

Bourdon tube pressure gauge with switch contacts For the process industry, NS 100, Model PGS23.100

data sheet PV 22.02



for further approvals see
page 8

switchGAUGE

Applications

- Control and regulation of processes
- Monitoring of plants and switching of circuits
- For gaseous and liquid aggressive media that are not highly viscous or crystallising, also in aggressive environments
- Chemical industry, petrochemical industry, power plants, mining, on-/offshore, environmental technology, machine building and general plant construction

Special features

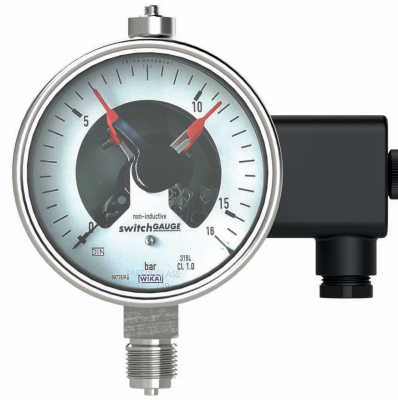
- Up to 4 switch contacts per instrument
- Also available with case filling for high dynamic pressure loads or vibrations
- Instruments with inductive contacts for use in hazardous areas
- Instruments with contacts for PLC applications
- Instruments optionally available in safety version S3 per EN 837

Description

Wherever the process pressure has to be indicated locally and, at the same time, circuits need to be switched, the model PGS23.1x0 switchGAUGE finds its use.

Switch contacts (electrical switch contacts) make or break an electric control circuit dependent upon the pointer position of the indicating measuring instrument. The switch contacts are adjustable over the full extent of the scale range (see DIN 16085), and are mounted predominantly below the dial, though also partly on top of the dial. The instrument pointer (actual value pointer) moves freely across the entire scale range, independent of the setting.

The set pointer can be adjusted using a removable adjustment key in the window.



Model PGS23.100 with switch contact

Switch contacts consisting of several contacts can also be set to a single set point. Contact actuation is made when the actual value pointer travels beyond or below the desired set point.

The pressure gauge is manufactured in accordance with DIN 16085 and fulfils all requirements of the relevant standards (EN 837-1) and regulations for the on-site display of the working pressure of pressure vessels.

As switch contacts, magnetic snap-action contacts, reed switches, inductive contacts and electronic contacts are available. Inductive contacts can be used in hazardous areas. For triggering programmable logic controllers (PLC), electronic contacts and reed switches can be used.

Specifications

Models PGS23.100 and PGS23.160	
Nominal size in mm	<ul style="list-style-type: none"> ■ 100 ■ 160 on request
Accuracy class	1.0
Scale ranges	0 ... 0.6 bar [0 ... 8.7 psi] to 0 ... 1,600 bar [0 ... 23,206 psi] other units (e.g. psi, kPa) available or all other equivalent vacuum or combined pressure and vacuum ranges
Scale	Single scale Option: Dual scale
Pressure limitation	
Steady	Full scale value
Fluctuating	0.9 x full scale value
Short time	1.3 x full scale value
Connection location	<ul style="list-style-type: none"> ■ Lower mount (radial) ■ Lower back mount
Process connection	<ul style="list-style-type: none"> ■ G ½ B ■ G ¼ B ■ G ⅜ B ■ ½ NPT ■ M20 x 1.5 others on request
Permissible temperature ¹⁾	
Medium	+200 °C [+392 °F] max. with unfilled instruments +100 °C [+212 °F] max. with filled instruments
Ambient	-20 ... +60 °C [-4 ... 140 °F]
Temperature effect	When the temperature of the measuring system deviates from the reference temperature (+20 °C): max. ±0.4 %/10 K of full scale value
Case	<ul style="list-style-type: none"> ■ Version S1 per EN 837: With blow-out device in case back ■ Safety version S3 per EN837: With solid baffle wall (Solidfront) and blow-out back
Case filling	Without Option: With case filling
Wetted materials	
Process connection, pressure element	Stainless steel 316L, option: Monel (model PGS26)
Non-wetted materials	
Case, movement, bayonet ring	Stainless steel
Dial	Aluminium, white, black lettering
Instrument pointer	Aluminium, black
Set pointer	Aluminium, red
Window	Laminated safety glass
Ingress protection per IEC/EN 60529	IP65 ²⁾ Option: IP66
Electrical connection	Cable socket PA 6, black Per VDE 0110 insulation group C/250 V Cable gland M20 x 1.5 Strain relief 6 screw terminals + PE for conductor cross-section 2.5 mm ² For dimensions see page 9 others on request

1) For hazardous areas, the permissible temperatures of the contact model 831 shall apply exclusively (see page 5). These must not be exceeded at the instrument either (for details see operating instructions). If necessary, measures for cooling (e.g. syphon, instrumentation valve, etc.) have to be taken.

2) Ingress protection IP54 with safety version case and connection location lower back mount.

Switch contacts

Magnetic snap-action contact model 821

- No control unit and no power supply required
- Direct switching up to 250 V, 1 A
- Up to 4 switch contacts per measuring instrument

Inductive contact model 831

- Suitable for use in hazardous areas with corresponding control unit (model 904.xx)
- Long service life due to non-contact sensor
- Low influence on the indication accuracy
- Fail-safe switching at high switching frequency
- Insensitive to corrosion
- Also available in safety version
- Up to 3 switch contacts per measuring instrument

Electronic contact model 830 E

- For direct triggering of a programmable logic controller (PLC)
- 2-wire system (option: 3-wire system)
- Long service life due to non-contact sensor
- Low influence on the indication accuracy
- Fail-safe switching at high switching frequency
- Insensitive to corrosion
- Up to 3 switch contacts per measuring instrument

Reed switch model 851

- No control unit and no power supply required
- Direct switching up to 250 V, 1 A
- For direct triggering of a programmable logic controller (PLC)
- Free from wear as without contact
- NS 100: Maximum two change-over contacts per measuring instrument
- NS 160: Maximum one change-over contact per measuring instrument (switching voltages AC < 50 V and DC < 75 V, switch contact not adjustable from outside)

Switching function

The switching function of the switch is indicated by index 1, 2 or 3.

Model 8xx.1: Normally open (clockwise pointer motion)

Model 8xx.2: Normally closed (clockwise pointer motion)

Models 821.3 Change-over; one contact breaks and one and 851.3: contact makes simultaneously when pointer reaches set point

For further information on switch contacts, see data sheet AC 08.01

Other versions

- Contact model 821 with separate circuits
- Contact model 821 as change-over contact (break or make simultaneously at the set point)
- Contact model 821 with cable break monitoring (parallel resistance 47 k Ω and 100 k Ω)
- Contact materials for contact model 821: Platinum-iridium alloy and gold-silver alloy
- Contacts fixed, without contact adjustment lock
- Contact adjustment lock leaded
- Contact adjustment key fixed
- Connector (instead of cable socket)

Specifications for instruments with magnetic snap-action contact model 821

Measuring span	Nominal size	Max. number of contacts	Switching current range I	Switch version ¹⁾
≤ 1.0 bar	100, 160	1	0.02 ... 0.3 A	L
> 1.0 bar	100, 160	1	0.02 ... 0.6 A	S
≤ 1.6 bar	100, 160	2	0.02 ... 0.3 A	L
> 1.6 bar	100, 160	2	0.02 ... 0.6 A	S
≤ 4.0 bar	100	3 or 4	0.02 ... 0.3 A	L
> 4.0 bar	100	3 or 4	0.02 ... 0.6 A	S
≤ 2.5 bar	160	3 or 4	0.02 ... 0.3 A	L
> 2.5 bar	160	3 or 4	0.02 ... 0.6 A	S

1) Design of the contact coil: Version "L" = light-weight, version "S" = heavy

The recommended setting range of the contacts is 25 ... 75 % of the scale (0 ... 100 % on request).

Contact material (standard): Silver-nickel, gold-plated

Setting the contacts

The recommended minimum clearance between 2 contacts is 20 % of the measuring span.

The switch hysteresis is 2 ... 5 % (typical).

Characteristics	Unfilled instruments		Filled instruments	
	Resistive load		Resistive load	
	Switch version "S"	Switch version "L"	Switch version "S"	Switch version "L"
Rated operating voltage U_{eff}	≤ 250 V		≤ 250 V	
Rated operating current				
Switch-on current	≤ 1.0 A	≤ 0.5 A	≤ 1.0 A	≤ 0.5 A
Switch-off current	≤ 1.0 A	≤ 0.5 A	≤ 1.0 A	≤ 0.5 A
Continuous current	≤ 0.6 A	≤ 0.3 A	≤ 0.6 A	≤ 0.3 A
Switching power	≤ 30 W / ≤ 50 VA		≤ 20 W / ≤ 20 VA	

Recommended contact load with resistive and inductive loads

Operating voltage	Unfilled instruments			Filled instruments		
	Resistive load		Inductive load	Resistive load		Inductive load
	Direct current	Alternating current	cos φ > 0.7	Direct current	Alternating current	cos φ > 0.7
DC 220 V / AC 230 V	100 mA	120 mA	65 mA	65 mA	90 mA	40 mA
DC 110 V / AC 110 V	200 mA	240 mA	130 mA	130 mA	180 mA	85 mA
DC 48 V / AC 48 V	300 mA	450 mA	200 mA	190 mA	330 mA	130 mA
DC 24 V / AC 24 V	400 mA	600 mA	250 mA	250 mA	450 mA	150 mA

Specifications for instruments with inductive contact model 831

Measuring span	Nominal size	Case version	Max. number of contacts
0.6 bar	100, 160	S1	1
0.6 bar	160	S3	1
1.0 bar	100, 160	S1	2
1.0 bar	100	S3	1
1.0 bar	160	S3	2
≥ 1.6 bar	100, 160	S1, S3	3

Legend:

S1 = Standard version, with blow-out device (per EN 837)

S3 = Safety version, Solidfront (per EN 837)

The recommended setting range of the contacts is 10 ... 90 % of the scale (0 ... 100 % on request).

Setting of contacts to identical set point

Up to 2 contacts can be set to an identical set point. For a version with 3 contacts this is not possible. The left (no. 1) or right (no. 3) contact may not be set to the same set point as the other 2 contacts. The required displacement is approx. 30°, optionally to the right or to the left.

Available contact versions

- 831-N
- 831-SN, safety version ¹⁾
- 831-S1N, safety version ¹⁾, inverted signal

¹⁾ only operate with a corresponding isolating amplifier (model 904.3x)

Permissible temperature ranges

T6	T5 ... T1	T135 °C
-20 ... +60 °C	-20 ... +70 °C	-20 ... +70 °C

For further information on hazardous areas, see operating instructions.

Associated isolating amplifiers and control units

Model	Version	Ex version
904.28 KFA6 - SR2 - Ex1.W	1 contact	yes
904.29 KFA6 - SR2 - Ex2.W	2 contacts	yes
904.30 KHA6 - SH - Ex1	1 contact	yes - safety equipment
904.33 KFD2 - SH - Ex1	1 contact	yes - safety equipment
904.25 MSR 010-I	1 contact	no
904.26 MSR 020-I	2 contacts	no
904.27 MSR 011-I	Two-point control	no

Specifications for instruments with electronic contact model 830 E

Measuring span	Nominal size	Case version	Max. number of contacts
0.6 bar	100, 160	S1	1
0.6 bar	160	S3	1
1.0 bar	100, 160	S1	2
1.0 bar	100	S3	1
1.0 bar	160	S3	2
≥ 1.6 bar	100, 160	S1, S3	2

Legend:

S1 = Standard version, with blow-out device (per EN 837)

S3 = Safety version, Solidfront (per EN 837)

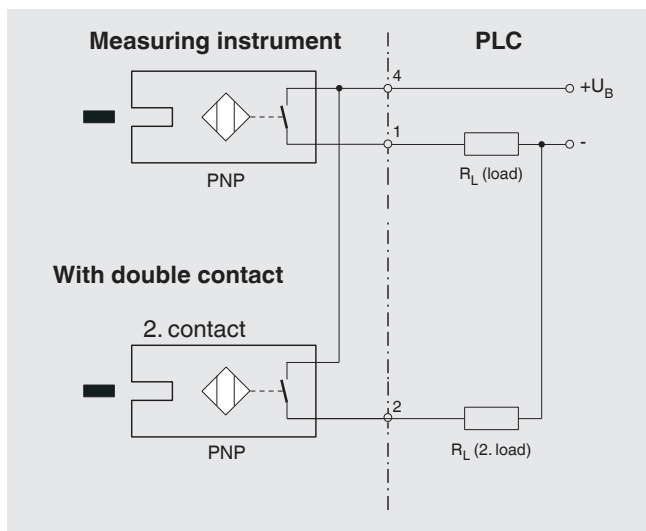
The recommended setting range of the contacts is 10 ... 90 % of the scale (0 ... 100 % on request).

Setting of contacts to identical set point

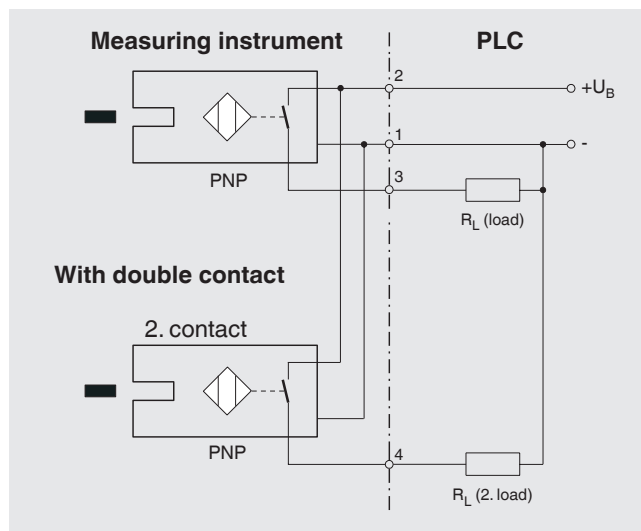
Up to 2 contacts can be set to an identical set point. For a version with 3 contacts this is not possible. The left (no. 1) or right (no. 3) contact may not be set to the same set point as the other 2 contacts. The required displacement is approx. 30°, optionally to the right or to the left.

Characteristics	
Contact version	Normally open, normally closed
Type of output	PNP transistor
Operating voltage	DC 10 ... 30 V
Residual ripple	max. 10 %
No-load current	≤ 10 mA
Switching current	≤ 100 mA
Residual current	≤ 100 μA
Voltage drop (with I _{max.})	≤ 0.7 V
Reverse polarity protection	Conditional U _B (the switched output 3 or 4 must never be set directly to minus)
Anti-inductive protection	1 kV, 0.1 ms, 1 kΩ
Oscillator frequency	approx. 1,000 kHz
EMC	per EN 60947-5-2

2-wire system (standard)



3-wire system



Specifications for instruments with reed switch model 851

Measuring span	Nominal size	Case version	Max. number of contacts
≥ 1.0 bar	100, 160	S1, S3 ¹⁾	1
≥ 1.6 bar	100, 160	S1, S3 ¹⁾	2

1) Case version S3 with NS 100

Legend:

S1 = Standard version, with blow-out device (per EN 837)

S3 = Safety version, Solidfront (per EN 837)










Switching power P_{\max} 60 W / 60 VA

Switching current 1 A

Characteristics	
Contact version	Change-over contact
Type of contact	Bistable
Max. switching voltage	AC/DC 250 V
Min. switching voltage	Not required
Switching current	AC/DC 1 A
Min. switching current	Not required
Transport current	AC/DC 2 A
cos φ	1
Switching power	60 W/ VA
Contact resistance (static)	100 m Ω
Insulation resistance	10 ⁹ Ω
Breakdown voltage	DC 1,000 V
Switching time incl. contact chatter	4.5 ms
Contact material	Rhodium
Switch hysteresis	3 ... 5 %

- The limit values presented here must not be exceeded.
- When using two contacts, these cannot be set to the same point. Depending on the switching function, a minimum clearance of 15 ... 30° is required.
- The setting range of the contacts is 10 ... 90 % of the scale.
- The switching function can be set in manufacturing such that the reed contact will actuate exactly at the required switch point. For this, we need the switching direction to be specified on order.

Approvals

Logo	Description	Country
 	EU declaration of conformity <ul style="list-style-type: none"> ■ EMC directive ■ Pressure equipment directive ■ Low voltage directive ■ RoHS directive ■ ATEX directive (option) ¹⁾ Hazardous areas - Ex ia Gas [II 2G Ex ia IIC T6/T5/T4 Gb] Dust [II 2D Ex ia IIIB T135°C Db]	European Union
 	IECEx (option) ¹⁾ Hazardous areas - Ex ia Gas [Ex ia IIC T6/T5/T4 Gb] Dust [Ex ia IIIB T135°C Db]	International
 	EAC (option) <ul style="list-style-type: none"> ■ EMC directive ■ Pressure equipment directive ■ Low voltage directive ■ Hazardous areas ¹⁾ 	Eurasian Economic Community
	GOST (option) Metrology, measurement technology	Russia
	KazInMetr (option) Metrology, measurement technology	Kazakhstan
-	MTSCHS (option) Permission for commissioning	Kazakhstan
	BelGIM (option) Metrology, measurement technology	Belarus
-	CRN Safety (e.g. electr. safety, overpressure, ...)	Canada

1) Only for instruments with inductive contact model 831

Certificates (option)

- 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, indication accuracy)
- 3.1 inspection certificate per EN 10204 (e.g. indication accuracy)

Approvals and certificates, see website

Accessories

- Panel mounting flange, polished stainless steel
- Surface mounting flange, stainless steel
- Sealings (model 910.17, see data sheet AC 09.08)
- Valves (models IV20/IV21, see data sheet AC 09.19, and models IV10/IV11, see data sheet AC 09.22)
- Syphons (model 910.15, see data sheet AC 09.06)
- Overpressure protector (model 910.13, see data sheet AC 09.04)
- Cooling element (model 910.32, see data sheet AC 09.21)
- Diaphragm seal

Dimensions in mm

Cable socket

Contact models: 821 and 851

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Only use cable with a diameter of 5 ... 10 mm

≈ 68

M20x1,5

Contact models: 831 und 830 E

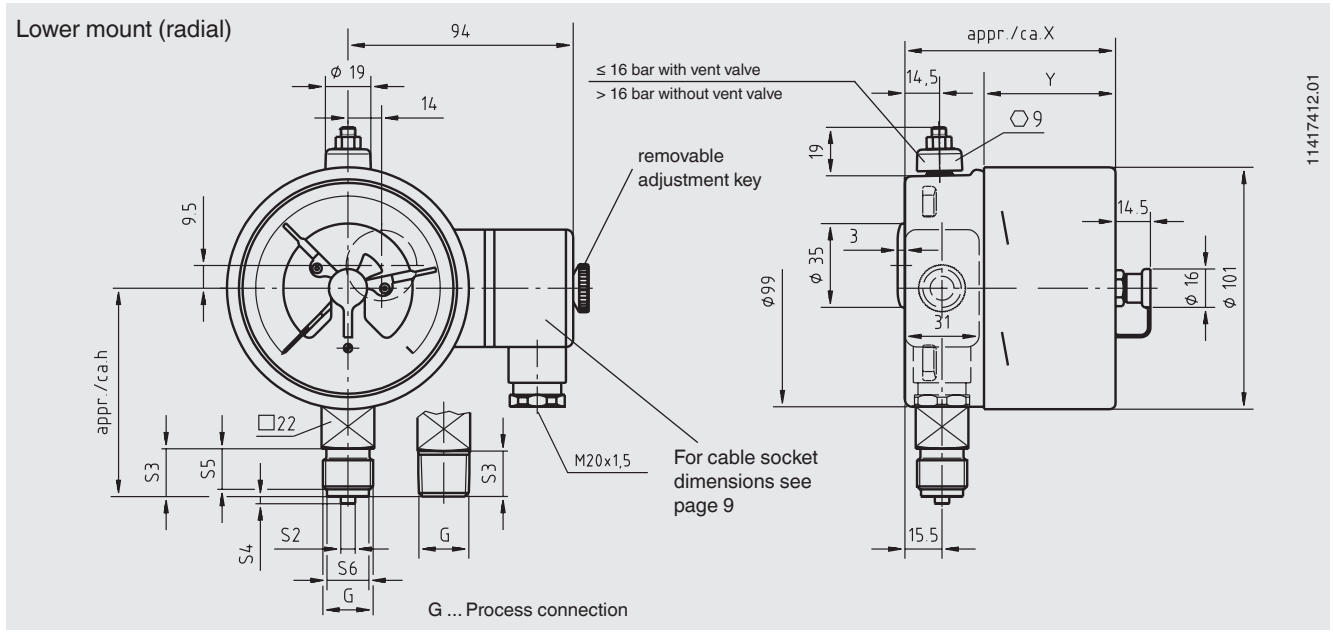
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Only use cable with a diameter of 7 ... 13 mm

≈ 49,5

M20x1,5

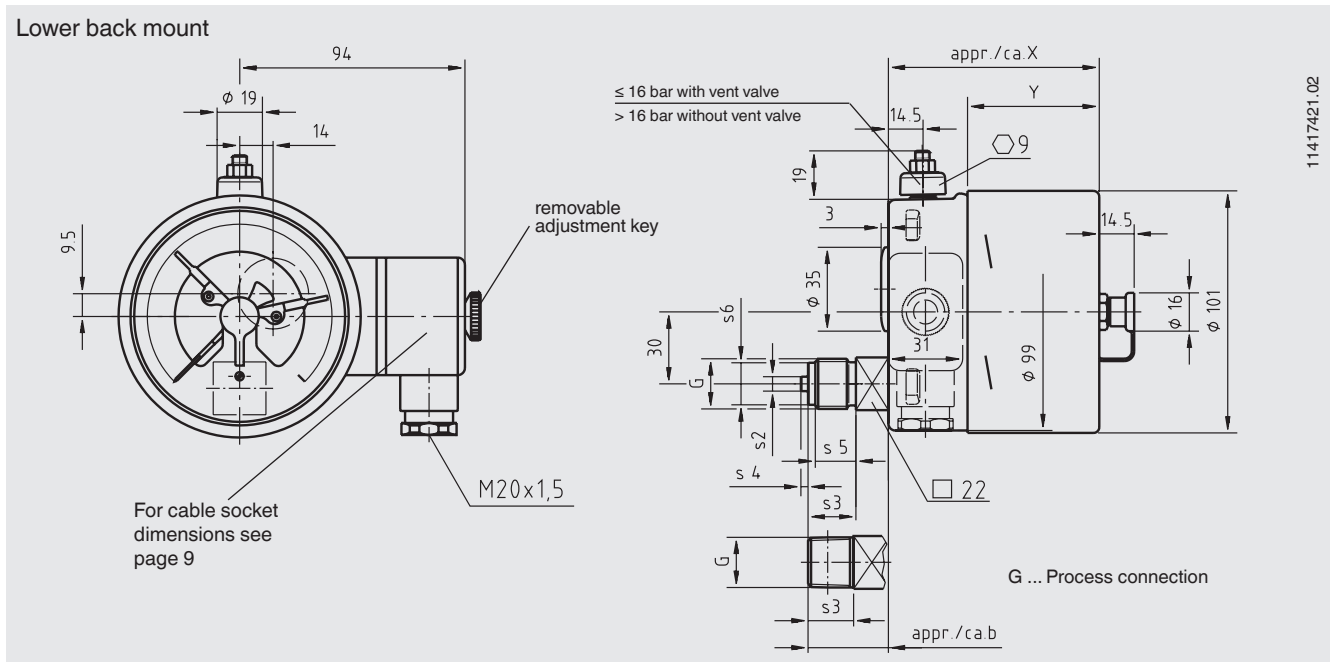
switchGAUGE model PGS23.100 with switch contact model 821, 831 or 830 E



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Type of contact	Dimensions in mm	
	X	Y
Single or double contact	88	55
Double (change-over) contact	113	80
Triple contact	96	63
Quadruple contact	113	80

Process connection	Dimensions in mm					
	h ±1	S2	S3	S4	S5	S6
G ½ B	87	6	20	3	17	17.5
G ¼ B	80	5	13	2	11	9.5
G ⅜ B	83	5.5	16	3	13	13
½ NPT	86	-	19	-	-	-



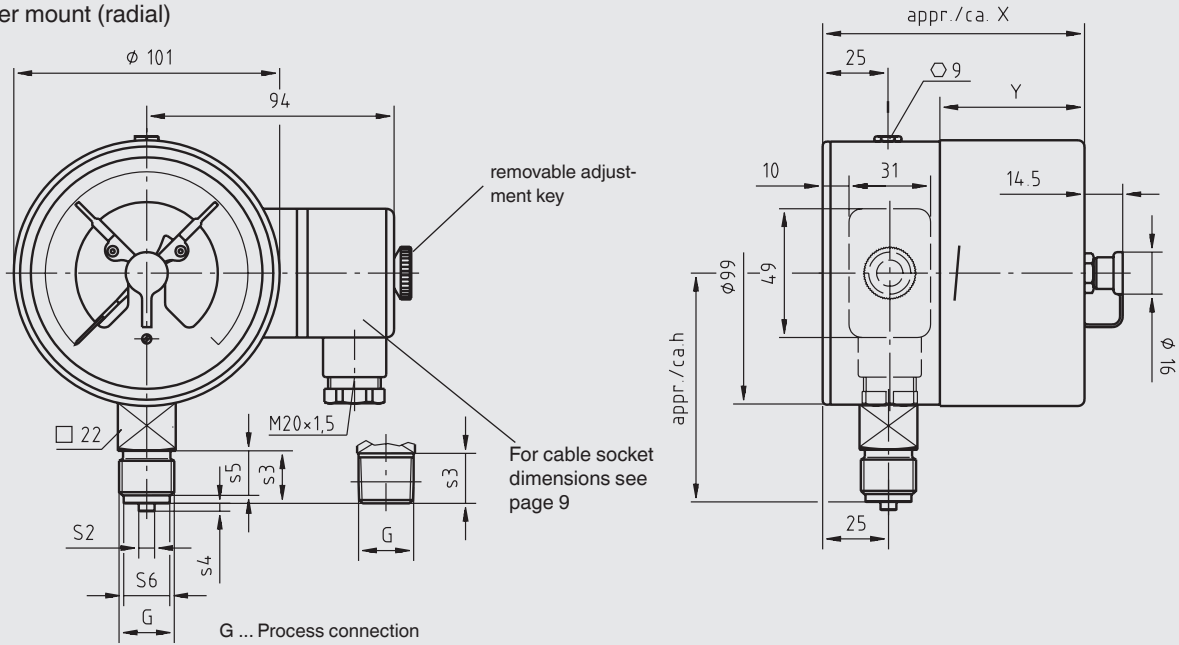
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Type of contact	Dimensions in mm	
	X	Y
Single or double contact	88	55
Double (change-over) contact	113	80
Triple contact	96	63
Quadruple contact	113	80

Process connection	Dimensions in mm					
	b	S2	S3	S4	S5	S6
G ½ B	33.5	6	20	3	17	17.5
G ¼ B	26.5	5	13	2	11	9.5
G ⅜ B	29.5	5.5	16	3	14	13
½ NPT	32.5	-	19	-	-	-

switchGAUGE model PGS23.100 (safety version) with switch contact model 821, 831 or 830 E

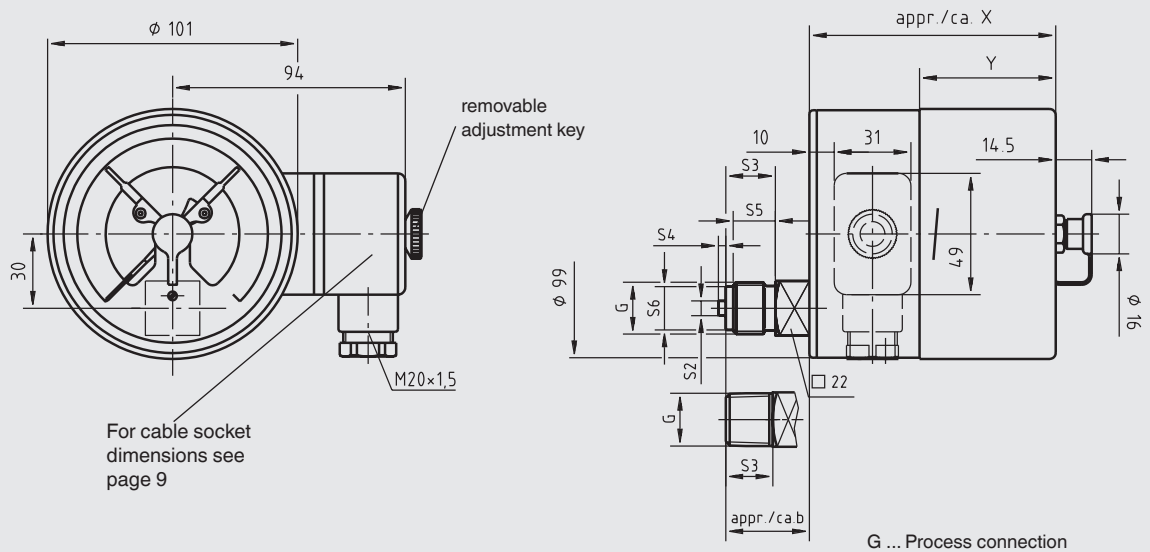
Lower mount (radial)



Type of contact	Dimensions in mm	
	X	Y
Single or double contact	97	55
Double (change-over) contact	122	80
Triple contact	105	63
Quadruple contact	122	80

Process connection	Dimensions in mm					
	h ± 1	S2	S3	S4	S5	S6
G 1/2 B	87	6	20	3	17	17.5
G 1/4 B	80	5	13	2	11	9.5
G 3/8 B	83	5.5	16	3	14	13
1/2 NPT	86	-	19	-	-	-

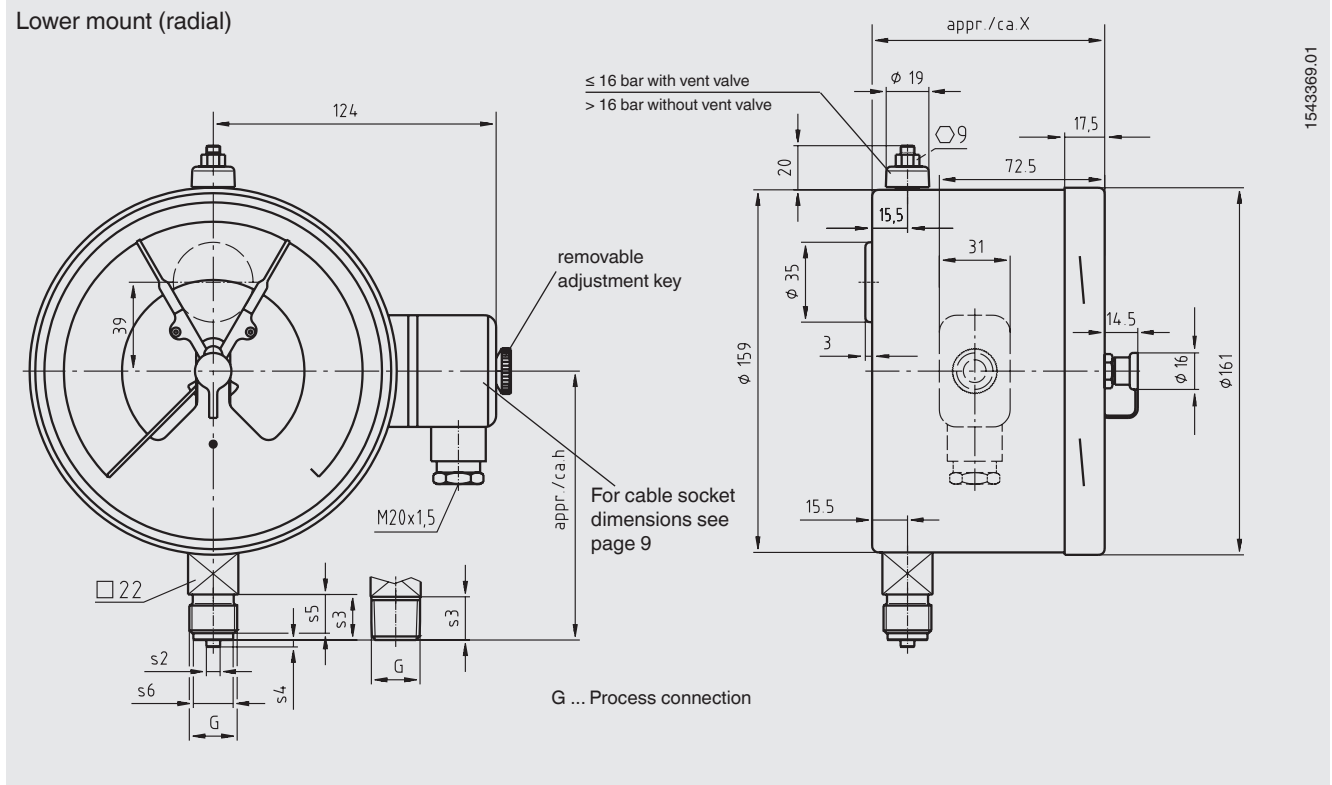
Lower back mount



Type of contact	Dimensions in mm	
	X	Y
Single or double contact	97	55
Double (change-over) contact	122	80
Triple contact	105	63

Process connection	Dimensions in mm					
	b	S2	S3	S4	S5	S6
G 1/2 B	33.5	6	20	3	17	17.5
G 1/4 B	26.5	5	13	2	11	9.5
G 3/8 B	29.5	5.5	16	3	14	13
1/2 NPT	32.5	-	19	-	-	-

switchGAUGE model PGS23.160 with switch contact model 821, 831 or 830 E

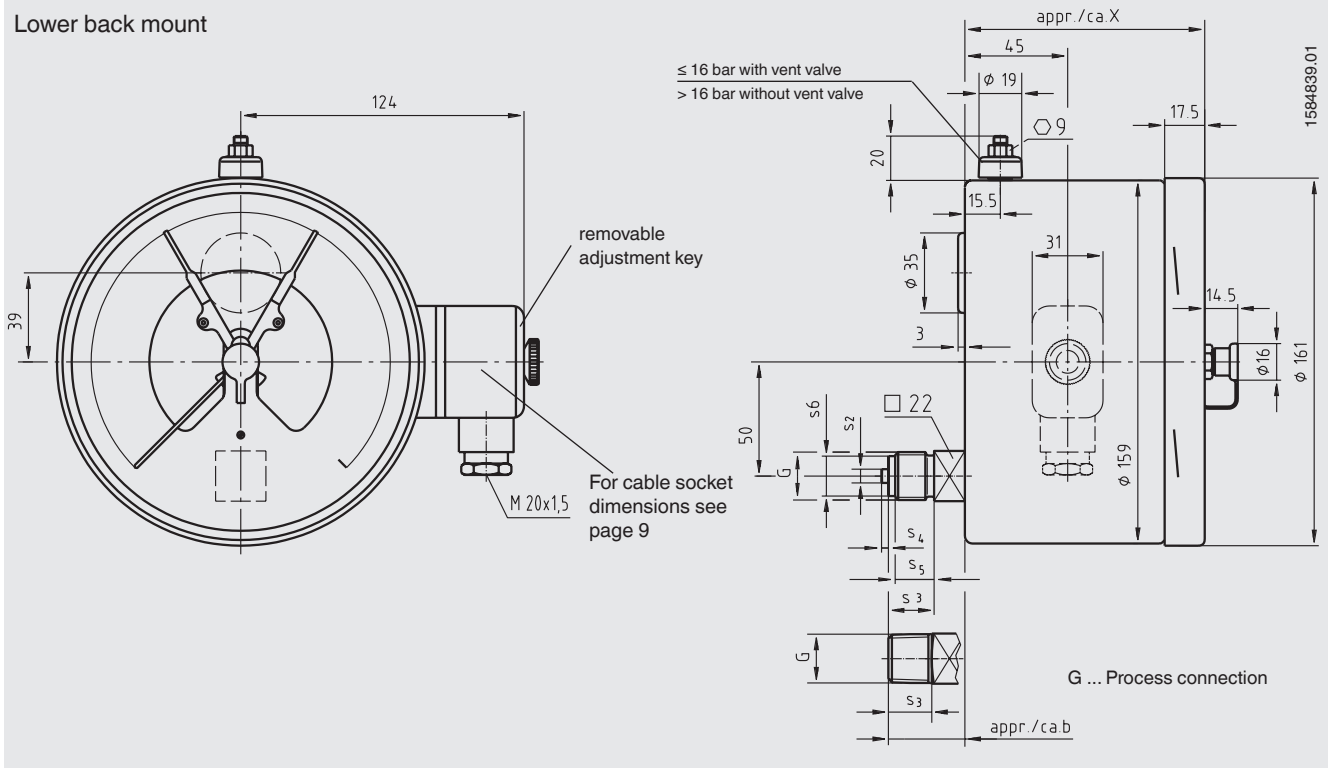


Type of contact	Dimensions in mm
	X
Single, double or triple contact	102 ¹⁾
Double (change-over) contact, quadruple contact	116 ¹⁾

Process connection	Dimensions in mm					
	h ±1	S2	S3	S4	S5	S6
G ½ B	118	6	20	3	17	17.5
G ¼ B	111	5	13	2	11	9.5
G ⅜ B	114	5.5	16	3	14	13
½ NPT	117	-	19	-	-	-

1) Plus 14 mm with pressure ranges ≥ 0 ... 100 bar

Lower back mount

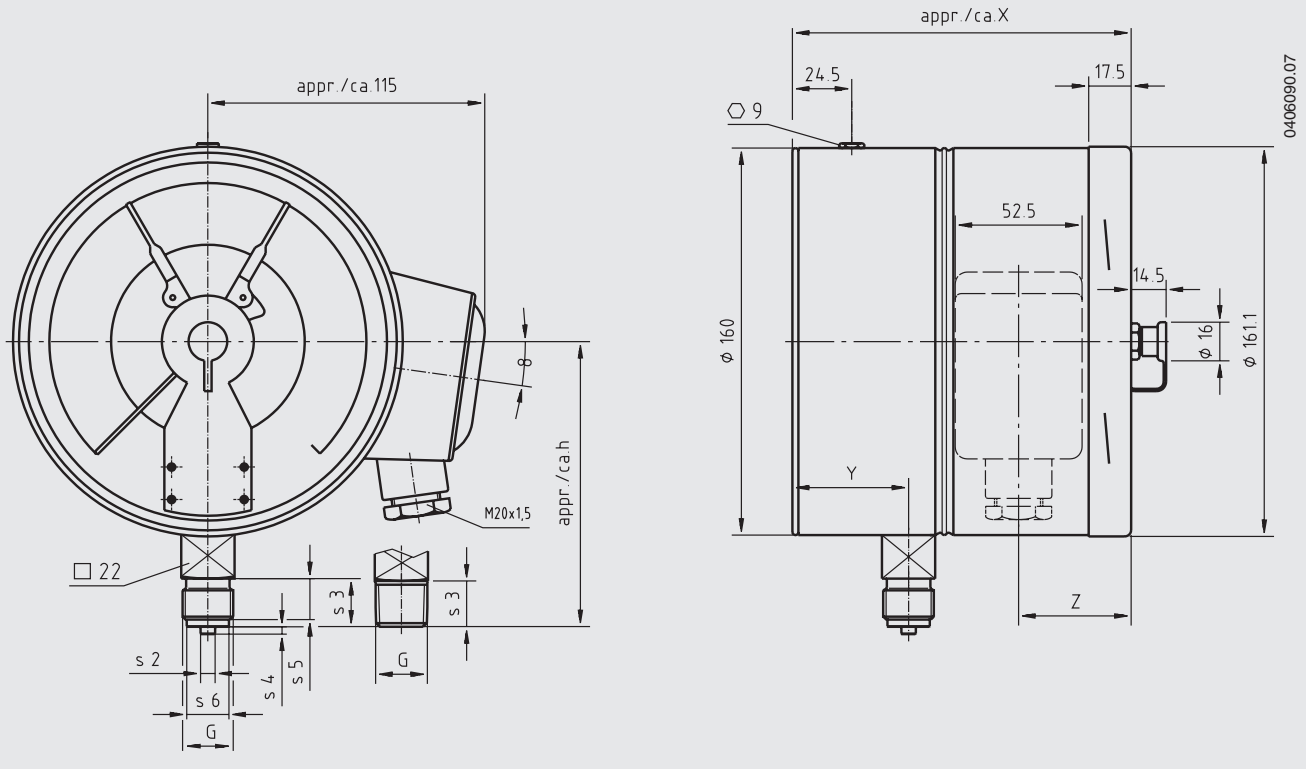


Type of contact	Dimensions in mm
	X
Single, double or triple contact	105
Double (change-over) contact, quadruple contact	119

Process connection	Dimensions in mm					
	b	S2	S3	S4	S5	S6
G 1/2 B	33.5	6	20	3	17	17.5
G 1/4 B	26.5	5	13	2	11	9.5
G 3/8 B	29.5	5.5	16	3	14	13
1/2 NPT	32.5	-	19	-	-	-

switchGAUGE model PGS23.160 (safety version) with switch contact model 821, 831 or 830 E

Lower mount (radial)



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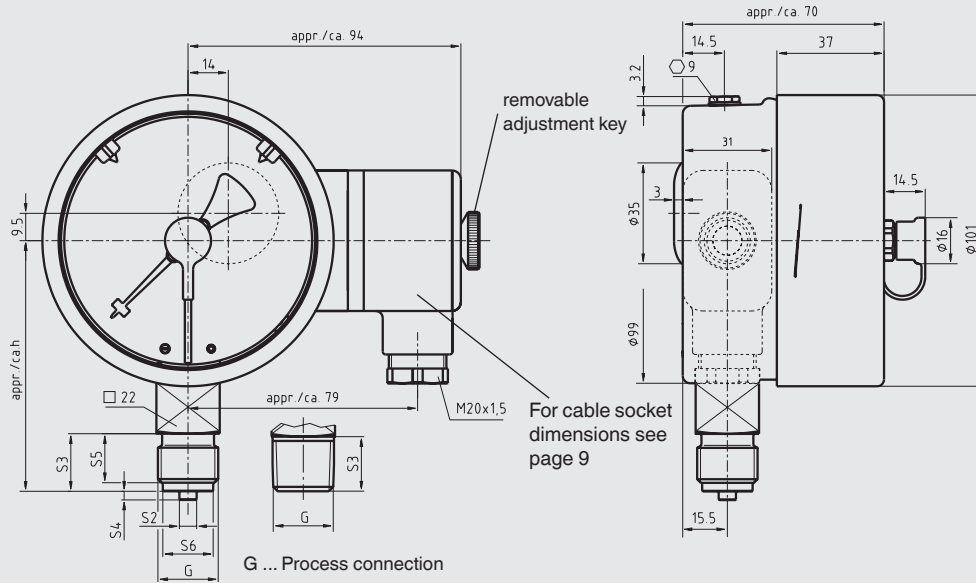
Type of contact	Dimensions in mm		
	X	Y	Z
Single or double contact	141	30.5 ¹⁾	48
Triple contact	153.5	30.5 ¹⁾	60.5

Process connection	Dimensions in mm					
	h ±1	S2	S3	S4	S5	S6
G ½ B	118	6	20	3	17	17.5
½ NPT	117	-	19	-	-	-
M20 x 1.5	118	6	20	3	17	17.5

1) Plus 17 mm with pressure ranges ≤ 0 ... 60 bar

switchGAUGE model PGS23.100 with switch contact model 851.3 or 851.33

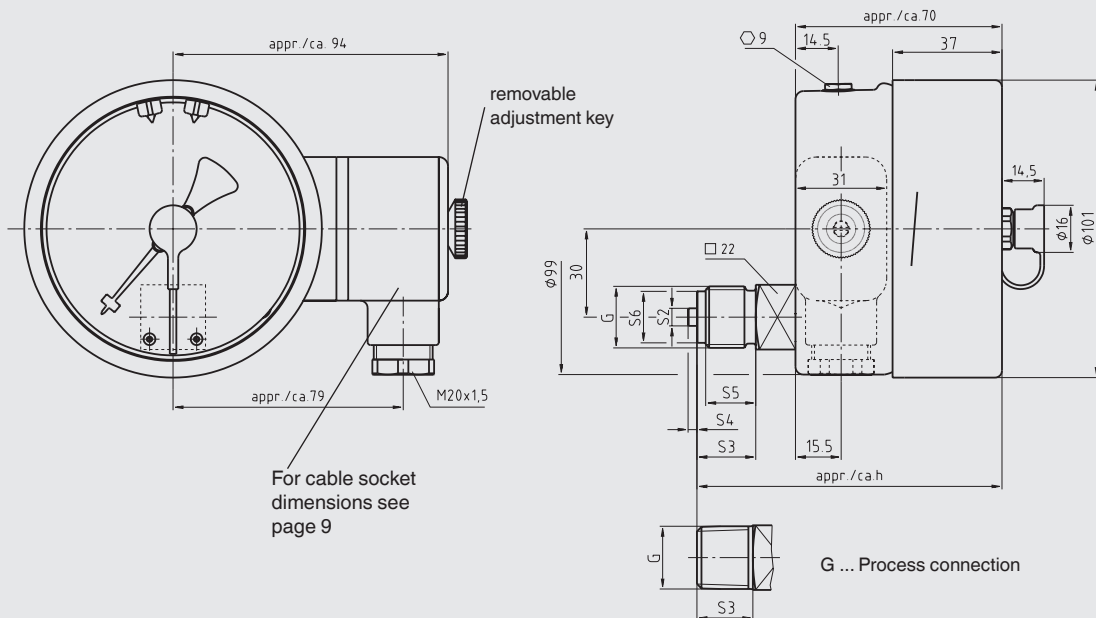
Lower mount (radial)



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Process connection	Dimensions in mm					
	h ±1	S2	S3	S4	S5	S6
G ½ B	87	6	20	3	17	17.5
G ¼ B	80	5	13	2	11	9.5
G ¾ B	83	5.5	16	3	14	13
½ NPT	86	-	19	-	-	-

Lower back mount

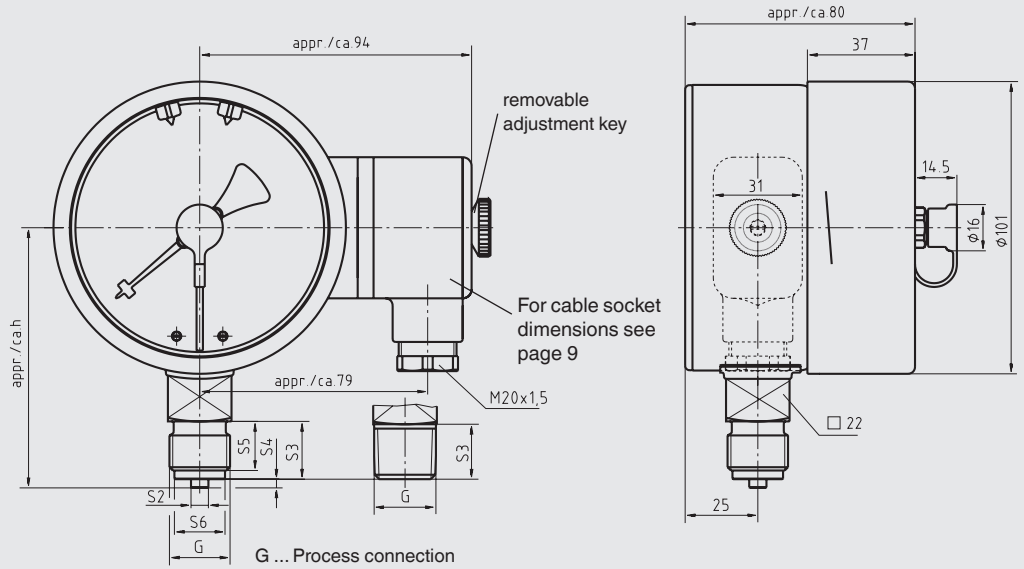


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Process connection	Dimensions in mm					
	h ±1	S2	S3	S4	S5	S6
G ½ B	103	6	20	3	17	17.5
G ¼ B	96	5	13	2	11	9.5
G ¾ B	99	5.5	16	3	14	13
½ NPT	102	-	19	-	-	-

switchGAUGE model PGS23.100 (safety version) with switch contact model 851.3 or 851.33

