

# Technical Information

## Proline Promass P 300

Coriolis flowmeter



Specialist for life sciences with a compact, easily accessible transmitter

### Application

- Measuring principle operates independently of physical fluid properties such as viscosity or density
- Dedicated to applications under sterile conditions in the life sciences industry

### Device properties

- ASME BPE, 3-A, EHEDG conform & low delta-ferrite
- Electropolished measuring tube in 1.4435 (316L)
- Fast recovery from CIP/SIP
- Compact hygienic dual-compartment housing with IP69 and up to 3 I/Os
- Backlit display with touch control and WLAN access
- Remote display available

### Your benefits

- Highest process quality – fully compliant to industry requirements
- Fewer process measuring points – multivariable measurement (flow, density, temperature)
- Space-saving installation – no in-/outlet run needs
- Full access to process and diagnostic information – numerous, freely combinable I/Os and Ethernet
- Reduced complexity and variety – freely configurable I/O functionality
- Integrated verification – Heartbeat Technology

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

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## About this document

### Symbols









#### Electrical symbols

Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current
	<b>Ground connection</b> A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	<b>Potential equalization connection (PE: protective earth)</b> Ground terminals that must be connected to ground prior to establishing any other connections.  The ground terminals are located on the interior and exterior of the device: <ul style="list-style-type: none"> <li>▪ Interior ground terminal: potential equalization is connected to the supply network.</li> <li>▪ Exterior ground terminal: device is connected to the plant grounding system.</li> </ul>

#### Communication-specific symbols




Symbol	Meaning
	<b>Wireless Local Area Network (WLAN)</b> Communication via a wireless, local network.

#### Symbols for certain types of information

Symbol	Meaning
	<b>Permitted</b> Procedures, processes or actions that are permitted.
	<b>Preferred</b> Procedures, processes or actions that are preferred.
	<b>Forbidden</b> Procedures, processes or actions that are forbidden.
	<b>Tip</b> Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Visual inspection

#### Symbols in graphics

Symbol	Meaning
1, 2, 3, ...	Item numbers
<b>1</b> , <b>2</b> , <b>3</b> , ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

Symbol	Meaning
	Hazardous area
	Safe area (non-hazardous area)
	Flow direction

## Function and system design

### Measuring principle

The measuring principle is based on the controlled generation of Coriolis forces. These forces are always present in a system when both translational and rotational movements are superimposed.

$$F_c = 2 \cdot \Delta m (v \cdot \omega)$$

$$F_c = \text{Coriolis force}$$

$$\Delta m = \text{moving mass}$$

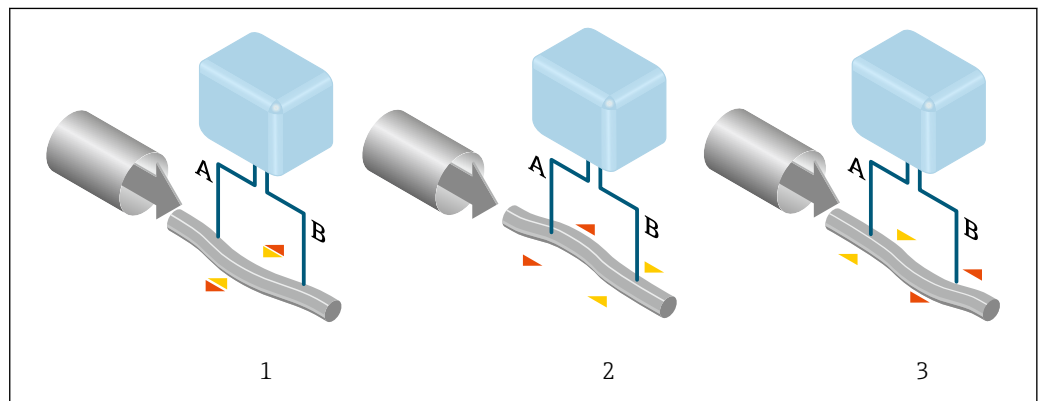
$$\omega = \text{rotational velocity}$$

$$v = \text{radial velocity in rotating or oscillating system}$$

The amplitude of the Coriolis force depends on the moving mass  $\Delta m$ , its velocity  $v$  in the system and thus on the mass flow. Instead of a constant rotational velocity  $\omega$ , the sensor uses oscillation.

In the sensor, an oscillation is produced in the measuring tube. The Coriolis forces produced at the measuring tube cause a phase shift in the tube oscillations (see illustration):

- If there is zero flow (i.e. when the fluid stands still), the oscillation measured at points A and B has the same phase (no phase difference) (1).
- Mass flow causes deceleration of the oscillation at the inlet of the tubes (2) and acceleration at the outlet (3).



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The phase difference (A-B) increases with increasing mass flow. Electrodynamic sensors register the tube oscillations at the inlet and outlet. System balance is created by exciting an eccentrically arranged swinging mass to antiphase oscillation. The measuring principle operates independently of temperature, pressure, viscosity, conductivity and flow profile.

### Density measurement

The measuring tube is continuously excited at its resonance frequency. A change in the mass and thus the density of the oscillating system (comprising measuring tube and fluid) results in a corresponding, automatic adjustment in the oscillation frequency. The resonance frequency is thus a function of the medium density. The microprocessor utilizes this relationship to obtain a density signal.

### Volume measurement

Together with the measured mass flow, this is used to calculate the volume flow.

**Temperature measurement**

The temperature of the measuring tube is determined in order to calculate the compensation factor due to temperature effects. This signal corresponds to the process temperature and is also available as an output signal.

**Gas Fraction Handler (GFH)**

The Gas Fraction Handler is a Promass software function that improves measurement stability and repeatability. The function continuously checks for the presence of disturbances in single-phase flow, i.e. gas bubbles in liquids or droplets in gas. In the presence of the second phase, flow and density become increasingly unstable. The Gas Fraction Handler function improves measurement stability with respect to the severity of the disturbances, without any effect under single-phase flow conditions.

 The Gas Fraction Handler is only available in device versions with HART, Modbus RS485, PROFINET and PROFINET with Ethernet-APL.

 For detailed information on the Gas Fraction Handler, see the Special Documentation for "Gas Fraction Handler" →  119

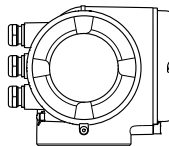
**Measuring system**

The device consists of a transmitter and a sensor.

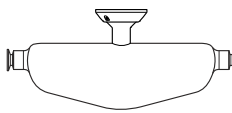
The device is available as a compact version:

The transmitter and sensor form a mechanical unit.

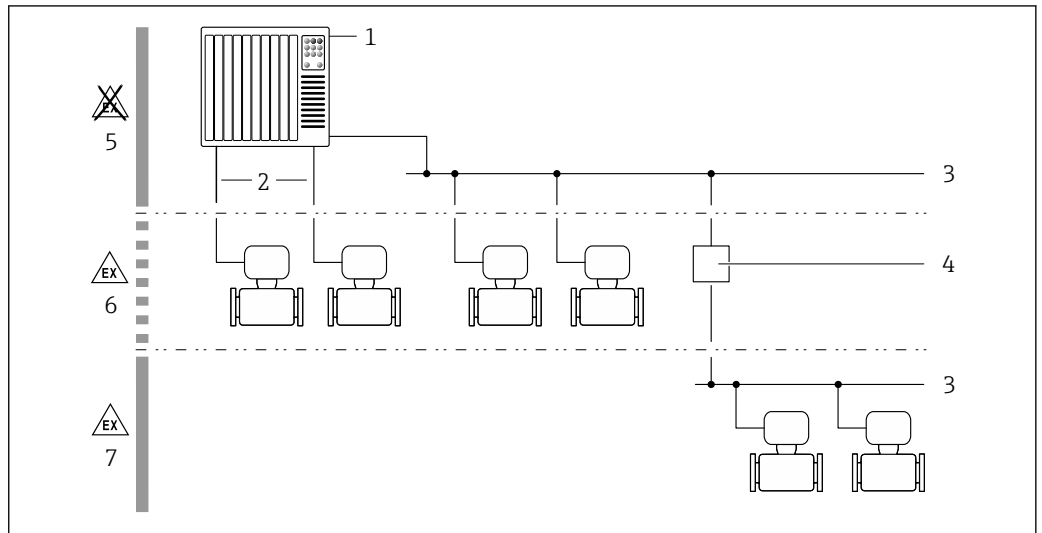
**Transmitter**

<p><b>Proline 300</b></p>  <p>A0026708</p>	<p>Device versions and materials:</p> <ul style="list-style-type: none"> <li>▪ Transmitter housing <ul style="list-style-type: none"> <li>▪ Aluminum, coated: aluminum, AlSi10Mg, coated</li> <li>▪ Stainless, hygienic: stainless steel, 1.4404</li> </ul> </li> <li>▪ Material of window in transmitter housing: <ul style="list-style-type: none"> <li>▪ Aluminum, coated: glass</li> <li>▪ Stainless, hygienic: polycarbonate</li> </ul> </li> </ul> <p>Configuration:</p> <ul style="list-style-type: none"> <li>▪ External operation via 4-line, illuminated graphic local display (LCD) with touch control and guided menus ("Make-it-run" wizards) for application-specific commissioning.</li> <li>▪ Via service interface or WLAN interface: <ul style="list-style-type: none"> <li>▪ Operating tools (e.g. FieldCare, DeviceCare)</li> <li>▪ Web server (access via Web browser, e.g. Microsoft Internet Explorer, Microsoft Edge)</li> </ul> </li> </ul>
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**Sensor**

<p><b>Promass P</b></p>  <p>A0026710</p>	<ul style="list-style-type: none"> <li>▪ Bent single-tube system</li> <li>▪ For use in sterile applications in heavily regulated industries</li> <li>▪ Nominal diameter range: DN 8 to 50 (3/8 to 2")</li> <li>▪ Materials: <ul style="list-style-type: none"> <li>▪ Sensor: stainless steel, 1.4301 (304)</li> <li>▪ Measuring tubes: stainless steel, 1.4435 BN2 (316L)</li> <li>▪ Process connections: stainless steel, 1.4435 BN2 (316L); 1.4404 (F316/F316L)</li> <li>▪ Surface quality: Ra ≤ 0.76 µm (30 µin) Ra ≤ 0.38 µm (15 µin) (electropolished)</li> <li>▪ Delta ferrite &lt;1%</li> </ul> </li> </ul>
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Equipment architecture



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1 Possibilities for integrating measuring devices into a system

- 1 Control system (e.g. PLC)
- 2 Connecting cable (0/4 to 20 mA HART etc.)
- 3 Fieldbus
- 4 Coupler
- 5 Non-hazardous area
- 6 Hazardous area: Zone 2; Class I, Division 2
- 7 Hazardous area: Zone 1; Class I, Division 1

Reliability

IT security

Our warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

Device-specific IT security

The device offers a range of specific functions to support protective measures on the operator's side. These functions can be configured by the user and guarantee greater in-operation safety if used correctly. The following list provides an overview of the most important functions:

Function/interface	Factory setting	Recommendation
Write protection via hardware write protection switch → 8	Not enabled	On an individual basis following risk assessment
Access code (also applies to web server login or FieldCare connection) → 8	Not enabled (0000)	Assign a customized access code during commissioning
WLAN (order option in display module)	Enabled	On an individual basis following risk assessment
WLAN security mode	Enabled (WPA2-PSK)	Do not change
WLAN passphrase (Password) → 8	Serial number	Assign an individual WLAN passphrase during commissioning
WLAN mode	Access point	On an individual basis following risk assessment
Web server → 8	Enabled	On an individual basis following risk assessment
Service interface CDI-RJ45 → 9	-	On an individual basis following risk assessment

*Protecting access via hardware write protection*

Write access to the parameters of the device via the local display, web browser or operating tool (e.g. FieldCare, DeviceCare) can be disabled via a write protection switch (DIP switch on the main electronics module). When hardware write protection is enabled, only read access to the parameters is possible.

Hardware write protection is disabled when the device is delivered.

*Protecting access via a password*

Different passwords are available to protect write access to the device parameters or access to the device via the WLAN interface.

- **User-specific access code**  
Protect write access to the device parameters via the local display, web browser or operating tool (e.g. FieldCare, DeviceCare). Access authorization is clearly regulated through the use of a user-specific access code.
- **WLAN passphrase**  
The network key protects a connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface which can be ordered as an option.
- **Infrastructure mode**  
When the device is operated in infrastructure mode, the WLAN passphrase corresponds to the WLAN passphrase configured on the operator side.

*User-specific access code*

Write access to the device parameters via the local display, web browser or operating tool (e.g. FieldCare, DeviceCare) can be protected by the modifiable, user-specific access code.

*WLAN passphrase: Operation as WLAN access point*

A connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface, which can be ordered as an optional extra, is protected by the network key. The WLAN authentication of the network key complies with the IEEE 802.11 standard.

When the device is delivered, the network key is pre-defined depending on the device. It can be changed via the **WLAN settings** submenu in the **WLAN passphrase** parameter.

*Infrastructure mode*

A connection between the device and WLAN access point is protected by means of an SSID and passphrase on the system side. Please contact the relevant system administrator for access.

*General notes on the use of passwords*

- The access code and network key supplied with the device should be changed during commissioning for safety reasons.
- Follow the general rules for generating a secure password when defining and managing the access code and network key.
- The user is responsible for the management and careful handling of the access code and network key.


*Access via web server*

The device can be operated and configured via a web browser with the integrated web server. The connection is established via the service interface (CDI-RJ45) or the WLAN interface. For device versions with the EtherNet/IP and PROFINET communication protocols, the connection can also be established via the terminal connection for signal transmission with EtherNet/IP, PROFINET (RJ45 plug) or PROFINET with Ethernet-APL (two-wire).

The web server is enabled when the device is delivered. The web server can be disabled via the **Web server functionality** parameter if necessary (e.g., after commissioning).



The device and status information can be hidden on the login page. This prevents unauthorized access to the information.



Detailed information on the device parameters:  
"Description of device parameters" document →  118.



#### *Access via OPC-UA*

 The "OPC UA Server" application package is available in the device version with the HART communication protocol →  114.

The device can communicate with OPC UA clients using the "OPC UA Server" application package.

The OPC UA server integrated in the device can be accessed via the WLAN access point using the WLAN interface - which can be ordered as an optional extra - or the service interface (CDI-RJ45) via Ethernet network. Access rights and authorization as per separate configuration.


The following Security Modes are supported as per the OPC UA Specification (IEC 62541):



- None
- Basic128Rsa15 – signed
- Basic128Rsa15 – signed and encrypted

#### *Access via service interface (CDI-RJ45)*

The device can be connected to a network via the service interface (CDI-RJ45). Device-specific functions guarantee the secure operation of the device in a network.

The use of relevant industrial standards and guidelines that have been defined by national and international safety committees, such as IEC/ISA62443 or the IEEE, is recommended. This includes organizational security measures such as the assignment of access authorization as well as technical measures such as network segmentation.

 Transmitters with an Ex de approval may not be connected via the service interface (CDI-RJ45)!  
Order code for "Approval transmitter + sensor", options (Ex de): BA, BB, C1, C2, GA, GB, MA, MB, NA, NB BB, C2, GB, MB, NB

 The device can be integrated into a ring topology. The device is integrated via the terminal connection for signal transmission (output 1) and the connection to the service interface (CDI-RJ45) →  104.

## Input

### Measured variable

#### Direct measured variables

- Mass flow
- Density
- Temperature

#### Calculated measured variables



- Volume flow
- Corrected volume flow
- Reference density

### Measuring range

#### Measuring range for liquids

DN		Measuring range full scale values $\dot{m}_{\min(F)}$ to $\dot{m}_{\max(F)}$	
[mm]	[in]	[kg/h]	[lb/min]
8	$\frac{3}{8}$	0 to 2 000	0 to 73.50
15	$\frac{1}{2}$	0 to 6 500	0 to 238.9
25	1	0 to 18 000	0 to 661.5
40	$1\frac{1}{2}$	0 to 45 000	0 to 1 654
50	2	0 to 70 000	0 to 2 573

#### Recommended measuring range

 Flow limit →  62

### Operable flow range

Over 1000 : 1.

Flow rates above the preset full scale value do not override the electronics unit, with the result that the totalizer values are registered correctly.

