



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

Pressure transducer UC2

Customer-specific pressure transducer

Individual solutions for your measuring tasks



Application

Pressure transducer e.g. for use in medical and laboratory-specific measuring technology, shipbuilding and hydrostatic level measurement.

Your benefits

Dry capacitive ceramic sensor

- Basic ceramic material Aluminum oxide ceramic Al_2O_3
(Measuring cells ≤ 1 bar purity $\geq 99,7\%$)
(Measuring cells ≥ 2 bar purity $\geq 96\%$)
 - high overload resistance
 - long-term stability
 - corrosion-resistant
- Finely graduated measuring ranges:
0 to 200 mbar to 0 to 20 bar gauge pressure or absolute pressure
- Special measuring ranges available on request
e.g. 0 to 100 mbar gauge pressure
- Small physical size from $\text{Ø}21.9$ mm
- Flexibly adapted to customer-specific requirements
- Housing made from various materials
- Various seal materials
- Output signal 0.5 to 4.5 V or 4 to 20 mA

Table of contents

Function and system design	3	External standards and guidelines	10
Measuring principle	3		
Input	3	Ordering information	11
Measured variable	3	Pressure transducer UC2	11
Measuring range	3	Additional documentation	11
Output	3	Operating instructions	11
Output signal	3	Safety instructions	11
Load	3		
Power supply	4		
Electrical connection	4		
Supply voltage	5		
Current consumption	5		
Performance characteristics	6		
Reference operating conditions	6		
Zero point deviation	6		
Span deviation	6		
Maximum measured error	6		
Rise time (T90)	6		
Settling time (T99)	6		
Long-term stability	6		
Thermal change of the zero output and the output span within the compensated temperature range	6		
Thermal span change within the compensated temperature range	6		
Operating conditions (installation)	7		
Orientation	7		
Operating conditions: Environment	7		
Ambient temperature range	7		
Storage temperature	7		
Degree of protection	7		
Climate class	7		
Shock resistance	7		
Electromagnetic compatibility	7		
Operating conditions (process)	7		
Process temperature limits	7		
Overload resistance	7		
Vacuum resistance	7		
Mechanical construction	8		
Dimensions of the basic modules	8		
Material	9		
Certificates and approvals	10		
CE mark	10		
Pressure Equipment Directive (PED)	10		

Function and system design

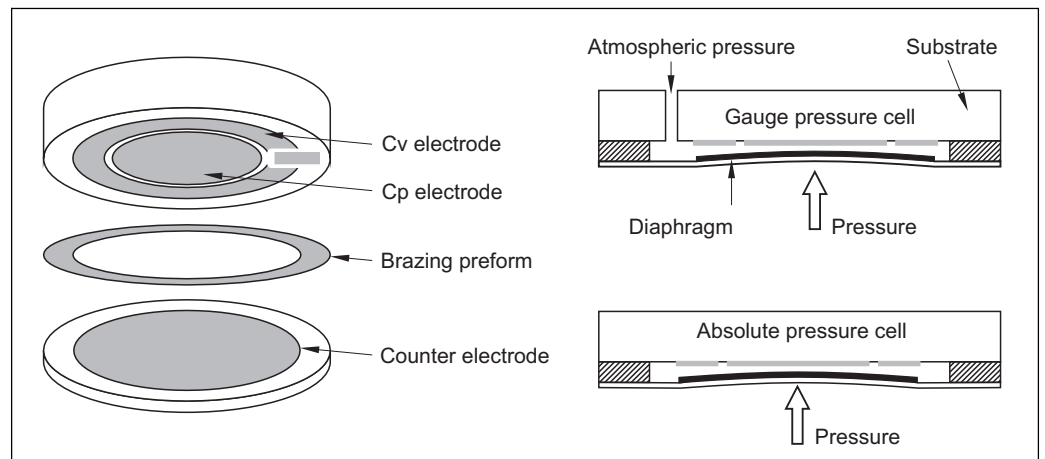
Measuring principle

A capacitive ceramic sensor element is at the core of the UC2 transducer.

