

## Bourdon tube pressure gauge with switch contacts

### Stainless steel case, NS 100 and 160

### Models PGS21.100 and PGS21.160


 for further approvals  
see page 7

**switchGAUGE**

#### Applications

- Control and regulation of industrial processes
- Monitoring of plants and switching of circuits
- For gaseous and liquid media that are not highly viscous or crystallising and will not attack copper alloy parts

#### Special features

- High reliability and long service life
- Up to 4 switch contacts per instrument
- Instruments with electronic contacts for PLC applications
- Contact gauges comply with DIN 16085


**Model PGS21.100 with model 821.21 switch contacts**

#### Description

Wherever the process pressure has to be indicated locally and, at the same time, circuits need to be switched, the model PGS21.1x0 switchGAUGE finds its use.

Switch contacts (electrical alarm contacts) make or break circuits 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.

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 and electronic contacts are available. For triggering programmable logic controllers (PLC), electronic contacts and reed switches can be used.

## Specifications

Standard version	
<b>Nominal size in mm</b>	<ul style="list-style-type: none"> <li>■ 100</li> <li>■ 160</li> </ul>
<b>Accuracy class</b>	1.0 ; 2.5 for measuring span less than 1.6 bar
<b>Scale ranges</b>	0 ... 0.6 bar [0 ... 8.7 psi] to 0 ... 600 bar [0 ... 8,702.26 psi] other units (e.g. psi, kPa) available or all other equivalent vacuum or combined pressure and vacuum ranges
<b>Scale</b>	<ul style="list-style-type: none"> <li>■ Single scale</li> <li>■ Dual scale</li> </ul>
<b>Pressure limitation</b>	
Steady	Full scale value
Fluctuating	0.9 x full scale value
Short time	1.3 x full scale value
<b>Connection location</b>	<ul style="list-style-type: none"> <li>■ Lower mount (radial)</li> <li>■ Lower back mount</li> </ul>
<b>Process connection (copper alloy)</b>	<ul style="list-style-type: none"> <li>■ G ½ B</li> <li>■ ½ NPT</li> <li>■ M20 x 1.5</li> <li>others on request</li> </ul>
<b>Permissible temperature</b>	
Medium	+80 °C [+176 °F] Higher medium temperature on request
Ambient	-20 ... +60 °C [-4 ... +140 °F]
<b>Temperature effect</b>	When the temperature of the measuring system deviates from the reference temperature (+20 °C): max. ±0.4 %/10 K of full scale value
<b>Case</b>	Stainless steel
<b>Case filling</b>	Without
<b>Wetted materials</b>	
Process connection, pressure element	< 100 bar: Copper alloy, trumpet form ≥ 100 bar: Stainless steel 316L, helical type
<b>Non-wetted materials</b>	
Case, bayonet ring	Stainless steel
Movement	Copper alloy, wear parts argentan
Dial	Aluminium, white, black lettering
Instrument pointer	Aluminium, black
Set pointer	Aluminium, red
Window	<ul style="list-style-type: none"> <li>■ Polycarbonate</li> <li>■ Laminated safety glass</li> </ul>
<b>Ingress protection per IEC/EN 60529</b>	IP54
<b>Electrical connection</b>	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 <sup>2</sup> For dimensions see page 9 others on request

## 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

### 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: Up to two change-over contacts per measuring instrument;  
NS 160: Up to 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 $\Omega$  and 100 k $\Omega$ )
- 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 <sup>1)</sup>
≤ 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"
<b>Rated operating voltage <math>U_{eff}</math></b>	≤ 250 V		≤ 250 V	
<b>Rated operating current</b>				
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
<b>Switching power</b>	≤ 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	Alter-nating current	cos φ > 0.7	Direct current	Alter-nating current	cos φ > 0.7
<b>DC 220 V / AC 230 V</b>	100 mA	120 mA	65 mA	65 mA	90 mA	40 mA
<b>DC 110 V / AC 110 V</b>	200 mA	240 mA	130 mA	130 mA	180 mA	85 mA
<b>DC 48 V / AC 48 V</b>	300 mA	450 mA	200 mA	190 mA	330 mA	130 mA
<b>DC 24 V / AC 24 V</b>	400 mA	600 mA	250 mA	250 mA	450 mA	150 mA

