

# Technical Information

## Pressure transducer UC2

Individual solutions for your measuring tasks



### Customer-specific pressure transducer

#### 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  $\text{Al}_2\text{O}_3$   
(Measuring cells  $\leq 1$  bar purity  $\geq 99,7\%$ )  
(Measuring cells  $\geq 2$  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

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## About this document

### Document function




This document contains all the technical data for the device and provides an overview of the device versions and accessories that can be ordered.

### Symbols used

#### Safety symbols

Symbol	Meaning
 <b>WARNING</b>	<b>WARNING!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 <b>NOTICE</b>	<b>NOTICE!</b> This symbol contains information on procedures and other facts which do not result in personal injury.

#### Symbols for certain types of information

Symbol	Meaning
	<b>Tip</b> Indicates additional information.
	Reference to documentation
	Reference to page

#### Symbols in graphics

Symbol	Meaning
1, 2, 3, ...	Item numbers
A, B, C, ...	Views

## Function and system design

### Measuring principle

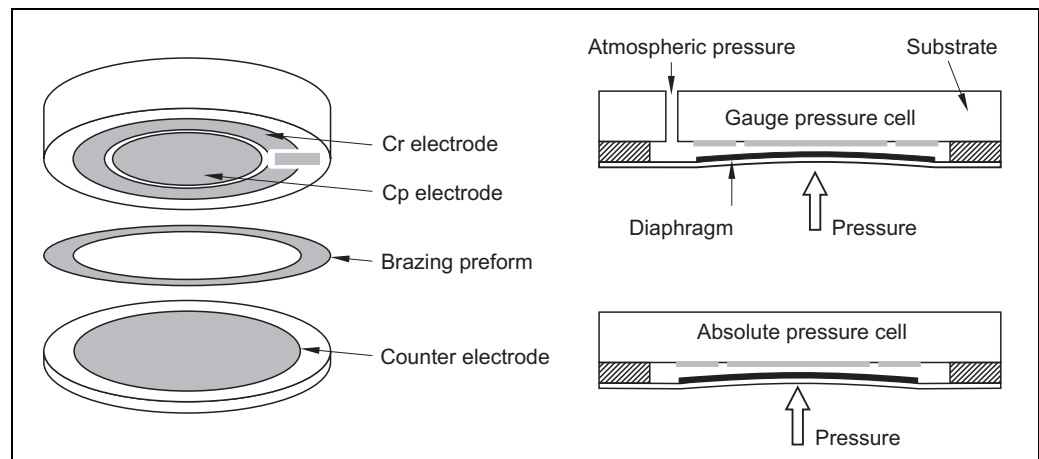
A capacitive ceramic sensor element is at the core of the UC2 transducer.

Its  $\text{Al}_2\text{O}_3$  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  $3.0 \times 10^{-6}$  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  $\text{Al}_2\text{O}_3$ , 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.