Its Al_2O_3 basic material is ceramic that is highly resistant against many aggressive gases and liquids. Two cylindrical ceramic components (diaphragm and meter body) are bonded to form a high-strength, hermetically sealed pressure sensor element. With absolute pressure sensors, the vacuum of 3.0×10^{-6} mbar created in the production process between the process isolating diaphragm and the meter body remains permanently. This permits pressure measurements relative to the vacuum. With gauge pressure sensors, the back of the process isolating diaphragm is vented, i.e. this sensor measures the gauge pressure relative to the atmospheric pressure. Electrically, the sensor element represents a plate capacitor whose capacitance change is the dimension for the pressure change. The capacitive measuring process satisfies the highest requirements concerning resolution and reproducibility.

Together with the hysteresis-free behavior of the material Al_2O_3 , it is the basis for the excellent specifications of the transducer. In addition, the sensor element is a dry measuring cell, i.e. there is no separating diaphragm or filling fluid which could influence the measurement.

A further advantage of the capacitive ceramic sensor is its high overload resistance. After removal of the overload, the process isolating diaphragm returns to the initial position without any damage or hysteresis.



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Input

Measured variable

Gauge pressure or absolute pressure

Measuring range

- Gauge pressure measurement: 0.2 to 20 bar
- Absolute pressure measurement: 0.2 to 20 bar
- Special measuring ranges available on request (e.g. 0 to 100 mbar absolute pressure)

See also "Ordering information" chapter → 11.

Output

Output signal

- Voltage output 0.5 to 4.5 V ratiometric
- Current output 4 to 20 mA

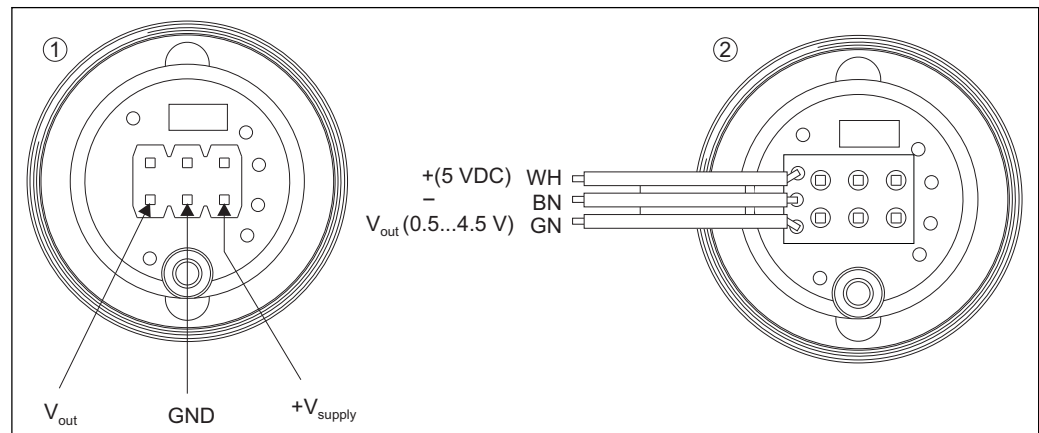
Load

- Voltage output: $\geq 10 \text{ k}\Omega$ or $\leq 300 \text{ pF}$
- Current output: $R_B = (U_S - 12 \text{ V}) / 0.02 \text{ A}$ ($U_S =$ supply voltage)