**Specifications for instruments with electronic contact model 830 E**

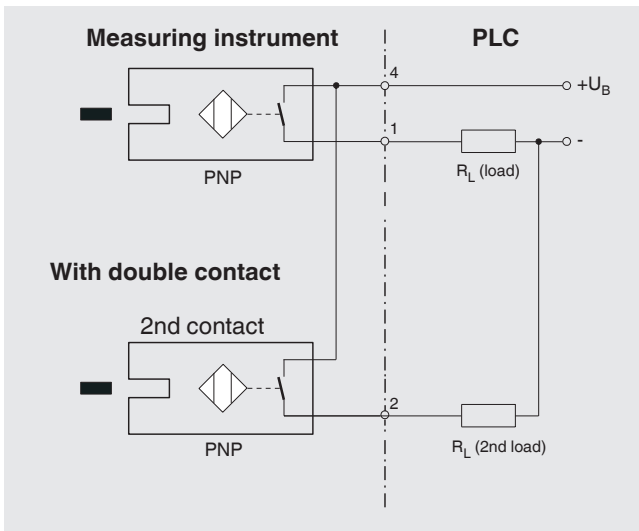
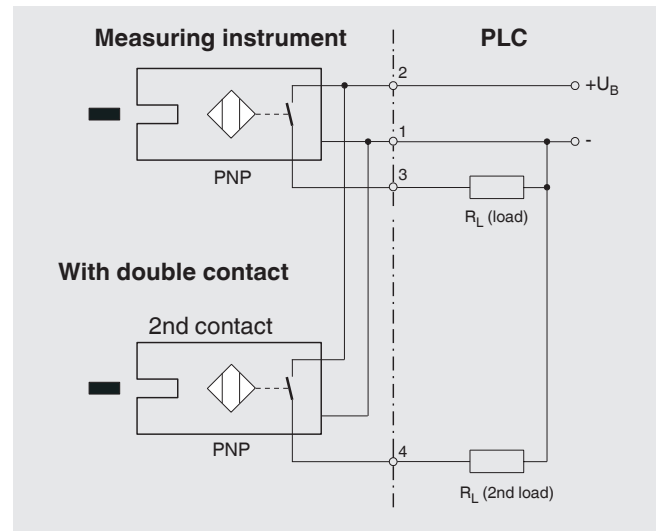
Measuring span	Nominal size	Max. number of contacts
0.6 bar	100, 160	1
1.0 bar	100, 160	2
≥ 1.6 bar	100, 160	2

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	Max. number of contacts
≥ 1.0 bar	100, 160	1
≥ 1.6 bar	100, 160	2







 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 mΩ
Insulation resistance	10 <sup>9</sup> 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
	<b>EU declaration of conformity</b> Pressure equipment directive PS > 200 bar, module A, pressure accessory	European Union
	<b>EAC (option)</b> <ul style="list-style-type: none"> <li>■ EMC directive</li> <li>■ Pressure equipment directive</li> <li>■ Low voltage directive</li> </ul>	Eurasian Economic Community
	<b>GOST (option)</b> Metrology, measurement technology	Russia
	<b>KazInMetr (option)</b> Metrology, measurement technology	Kazakhstan
-	<b>MTSCHS (option)</b> Permission for commissioning	Kazakhstan
	<b>BelGIM (option)</b> Metrology, measurement technology	Belarus
	<b>Uzstandard (option)</b> Metrology, measurement technology	Uzbekistan
-	<b>CRN</b> Safety (e.g. electr. safety, overpressure, ...)	Canada