P01-UC2xxxxx-15-xx-xx-en-000

## 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 → 10.

## Output

### Output signal

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

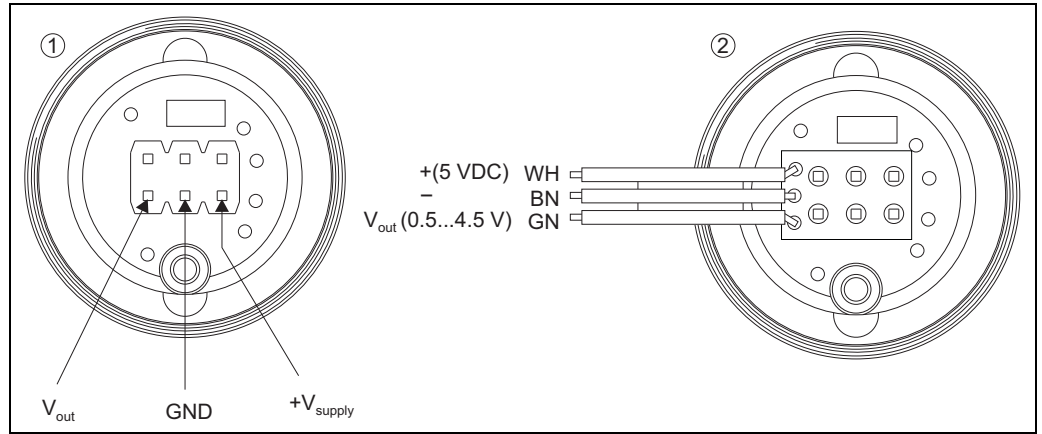
### Load

- 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



P01-UC2xxxxx-04-xx-xx-xx-001

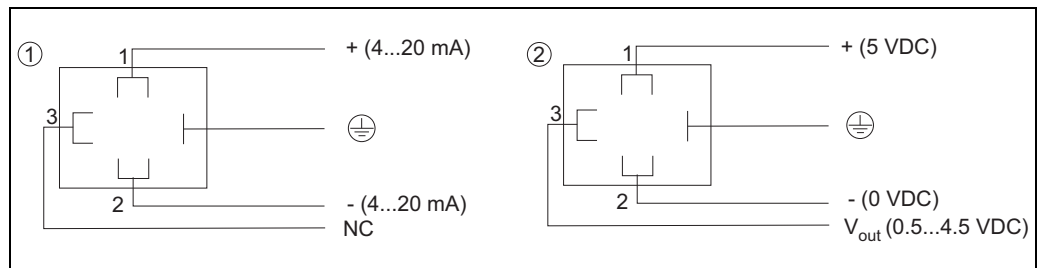
UC2 electrical connection with voltage output

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



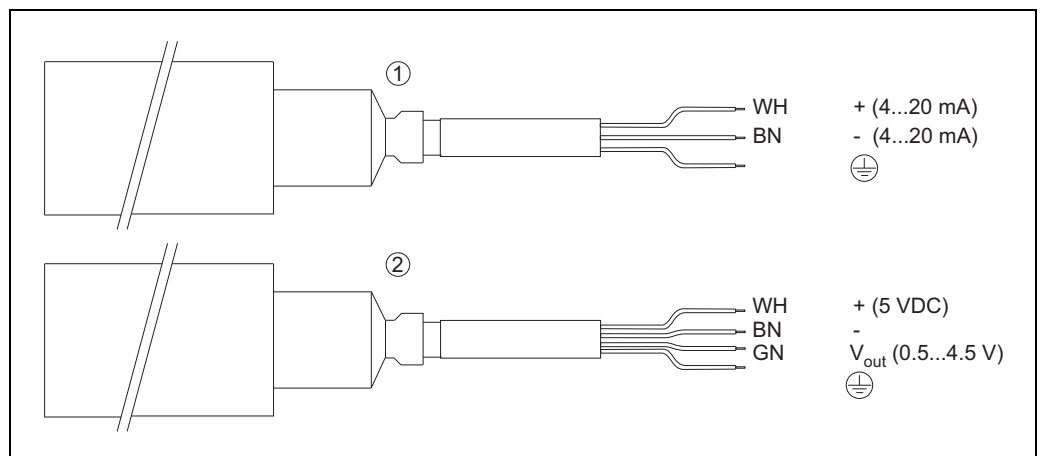
P01-UC2xxxxx-04-xx-xx-xx-002

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

<b>Supply voltage</b>	<ul style="list-style-type: none"> <li>■ 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</li> <li>■ 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.</li> </ul>
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<b>Current consumption</b>	<ul style="list-style-type: none"> <li>■ Voltage output: max. 2 mA with a supply voltage of 5 V, with reverse polarity protection</li> <li>■ Current output: max. 23 mA, with reverse polarity protection</li> </ul>
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## Performance characteristics

<b>Reference operating conditions</b>	As per DIN EN IEC 62828 $T_u = 25\text{ °C}$ (77 °F), humidity 45 to 75 %, ambient air pressure 860 to 1060 mbar, compensated temperature range: -20 to 80 °C
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<b>Zero point deviation</b>	<b>Voltage output</b>	<b>Current output</b>
	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.