### Input signal



#### Output and input variants

→  12

#### External measured values

To increase the measurement accuracy of certain measured variables, the automation system can continuously write various measured values to the measuring instrument:

- Operating pressure to increase measurement accuracy (Endress+Hauser recommends the use of a pressure measuring device for absolute pressure, e.g. Cerabar M or Cerabar S)
- Medium temperature to increase measurement accuracy (e.g. iTEMP)


 Various pressure and temperature measuring devices can be ordered from Endress+Hauser: see "Accessories" section →  117

#### HART protocol

The measured values are written from the automation system to the measuring device via the HART protocol. The pressure transmitter must support the following protocol-specific functions:

- HART protocol
- Burst mode

#### Current input

The measured values are written from the automation system to the measuring device via the current input →  11.

*Digital communication*

The measured values can be written by the automation system via:

- FOUNDATION Fieldbus
- PROFIBUS DP
- PROFIBUS PA
- Modbus RS485
- Modbus TCP over Ethernet-APL
- Ethernet/IP
- PROFINET
- PROFINET over Ethernet-APL

**Current input 0/4 to 20 mA**

<b>Current input</b>	0/4 to 20 mA (active/passive)
<b>Current span</b>	<ul style="list-style-type: none"> <li>■ 4 to 20 mA (active)</li> <li>■ 0/4 to 20 mA (passive)</li> </ul>
<b>Resolution</b>	1 µA
<b>Voltage drop</b>	Typically: 0.6 to 2 V for 3.6 to 22 mA (passive)
<b>Maximum input voltage</b>	≤ 30 V (passive)
<b>Open-circuit voltage</b>	≤ 28.8 V (active)
<b>Possible input variables</b>	<ul style="list-style-type: none"> <li>■ Pressure</li> <li>■ Temperature</li> <li>■ Density</li> </ul>

**Status input**

<b>Maximum input values</b>	<ul style="list-style-type: none"> <li>■ DC -3 to 30 V</li> <li>■ If status input is active (ON): <math>R_i &gt; 3 \text{ k}\Omega</math></li> </ul>
<b>Response time</b>	Configurable: 5 to 200 ms
<b>Input signal level</b>	<ul style="list-style-type: none"> <li>■ Low signal: DC -3 to +5 V</li> <li>■ High signal: DC 12 to 30 V</li> </ul>
<b>Assignable functions</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Reset the individual totalizers separately</li> <li>■ Reset all totalizers</li> <li>■ Flow override</li> </ul>

## Output

### Output and input variants

Depending on the option selected for output/input 1, different options are available for the other outputs and inputs. Only one option can be selected for each output/input 1 to 3. The following tables must be read vertically (↓).

Example: If the option BA "4–20 mA HART" was selected for output/input 1, one of the options A, B, D, E, F, H, I or J is available for output 2 and one of the options A, B, D, E, F, H, I or J is available for output 3.

### Output/input 1 and options for output/input 2



 Options for output/input 3 →  13

Order code for "Output; input 1" (020) →	Possible options												
Current output 4 to 20 mA HART	BA												
Current output 4 to 20 mA HART Ex i passive	↓	CA											
Current output 4 to 20 mA HART Ex i active		↓	CC										
FOUNDATION Fieldbus			↓	SA									
FOUNDATION Fieldbus Ex i				↓	TA								
PROFIBUS DP					↓	LA							
PROFIBUS PA						↓	GA						
PROFIBUS PA Ex i							↓	HA					
Modbus RS485								↓	MA				
EtherNet/IP 2-port switch integrated									↓	NA			
PROFINET 2-port switch integrated										↓	RA		
PROFINET over Ethernet-APL											↓	RB	
PROFINET over Ethernet-APL Ex i												↓	RC
<b>Order code for "Output; input 2" (021) →</b>	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Not used	A	A	A	A	A	A	A	A	A	A	A	A	A
Current output 4 to 20 mA	B			B		B	B		B	B	B	B	
Current output 4 to 20 mA Ex i passive		C	C		C			C					C
User-configurable input/output <sup>1)</sup>	D			D		D	D		D	D	D	D	
Pulse/frequency/switch output	E			E		E	E		E	E	E	E	
Double pulse output <sup>2)</sup>	F								F				
Pulse/frequency/switch output Ex i passive		G	G		G			G					G
Relay output	H			H		H	H		H	H	H	H	
Current input 0/4 to 20 mA	I			I		I	I		I	I	I	I	
Status input	J			J		J	J		J	J	J	J	

1) A specific input or output can be assigned →  20 to a user-configurable input/output.

2) If double pulse output (F) is selected for output/input 2 (021), only the double pulse output (F) option is available for selection for output/input 3 (022).

Output/input 1 and options for output/input 3


 Options for output/input 2 →  12

Order code for "Output; input 1" (020) →	Possible options												
Current output 4 to 20 mA HART	BA												
Current output 4 to 20 mA HART Ex i passive	↓	CA											
Current output 4 to 20 mA HART Ex i active		↓	CC										
FOUNDATION Fieldbus			↓	SA									
FOUNDATION Fieldbus Ex i				↓	TA								
PROFIBUS DP					↓	LA							
PROFIBUS PA						↓	GA						
PROFIBUS PA Ex i							↓	HA					
Modbus RS485								↓	MA				
EtherNet/IP 2-port switch integrated									↓	NA			
PROFINET 2-port switch integrated										↓	RA		
PROFINET over Ethernet-APL/SPE, 10 Mbit/s, 2-wire											↓	RB	
PROFINET over Ethernet-APL Ex i, 10 Mbit/s, 2-wire												↓	RC
<b>Order code for "Output; input 3" (022) →</b>	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Not used	A	A	A	A	A	A	A	A	A	A	A	A	A
Current output 4 to 20 mA	B						B			B	B	B	B
Current output 4 to 20 mA Ex i passive		C	C										
User-configurable input/output	D						D			D	D	D	D
Pulse/frequency/switch output	E						E			E	E	E	E
Double pulse output (slave) <sup>1)</sup>	F									F			
Pulse/frequency/switch output Ex i passive		G	G										
Relay output	H						H			H	H	H	H
Current input 0/4 to 20 mA	I						I			I	I	I	I
Status input	J						J			J	J	J	J

1) If double pulse output (F) is selected for output/input 2 (021), only the double pulse output (F) option is available for output/input 3 (022).


## Output signal

## Current output 4 to 20 mA HART

Order code	"Output; input 1" (20): Option BA: current output 4 to 20 mA HART
Signal mode	Can be set to: <ul style="list-style-type: none"> <li>■ Active</li> <li>■ Passive</li> </ul>
Current range	Can be set to: <ul style="list-style-type: none"> <li>■ 4 to 20 mA NAMUR</li> <li>■ 4 to 20 mA US</li> <li>■ 4 to 20 mA</li> <li>■ 0 to 20 mA (only if the signal mode is active)</li> <li>■ Fixed current</li> </ul>
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	250 to 700 $\Omega$
Resolution	0.38 $\mu$ A
Damping	Configurable: 0 to 999.9 s
Assignable measured variables	<ul style="list-style-type: none"> <li>■ Mass flow</li> <li>■ Volume flow</li> <li>■ Corrected volume flow</li> <li>■ Density</li> <li>■ Reference density</li> <li>■ Temperature</li> <li>■ Electronics temperature</li> <li>■ Oscillation frequency 0</li> <li>■ Oscillation damping 0</li> <li>■ Signal asymmetry</li> <li>■ Exciter current 0</li> </ul> <p> The range of options increases if the measuring device has one or more application packages.</p>

## Current output 4 to 20 mA HART Ex i

Order code	"Output; input 1" (20) choose from: <ul style="list-style-type: none"> <li>■ Option CA: current output 4 to 20 mA HART Ex i passive</li> <li>■ Option CC: current output 4 to 20 mA HART Ex i active</li> </ul>
Signal mode	Depends on the selected order version.
Current range	Can be set to: <ul style="list-style-type: none"> <li>■ 4 to 20 mA NAMUR</li> <li>■ 4 to 20 mA US</li> <li>■ 4 to 20 mA</li> <li>■ 0 to 20 mA (only if the signal mode is active)</li> <li>■ Fixed current</li> </ul>
Open-circuit voltage	DC 21.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	<ul style="list-style-type: none"> <li>■ 250 to 400 <math>\Omega</math> (active)</li> <li>■ 250 to 700 <math>\Omega</math> (passive)</li> </ul>
Resolution	0.38 $\mu$ A

<b>Damping</b>	Configurable: 0 to 999.9 s
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> <li>▪ Density</li> <li>▪ Reference density</li> <li>▪ Temperature</li> <li>▪ Electronics temperature</li> <li>▪ Oscillation frequency 0</li> <li>▪ Oscillation damping 0</li> <li>▪ Signal asymmetry</li> <li>▪ Exciter current 0</li> </ul> <p> The range of options increases if the measuring device has one or more application packages.</p>

**FOUNDATION Fieldbus**

<b>FOUNDATION Fieldbus</b>	H1, IEC 61158-2, galvanically isolated
<b>Data transfer</b>	31.25 kbit/s
<b>Current consumption</b>	10 mA
<b>Permitted supply voltage</b>	9 to 32 V
<b>Bus connection</b>	With integrated reverse polarity protection

**PROFIBUS DP**

<b>Signal encoding</b>	NRZ code
<b>Data transfer</b>	9.6 kBaud...12 MBaud
<b>Terminating resistor</b>	Integrated, can be activated via DIP switches

**PROFIBUS PA**

<b>PROFIBUS PA</b>	In accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
<b>Data transmission</b>	31.25 kbit/s
<b>Current consumption</b>	10 mA
<b>Permitted supply voltage</b>	9 to 32 V
<b>Bus connection</b>	With integrated reverse polarity protection

**Modbus RS485**

<b>Physical interface</b>	RS485 in accordance with EIA/TIA-485 standard
<b>Terminating resistor</b>	Integrated, can be activated via DIP switches

**EtherNet/IP**

<b>Standards</b>	In accordance with IEEE 802.3
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**PROFINET**

<b>Standards</b>	In accordance with IEEE 802.3
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**PROFINET with Ethernet-APL**


<b>Device use</b>	<p><b>Device connection to an APL field switch</b> The device may only be operated according to the following APL port classifications:</p> <ul style="list-style-type: none"> <li>▪ If used in hazardous areas: SLAA or SLAC <sup>1)</sup></li> <li>▪ If used in non-hazardous areas: SLAX</li> </ul> <p>Connection values of APL field switch (corresponds to APL port classification SPCC or SPAA, for instance):</p> <ul style="list-style-type: none"> <li>▪ Maximum input voltage: 15 V<sub>DC</sub></li> <li>▪ Minimum output values: 0.54 W</li> </ul> <p><b>Device connection to an SPE switch</b></p> <ul style="list-style-type: none"> <li>▪ In non-hazardous areas, the device can be used with an appropriate SPE switch: The device can be connected to an SPE switch with a maximum voltage of 30 V<sub>DC</sub> and a minimum output power of 1.85 W connected.</li> <li>▪ The SPE switch must support the 10BASE-T1L standard and PoDL power classes 10, 11 or 12 and have a function to disable power class detection.</li> </ul>
<b>PROFINET</b>	According to IEC 61158 and IEC 61784
<b>Ethernet-APL</b>	According to IEEE 802.3cg, APL port profile specification v1.0, galvanically isolated
<b>Data transmission</b>	10 Mbit/s
<b>Current consumption</b>	<p><b>Transmitter</b></p> <ul style="list-style-type: none"> <li>▪ Max. 400 mA (24 V)</li> <li>▪ Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)</li> </ul>
<b>Permitted supply voltage</b>	9 to 30 V
<b>Network connection</b>	With integrated reverse polarity protection

1) For more information on using the device in the hazardous area, see the Ex-specific Safety Instructions


**Current output 4 to 20 mA**

<b>Order code</b>	"Output; input 2" (21), "Output; input 3" (022): Option B: current output 4 to 20 mA
<b>Signal mode</b>	Can be set to: <ul style="list-style-type: none"> <li>▪ Active</li> <li>▪ Passive</li> </ul>
<b>Current range</b>	Can be set to: <ul style="list-style-type: none"> <li>▪ 4 to 20 mA NAMUR</li> <li>▪ 4 to 20 mA US</li> <li>▪ 4 to 20 mA</li> <li>▪ 0 to 20 mA (only if the signal mode is active)</li> <li>▪ Fixed current</li> </ul>
<b>Maximum output values</b>	22.5 mA
<b>Open-circuit voltage</b>	DC 28.8 V (active)
<b>Maximum input voltage</b>	DC 30 V (passive)
<b>Load</b>	0 to 700 Ω
<b>Resolution</b>	0.38 μA






<b>Damping</b>	Configurable: 0 to 999.9 s
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> <li>▪ Density</li> <li>▪ Reference density</li> <li>▪ Temperature</li> <li>▪ Electronics temperature</li> <li>▪ Oscillation frequency 0</li> <li>▪ Oscillation damping 0</li> <li>▪ Signal asymmetry</li> <li>▪ Exciter current 0</li> </ul> <p> The range of options increases if the measuring device has one or more application packages.</p>


**Current output 4 to 20 mA Ex i passive**

<b>Order code</b>	"Output; input 2" (21), "Output; input 3" (022): Option C: current output 4 to 20 mA Ex i passive
<b>Signal mode</b>	Passive
<b>Current range</b>	Can be set to: <ul style="list-style-type: none"> <li>▪ 4 to 20 mA NAMUR</li> <li>▪ 4 to 20 mA US</li> <li>▪ 4 to 20 mA</li> <li>▪ Fixed current</li> </ul>
<b>Maximum output values</b>	22.5 mA
<b>Maximum input voltage</b>	DC 30 V
<b>Load</b>	0 to 700 Ω
<b>Resolution</b>	0.38 µA
<b>Damping</b>	Configurable: 0 to 999 s
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> <li>▪ Density</li> <li>▪ Reference density</li> <li>▪ Temperature</li> <li>▪ Electronics temperature</li> <li>▪ Oscillation frequency 0</li> <li>▪ Oscillation damping 0</li> <li>▪ Signal asymmetry</li> <li>▪ Exciter current 0</li> </ul> <p> The range of options increases if the measuring device has one or more application packages.</p>


**Pulse/frequency/switch output**

<b>Function</b>	Can be configured as pulse, frequency or switch output
<b>Version</b>	Open collector Can be set to: <ul style="list-style-type: none"> <li>▪ Active</li> <li>▪ Passive</li> <li>▪ Passive NAMUR</li> </ul> <p> Ex-i, passive</p>
<b>Maximum input values</b>	DC 30 V, 250 mA (passive)
<b>Open-circuit voltage</b>	DC 28.8 V (active)
<b>Voltage drop</b>	For 22.5 mA: ≤ DC 2 V

Pulse output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Pulse width	Configurable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Configurable
Assignable measured variables	<ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> </ul>  The range of options increases if the measuring device has one or more application packages.
Frequency output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Output frequency	Configurable: end value frequency 2 to 10 000 Hz ( $f_{\max} = 12\,500$ Hz)
Damping	Configurable: 0 to 999.9 s
Pulse/pause ratio	1:1
Assignable measured variables	<ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> <li>▪ Density</li> <li>▪ Reference density</li> <li>▪ Temperature</li> <li>▪ Electronics temperature</li> <li>▪ Oscillation frequency 0</li> <li>▪ Oscillation damping 0</li> <li>▪ Signal asymmetry</li> <li>▪ Exciter current 0</li> </ul>  The range of options increases if the measuring device has one or more application packages.
Switch output	
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Switching behavior	Binary, conductive or non-conductive
Switching delay	Configurable: 0 to 100 s


<b>Number of switching cycles</b>	Unlimited
<b>Assignable functions</b>	<ul style="list-style-type: none"> <li>▪ Disable</li> <li>▪ On</li> <li>▪ Diagnostic behavior</li> <li>▪ Limit                             <ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> <li>▪ Density</li> <li>▪ Reference density</li> <li>▪ Temperature</li> <li>▪ Totalizer 1-3</li> </ul> </li> <li>▪ Flow direction monitoring</li> <li>▪ Status                             <ul style="list-style-type: none"> <li>▪ Partially filled pipe detection</li> <li>▪ Low flow cut off</li> </ul> </li> </ul> <p> The range of options increases if the measuring device has one or more application packages.</p>

### Double pulse output

<b>Function</b>	Double pulse
<b>Version</b>	Open collector Can be set to: <ul style="list-style-type: none"> <li>▪ Active</li> <li>▪ Passive</li> <li>▪ Passive NAMUR</li> </ul>
<b>Maximum input values</b>	DC 30 V, 250 mA (passive)
<b>Open-circuit voltage</b>	DC 28.8 V (active)
<b>Voltage drop</b>	For 22.5 mA: ≤ DC 2 V
<b>Output frequency</b>	Configurable: 0 to 1000 Hz
<b>Damping</b>	Configurable: 0 to 999 s
<b>Pulse/pause ratio</b>	1:1
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> <li>▪ Density</li> <li>▪ Reference density</li> <li>▪ Temperature</li> </ul> <p> The range of options increases if the measuring device has one or more application packages.</p>

### Relay output

<b>Function</b>	Switch output
<b>Version</b>	Relay output, galvanically isolated
<b>Switching behavior</b>	Can be set to: <ul style="list-style-type: none"> <li>▪ NO (normally open), factory setting</li> <li>▪ NC (normally closed)</li> </ul>

<b>Maximum switching capacity (passive)</b>	<ul style="list-style-type: none"> <li>▪ DC 30 V, 0.1 A</li> <li>▪ AC 30 V, 0.5 A</li> </ul>
<b>Assignable functions</b>	<ul style="list-style-type: none"> <li>▪ Disable</li> <li>▪ On</li> <li>▪ Diagnostic behavior</li> <li>▪ Limit <ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> <li>▪ Density</li> <li>▪ Reference density</li> <li>▪ Temperature</li> <li>▪ Totalizer 1-3</li> </ul> </li> <li>▪ Flow direction monitoring</li> <li>▪ Status <ul style="list-style-type: none"> <li>▪ Partially filled pipe detection</li> <li>▪ Low flow cut off</li> </ul> </li> </ul> <p> The range of options increases if the measuring device has one or more application packages.</p>

### User-configurable input/output

**One** specific input or output is assigned to a user-configurable input/output (configurable I/O) during device commissioning.