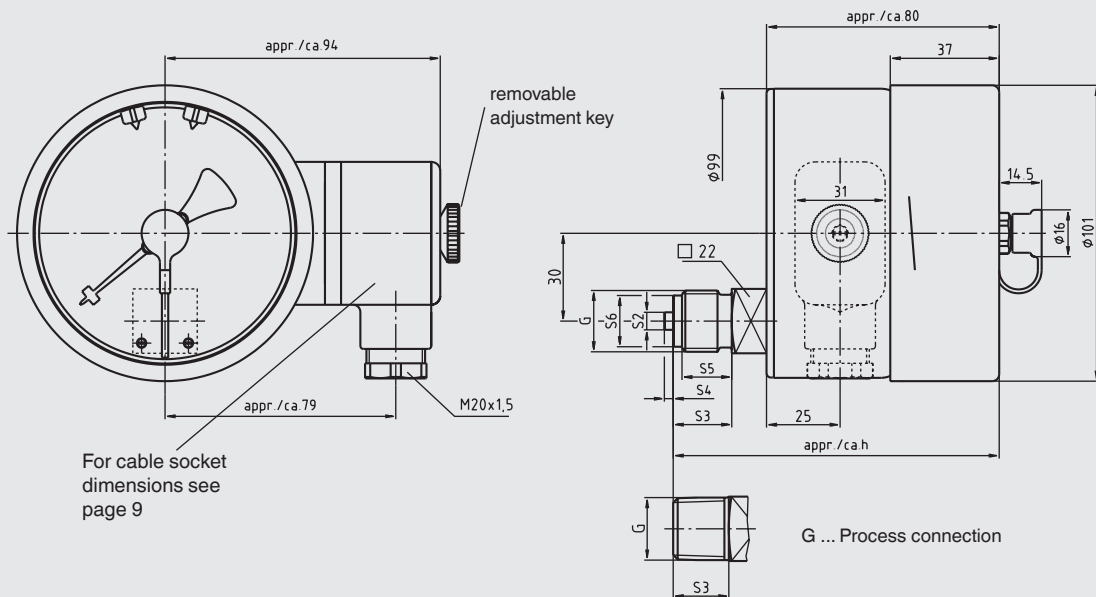
Lower mount (radial)



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Process connection	Dimensions in mm					
	$h \pm 1$	S2	S3	S4	S5	S6
G ½ B	87	6	20	3	17	17.5
G ¼ B	80	5	13	2	11	9.5
G ¾ B	83	5.5	16	3	13	13
½ NPT	86	-	19	-	-	-

Lower back mount

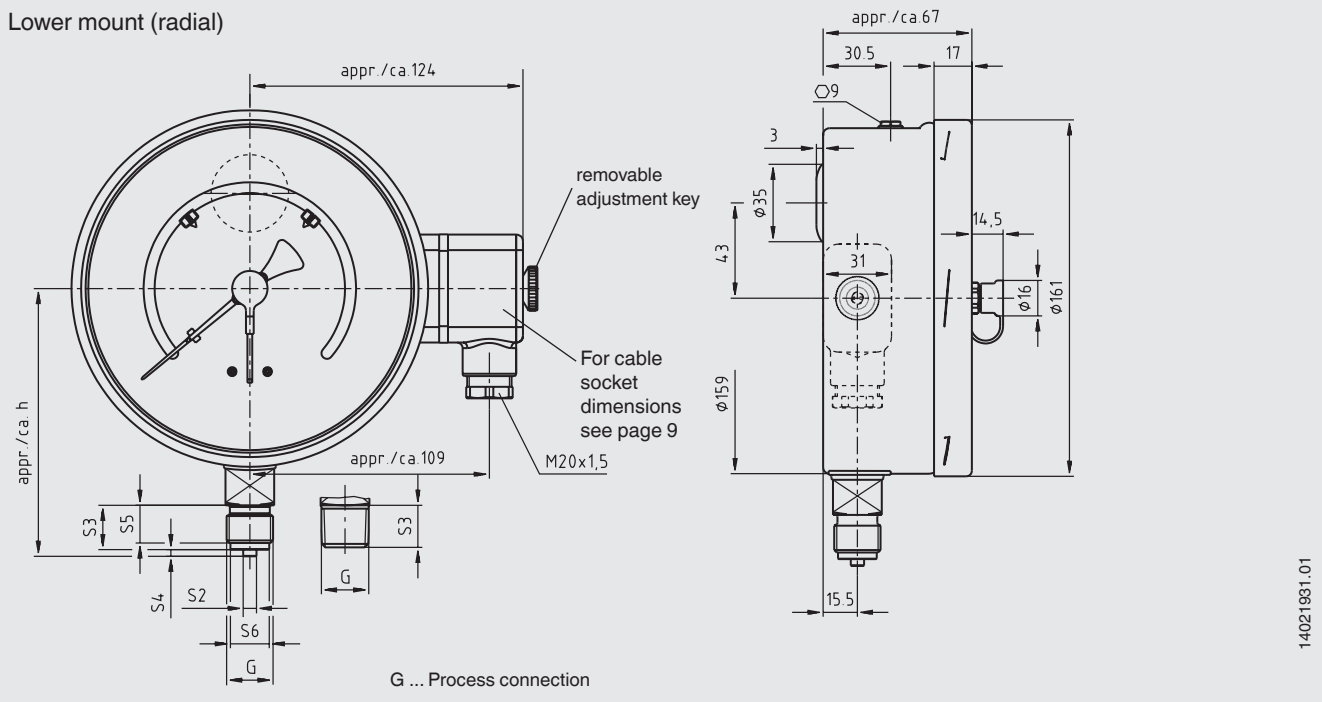


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Process connection	Dimensions in mm					
	$h \pm 1$	S2	S3	S4	S5	S6
G ½ B	112	6	20	3	17	17.5
G ¼ B	105	5	13	2	11	9.5
G ¾ B	108	5.5	16	3	14	13
½ NPT	111	-	19	-	-	-

switchGAUGE model PGS23.160 with switch contact model 851.3 or 851.33

Lower mount (radial)



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Process connection	Dimensions in mm					
	h ±1	S2	S3	S4	S5	S6
G ½ B	118	6	20	3	17	17.5
G ¼ B	111	5	13	2	11	9.5
G ⅜ B	114	5.5	16	3	14	13
½ NPT	117	-	19	-	-	-