<b>Span deviation</b>	<b>Voltage output</b>	<b>Current output</b>
	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.

<b>Maximum measured error</b>	Non-linearity + hysteresis + non-reproducibility: max. $\pm 0.25\%$ of span
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<b>Rise time (<math>T_{90}</math>)</b>	Approx. 5 ms
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<b>Settling time (<math>T_{99}</math>)</b>	Max. 10 ms
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<b>Long-term stability</b>	Max. 0.15 % of span per year
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<b>Thermal change of the zero output within the compensated temperature range</b>	<b>Voltage output</b>	<b>Current output</b>
	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.

<b>Thermal span change within the compensated temperature range</b>	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

<b>Voltage output</b>	<b>Current output</b>
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)

<b>Orientation</b>	Random Observe position-dependent zero point shift with small pressure ranges ( $\leq 1$ bar).
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## Operating conditions: Environment

<b>Ambient temperature range</b>	-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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<b>Storage temperature</b>	-40 to +80 °C
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<b>Degree of protection</b>	Depends on housing (IP 68 possible)
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<b>Climate class</b>	4K4H as per DIN EN 60721-3 (can be achieved with closed pressure transducers)
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<b>Shock resistance</b>	15 g as per DIN EN 60068-2-29 (6 ms)
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<b>Electromagnetic compatibility</b>	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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<b>Safety notes</b>	For work on and with the device:
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**NOTICE**  
**Danger of damaging the device**  
Static sensitive devices.  
▶ Handle only at static safe work stations!



## Operating conditions (process)

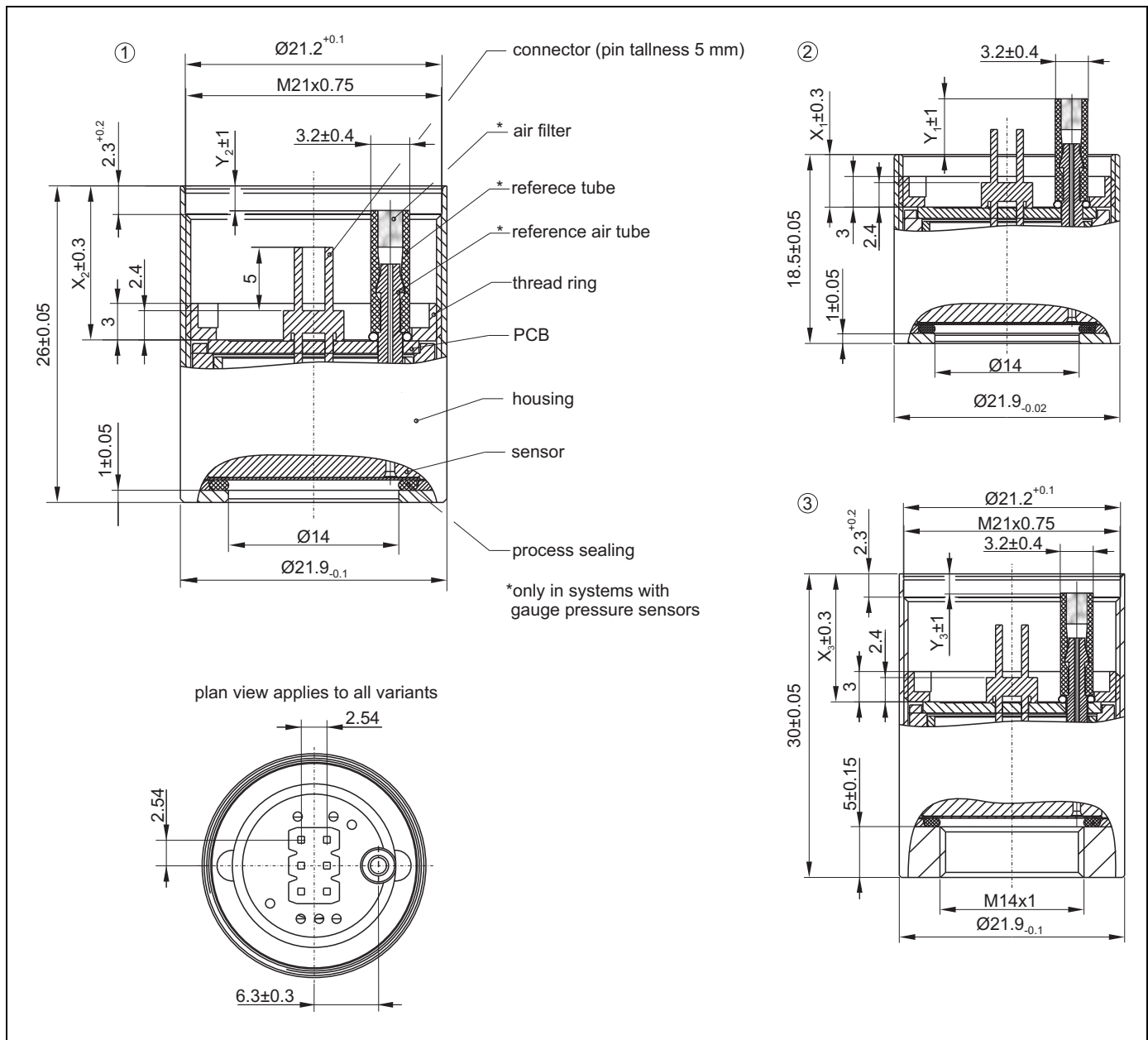
<b>Process temperature limits</b>	-20 to +80 °C Note the temperature limits of the applied process seal (see chapter "Material" → 9)
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<b>Overload resistance</b>	Overload limit: see chapter "Ordering information" → 10. Overload effect: negligible
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<b>Vacuum resistance</b>	Vacuum-resistant
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## Mechanical construction

### Dimensions of the basic modules



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 <sub>1</sub> [mm]	X <sub>2</sub> [mm]	X <sub>3</sub> [mm]	Y <sub>1</sub> [mm]	Y <sub>2</sub> [mm]	Y <sub>3</sub> [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



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**Material**

- Process isolating Diaphragm  
Aluminum oxide ceramic  $Al_2O_3$   
(Measuring cells  $\leq 1$  bar purity  $\geq 99,7$  %)  
(Measuring cells  $\geq 2$  bar purity  $\geq 96$  %)
- 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

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**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.

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**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.

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**External standards and guidelines**

DIN EN IEC 62828-1, 62828-2:  
Reference conditions and procedures for testing industrial and process measurement transmitters  
Part 1: General procedures for all types of transmitters  
Part 2: Specific procedures for pressure transmitters

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

Detailed ordering information is available from the following sources:  
 In the Product Configurator on the Endress+Hauser website:  
[www.sensors-components.endress.com](http://www.sensors-components.endress.com)



### Product Configurator - the tool for individual product configuration

- Product-specific configuration data
- Depending on the device: direct input of information specific to measuring point, such as measuring range
- Automatic verification of exclusion criteria

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

Other measuring ranges and special versions available on request.

## Additional documentation

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**Operating instructions** BA902P/00/A2

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**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

## Disposal

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If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), our products are marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Such products may not be disposed of as unsorted municipal waste and can be returned to Endress+Hauser for disposal at conditions stipulated in our General Terms and Conditions or as individually agreed.

## Contact addresses

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Internet: [www.sensors-components.endress.com](http://www.sensors-components.endress.com)  
 E-mail: [sensors-components.pcm@endress.com](mailto:sensors-components.pcm@endress.com)



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