Power supply

Electrical connection

Transducer without cover, with voltage output



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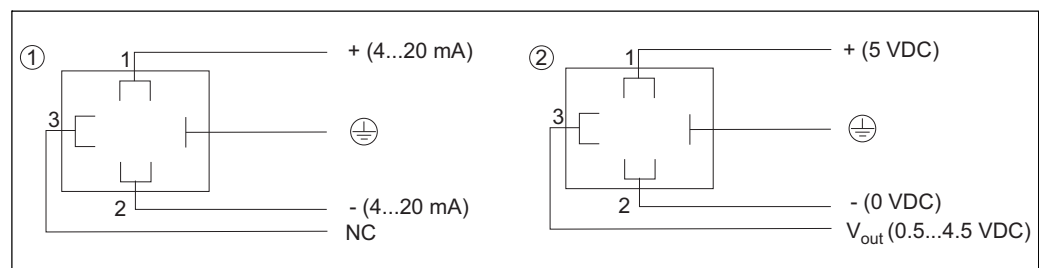
UC2 electrical connection with voltage output

① Six-pin pin rail

② Six-pin pin rail with ribbon wire

Color code for cores: WH = white, BN = brown, GN = green

Transducer with cover, with connector DIN 43650/C



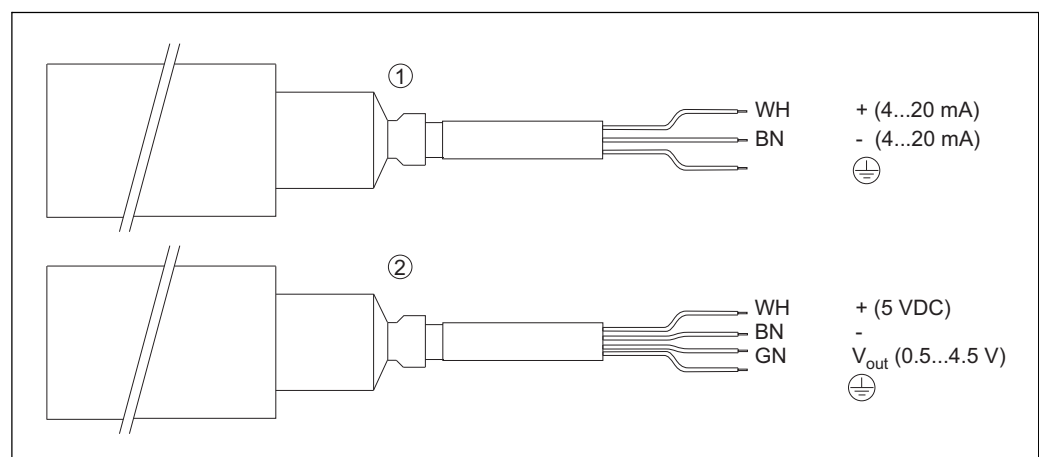
P01-UC2xxxxx-04-xx-xx-xx-002

UC2 electrical connection with connector DIN 43650/C

① Current output

② Voltage output

Transducer with cable connection



P01-UC2xxxxx-04-xx-xx-xx-003

UC2 electrical connection with cable connection

① Current output

② Voltage output

Color code for wires: WH = white, BN = brown, GN = green

Supply voltage

- Voltage output: 4.5 to 5.5 V DC stabilized
Ratiometric signal: proportional effect on lower range-value and span
No effect on linearity and temperature compensation
- Current output: 12 to 30 V DC
The permitted voltage range is limited for devices with an explosion protection certificate. Observe the related Safety Instructions XA513P.

Current consumption

- Voltage output: max. 2 mA with a supply voltage of 5 V, with reverse polarity protection
- Current output: max. 23 mA, with reverse polarity protection

Performance characteristics

Reference operating conditions

As per DIN IEC 60770
 $T_u = 25\text{ °C}$ (77 °F), humidity 45 to 75 %, ambient air pressure 860 to 1060 mbar,
 compensated temperature range: -20 to 80 °C

Zero point deviation

Voltage output	Current output
Max. $\pm 1\%$ of span	Max. $\pm 0,3\%$ of span
	With extended specification and small measuring ranges <0.3 bar, max. $\pm 0,5\%$ of span.

Span deviation

Voltage output	Current output
Max. $\pm 1\%$ of span	Max. $\pm 0,3\%$ of span
	With extended specification and small measuring ranges <0.3 bar, max. $\pm 0,5\%$ of span.

Maximum measured error

Non-linearity + hysteresis + non-reproducibility: max. $\pm 0,25\%$ of span

Rise time (T_{90})

Approx. 5 ms

Settling time (T_{99})

Max. 10 ms

Long-term stability

Max. 0.15 % of span per year

Thermal change of the zero output within the compensated temperature range

Voltage output	Current output
Max. $\pm 0,75\%$ of span	Max. $\pm 1\%$ of span
With extended specification $\pm 1\%$ of span.	With extended specification $\pm 1,25\%$ of span.

Thermal span change within the compensated temperature range

Voltage output: max. $\pm 0,5\%$ of span. With measuring ranges < 0.4 bar, the value increases to $\pm 0,8\%$ of span.
 With extended specification $\pm 1\%$ of span
 Current output: max. $\pm 1\%$. With extended specification $\pm 1,25\%$ of span

Voltage output	Current output
Max. $\pm 0,5\%$ of span	Max. $\pm 1\%$ of span
With measuring ranges <0,4 bar, the value increases to $\pm 0,8\%$ of span.	With measuring ranges <0,4 bar, the value increases to $\pm 1,25\%$ of span.
With extended specification $\pm 1\%$ of span.	With extended specification $\pm 1,25\%$ of span.

Operating conditions (installation)

Orientation	Random Observe position-dependent zero point shift with small pressure ranges (≤ 1 bar).
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Operating conditions: Environment

Ambient temperature range	-20 to +80 °C The permitted temperature range is limited for devices with an explosion protection certificate. Observe the related Safety Instructions XA513P.
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Storage temperature	-40 to +80 °C
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Degree of protection	Depends on housing (IP 68 possible)
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Climate class	4K4H as per DIN EN 60721-3 (can be achieved with closed pressure transducers)
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Shock resistance	15 g as per DIN EN 60068-2-29 (6 ms)
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Electromagnetic compatibility	The following applies for complete devices with a current output: Interference emission to EN 61326 Class B equipment. Interference immunity to EN 61326, Appendix A (Industrial)
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Operating conditions (process)

