Pressure Measurement

Pressure transmitters

Single-range transmitters for general applications

SITRANS P220 for gauge pressure

Overview



The pressure transmitter SITRANS P220 measures the gauge pressure of liquids, gases and vapors.

- Stainless steel measuring cell, fully welded
- Measuring ranges 2.5 to 1000 bar (36.3 to 14500 psi) relative
- For high-pressure applications and refrigeration technology division

Benefits

- High measuring accuracy
- Rugged stainless steel enclosure
- High overload withstand capability
- For aggressive and non-aggressive media
- For measuring the pressure of liquids, gases and vapors
- Compact design
- Gasket-less

Application

The pressure transmitter SITRANS P220 for gauge pressure is used in the following industrial areas:

- Mechanical engineering
- Shipbuilding
- Power engineering
- Chemical industry
- Water supply

Design

Device structure without explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65), a device plug M12 (IP67), a cable (IP67) or a Quickon cable quick screw connection (IP67) connected electrically. The output signal is between 4 and 20 mA or 0 and 10 V.

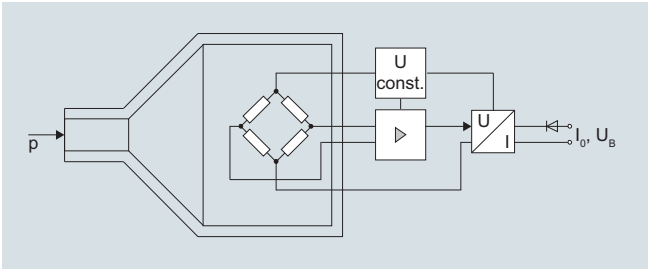
Device structure with explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65) or a device plug M12 (IP67) connected electrically. The output signal is between 4 and 20 mA.

Function

The pressure transmitter measures the gauge pressure of liquids and gases as well as the level of liquids.

Mode of operation



SITRANS P220 pressure transmitters (7MF1567-...), functional diagram

The stainless steel measuring cell has a thick-film resistance bridge to which the operating pressure p is transmitted through a stainless steel diaphragm.

The voltage output from the measuring cell is converted by an amplifier into an output current of 4 to 20 mA or an output voltage of 0 to 10 V DC.

The output current and voltage are linearly proportional to the input pressure.

Technical specifications

Application	
Gauge pressure measurement	Liquids, gases and vapors
Mode of operation	
Measuring principle	Piezoresistive measuring cell (stainless steel diaphragm)
Measured variable	Gauge pressure
Inputs	
Measuring range	
• Gauge pressure	
- Metric	2.5 … 1000 bar (36 … 14500 psi)
- US measuring range	30… 14500 psi
Output	
Current signal	4 ... 20 mA
• Load	(U_B - 10 V)/0.02 A
• Auxiliary power U_B	DC 7 ... 33 V (10 ... 30 V for Ex)
Voltage signal	0 ... 10 V DC
• Load	≥ 10 kΩ
• Auxiliary power U_B	12 ... 33 V DC
• Power consumption	< 7 mA at 10 kΩ
Ratiometric output	0 ... 90 %
• Load	≥ 10 kΩ
• Auxiliary power U_B	5 V DC ± 10 %
• Power consumption	< 7 mA at 10 kΩ
Characteristic curve	Linear rising
Measuring accuracy	
Error in measurement at limit setting incl. hysteresis and reproducibility	• Typical: 0.25 % of measuring span • Maximum: 0.5 % of measuring span
Step response time T_{99}	< 5 ms
Long-term stability	
• Lower range value and measuring span	0.25 % of measuring span/year
Influence of ambient temperature	
• Lower range value and measuring span	0.25 %/10 K of measuring span
• Influence of power supply	0.005 %/V
Operating conditions	
• Process temperature	-40 ... +120 °C (-40 ... +248 °F)
• Ambient temperature	-25 ... +85 °C (-13 ... +185 °F)
• Storage temperature	-50 ... +100 °C (-58 ... +212 °F)
• Degree of protection (to EN 60529)	• IP 65 with connector per EN 175301-803-A • IP 67 with device plug M12 • IP 67 with cable • IP 67 with cable quick screw connection
Electromagnetic compatibility	• acc. IEC 61326-1/-2/-3 • acc. NAMUR NE21, only for ATEX versions and with a max. measuring deviation ≤ 1 %