The following inputs and outputs are available for assignment:

- Choice of current output: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Pulse/frequency/switch output
- Choice of current input: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Status input

The technical values correspond to those of the inputs and outputs described in this section.

### Signal on alarm

Depending on the interface, failure information is displayed as follows:

#### HART current output

<b>Device diagnostics</b>	Device condition can be read out via HART Command 48
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#### PROFIBUS PA

<b>Status and alarm messages</b>	Diagnostics in accordance with PROFIBUS PA Profile 3.02
<b>Failure current FDE (Fault Disconnection Electronic)</b>	0 mA

#### PROFIBUS DP

<b>Status and alarm messages</b>	Diagnostics in accordance with PROFIBUS PA Profile 3.02
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#### EtherNet/IP

<b>Device diagnostics</b>	Device condition can be read out in Input Assembly
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#### PROFINET

<b>Device diagnostics</b>	According to "Application Layer protocol for decentralized periphery", Version 2.3
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**PROFINET with Ethernet-APL**

<b>Device diagnostics</b>	Diagnostics according to PROFINET PA Profile 4
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**FOUNDATION Fieldbus**

<b>Status and alarm messages</b>	Diagnostics in accordance with FF-891
<b>Failure current FDE (Fault Disconnection Electronic)</b>	0 mA

**Modbus RS485**

<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>▪ NaN value instead of current value</li> <li>▪ Last valid value</li> </ul>
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**Modbus TCP-APL**

<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>▪ NaN value instead of current value</li> <li>▪ Last valid value</li> </ul>
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**Current output 0/4 to 20 mA**

*4 to 20 mA*

<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>▪ 4 to 20 mA in accordance with NAMUR recommendation NE 43</li> <li>▪ 4 to 20 mA in accordance with US</li> <li>▪ Min. value: 3.59 mA</li> <li>▪ Max. value: 22.5 mA</li> <li>▪ Definable value between: 3.59 to 22.5 mA</li> <li>▪ Actual value</li> <li>▪ Last valid value</li> </ul>
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*0 to 20 mA*

<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>▪ Maximum alarm: 22 mA</li> <li>▪ Definable value between: 0 to 20.5 mA</li> </ul>
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**Pulse/frequency/switch output**

<b>Pulse output</b>	
<b>Fault mode</b>	Choose from: <ul style="list-style-type: none"> <li>▪ Actual value</li> <li>▪ No pulses</li> </ul>
<b>Frequency output</b>	
<b>Fault mode</b>	Choose from: <ul style="list-style-type: none"> <li>▪ Actual value</li> <li>▪ 0 Hz</li> <li>▪ Definable value between: 2 to 12 500 Hz</li> </ul>


Switch output	
<b>Fault mode</b>	Choose from: <ul style="list-style-type: none"> <li>■ Current status</li> <li>■ Open</li> <li>■ Closed</li> </ul>

### Relay output

<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>■ Current status</li> <li>■ Open</li> <li>■ Closed</li> </ul>
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### Local display



<b>Plain text display</b>	With information on cause and remedial measures
<b>Backlight</b>	Red lighting indicates a device error.

 Status signal as per NAMUR recommendation NE 107

### Interface/protocol

- Via digital communication:
  - HART protocol
  - FOUNDATION Fieldbus
  - PROFIBUS PA
  - PROFIBUS DP
  - Modbus RS485
  - Modbus TCP with Ethernet-APL
  - EtherNet/IP
  - PROFINET
  - PROFINET with Ethernet-APL
- Via service interface
  - CDI-RJ45 service interface
  - WLAN interface

<b>Plain text display</b>	With information on cause and remedial measures
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 Additional information on remote operation →  98

### Web browser

<b>Plain text display</b>	With information on cause and remedial measures
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### Light emitting diodes (LED)

<b>Status information</b>	Status indicated by various light emitting diodes The following information is displayed depending on the device version: <ul style="list-style-type: none"> <li>■ Supply voltage active</li> <li>■ Data transmission active</li> <li>■ Device alarm/error has occurred</li> <li>■ EtherNet/IP network available</li> <li>■ EtherNet/IP connection established</li> <li>■ PROFINET network available</li> <li>■ PROFINET connection established</li> <li>■ PROFINET blinking feature</li> </ul>
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Load

Output signal → 14

Ex connection data

Safety-related values

Order code "Output; input 1"	Output type	Safety-related values "Output; input 1"	
		26 (+)	27 (-)
Option BA	Current output 4 to 20 mA HART	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option GA	PROFIBUS PA	$U_N = 32 V_{DC}$ $U_M = 250 V_{AC}$	
Option LA	PROFIBUS DP	$U_N = 32 V_{DC}$ $U_M = 250 V_{AC}$	
Option MA	Modbus RS485	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option MB	Modbus TCP with Ethernet-APL	APL port profile SLAX SPE PoDL classes 10, 11, 12 $U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option SA	FOUNDATION Fieldbus	$U_N = 32 V_{DC}$ $U_M = 250 V_{AC}$	
Option NA	EtherNet/IP	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option RA	PROFINET	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option RB	PROFINET with Ethernet- APL	APL port profile SLAX SPE PoDL classes 10, 11, 12 $U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	

Order code "Output; input 2"; "Output; input 3"	Output type	Safety-related values			
		Output; input 2		Output; input 3	
		24 (+)	25 (-)	22 (+)	23 (-)
Option B	Current output 4 to 20 mA	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option D	User-configurable input/ output	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option E	Pulse/frequency/switch output	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option F	Double pulse output	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option H	Relay output	$U_N = 30 V_{DC}$ $I_N = 100 mA_{DC}/500 mA_{AC}$ $U_M = 250 V_{AC}$			
Option I	Current input 4 to 20 mA	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option J	Status input	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			

## Intrinsically safe values

Order code "Output; input 1"	Output type	Intrinsically safe values "Output; input 1"	
		26 (+)	27 (-)
Option CA	Current output 4 to 20 mA HART Ex i passive	$U_i = 30\text{ V}$ $I_i = 100\text{ mA}$ $P_i = 1.25\text{ W}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 6\text{ nF}$	
Option CC	Current output 4 to 20 mA HART Ex i active	<b>Ex ia</b> <sup>1)</sup> $U_0 = 21.8\text{ V}$ $I_0 = 90\text{ mA}$ $P_0 = 491\text{ mW}$ $L_0 = 4.1\text{ mH (IIC)}/15\text{ mH (IIB)}$ $C_0 = 160\text{ nF (IIC)}/1160\text{ nF (IIB)}$  $U_i = 30\text{ V}$ $I_i = 10\text{ mA}$ $P_i = 0.3\text{ W}$ $L_i = 5\text{ }\mu\text{H}$ $C_i = 6\text{ nF}$	<b>Ex ic</b> <sup>2)</sup> $U_0 = 21.8\text{ V}$ $I_0 = 90\text{ mA}$ $P_0 = 491\text{ mW}$ $L_0 = 9\text{ mH (IIC)}/39\text{ mH (IIB)}$ $C_0 = 600\text{ nF (IIC)}/4000\text{ nF (IIB)}$
Option HA	PROFIBUS PA Ex i (FISCO Field Device)	<b>Ex ia</b> <sup>1)</sup> $U_i = 30\text{ V}$ $I_i = 570\text{ mA}$ $P_i = 8.5\text{ W}$ $L_i = 10\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$	<b>Ex ic</b> <sup>2)</sup> $U_i = 32\text{ V}$ $I_i = 570\text{ mA}$ $P_i = 8.5\text{ W}$ $L_i = 10\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$
Option TA	FOUNDATION Fieldbus Ex i	<b>Ex ia</b> <sup>1)</sup> $U_i = 30\text{ V}$ $I_i = 570\text{ mA}$ $P_i = 8.5\text{ W}$ $L_i = 10\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$	<b>Ex ic</b> <sup>2)</sup> $U_i = 32\text{ V}$ $I_i = 570\text{ mA}$ $P_i = 8.5\text{ W}$ $L_i = 10\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$
Option RC	PROFINET with Ethernet- APL Ex i	<b>Ex ia</b> <sup>1)</sup> 2-WISE power load APL port profile SLAA	<b>Ex ic</b> <sup>2)</sup> 2-WISE power load APL port profile SLAC

1) Only available for Proline 500 transmitter Zone 1; Class I, Division 1.

2) Only available for transmitter Zone 2; Class I, Division 2.

Order code for "Output; input 2"; "Output; input 3"	Output type	Intrinsically safe values or NIFW values			
		Output; input 2		Output; input 3	
		24 (+)	25 (-)	22 (+)	23 (-)
Option C	Current output 4 to 20 mA Ex i passive	$U_i = 30\text{ V}$ $I_i = 100\text{ mA}$ $P_i = 1.25\text{ W}$ $L_i = 0$ $C_i = 0$			
Option G	Pulse/frequency/switch output Ex i passive	$U_i = 30\text{ V}$ $I_i = 100\text{ mA}$ $P_i = 1.25\text{ W}$ $L_i = 0$ $C_i = 0$			

## Low flow cut off

The switch points for low flow cut off are user-selectable.




**Galvanic isolation**

- The outputs are galvanically isolated:
- from the power supply
  - from one another
  - from the potential equalization (PE) terminal


**Protocol-specific data**

**HART**




<b>Manufacturer ID</b>	0x11
<b>Device type ID</b>	0x3B
<b>HART protocol revision</b>	7
<b>Device description files (DTM, DD)</b>	Information and files under: <a href="http://www.endress.com">www.endress.com</a>
<b>HART load</b>	Min. 250 Ω
<b>System integration</b>	Information on system integration: Operating Instructions →  118. <ul style="list-style-type: none"> <li>▪ Measured variables via HART protocol</li> <li>▪ Burst Mode functionality</li> </ul>

**FOUNDATION Fieldbus**

<b>Manufacturer ID</b>	0x452B48 (hex)
<b>Ident number</b>	0x103B (hex)
<b>Device revision</b>	1
<b>DD revision</b>	Information and files under: <ul style="list-style-type: none"> <li>▪ <a href="http://www.endress.com">www.endress.com</a></li> <li>▪ <a href="http://www.fieldcommgroup.org">www.fieldcommgroup.org</a></li> </ul>
<b>CFF revision</b>	
<b>Interoperability Test Kit (ITK)</b>	Version 6.2.0
<b>ITK Test Campaign Number</b>	Information: <ul style="list-style-type: none"> <li>▪ <a href="http://www.endress.com">www.endress.com</a></li> <li>▪ <a href="http://www.fieldcommgroup.org">www.fieldcommgroup.org</a></li> </ul>
<b>Link Master capability (LAS)</b>	Yes
<b>Choice of "Link Master" and "Basic Device"</b>	Yes Factory setting: Basic Device
<b>Node address</b>	Factory setting: 247 (0xF7)
<b>Supported functions</b>	The following methods are supported: <ul style="list-style-type: none"> <li>▪ Restart</li> <li>▪ ENP Restart</li> <li>▪ Diagnostic</li> <li>▪ Set to OOS</li> <li>▪ Set to AUTO</li> <li>▪ Read trend data</li> <li>▪ Read event logbook</li> </ul>
<b>Virtual Communication Relationships (VCRs)</b>	
<b>Number of VCRs</b>	44
<b>Number of link objects in VFD</b>	50
<b>Permanent entries</b>	1
<b>Client VCRs</b>	0
<b>Server VCRs</b>	10
<b>Source VCRs</b>	43
<b>Sink VCRs</b>	0
<b>Subscriber VCRs</b>	43
<b>Publisher VCRs</b>	43




Device Link Capabilities	
Slot time	4
Min. delay between PDU	8
Max. response delay	16
System integration	Information regarding system integration: Operating Instructions →  118. <ul style="list-style-type: none"> <li>▪ Cyclic data transmission</li> <li>▪ Description of the modules</li> <li>▪ Execution times</li> <li>▪ Methods</li> </ul>

### PROFIBUS DP

Manufacturer ID	0x11
Ident number	0x156F
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: <ul style="list-style-type: none"> <li>▪ <a href="https://www.endress.com/download">https://www.endress.com/download</a> On the device product page: PRODUCTS → Product Finder → Links</li> <li>▪ <a href="https://www.profibus.com">https://www.profibus.com</a></li> </ul>
Supported functions	<ul style="list-style-type: none"> <li>▪ Identification &amp; Maintenance Simplest device identification on the part of the control system and nameplate</li> <li>▪ PROFIBUS upload/download Reading and writing parameters is up to ten times faster with PROFIBUS upload/download</li> <li>▪ Condensed status Simplest and self-explanatory diagnostic information by categorizing diagnostic messages that occur</li> </ul>
Configuration of the device address	<ul style="list-style-type: none"> <li>▪ DIP switches on the I/O electronics module</li> <li>▪ Via operating tools (e.g. FieldCare)</li> </ul>
Compatibility with earlier model	<p>If the device is replaced, the measuring device Promass 300 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promass 300 GSD file.</p> <p>Previous model: Promass 83 PROFIBUS DP</p> <ul style="list-style-type: none"> <li>▪ ID No.: 1529 (hex)</li> <li>▪ Extended GSD file: EH3x1529.gsd</li> <li>▪ Standard GSD file: EH3_1529.gsd</li> </ul> <p> Description of the function scope of compatibility: Operating Instructions →  118.</p>
System integration	Information regarding system integration: Operating Instructions →  118. <ul style="list-style-type: none"> <li>▪ Cyclic data transmission</li> <li>▪ Block model</li> <li>▪ Description of the modules</li> </ul>





### PROFIBUS PA

Manufacturer ID	0x11
Ident number	0x156D
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: <ul style="list-style-type: none"> <li>▪ <a href="https://www.endress.com/download">https://www.endress.com/download</a> On the device product page: PRODUCTS → Product Finder → Links</li> <li>▪ <a href="https://www.profibus.com">https://www.profibus.com</a></li> </ul>


<b>Supported functions</b>	<ul style="list-style-type: none"> <li>▪ Identification &amp; Maintenance Simplest device identification on the part of the control system and nameplate</li> <li>▪ PROFIBUS upload/download Reading and writing parameters is up to ten times faster with PROFIBUS upload/download</li> <li>▪ Condensed status Simplest and self-explanatory diagnostic information by categorizing diagnostic messages that occur</li> </ul>
<b>Configuration of the device address</b>	<ul style="list-style-type: none"> <li>▪ DIP switches on the I/O electronics module</li> <li>▪ Local display</li> <li>▪ Via operating tools (e.g. FieldCare)</li> </ul>
<b>Compatibility with earlier model</b>	<p>If the device is replaced, the measuring device Promass 300 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promass 300 GSD file.</p> <p>Earlier models:</p> <ul style="list-style-type: none"> <li>▪ Promass 80 PROFIBUS PA <ul style="list-style-type: none"> <li>▪ ID No.: 1528 (hex)</li> <li>▪ Extended GSD file: EH3x1528.gsd</li> <li>▪ Standard GSD file: EH3_1528.gsd</li> </ul> </li> <li>▪ Promass 83 PROFIBUS PA <ul style="list-style-type: none"> <li>▪ ID No.: 152A (hex)</li> <li>▪ Extended GSD file: EH3x152A.gsd</li> <li>▪ Standard GSD file: EH3_152A.gsd</li> </ul> </li> </ul> <p> Description of the function scope of compatibility: Operating Instructions →  118.</p>
<b>System integration</b>	<p>Information regarding system integration: Operating Instructions →  118.</p> <ul style="list-style-type: none"> <li>▪ Cyclic data transmission</li> <li>▪ Block model</li> <li>▪ Description of the modules</li> </ul>

### Modbus RS485

<b>Protocol</b>	Modbus Applications Protocol Specification V1.1
<b>Response times</b>	<ul style="list-style-type: none"> <li>▪ Direct data access: typically 25 to 50 ms</li> <li>▪ Auto-scan buffer (data range): typically 3 to 5 ms</li> </ul>
<b>Device type</b>	Slave
<b>Slave address range</b>	1 to 247
<b>Broadcast address range</b>	0
<b>Function codes</b>	<ul style="list-style-type: none"> <li>▪ 03: Read holding register</li> <li>▪ 04: Read input register</li> <li>▪ 06: Write single registers</li> <li>▪ 08: Diagnostics</li> <li>▪ 16: Write multiple registers</li> <li>▪ 23: Read/write multiple registers</li> </ul>
<b>Broadcast messages</b>	<p>Supported by the following function codes:</p> <ul style="list-style-type: none"> <li>▪ 06: Write single registers</li> <li>▪ 16: Write multiple registers</li> <li>▪ 23: Read/write multiple registers</li> </ul>
<b>Supported baud rate</b>	<ul style="list-style-type: none"> <li>▪ 1 200 BAUD</li> <li>▪ 2 400 BAUD</li> <li>▪ 4 800 BAUD</li> <li>▪ 9 600 BAUD</li> <li>▪ 19 200 BAUD</li> <li>▪ 38 400 BAUD</li> <li>▪ 57 600 BAUD</li> <li>▪ 115 200 BAUD</li> </ul>
<b>Data transmission mode</b>	<ul style="list-style-type: none"> <li>▪ ASCII</li> <li>▪ RTU</li> </ul>


<b>Data access</b>	Each device parameter can be accessed via Modbus RS485.  For Modbus register information
<b>Compatibility with earlier model</b>	If the device is replaced, the measuring device Promass 300 supports the compatibility of the Modbus registers for the process variables and the diagnostic information with the previous model Promass 83. It is not necessary to change the engineering parameters in the automation system.  Description of the function scope of compatibility: Operating Instructions →  118.
<b>System integration</b>	Information regarding system integration: Operating Instructions →  118. <ul style="list-style-type: none"> <li>▪ Modbus RS485 information</li> <li>▪ Function codes</li> <li>▪ Register information</li> <li>▪ Response time</li> <li>▪ Modbus data map</li> </ul>

### EtherNet/IP

<b>Protocol</b>	<ul style="list-style-type: none"> <li>▪ The CIP Networks Library Volume 1: Common Industrial Protocol</li> <li>▪ The CIP Networks Library Volume 2: EtherNet/IP Adaptation of CIP</li> </ul>
<b>Communication type</b>	<ul style="list-style-type: none"> <li>▪ 10Base-T</li> <li>▪ 100Base-TX</li> </ul>
<b>Device profile</b>	Generic device (product type: 0x2B)
<b>Manufacturer ID</b>	0x000049E
<b>Device type ID</b>	0x103B
<b>Baud rates</b>	Automatic <sup>19</sup> / <sub>100</sub> Mbit with half-duplex and full-duplex detection
<b>Polarity</b>	Auto-polarity for automatic correction of crossed TxD and RxD pairs
<b>Supported CIP connections</b>	Max. 3 connections
<b>Explicit connections</b>	Max. 6 connections
<b>I/O connections</b>	Max. 6 connections (scanner)
<b>Configuration options for measuring device</b>	<ul style="list-style-type: none"> <li>▪ DIP switches on the electronics module for IP addressing</li> <li>▪ Manufacturer-specific software (FieldCare)</li> <li>▪ Add-on Profile Level 3 for Rockwell Automation control systems</li> <li>▪ Web browser</li> <li>▪ Electronic Data Sheet (EDS) integrated in the measuring device</li> </ul>
<b>Configuration of the EtherNet interface</b>	<ul style="list-style-type: none"> <li>▪ Speed: 10 MBit, 100 MBit, auto (factory setting)</li> <li>▪ Duplex: half-duplex, full-duplex, auto (factory setting)</li> </ul>
<b>Configuration of the device address</b>	<ul style="list-style-type: none"> <li>▪ DIP switches on the electronics module for IP addressing (last octet)</li> <li>▪ DHCP</li> <li>▪ Manufacturer-specific software (FieldCare)</li> <li>▪ Add-on Profile Level 3 for Rockwell Automation control systems</li> <li>▪ Web browser</li> <li>▪ EtherNet/IP tools, e.g. RSLinx (Rockwell Automation)</li> </ul>
<b>Device Level Ring (DLR)</b>	Yes
<b>System integration</b>	Information regarding system integration: Operating Instructions →  118. <ul style="list-style-type: none"> <li>▪ Cyclic data transmission</li> <li>▪ Block model</li> <li>▪ Input and output groups</li> </ul>


### PROFINET

<b>Protocol</b>	Application layer protocol for decentral device periphery and distributed automation, Version 2.3
<b>Communication type</b>	100 MBit/s

<b>Conformance Class</b>	Conformance Class B
<b>Netload Class</b>	Netload Class 2 0 Mbps
<b>Baud rates</b>	Automatic 100 Mbit/s with full-duplex detection
<b>Cycle times</b>	From 8 ms
<b>Polarity</b>	Auto-polarity for automatic correction of crossed TxD and RxD pairs
<b>Media Redundancy Protocol (MRP)</b>	Yes
<b>System redundancy support</b>	System redundancy S2 (2 AR with 1 NAP)
<b>Device profile</b>	Application interface identifier 0xF600 Generic device
<b>Manufacturer ID</b>	0x11
<b>Device type ID</b>	0x843B
<b>Device description files (GSD, DTM, DD)</b>	Information and files under: <ul style="list-style-type: none"> <li>▪ <a href="http://www.endress.com">www.endress.com</a></li> <li>▪ On the product page for the device: Documents/Software → Device drivers</li> <li>▪ <a href="http://www.profibus.com">www.profibus.com</a></li> </ul>
<b>Supported connections</b>	<ul style="list-style-type: none"> <li>▪ 2 x AR (IO Controller AR)</li> <li>▪ 1 x AR (IO-Supervisor Device AR connection allowed)</li> <li>▪ 1 x Input CR (Communication Relation)</li> <li>▪ 1 x Output CR (Communication Relation)</li> <li>▪ 1 x Alarm CR (Communication Relation)</li> </ul>
<b>Configuration options for measuring device</b>	<ul style="list-style-type: none"> <li>▪ DIP switches on the electronics module, for device name assignment (last part)</li> <li>▪ Asset management software (FieldCare, DeviceCare, Field Xpert)</li> <li>▪ Integrated Web server via Web browser and IP address</li> <li>▪ Device master file (GSD), can be read out via the integrated Web server of the measuring device.</li> <li>▪ Onsite operation</li> </ul>
<b>Configuration of the device name</b>	<ul style="list-style-type: none"> <li>▪ DIP switches on the electronics module, for device name assignment (last part)</li> <li>▪ DCP protocol</li> <li>▪ Asset management software (FieldCare, DeviceCare, Field Xpert)</li> <li>▪ Integrated Web server</li> </ul>
<b>Supported functions</b>	<ul style="list-style-type: none"> <li>▪ Identification &amp; Maintenance, simple device identifier via: <ul style="list-style-type: none"> <li>▪ Control system</li> <li>▪ Nameplate</li> </ul> </li> <li>▪ Measured value status The process variables are communicated with a measured value status</li> <li>▪ Blinking feature via the local display for simple device identification and assignment</li> <li>▪ Device operation via asset management software (e.g. FieldCare, DeviceCare, SIMATIC PDM)</li> </ul>
<b>System integration</b>	Information regarding system integration: Operating Instructions →  118. <ul style="list-style-type: none"> <li>▪ Cyclic data transmission</li> <li>▪ Overview and description of the modules</li> <li>▪ Status coding</li> <li>▪ Startup configuration</li> <li>▪ Factory setting</li> </ul>

#### PROFINET with Ethernet-APL

<b>Protocol</b>	Application layer protocol for decentral device periphery and distributed automation, Version 2.43
<b>Communication type</b>	Ethernet Advanced Physical Layer 10BASE-T1L
<b>Conformance Class</b>	Conformance Class B (PA)
<b>Netload Class</b>	PROFINET Netload Robustness Class 2 10 Mbit/s

<b>Baud rates</b>	10 Mbit/s Full-duplex
<b>Cycle times</b>	64 ms
<b>Polarity</b>	Automatic correction of crossed "APL signal +" and "APL signal -" signal lines
<b>Media Redundancy Protocol (MRP)</b>	Not possible (point-to-point connection to APL field switch)
<b>System redundancy support</b>	System redundancy S2 (2 AR with 1 NAP)
<b>Device profile</b>	PROFINET PA profile 4 (Application interface identifier API: 0x9700)
<b>Manufacturer ID</b>	17
<b>Device type ID</b>	0xA43B
<b>Device description files (GSD, DTM, FDI)</b>	Information and files available at: <ul style="list-style-type: none"> <li>▪ <a href="http://www.endress.com">www.endress.com</a> → Downloads section</li> <li>▪ <a href="http://www.profibus.com">www.profibus.com</a></li> </ul>
<b>Supported connections</b>	<ul style="list-style-type: none"> <li>▪ 2x AR (IO Controller AR)</li> <li>▪ 2x AR (IO Supervisor Device AR connection allowed)</li> </ul>
<b>Configuration options for measuring device</b>	<ul style="list-style-type: none"> <li>▪ DIP switches on the electronics module, for device name assignment (last part)</li> <li>▪ Asset management software (FieldCare, DeviceCare, Field Xpert)</li> <li>▪ Integrated Web server via Web browser and IP address</li> <li>▪ Device master file (GSD), can be read out via the integrated Web server of the measuring device.</li> <li>▪ Onsite operation</li> </ul>
<b>Configuration of the device name</b>	<ul style="list-style-type: none"> <li>▪ DIP switches on the electronics module, for device name assignment (last part)</li> <li>▪ DCP protocol</li> <li>▪ Asset management software (FieldCare, DeviceCare, Field Xpert)</li> <li>▪ Integrated Web server</li> </ul>
<b>Supported functions</b>	<ul style="list-style-type: none"> <li>▪ Identification &amp; Maintenance, simple device identifier via: <ul style="list-style-type: none"> <li>▪ Control system</li> <li>▪ Nameplate</li> </ul> </li> <li>▪ Measured value status The process variables are communicated with a measured value status</li> <li>▪ Blinking feature via the local display for simple device identification and assignment</li> <li>▪ Device operation via asset management software (e.g. FieldCare, DeviceCare, SIMATIC PDM with FDI package)</li> </ul>
<b>System integration</b>	Information regarding system integration: Operating Instructions →  118. <ul style="list-style-type: none"> <li>▪ Cyclic data transmission</li> <li>▪ Overview and description of the modules</li> <li>▪ Status coding</li> <li>▪ Factory setting</li> </ul>

## Power supply

### Terminal assignment

#### Transmitter: supply voltage, input/outputs

##### HART

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.							

##### FOUNDATION Fieldbus

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (A)	27 (B)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.							

##### PROFIBUS DP

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.							

##### PROFIBUS PA

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.							

##### Modbus RS485

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.							

##### Modbus TCP with Ethernet-APL

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.							

##### PROFINET

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	PROFINET (RJ45 connector)		24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.							

##### PROFINET with Ethernet-APL

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.							

## EtherNet/IP

Supply voltage		Input/output 1	Input/output 2		Input/output 3	
1 (+)	2 (-)	EtherNet/IP (RJ45 connector)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 12.						



Terminal assignment of the remote display and operating module → 35.

## Available device plugs



Device plugs may not be used in hazardous areas!

**Device plugs for fieldbus systems:**

Order code for "Input; output 1"

- Option SA "FOUNDATION Fieldbus" → 32
- Option GA "PROFIBUS PA" → 32
- Option NA "EtherNet/IP" → 32
- Option RA "PROFINET" → 33
- Option RB "PROFINET with Ethernet-APL" → 33

**Device plug for connecting to the service interface:**

Order code for "Accessory mounted"

Option NB, RJ45 M12 adapter (service interface) → 46

**Order code for "Input; output 1", option SA "FOUNDATION Fieldbus"**

Order code for "Electrical connection"	Cable entry/connection → 34	
	2	3
M, 3, 4, 5	7/8" connector	-

**Order code for "Input; output 1", option GA "PROFIBUS PA"**

Order code for "Electrical connection"	Cable entry/connection → 34	
	2	3
L, N, P, U	Connector M12 × 1	-

**Order code for "Input; output 1", option NA "EtherNet/IP"**

Order code for "Electrical connection"	Cable entry/connection → 34	
	2	3
L, N, P, U	Connector M12 × 1	-
R <sup>1) 2)</sup> , S <sup>1) 2)</sup> , T <sup>1) 2)</sup> , V <sup>1) 2)</sup>	Connector M12 × 1	Connector M12 × 1

- 1) Cannot be combined with an external WLAN antenna (order code for "Enclosed accessories", option P8) of an RJ45 M12 adapter for the service interface (order code for "Accessories mounted", option NB) or of the remote display and operating module DKX001
- 2) Suitable for integrating the device in a ring topology.



**Order code for "Input; output 1", option RA "PROFINET"**

Order code for "Electrical connection"	Cable entry/connection → 34	
	2	3
L, N, P, U	Connector M12 × 1	-
R <sup>1) 2)</sup> , S <sup>1) 2)</sup> , T <sup>1) 2)</sup> , V <sup>1) 2)</sup>	Connector M12 × 1	Connector M12 × 1

- 1) Cannot be combined with an external WLAN antenna (order code for "Enclosed accessories", option P8) of an RJ45 M12 adapter for the service interface (order code for "Accessories mounted", option NB) or of the remote display and operating module DKX001.
- 2) Suitable for integrating the device in a ring topology.

**Order code for "Input; output 1", option RB "PROFINET with Ethernet-APL"**

Order code "Electrical connection"	Cable entry/connection → 34	
	2	3
L, N, P, U	M12 plug × 1	-

**Order code for "Accessory mounted", option NB "Adapter RJ45 M12 (service interface)"**

Order code "Accessory mounted"	Cable entry/coupling → 34	
	Cable entry 2	Cable entry 3
NB	Plug M12 × 1	-

**Supply voltage**

Order code "Power supply"	Terminal voltage		Frequency range
	DC	AC	
Option D	DC 24 V	±20%	-
Option E	AC 100 to 240 V	-15...+10%	50/60 Hz
Option I	DC 24 V	±20%	-
	AC 100 to 240 V	-15...+10%	50/60 Hz

**Power consumption**

**Transmitter**

Max. 10 W (active power)

<b>switch-on current</b>	Max. 36 A (<5 ms) as per NAMUR Recommendation NE 21
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**Current consumption**

**Transmitter**

- Max. 400 mA (24 V)
- Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)

**Power supply failure**

- Totalizers stop at the last value measured.
- Depending on the device version, the configuration is retained in the device memory or in the pluggable data memory (HistoROM DAT).
- Error messages (incl. total operated hours) are stored.



**Overcurrent protection element**

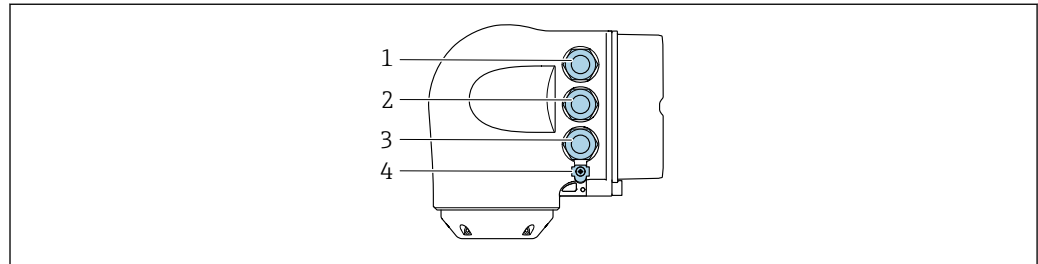
The device must be operated with a dedicated circuit breaker, as it does not have an ON/OFF switch of its own.

- The circuit breaker must be easy to reach and labeled accordingly.
- Permitted nominal current of the circuit breaker: 2 A up to maximum 10 A.

## Electrical connection

## Transmitter connection

- i** ■ Terminal assignment →  31
- Device plugs available →  32



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- 1 Terminal connection for supply voltage
- 2 Terminal connection for signal transmission, input/output
- 3 Terminal connection for signal transmission, input/output or terminal for network connection via service interface (CDI-RJ45); Optional: terminal connection for external WLAN antenna or connection for remote display and operating module DKX001
- 4 Terminal connection for potential equalization (PE)

- i** An adapter for the RJ45 to the M12 plug is optionally available:  
Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"

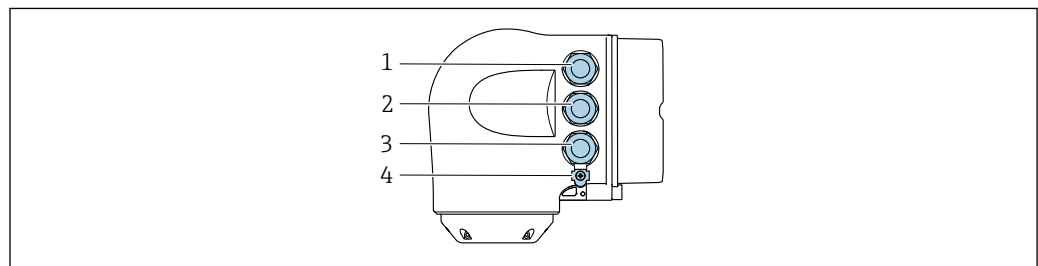
The adapter connects the service interface (CDI-RJ45) to an M12 plug mounted in the cable entry. The connection to the service interface can therefore be established via an M12 plug without opening the device.

- i** Network connection via service interface (CDI-RJ45) →  104

*Connecting in a ring topology*

Device versions with EtherNet/IP and PROFINET communication protocols can be integrated into a ring topology. The device is integrated via the terminal connection for signal transmission (output 1) and the connection to the service interface (CDI-RJ45).

- i** Integrate the transmitter into a ring topology:
  - EtherNet/IP
  - PROFINET



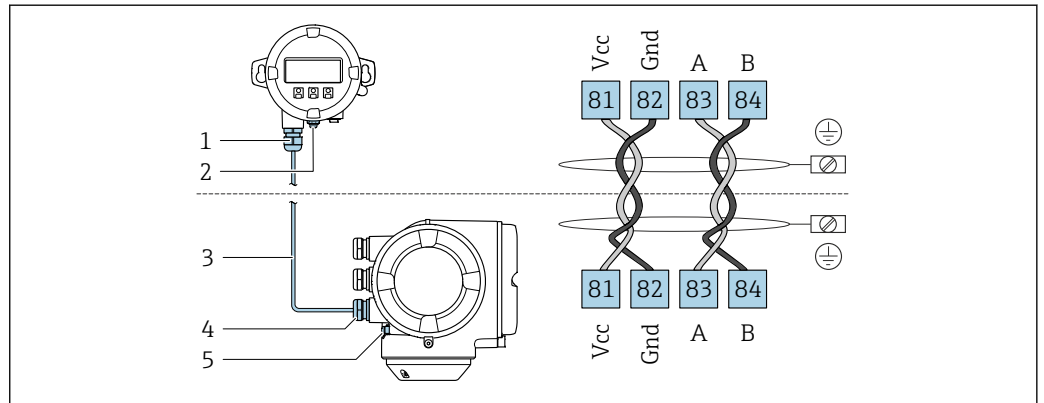
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- 1 Terminal connection for supply voltage
- 2 Terminal connection for signal transmission: PROFINET or EtherNet/IP (RJ45 connector)
- 3 Terminal connection to service interface (CDI-RJ45)
- 4 Terminal connection for potential equalization (PE)

- i** If the device has additional inputs/outputs, these are routed in parallel via the cable entry for connection to the service interface (CDI-RJ45).

### Connecting the remote display and operating module DKX001

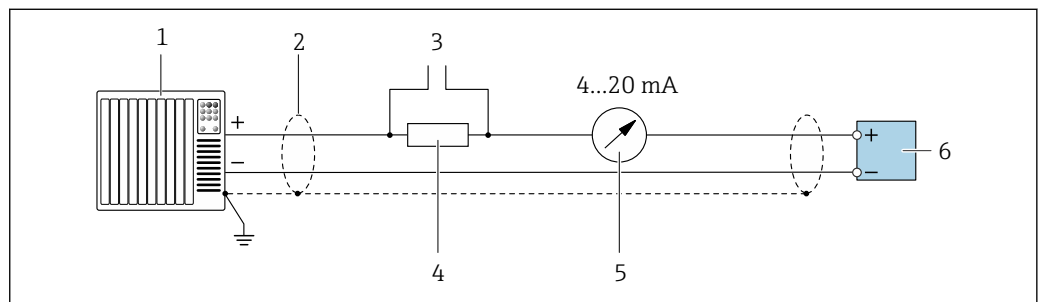
- i** The remote display and operating module DKX001 is available as an optional extra → 115..
  - The remote display and operating module DKX001 is only available for the following housing version: order code for "Housing": option A "Aluminum, coated"
  - The measuring instrument is always supplied with a dummy cover when the remote display and operating module DKX001 is ordered directly with the measuring instrument. Display or operation at the transmitter is not possible in this case.
  - If ordered subsequently, the remote display and operating module DKX001 may not be connected at the same time as the existing measuring instrument display module. Only one display or operation unit may be connected to the transmitter at any one time.



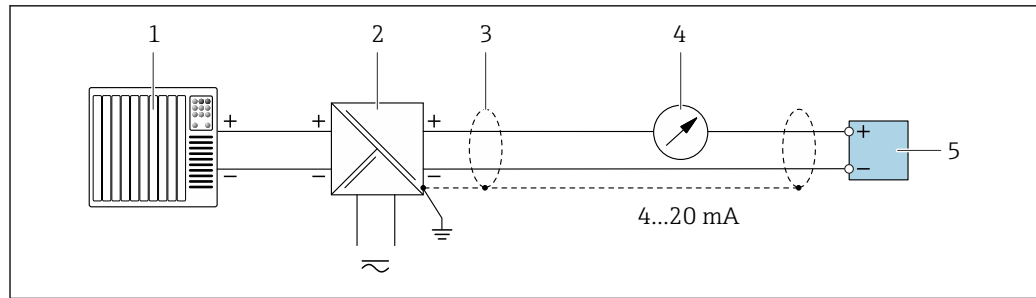
- 1 Remote display and operating module DKX001
- 2 Terminal connection for potential equalization (PE)
- 3 Connecting cable
- 4 Measuring instrument
- 5 Terminal connection for potential equalization (PE)

### Connection examples

Current output 4 to 20 mA HART



- 2** Connection example for 4 to 20 mA HART current output (active)
- 1 Automation system with current input (e.g. PLC)
  - 2 Ground cable shield at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 46
  - 3 Connection for HART operating devices → 98
  - 4 Resistor for HART communication ( $\geq 250 \Omega$ ): observe maximum load → 14
  - 5 Analog display unit: observe maximum load → 14
  - 6 Transmitter

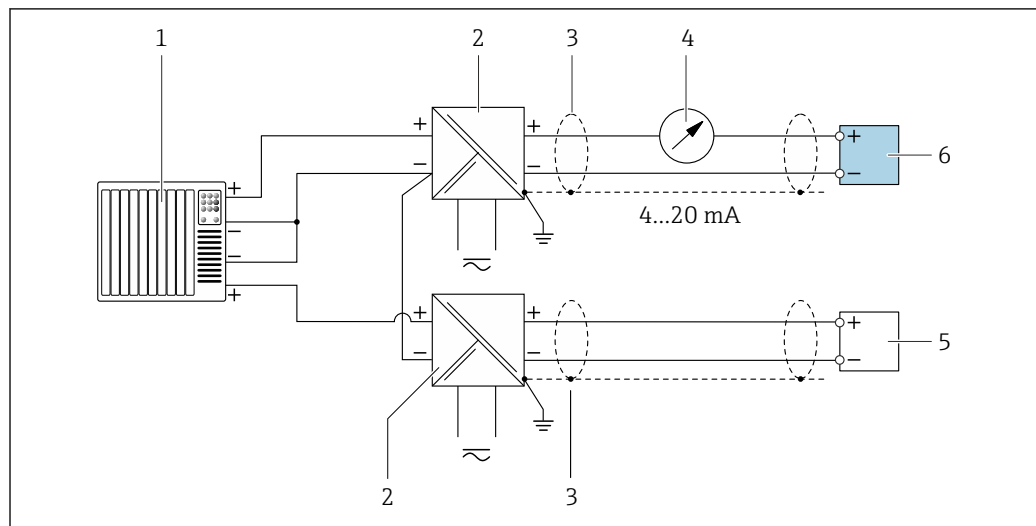


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3 Connection example for 4 to 20 mA HART current output (passive)

- 1 Automation system with current input (e.g. PLC)
- 2 Power supply
- 3 Ground cable shield at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 46
- 4 Analog display unit: observe maximum load → 14
- 5 Transmitter

#### HART input

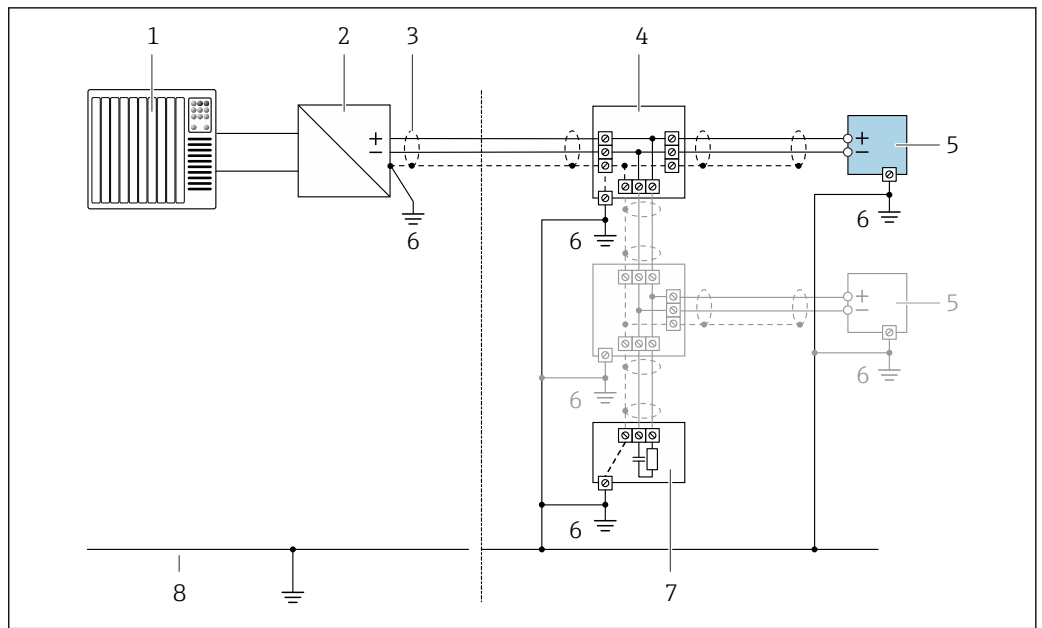


A0028763

4 Connection example for HART input with a common negative (passive)

- 1 Automation system with HART output (e.g. PLC)
- 2 Active barrier for power supply (e.g. RN221N)
- 3 Ground cable shield at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 4 Analog display unit: observe maximum load → 14
- 5 Pressure measuring device (e.g. Cerabar M, Cerabar S): observe requirements
- 6 Transmitter

PROFIBUS PA

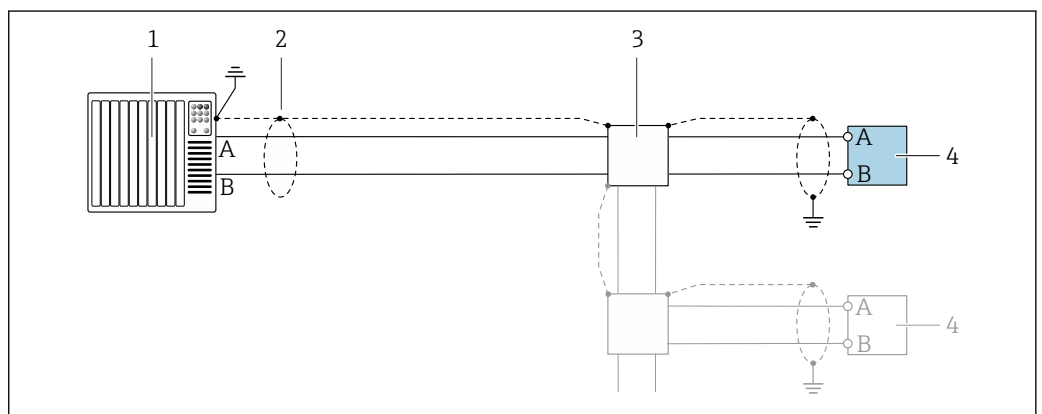


A0028768

5 Connection example for PROFIBUS PA

- 1 Control system (e.g. PLC)
- 2 PROFIBUS PA segment coupler
- 3 Cable shield provided at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 4 T-box
- 5 Measuring device
- 6 Local grounding
- 7 Bus terminator
- 8 Potential matching line

PROFIBUS DP



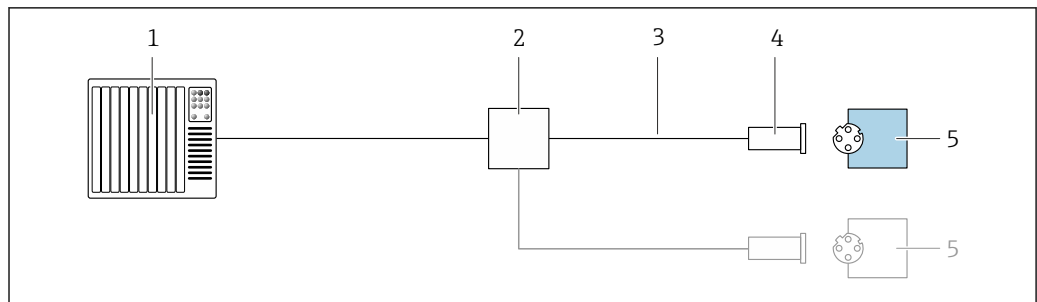
A0028765

6 Connection example for PROFIBUS DP, non-hazardous area and Zone 2/Div. 2

- 1 Control system (e.g. PLC)
- 2 Cable shield provided at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 3 Distribution box
- 4 Transmitter

**i** If baud rates > 1.5 Mbaud an EMC cable entry must be used and the cable shield must continue as far as the terminal wherever possible.

*EtherNet/IP*

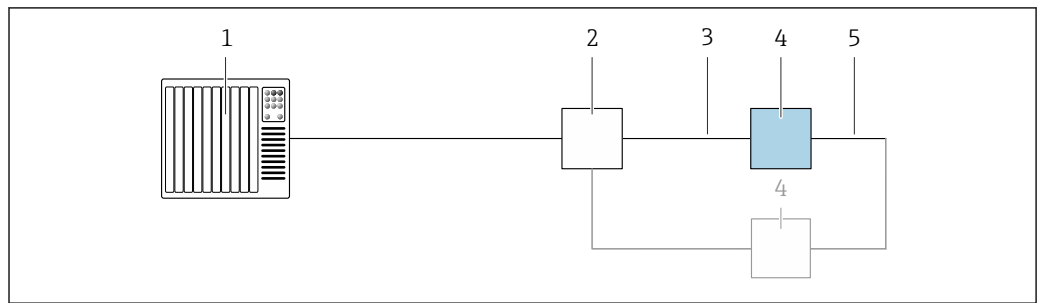


A0028767

**7** Connection example for EtherNet/IP

- 1 Control system (e.g. PLC)
- 2 Ethernet switch
- 3 Observe cable specifications
- 4 Device plug
- 5 Transmitter

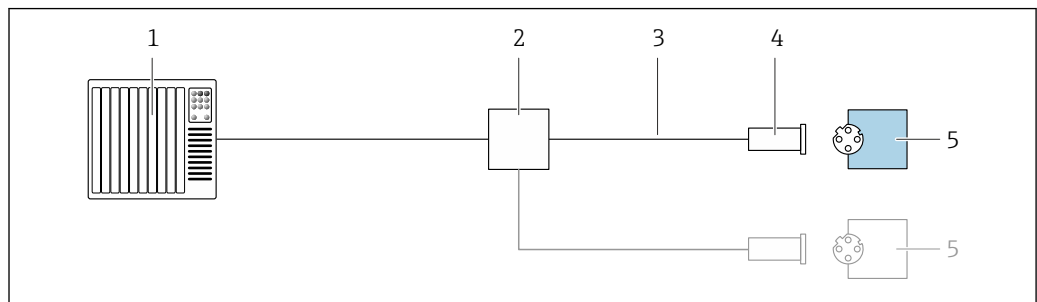
*EtherNet/IP: DLR (Device Level Ring)*



A0027544

- 1 Control system (e.g. PLC)
- 2 Ethernet switch
- 3 Observe cable specifications → 47
- 4 Transmitter
- 5 Connecting cable between the two transmitters

*PROFINET*

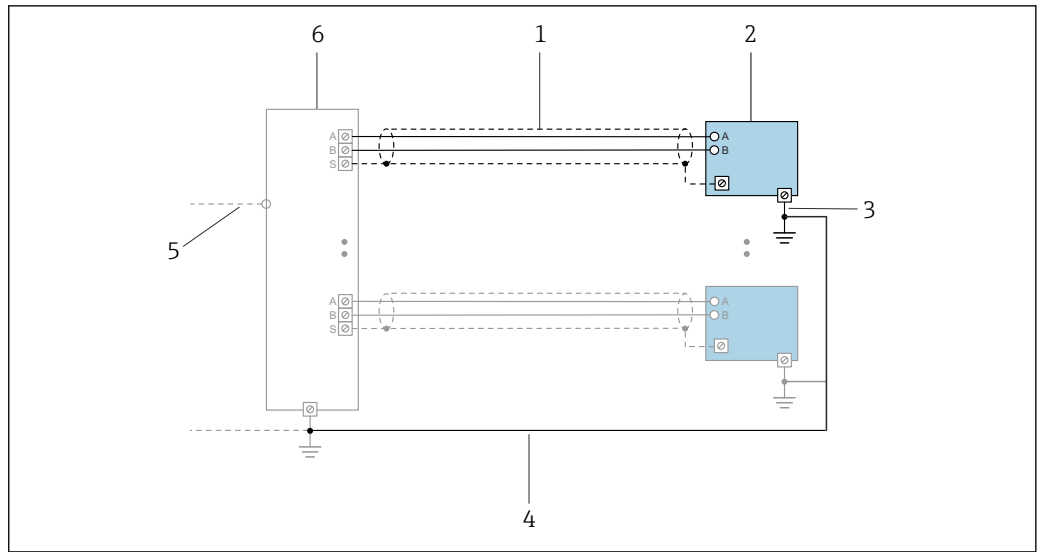


A0028767

**8** Connection example for PROFINET

- 1 Control system (e.g. PLC)
- 2 Ethernet switch
- 3 Observe cable specifications
- 4 Device plug
- 5 Transmitter

PROFINET with Ethernet-APL

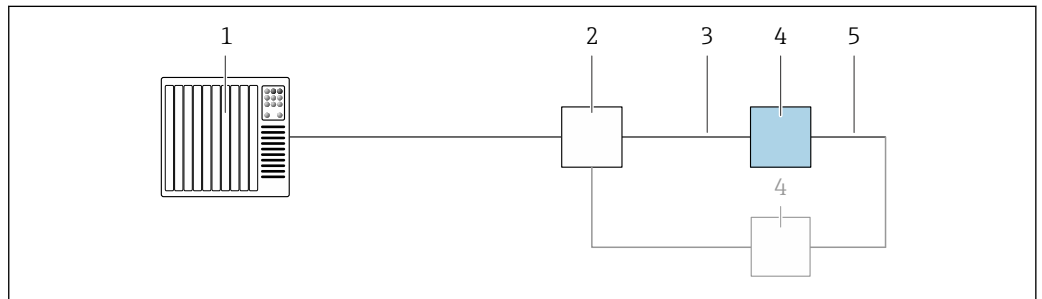


A0047536

9 Connection example for PROFINET with Ethernet-APL

- 1 Cable shield
- 2 Measuring device
- 3 Local grounding
- 4 Potential equalization
- 5 Trunk or TCP
- 6 Field switch

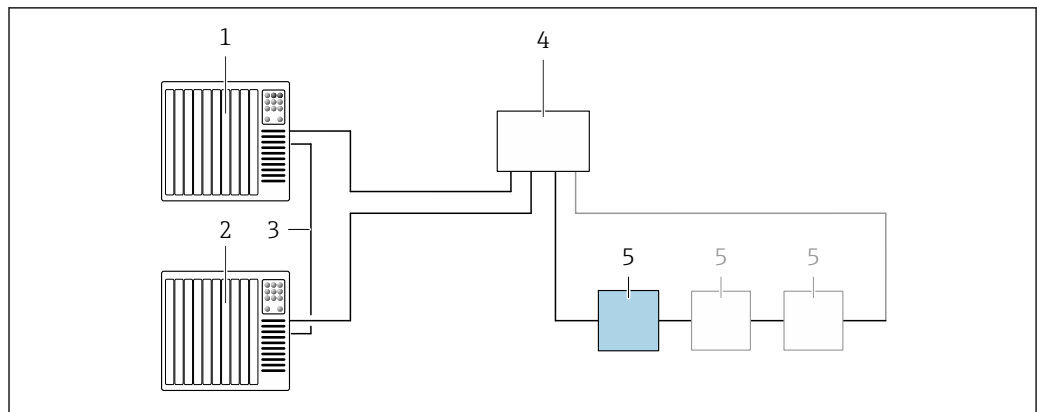
PROFINET: MRP (Media Redundancy Protocol)



A0027544

- 1 Control system (e.g. PLC)
- 2 Ethernet switch
- 3 Observe cable specifications → 47
- 4 Transmitter
- 5 Connecting cable between the two transmitters

PROFINET: system redundancy S2

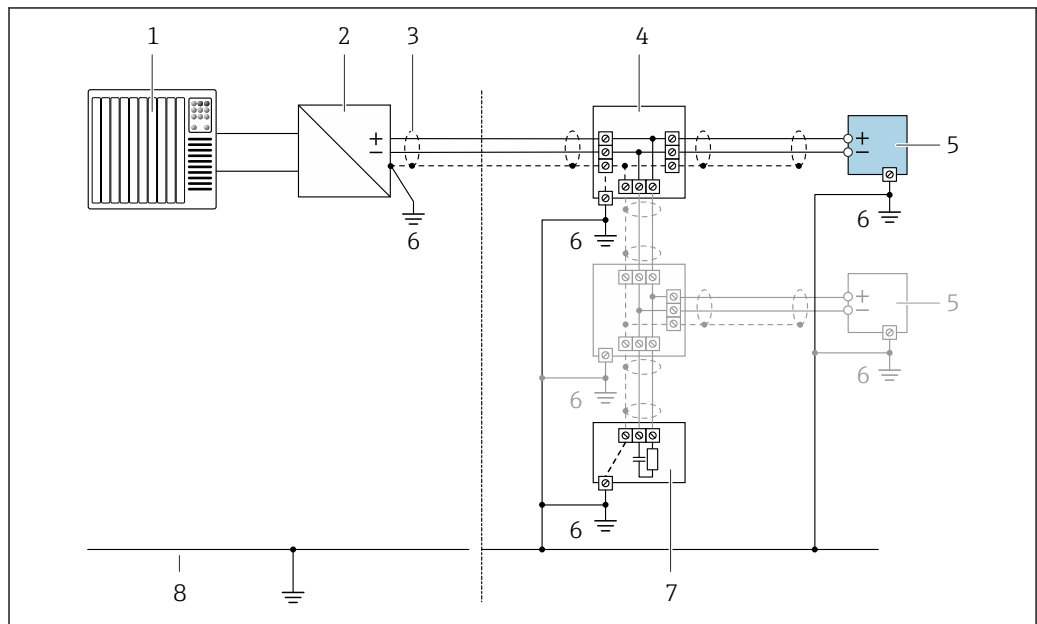


A0039553

10 Connection example for system redundancy S2

- 1 Control system 1 (e.g. PLC)
- 2 Synchronization of control systems
- 3 Control system 2 (e.g. PLC)
- 4 Industrial Ethernet Managed Switch
- 5 Transmitter

FOUNDATION Fieldbus



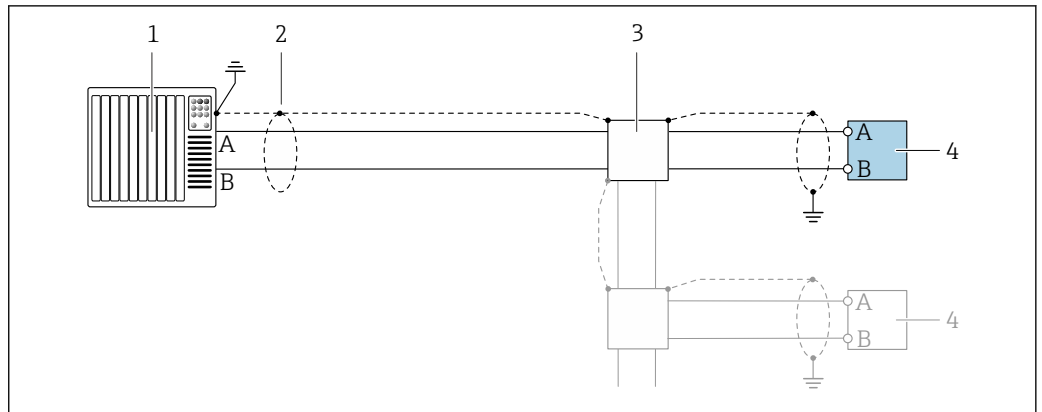
A0028768

11 Connection example for FOUNDATION Fieldbus

- 1 Control system (e.g. PLC)
- 2 Power Conditioner (FOUNDATION Fieldbus)
- 3 Cable shield provided at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 4 T-box
- 5 Measuring device
- 6 Local grounding
- 7 Bus terminator
- 8 Potential matching line



Modbus RS485

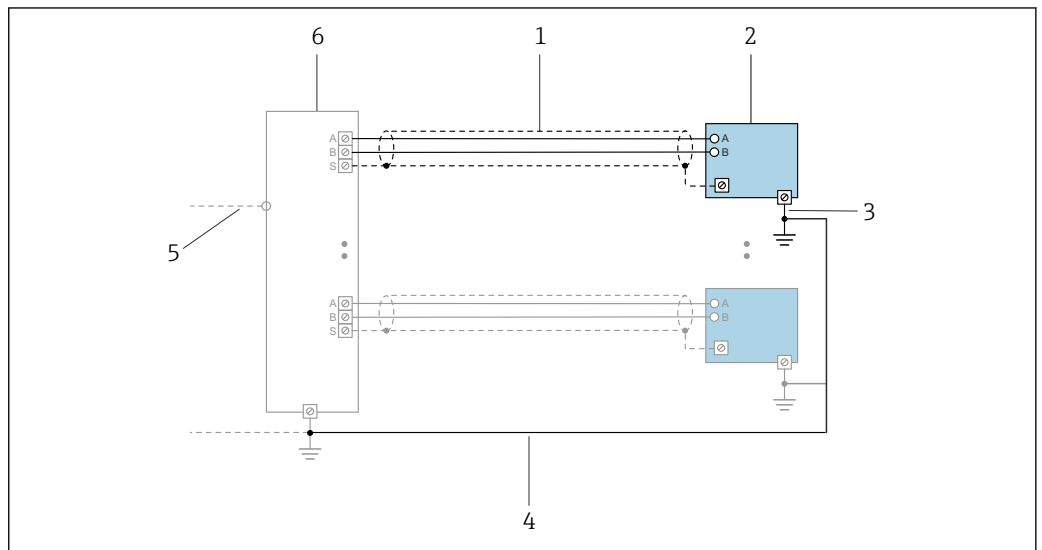


A0028765

12 Connection example for Modbus RS485, non-hazardous area and Zone 2; Class I, Division 2

- 1 Control system (e.g. PLC)
- 2 Cable shield provided at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 3 Distribution box
- 4 Transmitter

Modbus with TCP-APL

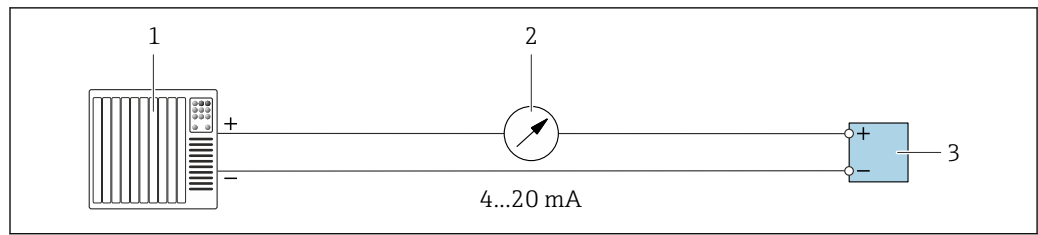


A0047536

13 Connection example for Modbus with TCP-APL

- 1 Cable shield
- 2 Measuring device
- 3 Local grounding
- 4 Potential equalization
- 5 Trunk or TCP
- 6 Field switch

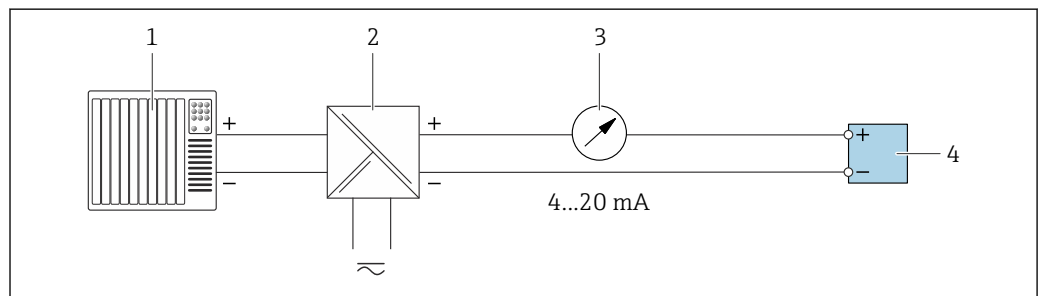
Current output 4-20 mA



A0028758

14 Connection example for 4-20 mA current output (active)

- 1 Automation system with current input (e.g. PLC)
- 2 Analog display unit: observe maximum load → 14
- 3 Transmitter

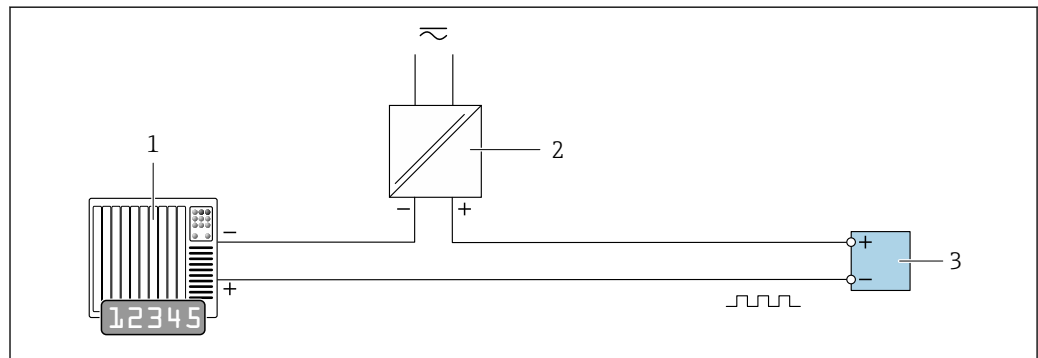


A0028759

15 Connection example for 4-20 mA current output (passive)

- 1 Automation system with current input (e.g. PLC)
- 2 Active barrier for power supply (e.g. RN221N)
- 3 Analog display unit: observe maximum load → 14
- 4 Transmitter

Pulse/frequency output

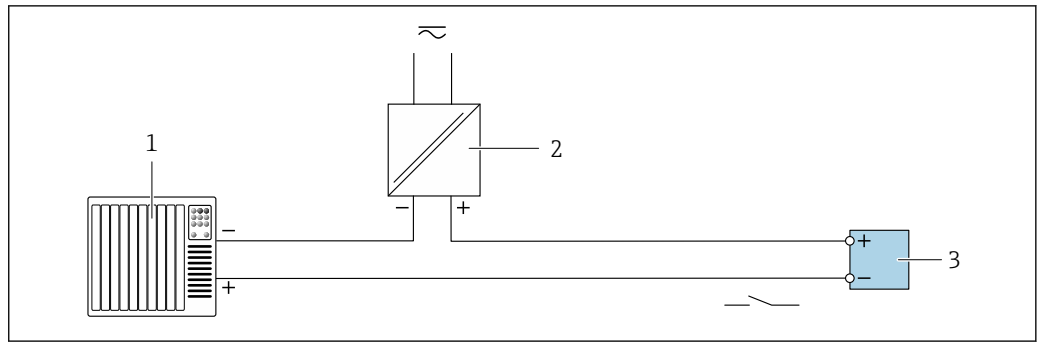


A0028761

16 Connection example for pulse/frequency output (passive)

- 1 Automation system with pulse/frequency input (e.g. PLC with 10 kΩ pull-up or pull-down resistor)
- 2 Power supply
- 3 Transmitter: observe input values → 17

Switch output

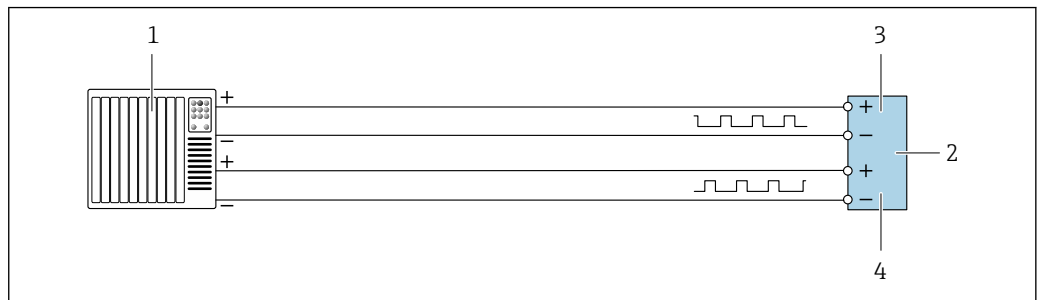


A0028760

17 Connection example for switch output (passive)

- 1 Automation system with switch input (e.g. PLC with a 10 kΩ pull-up or pull-down resistor)
- 2 Power supply
- 3 Transmitter: observe input values → 17

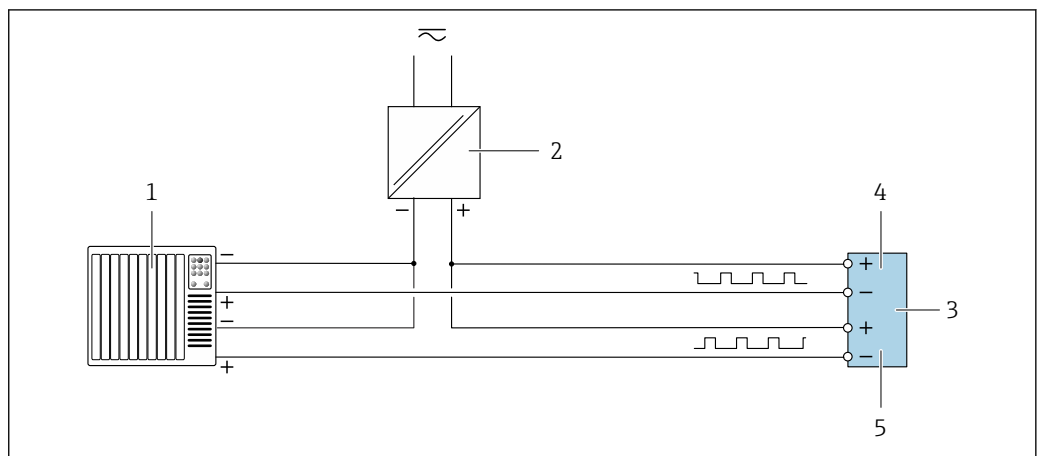
Double pulse output



A0029280

18 Connection example for double pulse output (active)

- 1 Automation system with double pulse input (e.g. PLC)
- 2 Transmitter: observe input values → 19
- 3 Double pulse output
- 4 Double pulse output (slave), phase-shifted

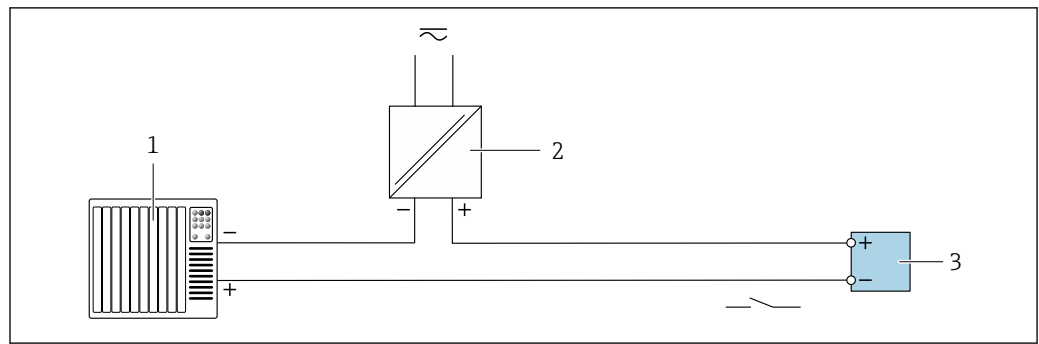


A0029279

19 Connection example for double pulse output (passive)

- 1 Automation system with double pulse input (e.g. PLC with a 10 kΩ pull-up or pull-down resistor)
- 2 Power supply
- 3 Transmitter: observe input values → 19
- 4 Double pulse output
- 5 Double pulse output (slave), phase-shifted

## Relay output

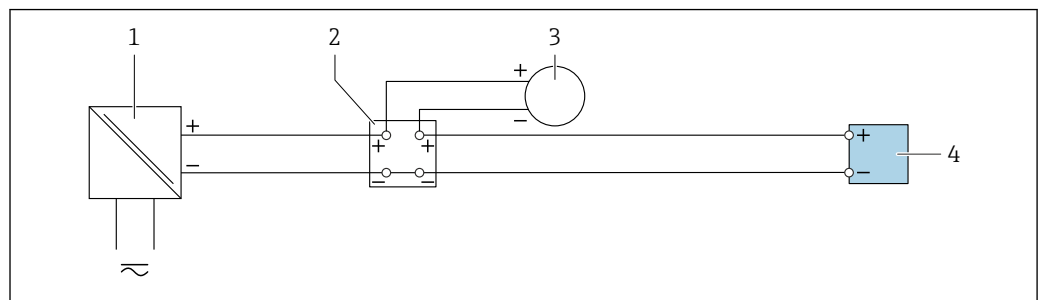


A0028760

20 Connection example for relay output (passive)

- 1 Automation system with relay input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: observe input values → 19

## Current input

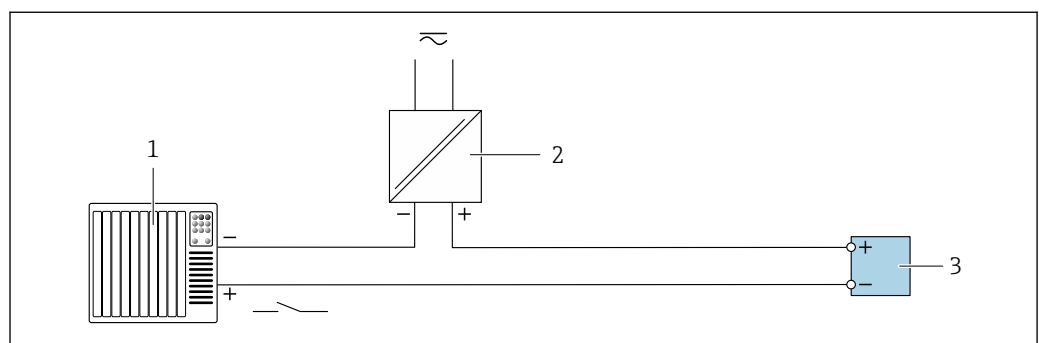


A0028915

21 Connection example for 4 to 20 mA current input

- 1 Power supply
- 2 Terminal box
- 3 External measuring device (to read in pressure or temperature, for instance)
- 4 Transmitter

## Status input



A0028764

22 Connection example for status input

- 1 Automation system with status output (e.g. PLC)
- 2 Power supply
- 3 Transmitter

**Potential equalization**

**Requirements**


For potential equalization:

- Pay attention to in-house grounding concepts
- Take account of operating conditions, such as the pipe material and grounding
- Connect the medium, sensor and transmitter to the same electric potential
- Use a ground cable with a minimum cross-section of 6 mm<sup>2</sup> (10 AWG) and a cable lug for potential equalization connections

**Terminals**

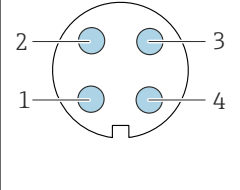
Spring-loaded terminals: Suitable for strands and strands with ferrules.  
 Conductor cross-section 0.2 to 2.5 mm<sup>2</sup> (24 to 12 AWG).

**Cable entries**

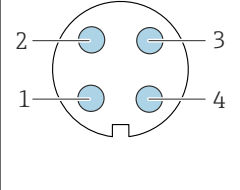
- Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT ½"
  - G ½"
  - M20
- Device plug for digital communication: M12  
 Only available for certain device versions →  32.

**Pin assignment, device plug**

**FOUNDATION Fieldbus**

	Pin	Assignment		Coding	Plug/socket		
	1	+	Signal +			A	Plug
	2	-	Signal -				
	3		Grounding				
	4		Not assigned				

**PROFIBUS PA**

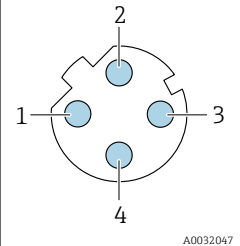
	Pin	Assignment		Coding	Plug/socket		
	1	+	PROFIBUS PA +			A	Plug
	2		Grounding				
	3	-	PROFIBUS PA -				
	4		Not assigned				



Recommended plug:

- Binder, series 713, part no. 99 1430 814 04
- Phoenix, part no. 1413934 SACC-FS-4QO SH PBPA SCO

**PROFINET**

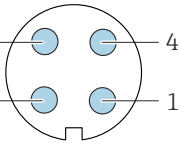
	Pin	Assignment		Coding	Plug/socket		
	1	+	TD +			D	Socket
	2	+	RD +				
	3	-	TD -				
	4	-	RD -				



Recommended plug:

- Binder, series 825, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q

**PROFINET with Ethernet-APL**

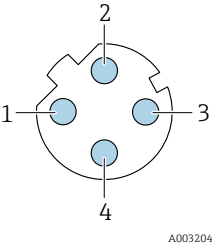
	Pin	Assignment	Coding	Plug/socket
	1	APL signal -	A	Socket
	2	APL signal +		
	3	Cable shield <sup>1</sup>		
	4	Not used		
Metal plug housing	Cable shield			
<sup>1</sup> If a cable shield is used				



Recommended plug:

- Binder, series 713, part no. 99 1430 814 04
- Phoenix, part no. 1413934 SACC-FS-4QO SH PBPA SCO

**EtherNet/IP**

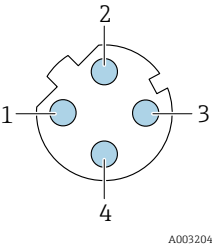
	Pin	Assignment	
	1	+	Tx
	2	+	Rx
	3	-	Tx
	4	-	Rx
Coding	Plug/socket		
D	Socket		



Recommended plug:

- Binder, series 825, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q

**Service interface for**Order code for "Accessories mounted", option **NB**: Adapter RJ45 M12 (service interface)

	Pin	Assignment	
	1	+	Tx
	2	+	Rx
	3	-	Tx
	4	-	Rx
Coding	Plug/socket		
D	Socket		



Recommended plug:

- Binder, series 825, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q

**Cable specification****Permitted temperature range**

- The installation guidelines that apply in the country of installation must be observed.
- The cables must be suitable for the minimum and maximum temperatures to be expected.

**Power supply cable (incl. conductor for the inner ground terminal)**


Standard installation cable is sufficient.

**Protective grounding cable for the outer ground terminal**Conductor cross-section < 2.1 mm<sup>2</sup> (14 AWG)

The use of a cable lug enables the connection of larger cross-sections.

The grounding impedance must be less than 2 Ω.

### Signal cable

 For custody transfer, all signal lines must be shielded cables (tinned copper braiding, optical coverage ≥ 85 %). The cable shield must be connected on both sides.

*Current output 4 to 20 mA HART*

Shielded twisted-pair cable.

 See <https://www.fieldcommgroup.org> "HART PROTOCOL SPECIFICATIONS".

*PROFIBUS PA*

Shielded twisted-pair cable. Cable type A is recommended.

 See <https://www.profibus.com> "PROFIBUS Installation Guidelines".

*PROFIBUS DP*

Shielded twisted-pair cable. Cable type A is recommended.

 See <https://www.profibus.com> "PROFIBUS Installation Guidelines".

*EtherNet/IP*

Twisted-pair Ethernet CAT 5 or better.

 See <https://www.odva.org> "EtherNet/IP Media Planning & Installation Manual".

*PROFINET*

Only PROFINET cables.

 See <https://www.profibus.com> "PROFINET Planning guideline".


*Ethernet-APL*

Shielded twisted-pair cable. Cable type A is recommended.

 See <https://www.profibus.com> Ethernet-APL White Paper "

*FOUNDATION Fieldbus*

Twisted, shielded two-wire cable.

 For further information on planning and installing FOUNDATION Fieldbus networks see:

- Operating Instructions for "FOUNDATION Fieldbus Overview" (BA00013S)
- FOUNDATION Fieldbus Guideline
- IEC 61158-2 (MBP)

*Modbus RS485*

Shielded twisted-pair cable.

 See <https://modbus.org> "MODBUS over Serial Line Specification and Implementation Guide".

*Current output 0 /4 to 20 mA (excluding HART)*

Standard installation cable is sufficient.

*Pulse /frequency /switch output*

Standard installation cable is sufficient.

*Relay output*

Standard installation cable is sufficient.

*Current input 4 to 20 mA*

Standard installation cable is sufficient.

*Status input*

Standard installation cable is sufficient.

**Connecting cable for transmitter - remote display and operating module DKX001***Standard cable*

A standard cable can be used as the connecting cable.

<b>Standard cable</b>	4 cores (2 pairs); pair-stranded with common shield
<b>Shielding</b>	Tin-plated copper-braid, optical cover $\geq 85\%$
<b>Capacitance: core/shield</b>	Maximum 1 000 nF for Zone 1; Class I, Division 1
<b>L/R</b>	Maximum 24 $\mu\text{H}/\Omega$ for Zone 1; Class I, Division 1
<b>Cable length</b>	Maximum 300 m (1 000 ft), see the following table

<b>Cross-section</b>	<b>Cable length for use in:</b> <ul style="list-style-type: none"> <li>■ Non-hazardous area</li> <li>■ Hazardous area: Zone 2; Class I, Division 2</li> <li>■ Hazardous area: Zone 1; Class I, Division 1</li> </ul>
0.34 mm <sup>2</sup> (22 AWG)	80 m (270 ft)
0.50 mm <sup>2</sup> (20 AWG)	120 m (400 ft)
0.75 mm <sup>2</sup> (18 AWG)	180 m (600 ft)
1.00 mm <sup>2</sup> (17 AWG)	240 m (800 ft)
1.50 mm <sup>2</sup> (15 AWG)	300 m (1 000 ft)

*Optionally available connecting cable*

<b>Standard cable</b>	2 × 2 × 0.34 mm <sup>2</sup> (22 AWG) PVC cable <sup>1)</sup> with common shield (2 pairs, pair-stranded)
<b>Flame resistance</b>	According to DIN EN 60332-1-2
<b>Oil-resistance</b>	According to DIN EN 60811-2-1
<b>Shielding</b>	Tin-plated copper-braid, optical cover $\geq 85\%$
<b>Capacitance: core/shield</b>	$\leq 200$ pF/m
<b>L/R</b>	$\leq 24$ $\mu\text{H}/\Omega$
<b>Available cable length</b>	10 m (35 ft)
<b>Operating temperature</b>	When mounted in a fixed position: $-50$ to $+105$ °C ( $-58$ to $+221$ °F); when cable can move freely: $-25$ to $+105$ °C ( $-13$ to $+221$ °F)

1) UV radiation can impair the cable outer sheath. Protect the cable from direct sunshine where possible.



**Overvoltage protection**

<b>Mains voltage fluctuations</b>	→ 33
<b>Overvoltage category</b>	Overvoltage category II
<b>Short-term, temporary overvoltage</b>	Between cable and ground up to 1200 V, for max. 5 s
<b>Long-term, temporary overvoltage</b>	Between cable and ground up to 500 V



## Performance characteristics



### Reference operating conditions

- Error limits based on ISO 11631
  - Water
    - +15 to +45 °C (+59 to +113 °F)
    - 2 to 6 bar (29 to 87 psi)
  - Data as indicated in the calibration protocol
  - Accuracy based on accredited calibration rigs according to ISO 17025
-  To obtain measured errors, use the *Applicator* sizing tool →  117

### Maximum measurement error

o.r. = of reading; 1 g/cm<sup>3</sup> = 1 kg/l; T = medium temperature

#### Base accuracy

 Design fundamentals →  52

*Mass flow and volume flow (liquids)*

±0.10 % o.r.

*Density (liquids)*

Under reference conditions	Standard density calibration <sup>1)</sup>	Wide-range Density specification <sup>2) 3)</sup>
[g/cm <sup>3</sup> ]	[g/cm <sup>3</sup> ]	[g/cm <sup>3</sup> ]
±0.0005	±0.01	±0.002

- 1) Valid over the entire temperature and density range
- 2) Valid range for special density calibration: 0 to 2 g/cm<sup>3</sup>, +10 to +80 °C (+50 to +176 °F)
- 3) order code for "Application package", option EE "Special density"

*Temperature*

±0.5 °C ± 0.005 · T °C (±0.9 °F ± 0.003 · (T - 32) °F)

#### Zero point stability

DN		Zero point stability	
[mm]	[in]	[kg/h]	[lb/min]
8	3/8	0.20	0.007
15	1/2	0.65	0.024
25	1	1.80	0.066
40	1 1/2	4.50	0.165
50	2	7.0	0.257

#### Flow values

Flow values as turndown parameters depending on nominal diameter.

*SI units*

DN	1:1	1:10	1:20	1:50	1:100	1:500
[mm]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]
8	2 000	200	100	40	20	4
15	6 500	650	325	130	65	13

DN	1:1	1:10	1:20	1:50	1:100	1:500
[mm]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]
25	18 000	1 800	900	360	180	36
40	45 000	4 500	2 250	900	450	90
50	70 000	7 000	3 500	1 400	700	140

*US units*

DN	1:1	1:10	1:20	1:50	1:100	1:500
[inch]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]
$\frac{3}{8}$	73.50	7.350	3.675	1.470	0.735	0.147
$\frac{1}{2}$	238.9	23.89	11.95	4.778	2.389	0.478
1	661.5	66.15	33.08	13.23	6.615	1.323
$1\frac{1}{2}$	1 654	165.4	82.70	33.08	16.54	3.308
2	2 573	257.3	128.7	51.46	25.73	5.146

**Accuracy of outputs**

The outputs have the following base accuracy specifications.

*Current output*

<b>Accuracy</b>	$\pm 5 \mu\text{A}$
-----------------	---------------------

*Pulse/frequency output*

o.r. = of reading

<b>Accuracy</b>	Max. $\pm 50 \text{ ppm o.r.}$ (over the entire ambient temperature range)
-----------------	--

**Repeatability**

o.r. = of reading;  $1 \text{ g/cm}^3 = 1 \text{ kg/l}$ ; T = medium temperature

**Base repeatability**

 Design fundamentals →  52

*Mass flow and volume flow (liquids)*

$\pm 0.05 \%$  o.r.

*Density (liquids)*

$\pm 0.00025 \text{ g/cm}^3$

*Temperature*

$\pm 0.25 \text{ }^\circ\text{C} \pm 0.0025 \cdot T \text{ }^\circ\text{C}$  ( $\pm 0.45 \text{ }^\circ\text{F} \pm 0.0015 \cdot (T-32) \text{ }^\circ\text{F}$ )

**Response time**

The response time depends on the configuration (damping).

**Influence of ambient temperature****Current output**

<b>Temperature coefficient</b>	Max. $1 \mu\text{A}/^\circ\text{C}$
--------------------------------	-------------------------------------

**Pulse/frequency output**

<b>Temperature coefficient</b>	No additional effect. Included in accuracy.
--------------------------------	---

**Influence of medium temperature**

**Mass flow**

o.f.s. = of full scale value


If there is a difference between the temperature during zero adjustment and the process temperature, the additional measurement error of the sensors is typically  $\pm 0.0002$  %o.f.s./ $^{\circ}\text{C}$  ( $\pm 0.0001$  % o. f.s./ $^{\circ}\text{F}$ ).

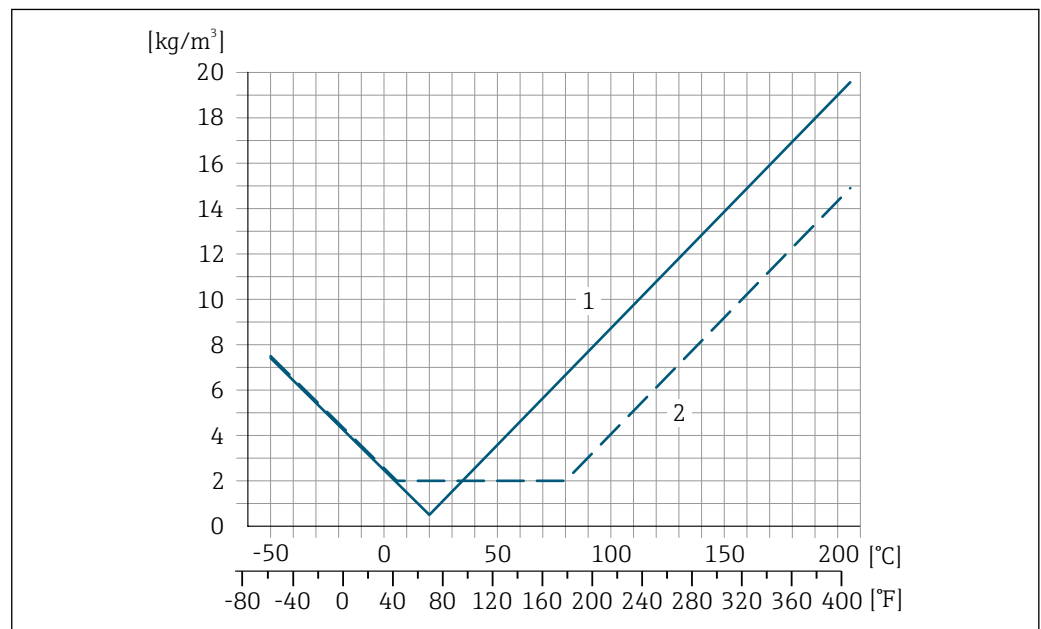
The influence is reduced when the zero adjustment is performed at process temperature.

**Density**

If there is a difference between the density calibration temperature and the process temperature, the measurement error of the sensors is typically  $\pm 0.0001$  g/cm<sup>3</sup>/ $^{\circ}\text{C}$  ( $\pm 0.00005$  g/cm<sup>3</sup>/ $^{\circ}\text{F}$ ). Field density adjustment is possible.

**Wide-range density specification (special density calibration)**

If the process temperature is outside the valid range ( $\rightarrow$   49) the measurement error is  $\pm 0.0001$  g/cm<sup>3</sup> / $^{\circ}\text{C}$  ( $\pm 0.00005$  g/cm<sup>3</sup> / $^{\circ}\text{F}$ )



- 1 Field density adjustment, for example at +20 °C (+68 °F)
- 2 Special density calibration


**Temperature**

$$\pm 0.005 \cdot T \text{ } ^{\circ}\text{C} (\pm 0.005 \cdot (T - 32) \text{ } ^{\circ}\text{F})$$

**Influence of medium pressure**

The following shows how the process pressure (gauge pressure) affects the accuracy of the mass flow.

o.r. = of reading

-  It is possible to compensate for the effect by:
  - Reading in the current pressure measured value via the current input or a digital input.
  - Specifying a fixed value for the pressure in the device parameters.

 Operating Instructions  $\rightarrow$   118.

DN		[% o.r./bar]	[% o.r./psi]
[mm]	[in]		
8	3/8	-0.002	-0.0001
15	1/2	-0.006	-0.0004
25	1	-0.005	-0.0003
40	1 1/2	-0.007	-0.0005
50	2	-0.006	-0.0004

**Design fundamentals**

o.r. = of reading, o.f.s. = of full scale value

BaseAccu = base accuracy in % o.r., BaseRepeat = base repeatability in % o.r.

MeasValue = measured value; ZeroPoint = zero point stability

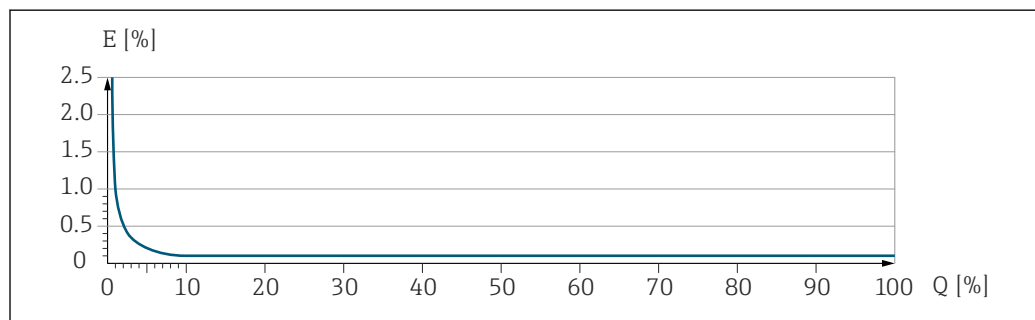
*Calculation of the maximum measured error as a function of the flow rate*

Flow rate	Maximum measured error in % o.r.
$\geq \frac{\text{ZeroPoint}}{\text{BaseAccu}} \cdot 100$ <small>A0021332</small>	$\pm \text{BaseAccu}$ <small>A0021339</small>
$< \frac{\text{ZeroPoint}}{\text{BaseAccu}} \cdot 100$ <small>A0021333</small>	$\pm \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ <small>A0021334</small>

*Calculation of the maximum repeatability as a function of the flow rate*

Flow rate	Maximum repeatability in % o.r.
$\geq \frac{1/2 \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ <small>A0021335</small>	$\pm \text{BaseRepeat}$ <small>A0021340</small>
$< \frac{1/2 \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ <small>A0021336</small>	$\pm 1/2 \cdot \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ <small>A0021337</small>

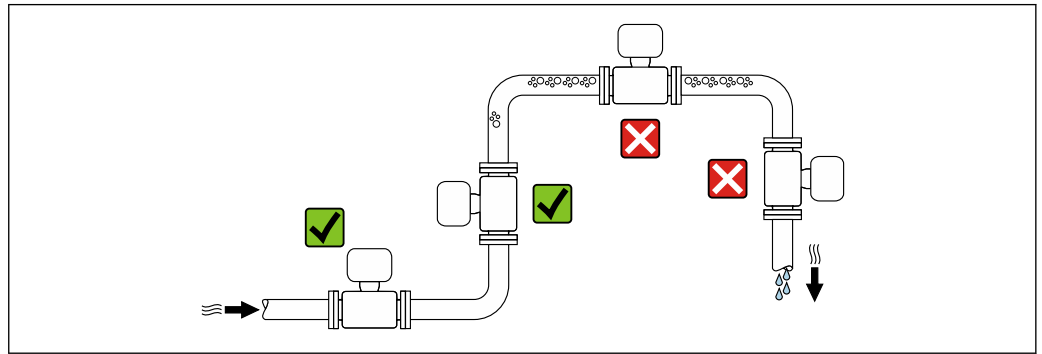
**Example of maximum measurement error**



E Maximum measurement error in % o.r. (example)  
 Q Flow rate in % of maximum full scale value

## Mounting

### Installation point



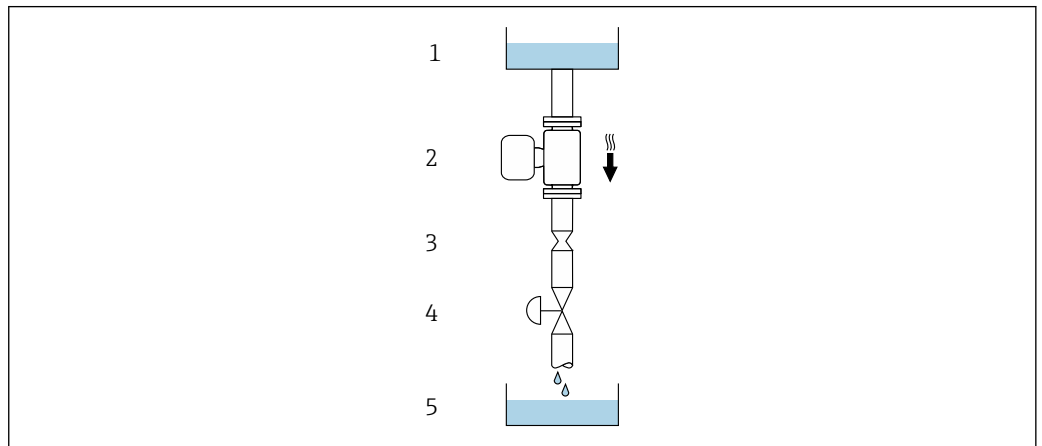
A0028772

To prevent measuring errors arising from accumulation of gas bubbles in the measuring pipe, avoid the following mounting locations in the piping:

- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

### Installation in down pipes

However, the following installation suggestion allows for installation in an open vertical pipeline. Pipe restrictions or the use of an orifice with a smaller cross-section than the nominal diameter prevent the sensor running empty while measurement is in progress.



A0028773

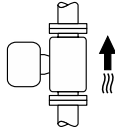
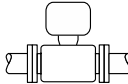
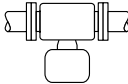

23 Installation in a down pipe (e.g. for batching applications)

- 1 Supply tank
- 2 Sensor
- 3 Orifice plate, pipe restriction
- 4 Valve
- 5 Filling vessel

DN		Ø orifice plate, pipe restriction	
[mm]	[in]	[mm]	[in]
8	3/8	6	0.24
15	1/2	10	0.40
25	1	14	0.55
40	1 1/2	22	0.87
50	2	28	1.10

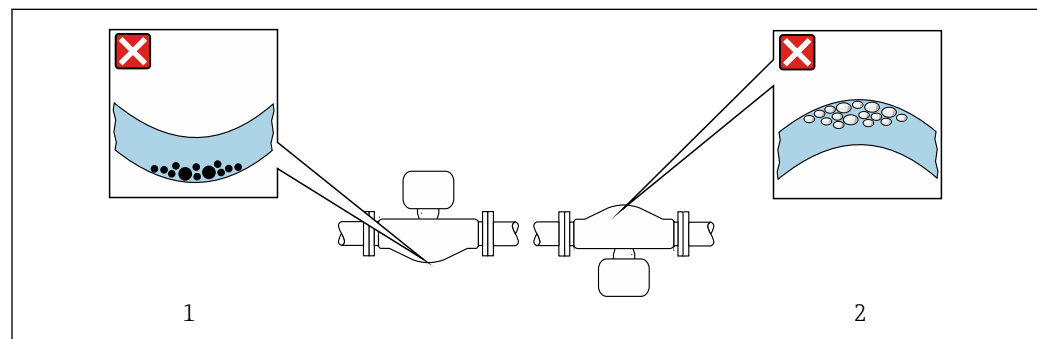
**Orientation**

The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

Orientation			Recommendation
<b>A</b>	Vertical orientation	 A0015591	✓✓ <sup>1)</sup>
<b>B</b>	Horizontal orientation, transmitter at top	 A0015589	✓✓ <sup>2)</sup> