

Pressure switch Models 021, 023

WIKA data sheet PV 35.53

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 $\pm 2\%$ of FSR for reliable switching



Fig. Left: Model 021, GK flameproof enclosure
Right: Model 021, GM weatherproof enclosure

Description

The model 020 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 $\pm 2\%$ enables reliable switching in critical operating conditions.

Low pressure ranges 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.

Specifications

Basic information	
Switch enclosure	<ul style="list-style-type: none"> ■ 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-1) aluminium pressure die cast, weatherproof and flameproof to group IIC as per IS/IEC 60079-1
Environment sealing	<ul style="list-style-type: none"> ■ GM/GA enclosure: Nitrile & EPDM ■ GK enclosure: Neoprene only

Wetted parts	
Sensor	Diaphragm
Measuring element	<ul style="list-style-type: none"> ■ Neoprene Diaphragm (standard) ■ Nitrile Diaphragm (M047, B025, B024 & B030 these range code available Nitrile diaphragm only) ■ EPDM Diaphragm ■ Silicon Diaphragm ■ 316L SS
Sensor Housing	<ul style="list-style-type: none"> ■ Aluminium (Standard) ■ 304 SS ■ 316 SS
Sealing	Nitrile & EPDM

Ourput signal	
Ranges	Refer table
Switching differential	Refer table
Repeatability of the setpoint (note 4)	±2% of FSR
Maximum working pressure	Refer table 1
Response time	<1 second
Scale accuracy (note 6)	±5% of FSR
Switching contacts with microswitch	<ul style="list-style-type: none"> ■ 1 x SPDT (single pole double throw) ■ 2 x SPDT (single pole double throw)
Switching function (note 8)	Instrument quality snap acting microswitch

Operating condition	
Permissible ambient temperature (note 14)	-10°C ... +60°C
Permissible medium temperature (note 13)	<ul style="list-style-type: none"> ■ 95°C for Neoprene ■ 100°C for 316L SS ■ 110°C for Nitrile ■ 130°C for EPDM ■ 200°C for Silicone
Ingress protection	IP66
Process connection	<ul style="list-style-type: none"> ■ 1/4" NPT(F) per ASME B1.20.1 ■ 1/2" NPT(F) per ASME B1.20.1 Other connections through adaptor
Electrical connection	1/2" NPT(F) per ASME B1.20.1 single entry standard Dual entry on request
Mounting	<ul style="list-style-type: none"> ■ On-line ■ Wall ■ 2" pipe ■ Universal

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

Model

Pressure switch meant for low/ultra low range spans having very low non-adjustable fixed switching differential. — **021**
 Same as 021, but with auxiliary mechanism providing adjustment of switching differential. Refer differential chart. — **023**

Sensor material

Neoprene — **N**
 Silicone — **S**
 EPDM — **E**
 Buna-N — **B**
 316L SS — **3**

Wetted part

Aluminium — **5**
 316 SS — **2**
 304 SS — **4**

Note : M047, B025, B024 & B030 ranges are available only with Buna-N diaphragm.
 For Ammonia service : EPDM diaphragm only.

Range code

Refer table-1 — ☐

Switch code and rating

Refer table-6 — ☐

Electrical entry code

Refer table-7 — ☐

Process connection

1/4" NPT(F) per ASME B1.20.1 — **S1**
 1/2" NPT(F) per ASME B1.20.1 — **S2**

Mounting

On-line — **Z**
 Wall — **W**
 2" pipe — **2**
 Universal — **U**

Mounting material

Not applicable — **0**
 mild steel — **C**
 316 SS — **2**

For available other options refer table-8

Table 1: Range code and availability

Range code	Range availability in model			
	Range	021	023	Maximum working pressure (bar)
M011	0 ... 2.5 mbar	✓	×	0.5
M036	0.5 ... 5 mbar	✓	×	0.5
M037	1 ... 10 mbar	✓	✓	0.5
M038	2.5 ... 15 mbar	✓	✓	0.5
M039	2.5 ... 25 mbar	✓	✓	0.5
M041	5 ... 50 mbar	✓	✓	0.5
M045	7.5 ... 75 mbar	✓	✓	0.5
M046	10 ... 100 mbar	✓	✓	0.5
M047	40 ... 400 mbar	✓	✓	1
B025	0.2 ... 1 bar	✓	✓	4
B024	0.16 ... 1.6 bar	✓	✓	4
B030	0.4 to 4 bar	✓	✓	7
M008	-5 to 0 mbar	✓	✓	0.5
M007	-10 to 0 mbar	✓	✓	0.5
M004	-20 to 0 mbar	✓	✓	0.5
M003	-25 to 0 mbar	✓	✓	0.5
M001	-50 to 0 mbar	✓	✓	0.5
M049	-100 to 0 mbar	✓	✓	0.5
M009	-2.5 to +2.5 mbar	✓	×	0.5
M007	-10 to +10 mbar	✓	✓	0.5
M005	-20 to +20 mbar	✓	✓	0.5
M002	-50 to +50 mbar	✓	✓	0.5

- For On-off Differential values refer "switching differential data" table.
- Full vacuum withstandability available for ranges M047, B025, B024, B030 only.
- Chemical seal not available in this model.