Design	
Weight	Approx. 0.090 kg (0.198 lb)
Process connections	See dimension drawings
Electrical connections	• Connector per EN 175301-803-A Form A with cable inlet M16x1.5 or ½-14 NPT or Pg 11 • Device plug M12 • 2 or 3-wire (0.5 mm²) cable (∅ ± 5.4 mm) • Quickon cable quick screw connection
Wetted parts materials	
• Measuring cell	Stainless steel, mat.-No. 1.4016
• Process connection	Stainless steel, mat. No. 1.4404 (SST 316 L)
Non-wetted parts materials	
• Enclosure	Stainless steel, mat. No. 1.4404 (SST 316 L)
• Rack	Plastic
• cables	PVC
Certificates and approvals	
Classification according to pressure equipment directive (PED 2014/68/EU)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 4, paragraph 3 (sound engineering practice)
Lloyd's Register of Shipping (LR)[1]	12/20010
Germanischer Lloyd (GL)[1]	GL19740 11 HH00
American Bureau of Shipping (ABS)[1]	ABS_11_HG 789392_PDA
Bureau Veritas (BV)[1]	BV 271007A0 BV
Det Norske Veritas (DNV)[1]	A 12553
Drinking water approval (ACS)[1]	ACS 15 ACC NY 360
EAC[1]	№ ТС RU C-DE.ГБ05.В.00732 ОС НАНИО «ЦСВЭ»
CRN[2]	0F18659.5C
Underwriters Laboratories (UL)[1]	
• for USA and Canada	UL 20110217 - E34453
• worldwide	IEC UL DK 21845
Explosion protection	
Intrinsic safety "i" (only with current output)	Ex II 1/2 G Ex ia IIC T4 Ga/Gb Ex II 1/2 D Ex ia IIIC T125 °C Da/Db
EC type-examination certificate	SEV 10 ATEX 0146
Connection to certified intrinsically-safe resistive circuits with maximum values:	U_i ≤ 30 V DC; I_i ≤ 100 mA; P_i ≤ 0.75 W
Effective internal inductance and capacity for versions with plugs per EN 175301-803-A and M12	L_i = 0 nH; C_i = 0 nF
CSA[2]	70006348 Class I, Division I, Groups A, B, C and D; Class II, Division 1, Groups E, F and G, Class III Class I, Division 2, Groups A, B, C and D; Class II, Division 2, Groups F and G, Class III A/Ex ia IIC T4 Ga/Gb A/Ex ia IIIC T125°C Da/Db

[1] For variants with output signal 0 ... 5 V and ratiometric output available soon.
[2] See ordering data for available versions.

Selection and ordering data

Article No. 7MF1567 - ■■■■■ - ■■A■ ■■■

Order code

SITRANS P 220 pressure transmitters for gauge pressure, high-pressure and refrigeration applications, fully-welded version
Accuracy typ. 0.25 %
Wetted parts materials: stainless steel
Non-wetted parts materials: stainless steel