## 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)

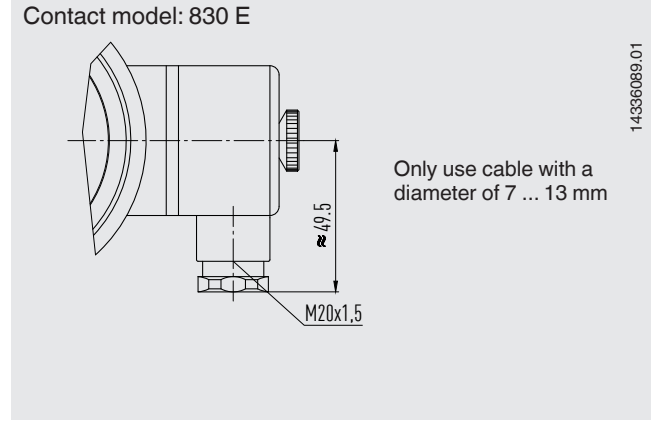
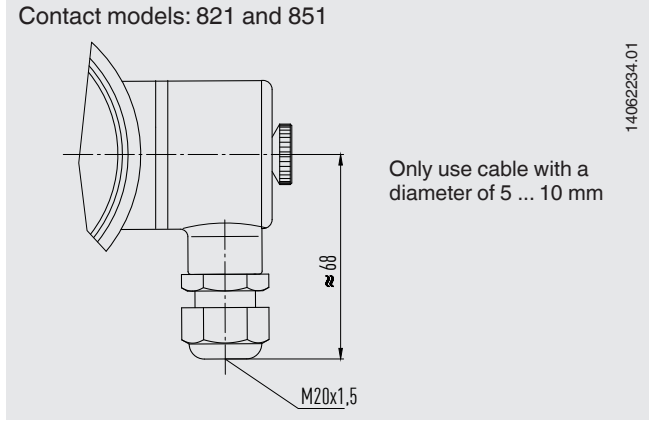
Approvals and certificates, see website

## Accessories

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

**Dimensions in mm**

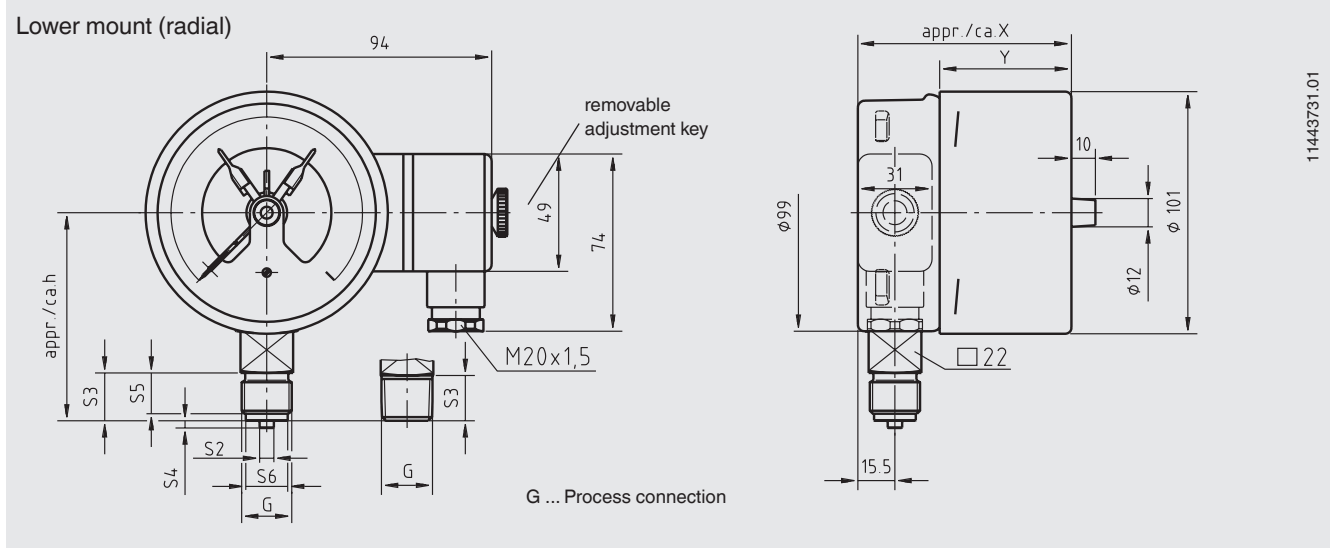
**Cable socket**





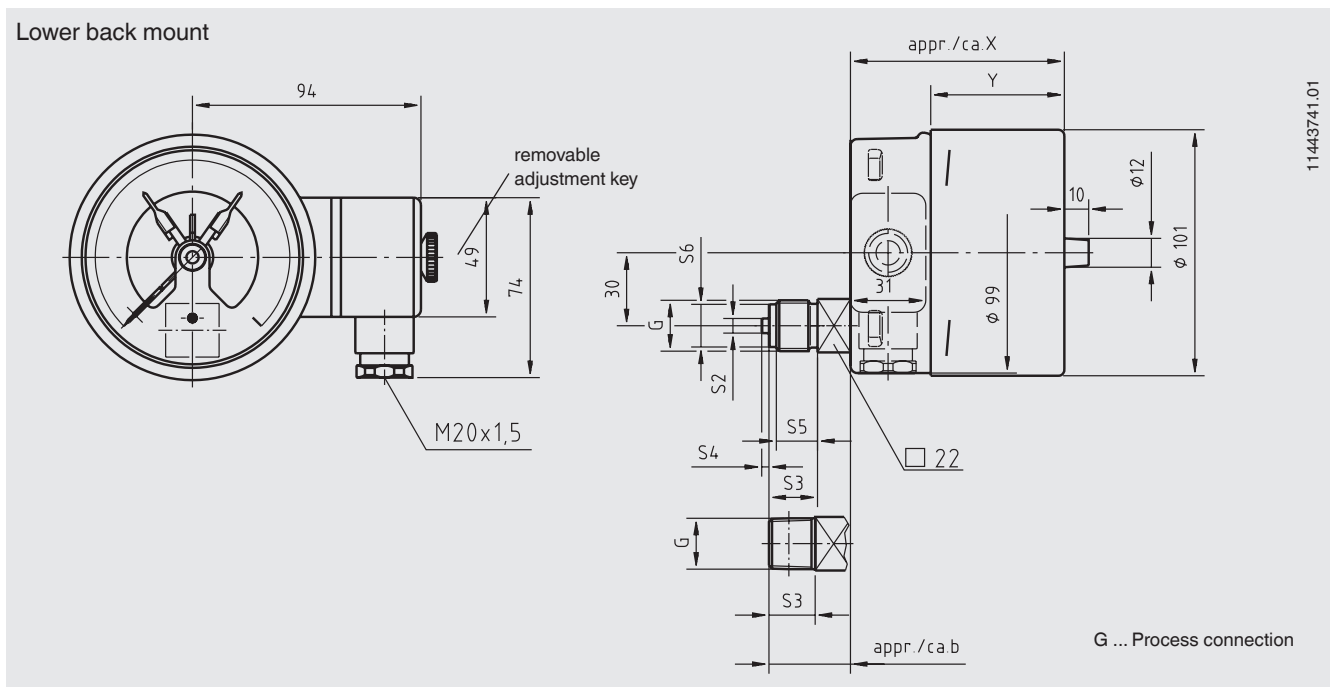
## Dimensions in mm

### switchGAUGE model PGS21.100 with switch contact model 821 or 830 E



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

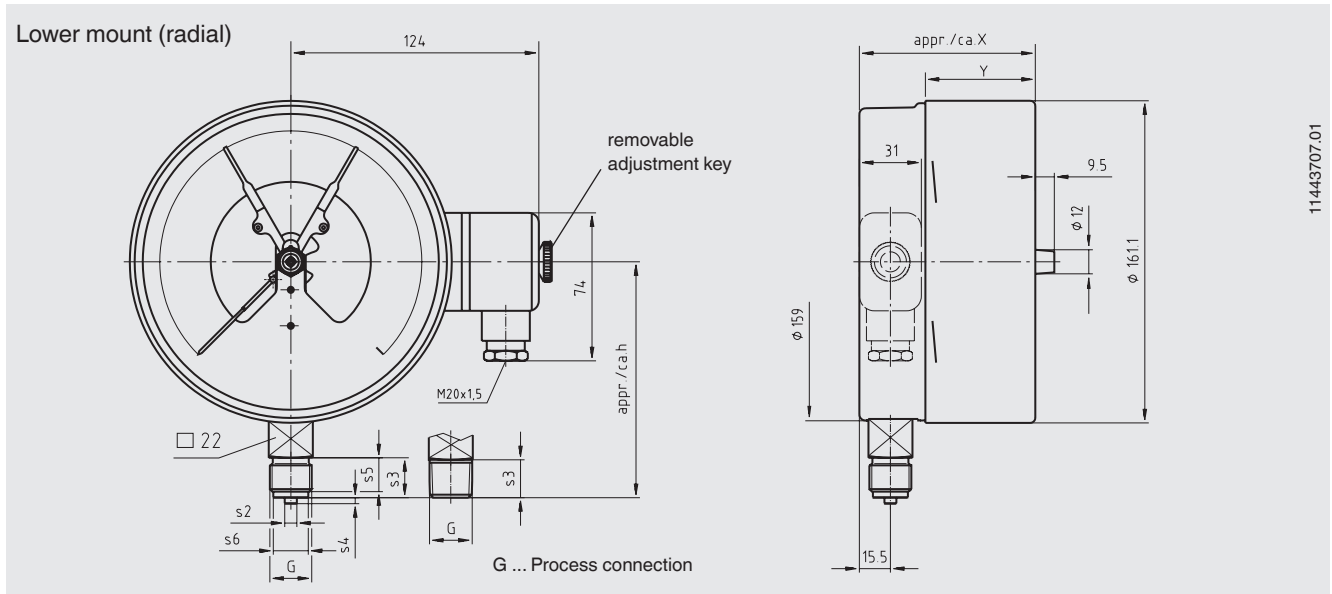
Process connection	Dimensions in mm					
	h ±1	S2	S3	S4	S5	S6
G ½ B	87	6	20	3	17	17.5
G ¼ B	80	5	13	2	11	9.5
G ⅜ B	83	5.5	16	3	14	13
½ NPT	86	-	19	-	-	-



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

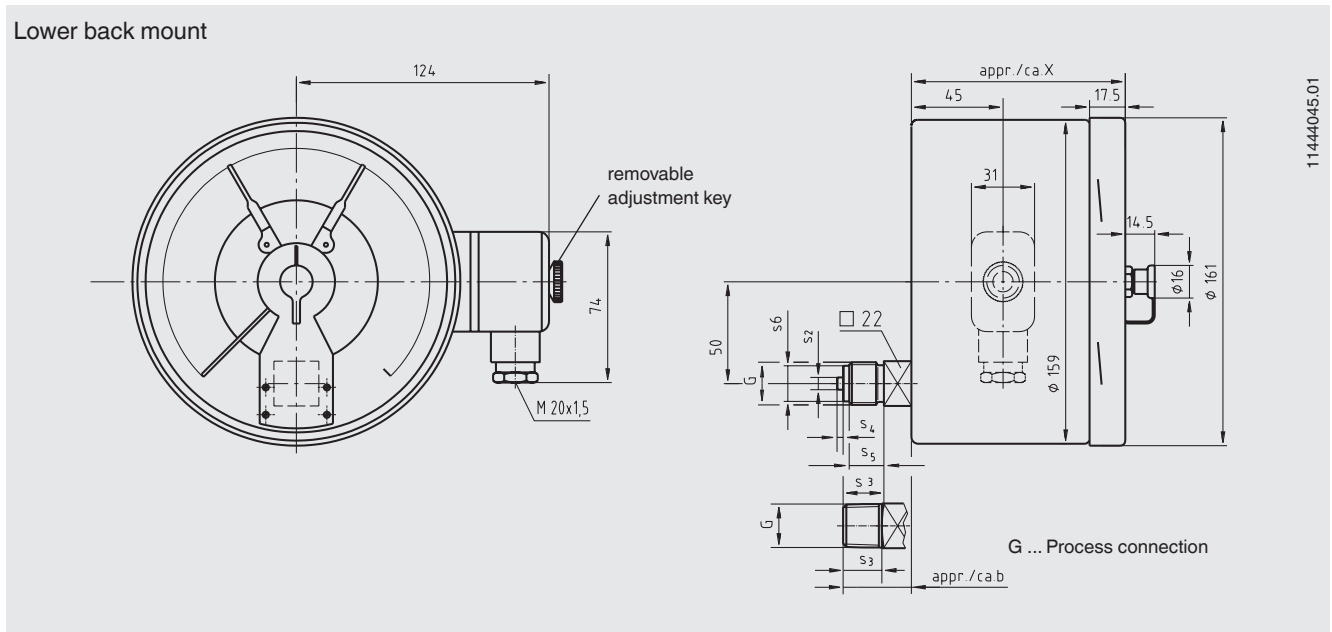
Process connection	Dimensions in mm					
	b	S2	S3	S4	S5	S6
G ½ B	33.5	6	20	3	17	17.5
G ¼ B	26.5	5	13	2	11	9.5
G ⅜ B	29.5	5.5	16	3	14	13
½ NPT	32.5	-	19	-	-	-

switchGAUGE model PGS21.160 with switch contact model 821 or 830 E



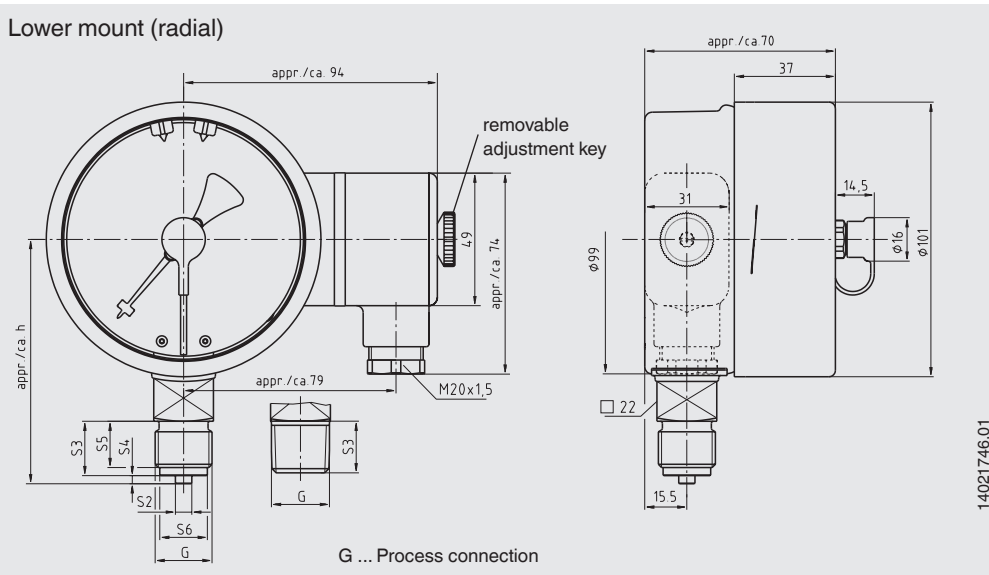
Type of contact	Dimensions in mm	
	X	Y
Single or double contact	88	55
Triple contact	96	63
Quadruple contact	113	80

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	-	-	-



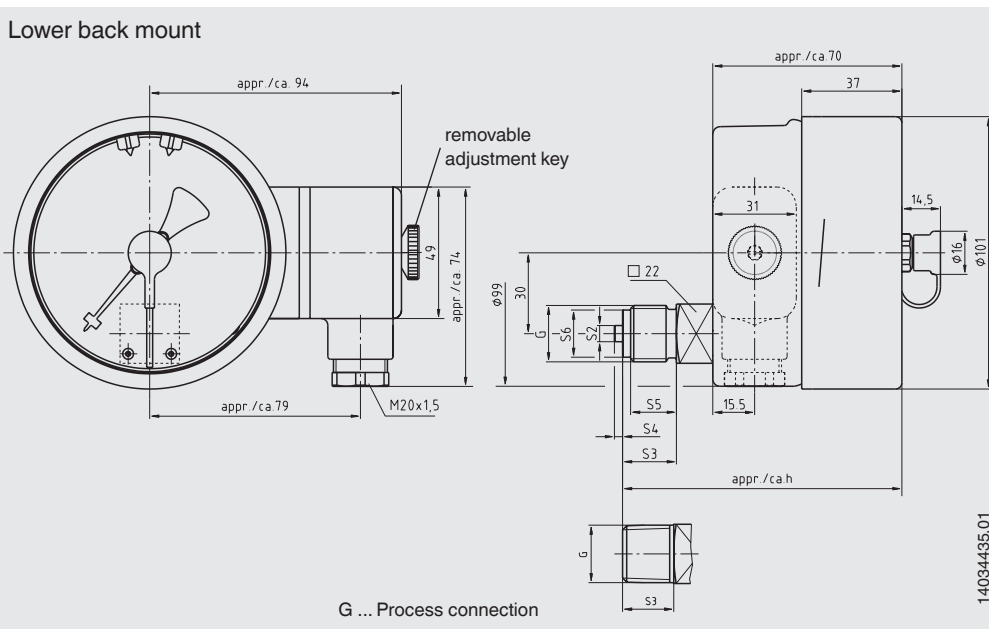
Type of contact	Dimensions in mm
	X
Single or double contact	105
Triple contact	105
Quadruple contact	119

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 PGS21.100 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 ⅜ B	83	5.5	16	3	14	13
½ NPT	86	-	19	-	-	-

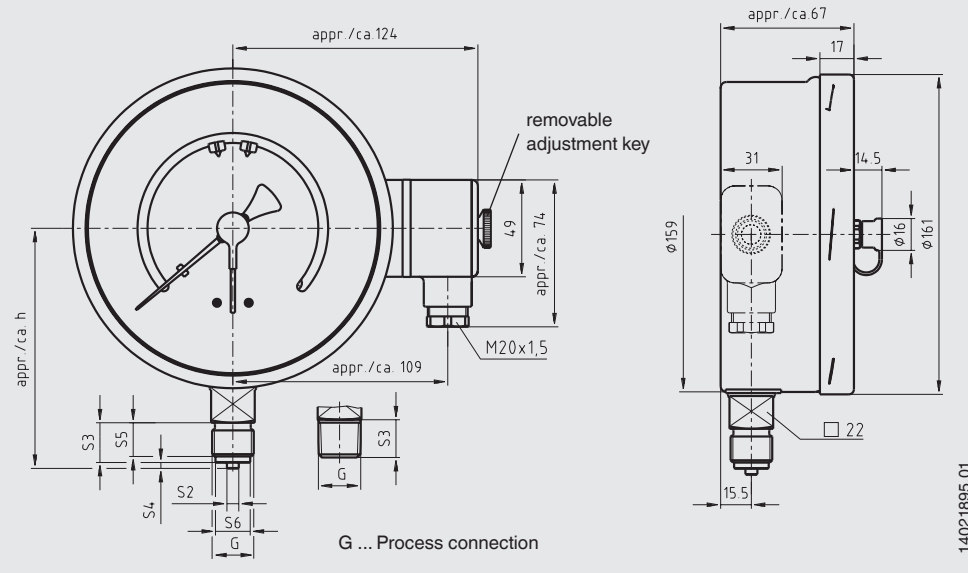
**Lower back mount**


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Process connection	Dimensions in mm					
	$h \pm 1$	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 ⅜ B	99	5.5	16	3	14	13
½ NPT	102	-	19	-	-	-

**switchGAUGE model PGS21.160 with switch contact model 851.3 or 851.33**

Lower mount (radial)



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