Table 2: Switching differential for Elastomer diaphragm, GM / GA enclosure

Range code	Range	Unit	Switching differential for contact versions - GM/GA Enclosures			
			D, 3	4	5	W
M011	0 ... 2.5	mbar	0.8	0.7	0.8	-
M036	0.5 ... 5	mbar	0.9	0.9	0.8	-
M037	1 ... 10	mbar	1.1	0.9	0.8	3 ... 6
M038	2.5 ... 15	mbar	1.2	1.0	0.9	4 ... 9
M039	2.5 ... 25	mbar	1.2	1.2	1	5 ... 15
M041	5 ... 50	mbar	1.5	1.3	1.6	6 ... 30
M045	7.5 ... 75	mbar	1.8	1.4	1.8	7 ... 45
M046	10 ... 100	mbar	2.0	1.5	2	8 ... 60
M047	40 ... 400	mbar	20	18	15	40 ... 240
B025	0.2 ... 1	bar	0.025	0.025	0.05	0.15 ... 0.600
B024	0.16 ... 1.6	bar	0.035	0.035	0.05	0.20 ... 0.960
B030	0.4 ... 4	bar	0.10	0.10	0.075	0.5 ... 2.400
M008	-5 ... 0	mbar	1.2	0.7	1.2	-
M007	-10 ... 0	mbar	1.4	1	1.5	3.5 ... 6
M004	-20 ... 0	mbar	1.5	1.2	2.3	4 ... 12
M003	-25 ... 0	mbar	1.5	1.6	2.5	5 ... 15
M001	-50 ... 0	mbar	2	2.2	3	7 ... 30
M049	-100 ... 0	mbar	2.5	2.8	3.5	10 ... 50
M009	-2.5 ... +2.5	mbar	-1.0 / +0.8	-1.0 / +0.8	-1.0 / +0.8	-
M007	-10 ... +10	mbar	-1.3 / +1.0	-1.3 / +1.2	-1.5 / +1.0	4.0 ... 10
M005	-20 ... +20	mbar	-1.5 / +1.2	-1.7 / +1.2	-2 / +1.5	8.0 ... 20
M002	-50 ... +50	mbar	-2 / +1.4	-2.2 / +1.3	-3 / +1.5	10.0 ... 50

Notes :

1. For on-off differential values with switch codes '9' & 'G' consult sales.
2. To arrive at differentials for DPDT switching, apply multiplication factor of 1.3 to the above values.

Table 3: Switching differential for Elastomer diaphragm, GK enclosure

Range code	Range	Unit	Switching differential for contact versions - GK Enclosure			
			D, 3	4	5	W
M011	0 ... 2.5	mbar	0.9	1.1	1.1	-
M036	0.5 ... 5	mbar	1.1	1.4	1.6	-
M037	1 ... 10	mbar	1.1	1.4	1.6	3.5 ... 6
M038	2.5 ... 15	mbar	1.3	1.6	2.1	4.5 ... 9
M039	2.5 ... 25	mbar	1.4	1.8	2.3	5 ... 15
M041	5 ... 50	mbar	2	2.3	2.9	7 ... 30
M045	7.5 ... 75	mbar	2.3	2.5	3.2	8 ... 45
M046	10 ... 100	mbar	2.7	2.7	3.6	9 ... 60
M047	40 ... 400	mbar	22	20	27	0.25 ... 240
B025	0.2 ... 1	bar	0.045	0.045	0.09	0.20 ... 0.60
B024	0.16 ... 1.6	bar	0.063	0.063	0.09	0.25 ... 0.96
B030	0.4 ... 4	bar	0.12	0.12	0.135	0.50 ... 2.40
M008	-5 ... 0	mbar	1.4	1.3	2	-
M007	-10 ... 0	mbar	1.6	1.8	2.7	-
M004	-20 ... 0	mbar	2	2.1	4.1	5 ... 12
M003	-25 ... 0	mbar	2.7	2.9	4.5	6 ... 15
M001	-50 ... 0	mbar	3.6	3.9	5.4	8 ... 30
M049	-100 ... 0	mbar	4.5	5	6.3	10 ... 50
M009	-2.5 ... +2.5	mbar	-1.4 / +1.0	-1.6 / +1.2	-1.8 / +1.1	-
M007	-10 ... +10	mbar	-2 / +1.6	-2.3 / +1.4	-2.7 / +1.4	4.5 ... 10
M005	-20 ... +20	mbar	-2.7 / +2.0	-3 / +2.2	-3.6 / +1.8	9 ... 10
M002	-50 ... +50	mbar	-3.6 / +2.5	-3.9 / +3.0	-5.4 / +2.7	10 ... 50

Notes :

1. For on-off differential values with switch codes '9' & 'G' consult sales.
2. To arrive at differentials for DPDT switching, apply multiplication factor of 1.3 to the above values.