Measuring range	Overload limit: Minimum		Overload limit: Max.		Burst pressure			Order code
For gauge pressure								
0 ... 2.5 bar	(0 ... 36.3 psi)	-1 bar	(-14.5 psi)	6.25 bar	(90.7 psi)	25 bar	(363 psi)	3BD
0 ... 4 bar	(0 ... 58 psi)	-1 bar	(-14.5 psi)	10 bar	(145 psi)	40 bar	(870 psi)	3BE
0 ... 6 bar	(0 ... 87 psi)	-1 bar	(-14.5 psi)	15 bar	(217 psi)	60 bar	(522 psi)	3BG
0 ... 10 bar	(0 ... 145 psi)	-1 bar	(-14.5 psi)	25 bar	(362 psi)	60 bar	(870 psi)	3CA
0 ... 16 bar	(0 ... 232 psi)	-1 bar	(-14.5 psi)	40 bar	(580 psi)	96 bar	(1392 psi)	3CB
0 ... 25 bar	(0 ... 363 psi)	-1 bar	(-14.5 psi)	62.5 bar	(906 psi)	150 bar	(2176 psi)	3CD
0 ... 40 bar	(0 ... 580 psi)	-1 bar	(-14.5 psi)	100 bar	(1450 psi)	240 bar	(3481 psi)	3CE
0 ... 60 bar	(0 ... 870 psi)	-1 bar	(-14.5 psi)	150 bar	(2175 psi)	360 bar	(5221 psi)	3CG
0 ... 100 bar	(0 ... 1450 psi)	-1 bar	(-14.5 psi)	250 bar	(3625 psi)	600 bar	(8702 psi)	3DA
0 ... 160 bar	(0 ... 2320 psi)	-1 bar	(-14.5 psi)	400 bar	(5801 psi)	960 bar	(13924 psi)	3DB
0 ... 250 bar	(0 ... 3625 psi)	-1 bar	(-14.5 psi)	625 bar	(9064 psi)	1500 bar	(21756 psi)	3DD
0 ... 400 bar	(0 ... 5801 psi)	-1 bar	(-14.5 psi)	1000 bar	(14503 psi)	2400 bar	(34809 psi)	3DE
0 ... 600 bar	(0 ... 8702 psi)	-1 bar	(-14.5 psi)	1500 bar	(21755 psi)	3600 bar	(52200 psi)	3DG
0 ... 1000 bar	(0 ... 14500 psi)	-1 bar	(-14.5 psi)	1500 bar	(21755 psi)	5000 bar	(72520 psi)	3EA
Other version, add Order code and plain text: Measuring range: ... up to... bar (psi)								9AA ... H1Y

Measuring ranges for gauge pressure					Order code
0 ... 30 psi	-14.5 psi	75 psi	360 psi	*	4BE
0 ... 60 psi	-14.5 psi	150 psi	580 psi	*	4BF
0 ... 100 psi	-14.5 psi	250 psi	580 psi	*	4BG
0 ... 150 psi	-14.5 psi	375 psi	870 psi	*	4CA
0 ... 200 psi	-14.5 psi	500 psi	1390 psi	*	4CB
0 ... 300 psi	-14.5 psi	750 psi	2170 psi	*	4CD
0 ... 500 psi	-14.5 psi	1250 psi	3481 psi	*	4CE
0 ... 750 psi	-14.5 psi	1875 psi	5220 psi	*	4CF
0 ... 1000 psi	-14.5 psi	2500 psi	5220 psi	*	4CG
0 ... 1500 psi	-14.5 psi	3750 psi	8700 psi	*	4DA
0 ... 2000 psi	-14.5 psi	5000 psi	13920 psi	*	4DB
0 ... 3000 psi	-14.5 psi	7500 psi	21750 psi	*	4DD
0 ... 5000 psi	-14.5 psi	12500 psi	34800 psi	*	4DE
0 ... 6000 psi	-14.5 psi	15000 psi	34800 psi	*	4DF
0 ... 8700 psi	-14.5 psi	21755 psi	52200 psi	*	4DG
0 ... 14500 psi	-14.5 psi	21755 psi	72520 psi		4EA
Other version, add Order code and plain text: Measuring range: ... up to ... psi					9AA ... H1Y

Output signal	Order code
4 ... 20 mA; two-wire system; power supply 7 ... 33 V DC (10 ... 30 V DC for ATEX versions)	0
0 ... 10 V; three-wire system; power supply 12 ... 33 V DC	10
0 ... 5 V; 3-wire system; auxiliary power 7 ... 33 V DC	20
Ratiometric 10 ... 90 %; 3-wire system; auxiliary power 5 V DC ± 10 %	30

Explosion protection (only 4 ... 20 mA)	Order code
None	0
With explosion protection Ex ia IIC T4	1

Electrical connection		Order code
Connector per DIN EN 175301-803-A, stuffing box thread M16 (with coupling)	*	1
Device plug M12 per IEC 61076-2-101		2
Connection via fixed mounted cable, 2 m (not for type of protection "Intrinsic safety i")		03
Quickon cable quick screw connection PG9 (not for type of protection "Intrinsic safety i")		04
Connector per DIN EN 175301-803-A, stuffing box thread 1/2"-14 NPT (with coupling)	*	5
Connector per DIN EN 175301-803-A, stuffing box thread PG11 (with coupling)	*	6
Fixed mounted cable, length 5 m		07
Special version		9 ... N1Y

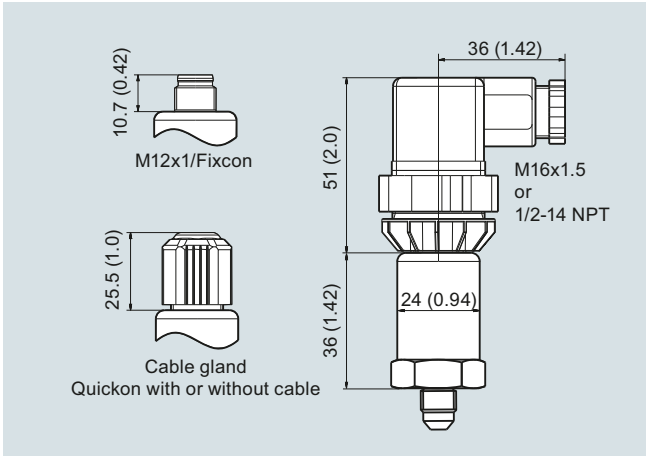
* Order code E21 required for complete configuration with CRN and $_{c}CSA_{us}$ Ex approval.

SITRANS P220 for gauge pressure

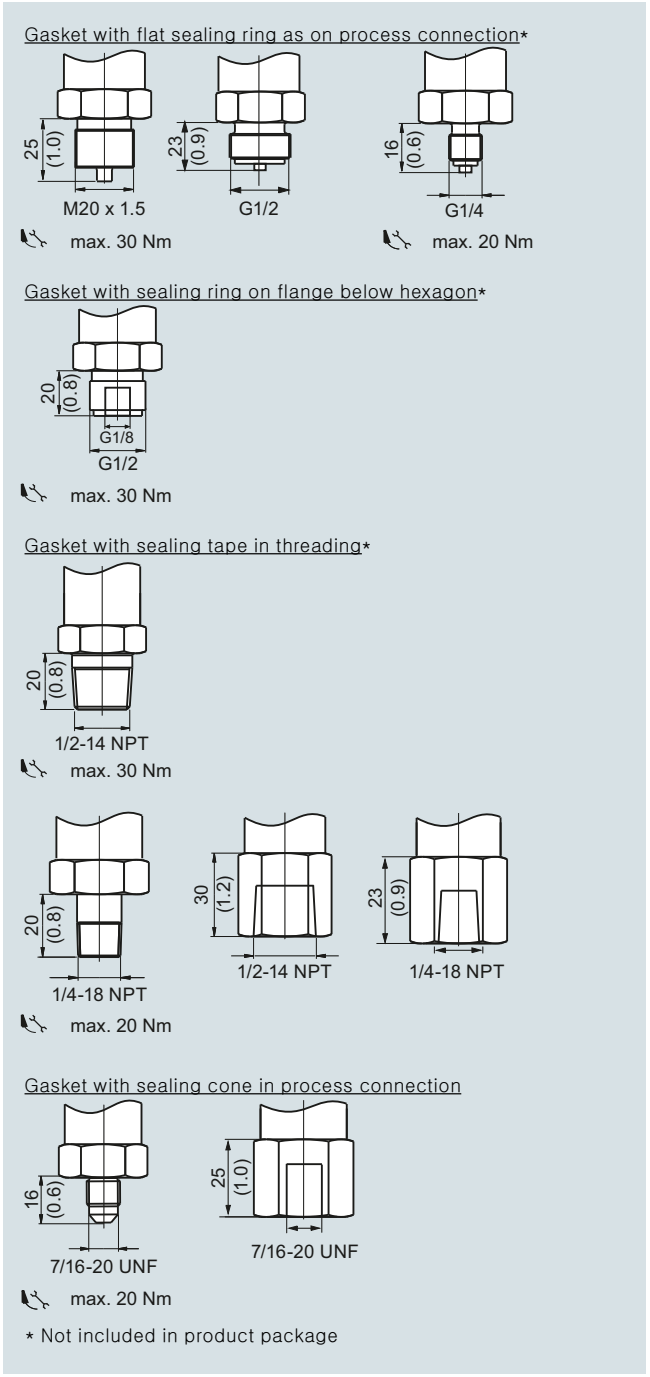
Selection and ordering data		Article No.	Order code
SITRANS P 220 pressure transmitters for gauge pressure, high-pressure and refrigeration applications, fully-welded version Accuracy typ. 0.25 % Wetted parts materials: stainless steel Non-wetted parts materials: stainless steel		**7MF1567 -** ■■■■■ **-** ■■**A**■	■■■
Process connection			
G½" male per EN 837-1 (½" BSP male) (standard for metric pressure ranges mbar, bar)			**A**
G½" male thread and G1/8" female thread			**B**
G¼" male per EN 837-1 (¼" BSP male)			**C**
7/16"-20 UNF male			**D**
¼"-18 NPT male (standard for pressure ranges in H_2O and psi)	*		**E**
¼"-18 NPT female			**F**
½"-14 NPT male			**G**
½"-14 NPT female (Only for measuring ranges ≤ 60 bar (870 psi))			**H**
7/16"-20 UNF female			**J**
M20x1.5 male			**P**
G1/4" to DIN 3852 Form E			**Q**
G1/2" to DIN 3852 Form E			**R**
Special version			**Z** **P1Y**
Version			
Standard version	*		**1**
Further designs			
Supplement the Article No. with "**-Z**" and add Order code.			
Quality test certificate, 5-point factory calibration (IEC 60770-2) (not possible for measuring ranges > 0 ... 600 bar/0 ... 8 702 psi)		**C11**	
Oxygen version, free of oil and degreased (not in conjunction with explosion protection version)		**E10**	
With CRN and $_cCSA_{us}$ Ex approval (only for measuring ranges 0 ... 30 psi bis 0 ... 8 700 psi)		**E21**	

* Order code E21 required for complete configuration with CRN and $_cCSA_{us}$ Ex approval..

Dimensional drawings

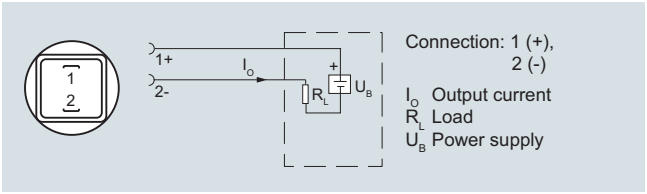


SITRANS P220, electrical connections, dimensions in mm (inch)

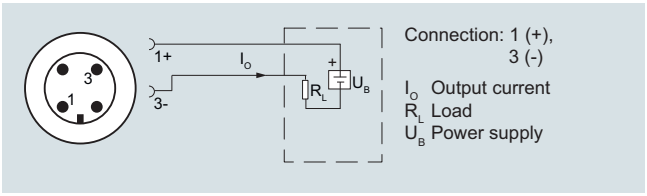


SITRANS P220, process connections, dimensions in mm (inch)

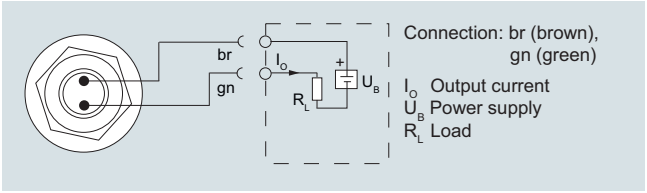
Schematics



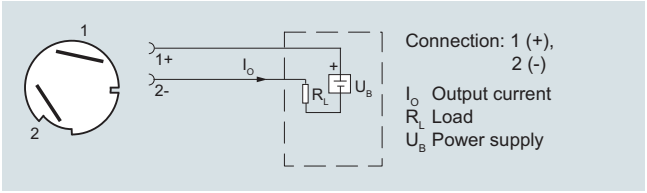
Connection with current output and connector per EN 175301



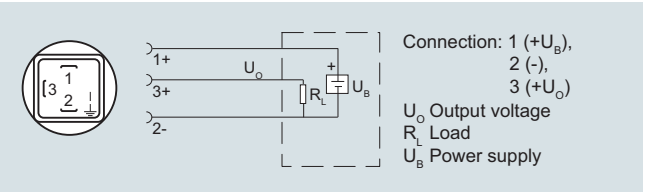
Connection with current output and device plug M12x1



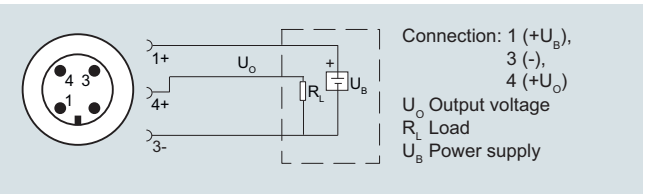
Connection with current output and cable



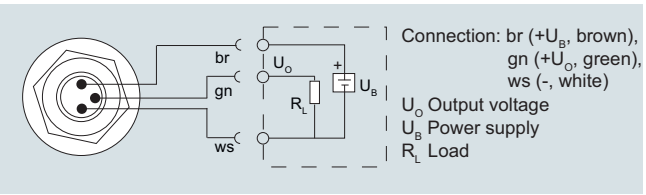
Connection with current output and cable quick screw connection Quick-on



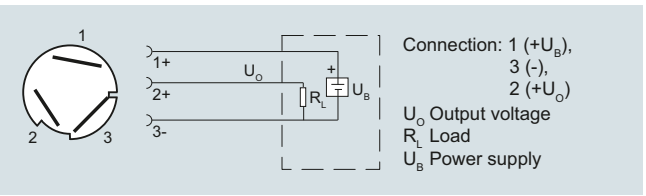
Connection with voltage output, ratiometric output and plug according to EN 175301



Connection with voltage output, ratiometric output and device plug M12x1



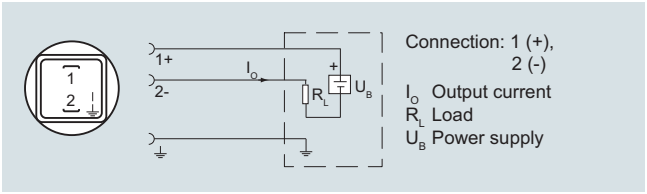
Connection with voltage output, ratiometric output and cable



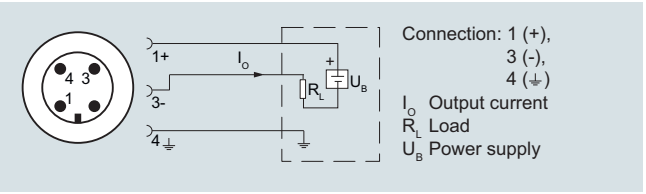
Connection with voltage output, ratiometric output and Quickon fast cable termination

Version with explosion protection: 4 ... 20 mA

The grounding connection is conductively bonded to the transmitter enclosure



Connection with current output and connector per EN 175301 (Ex)



Connection with current output and device plug M12x1 (Ex)