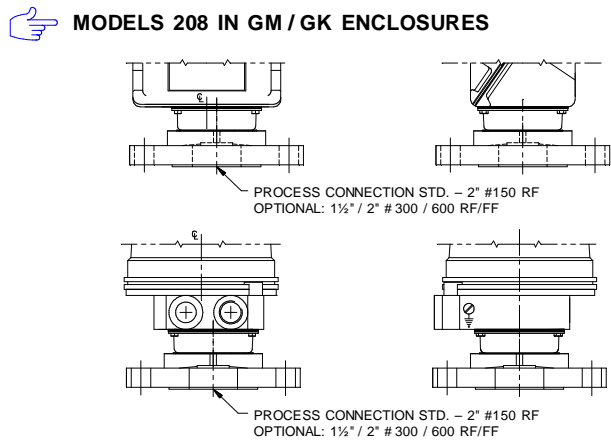


► DIM 'D' VARIES FROM 42 TO 92±2 DEPENDING ON RANGE



► DIM 'E' VARIES FROM 45 TO 74±2 DEPENDING ON RANGE  
 ► DIM 'CØ' VARIES FROM 66 TO 88 DEPENDING ON RANGE

## DIAPHRAGM VERSION (FLANGED CONNECTION)



**NOTES :** FIX CERTIFIED WEATHERPROOF CABLE GIAND FOR GM/GA ENCLOSURE  
 FIX CERTIFIED WEATHERPROOF CUM FLAMEPROOF CABLE GIAND FOR GK ENCLOSURE  
 UNSPECIFIED GENERAL TOLERANCE : ±1

All dimensions are in mm

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



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