Table 4: Switching differential for SS diaphragm, GM / GA enclosure

Range code	Range	Unit	Switching differential for contact versions - GM/GA Enclosures			
			D, 3	4	5	W
M011	0 ... 2.5	mbar	1.0	0.9	1.0	-
M036	0.5 ... 5	mbar	1.0	1	1	-
M037	1 ... 10	mbar	1.2	1	1	-
M038	2.5 ... 15	mbar	1.3	1.1	1.1	4.5 ... 9
M039	2.5 ... 25	mbar	1.3	1.2	1.2	6 ... 15
M041	5 ... 50	mbar	1.6	1.9	1.9	7 ... 30
M045	7.5 ... 75	mbar	1.9	2.2	2.2	8 ... 45
M046	10 ... 100	mbar	2.2	2.4	2.4	10 ... 60
M008	-5 ... 0	mbar	1.4	1.2	1.3	-
M007	-10 ... 0	mbar	1.5	1.4	1.8	-
M004	-20 ... 0	mbar	1.8	1.4	2.8	5 ... 12
M003	-25 ... 0	mbar	1.8	1.9	3	6 ... 15
M001	-50 ... 0	mbar	2.4	2.6	3.6	8.3 ... 30
M049	-100 ... 0	mbar	3	3.4	4.2	11.3 ... 50
M009	-2.5 ... +2.5	mbar	-1.2 / +1.0	-1.1 / +0.9	-1.2 / +1.0	-
M007	-10 ... +10	mbar	-1.8 / +1.2	-1.8 / +1.2	-1.8 / +1.3	4.8 ... 10
M005	-20 ... +20	mbar	-2.0 / +1.4	-2 / +1.2	-2.8 / +1.6	9 ... 20
M002	-50 ... +50	mbar	-2.5 / +1.6	-2.6 / +1.6	-3.6 / +1.8	11 ... 50

Notes :

1. For on-off differential values with switch codes '9' & 'G' consult sales.
2. To arrive at differentials for DPDT switching, apply multiplication factor of 1.3 to the above values.

Table 5: Switching differential for SS diaphragm, GK enclosure

Range code	Range	Unit	Switching differential for contact versions - GK Enclosures			
			D, 3	4	5	W
M011	0 ... 2.5	mbar	1.2	1.22	1.22	-
M036	0.5 ... 5	mbar	1.22	1.56	1.76	-
M037	1 ... 10	mbar	1.22	1.56	1.76	-
M038	2.5 ... 15	mbar	1.44	1.78	2.28	4.86 ... 9
M039	2.5 ... 25	mbar	2.22	2	2.5	7 ... 15
M041	5 ... 50	mbar	2.26	2.56	3.22	8 ... 30
M045	7.5 ... 75	mbar	2.56	2.78	3.56	9 ... 45
M046	10 ... 100	mbar	3	3	4	12 ... 60
M008	-5 ... 0	mbar	1.6	1.4	2.2	-
M007	-10 ... 0	mbar	1.8	2	3	-
M004	-20 ... 0	mbar	2.2	2.3	4.6	6 ... 12
M003	-25 ... 0	mbar	3	3.2	5	7 ... 15
M001	-50 ... 0	mbar	4	4.3	6	9 ... 30
M049	-100 ... 0	mbar	5	5.6	7	12 ... 50
M009	-2.5 ... +2.5	mbar	-1.6 / +1.2	-1.8 / +1	-2 / +1.2	-
M007	-10 ... +10	mbar	-2.2 / +1.6	-2.6 / +1.6	-3 / +1.6	5.5 ... 10
M005	-20 ... +20	mbar	-3 / +2.3	-3.3 / +2	-4 / +2.8	10 ... 20
M002	-50 ... +50	mbar	-4 / +2.5	-4.3 / +2.6	-6 / +3	15 ... 50

Notes :

1. For on-off differential values with switch codes '9' & 'G' consult sales.
2. To arrive at differentials for DPDT switching, apply multiplication factor of 1.4 to the above values.

Table 6: Switch code, rating and availability (note 9)

Switch code		Contact version	AC rating	DC rating in Ampere						Availability in models	
SPDT	DPDT			Resistive			Inductive				
				250V	125V	30V	250V	125V	30V	SPDT	DPDT
D	DD	General purpose	15A 250 / 125V	0.2	0.4	2.0	0.02	0.03	1.0	021	021
3	33	General purpose	15A 250 / 125V	-	-	-	-	-	-	021	021
W	WW	General purpose	15A 250 / 125V	0.30	0.60	10.0	0.30	0.60	10.0	023	023
4	44	With Gold alloy contact.	1A 125V	-	0.5	0.5	-	0.25	0.25	021	021
5	55	General purpose with good DC rating.	5A 250 / 125V	0.2	0.4	4.0	0.2	0.4	3.0	021	021
9	99	Hermetically sealed, inert gas filled with Silver alloy contact.	1A 115V 400 Hz.	-	-	3.0 ★	-	-	1.0 ★	021	021
G	GG	Hermetically sealed, inert gas filled with Gold plated contact.	-	-	-	1.0 ★	-	-	0.25 ★	021	021

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

Table 7: 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 ISO 724 ★★	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.

Table 8: Options

Details	Model	
	021	023
Ammonia service (available only with E4 and E2 wetted parts)	✓	✓
Nuclear grade cleaning	✓	✓
Full Vacuum withstandability	✓	✓
Optional scale accuracy ±2%	✓	✓
CE conformity	✓	✓
Blow out disc	✓	✓

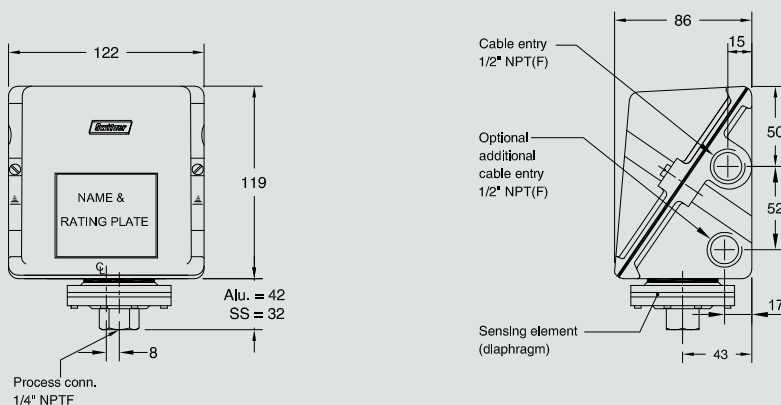
Notes

1. Gr.IIC of IS/IEC 60079–1 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 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 $\pm 2\%$ 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. 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.
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 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.
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., $\pm 2\%$ 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.
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 $(-) 10^\circ\text{C}$ to $(+) 60^\circ\text{C}$ 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 $(-) 25^\circ\text{C}$ to $(+) 80^\circ\text{C}$.
13. 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 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. Custom built instruments are available for special service requirements under Special Engineering Category.
16. Accuracy figures are exclusive of test equipment tolerance on the claimed values.

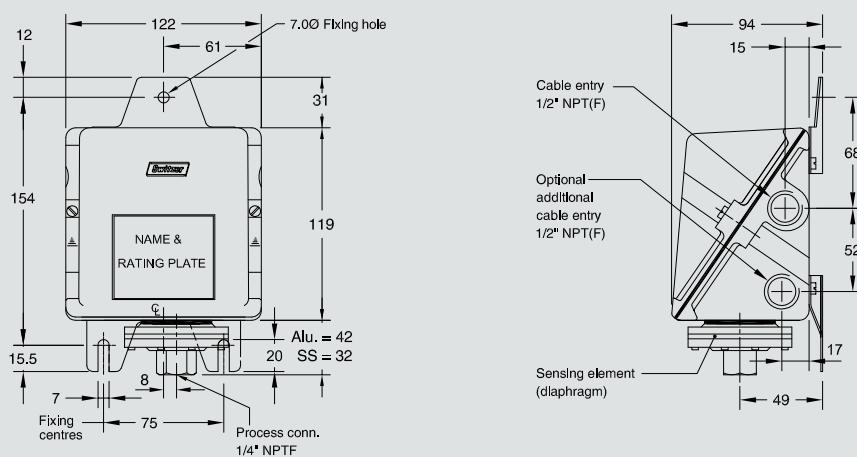
Dimensions in mm

Model 021 / 023 in GM – High range

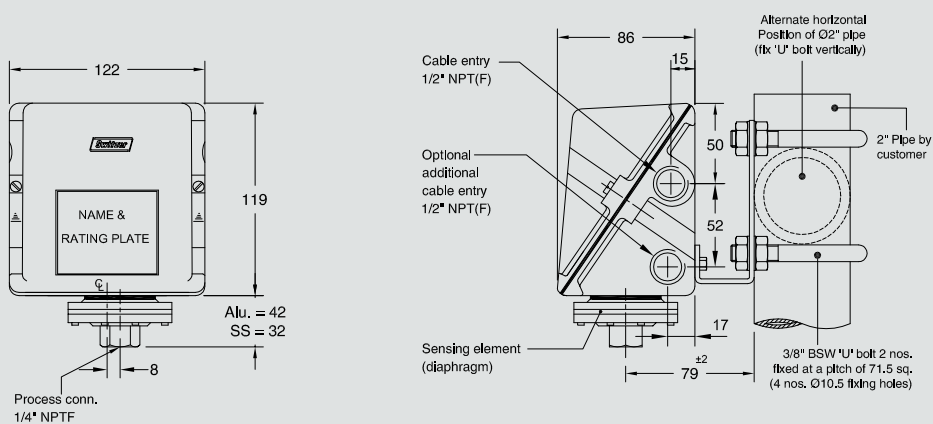
On-line mounting



Wall mounting



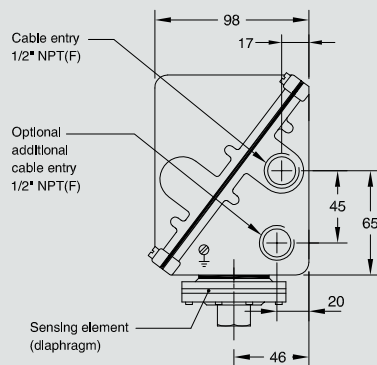
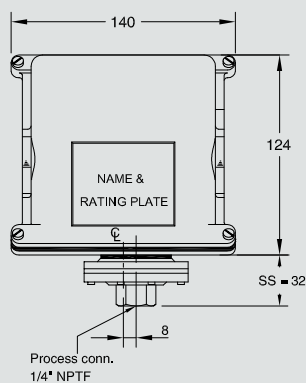
2" pipe mounting



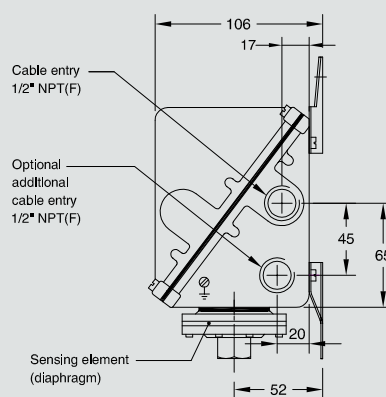
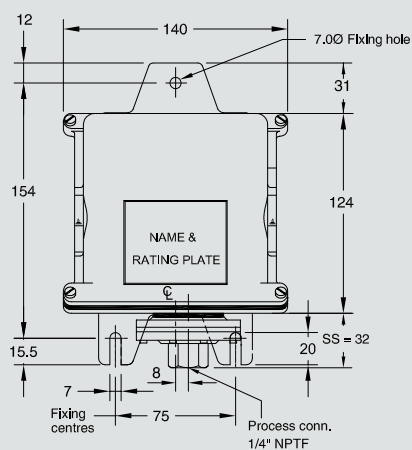
Dimensions in mm

Model 021 / 023 in GA – High range

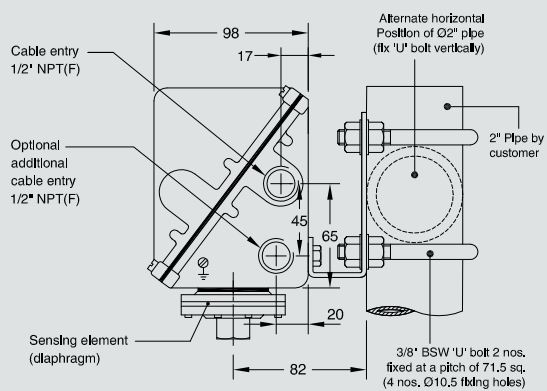
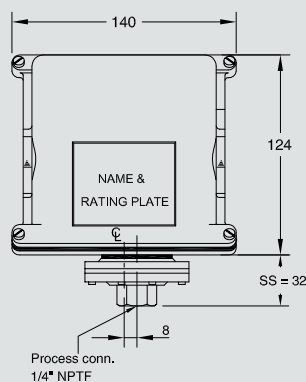
On-line mounting



Wall mounting



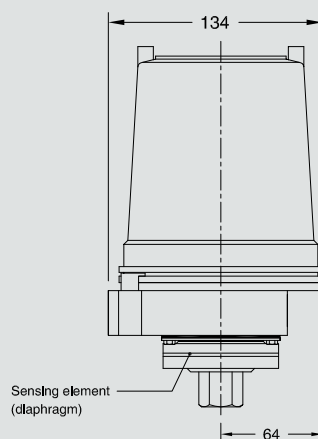
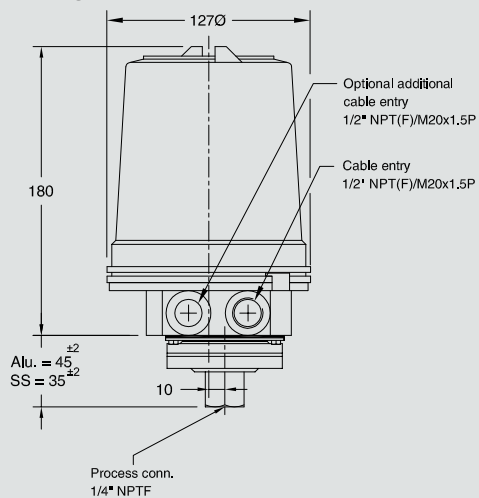
2" pipe mounting



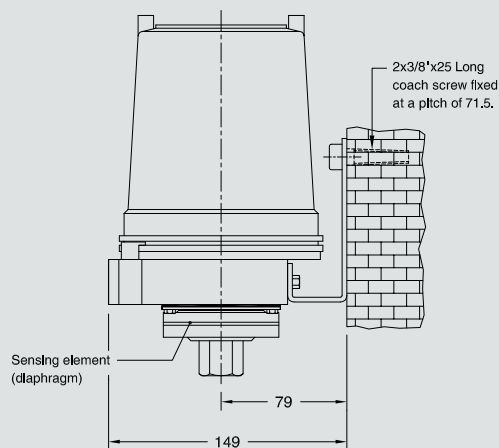
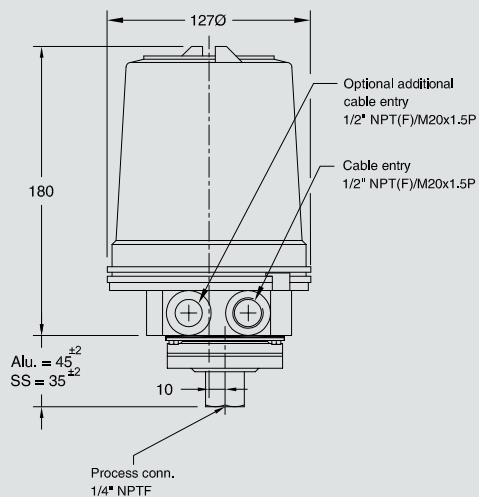
Dimensions in mm

Model 021 / 023 in GK – High range

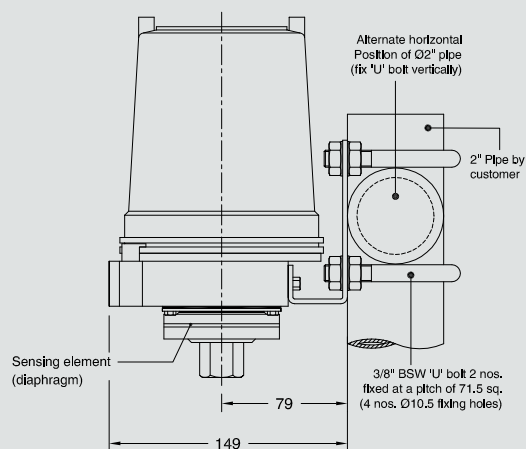
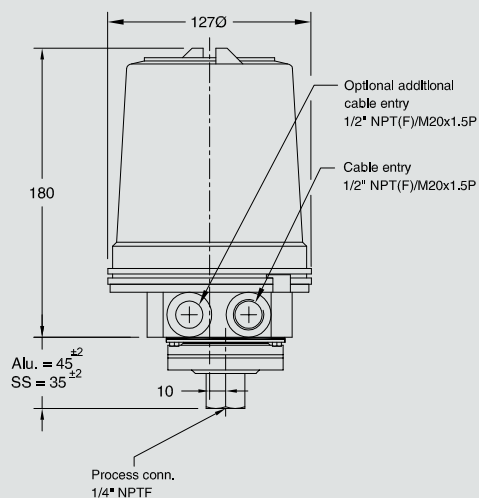
On-line mounting



Wall mounting



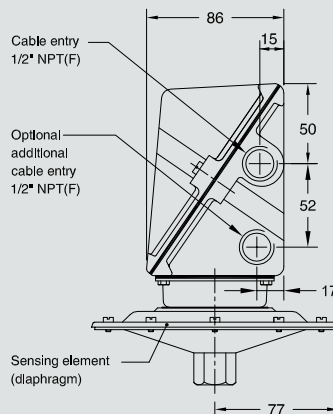
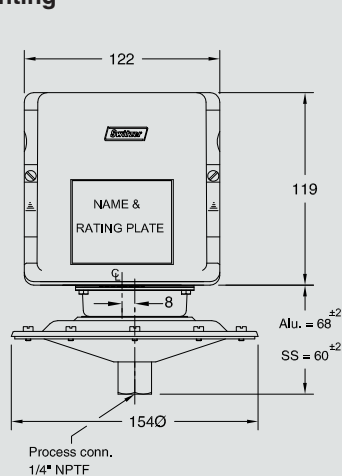
2" pipe mounting



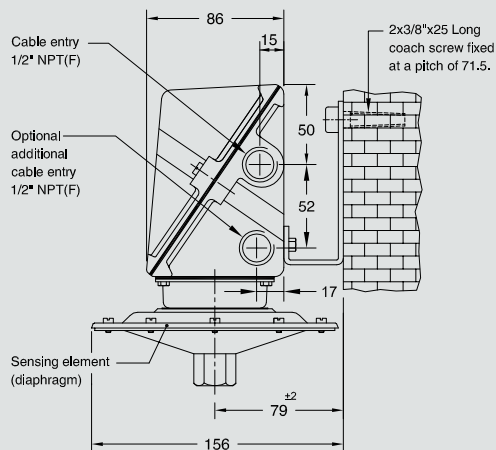
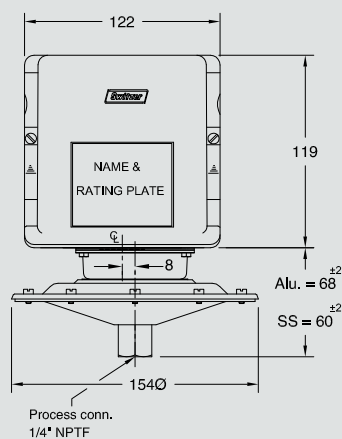
Dimensions in mm

Model 021 / 023 in GM – Low range

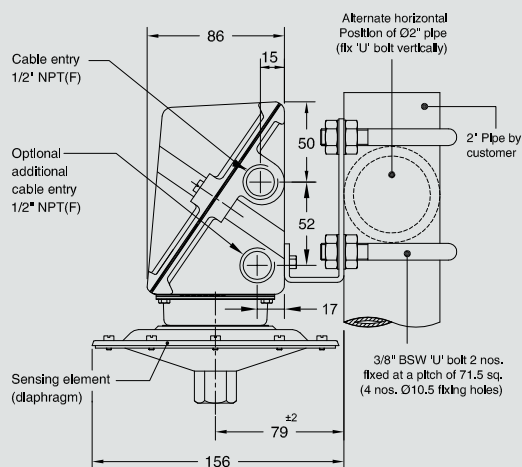
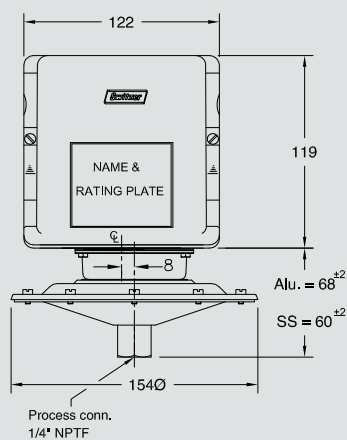
On-line mounting



Wall mounting



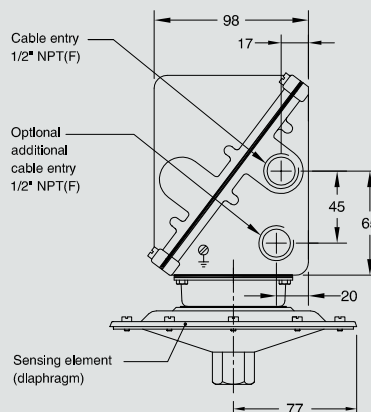
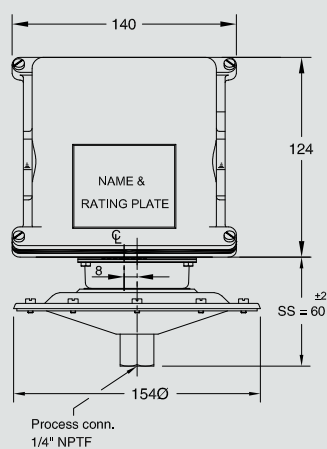
2" pipe mounting



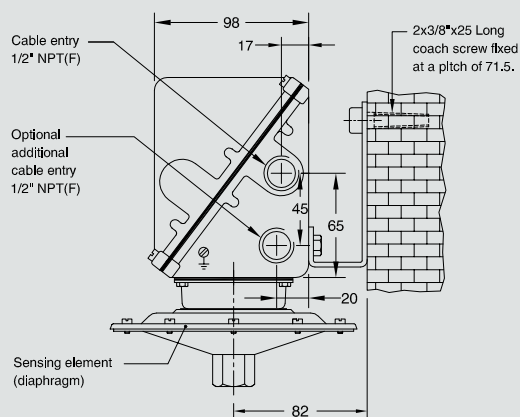
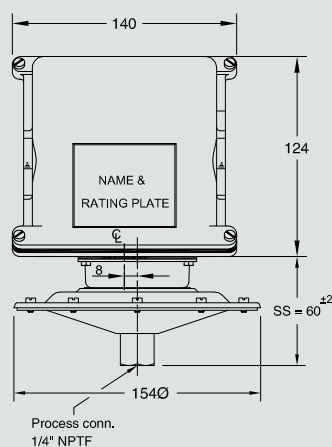
Dimensions in mm

Model 021 / 023 in GA – Low range

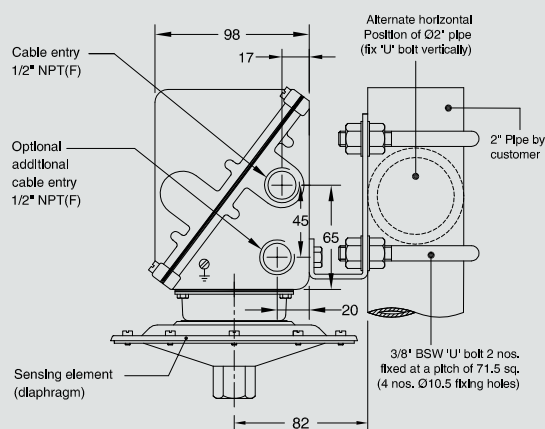
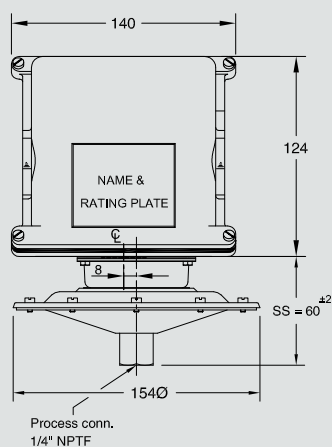
On-line mounting



Wall mounting



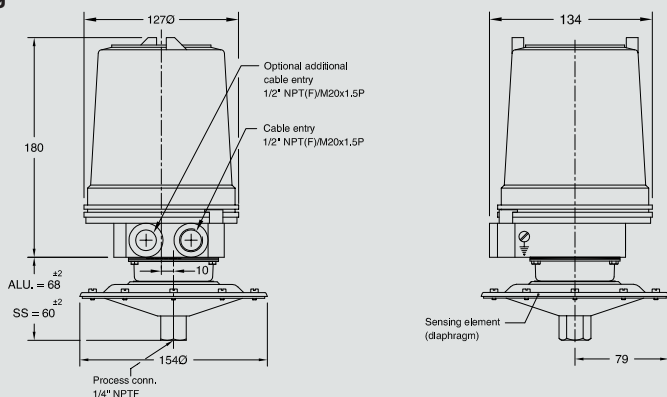
2" pipe mounting



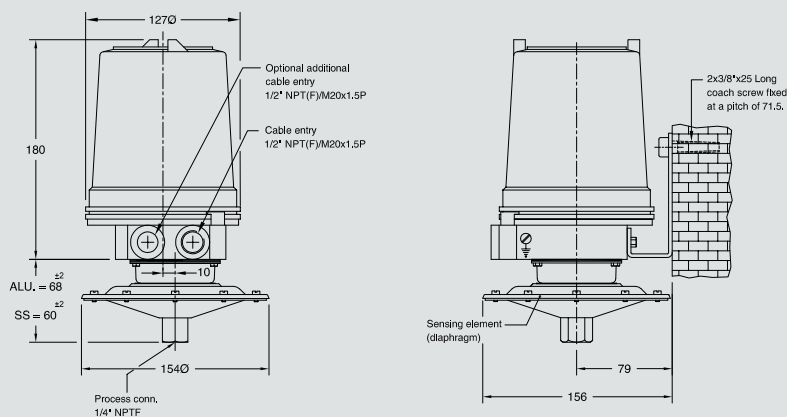
Dimensions in mm

Model 021 / 023 in GK – Low range

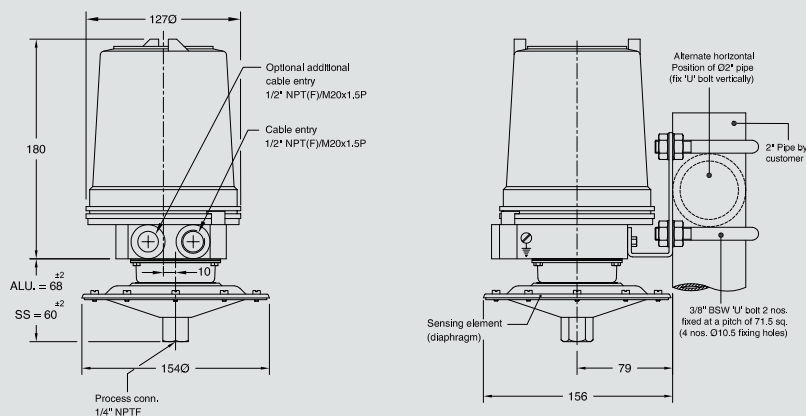
On-line mounting



Wall mounting



2" pipe mounting



Ordering information

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

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