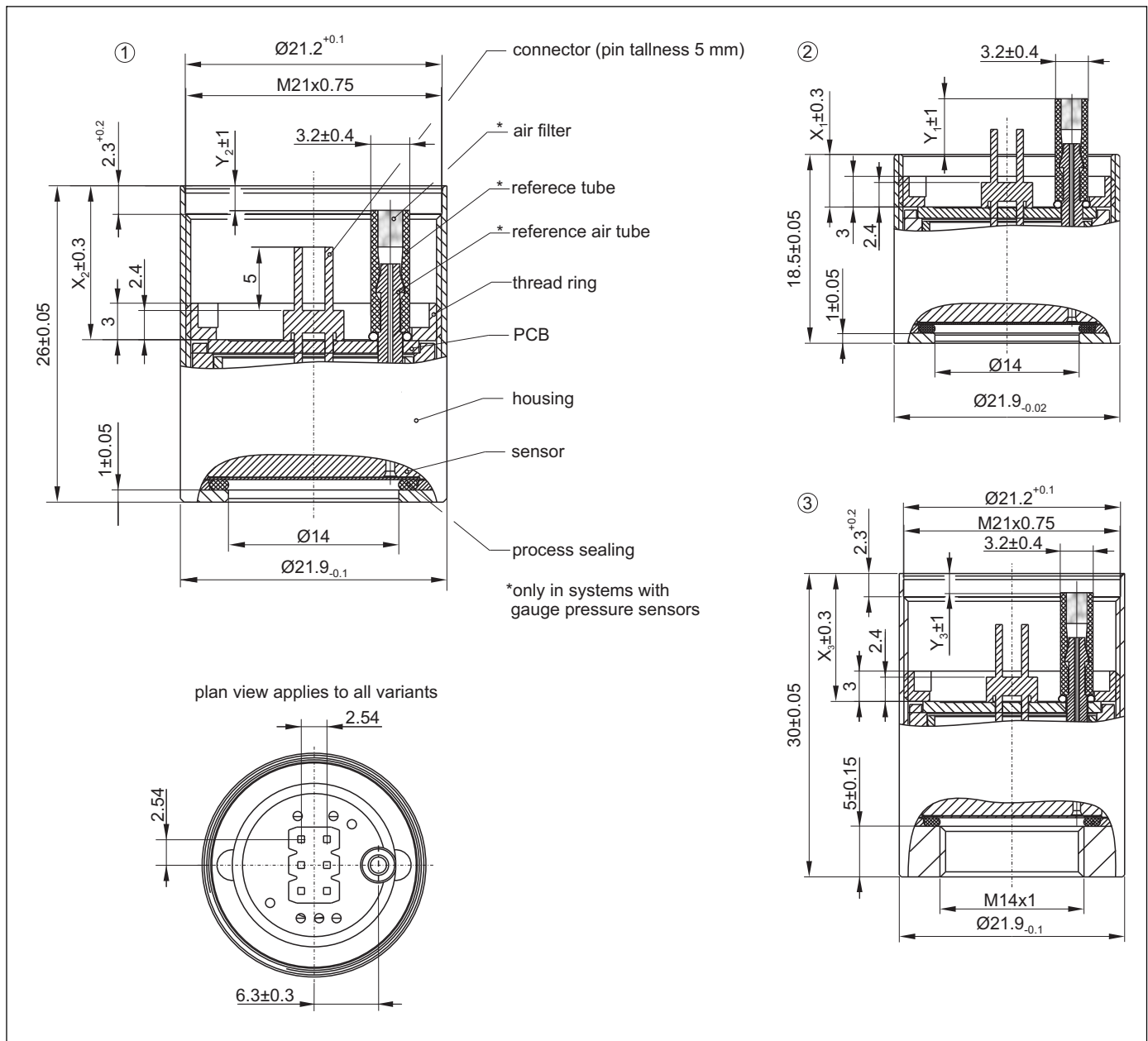
Process temperature limits	-20 to +80 °C Note the temperature limits of the applied process seal (see chapter "Material" → 9)
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Overload resistance	Overload limit: see chapter "Ordering information" → 11 . Overload effect: negligible
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Vacuum resistance	Vacuum-resistant
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Mechanical construction

Dimensions of the basic modules



P01-UC2xxxxx-06-xx-xx-en-001

Dimensions: ① basic module $\varnothing 21.9 \times 26$; ② basic module $\varnothing 21.9 \times 18,5$; ③ basic module $\varnothing 21.9 \times 30$

Measuring range [bar]	Diaphragm thickness [mm]	X ₁ [mm]	X ₂ [mm]	X ₃ [mm]	Y ₁ [mm]	Y ₂ [mm]	Y ₃ [mm]
0.2	0.17	5.15	12.65	12.65	4.8	2.7	2.7
0.4	0.21	5.11	12.61	12.61	4.8	2.7	2.7
1	0.28	5.04	12.54	12.54	4.9	2.6	2.6
2	0.37	4.95	12.45	12.45	5.0	2.5	2.5
4	0.46	4.86	12.36	12.36	5.1	2.4	2.4
10	0.65	4.67	12.17	12.17	5.3	2.3	2.3
20	0.85	4.47	11.97	11.97	5.5	2.1	2.1

Material

- Process isolating Diaphragm
Aluminum oxide ceramic Al_2O_3
(Measuring cells ≤ 1 bar purity $\geq 99,7$ %)
(Measuring cells ≥ 2 bar purity ≥ 96 %)
- Process seal
FKM: Viton, temperature range -20 to $+80$ °C
FFKM: temperature range 0 to $+80$ °C
EPDM: temperature range -20 to $+80$ °C; FDA number 21 CFR 177.2600
HNBR: temperature range -20 to $+80$ °C
- Housing
316L (1.4404) standard
Other materials on request.

Certificates and approvals

CE mark	For complete devices with a current output: The device meets the legal requirements of the EC directives. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.
Pressure Equipment Directive (PED)	This measuring device corresponds to Article 3 (3) of the EC directive 97/23/EC (Pressure Equipment Directive) and has been designed and manufactured according to good engineering practice.
External standards and guidelines	DIN EN 60770 (IEC 60770): Transmitter for controlling and regulating in industrial process engineering systems DIN EN 61003-1, Ed.: 1993-12 Industrial process control systems; Instruments with analog inputs and two-or multi-state outputs; Part 1: Methods of evaluating operating performance. DIN 16086 Electrical pressure measuring instruments - Pressure transmitters, pressure measuring instruments IEC 60529 Degrees of protection provided by enclosures (IP code). EN 61326: Electrical equipment for measurement, control and laboratory use - EMC requirements.

Ordering information

Pressure transducer UC2

This overview is an excerpt of the complete ordering structure and does not include all options. This overview does not mark options which are mutually exclusive.

10		Sensor nominal range; Overload
B	0	0 to 200 mbar /20 kPa/3 psi absolute; 4 bar/400 kPa/ 60 psi ¹⁾
C	0	0 to 400 mbar /40 kPa/6 psi absolute; 4 bar/400 kPa/ 60 psi ¹⁾
D	0	0 to 1 bar /100 kPa/15 psi absolute; 10 bar/1 MPa/ 150 psi
E	0	0 to 2 bar /200 kPa/30 psi absolute; 15 bar/1.5 MPa/ 225 psi
F	0	0 to 4 bar /400 kPa/60 psi absolute; 25 bar/2.5 MPa/ 375 psi
G	0	0 to 10 bar /1 MPa/150 psi absolute; 40 bar/4 MPa/ 600 psi
H	0	0 to 20 bar /2 MPa/300 psi absolute; 40 bar/4 MPa/ 600 psi
M	0	0 to 200 mbar /20 kPa/3 psi relative; 5 bar/500 kPa/ 75 psi
N	0	0 to 400 mbar /40 kPa/6 psi relative; 6 bar/600 kPa/ 90 psi
O	0	0 to 1 bar /100 kPa/15 psi relative; 10 bar/1 MPa/ 150 psi
P	0	0 to 2 bar /200 kPa/30 psi relative; 15 bar/1.5 MPa/ 225 psi
R	0	0 to 4 bar /400 kPa/60 psi relative; 25 bar/2.5 MPa/ 375 psi
S	0	0 to 10 bar /1 MPa/150 psi relative; 40 bar/4 MPa/ 600 psi
T	0	0 to 20 bar /2 MPa/300 psi relative; 40 bar/4 MPa/ 600 psi

1) on request

20		Calibration; Unit
A	See additional specification (special measuring ranges with extended specifications)	
1	Sensor nominal range; mbar/bar	
2	Sensor nominal range; kPa/MPa	
3	Sensor nominal range; psi	

30		Output
B	4	4 to 20 mA
C	0.5	0.5 to 4.5 V + power supply 5 V

40		Sensor seal
0	FKM	Viton
1	HNBR	
7	FFKM	495
8	EPDM-E7502,	FDA

50		Process connection
AA	Basic module	ø21.9x26; 316L
AB	Basic module	ø21.9x30; 316L
AC	Basic module	ø21.9x18.5; 316L

UC2 -	10	20	30	40	50	60	70	80	90	100	110
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Other measuring ranges and special versions available on request.

Additional documentation

Operating instructions BA902P/00/A2

Safety instructions

Certificate/explosion protection	Documentation
ATEX II 1/2 G Ex ia IIC T6 Ga/Gb ATEX II 1/2 D Ex ia IIIC T 90 °C Da/Db	- XA513P

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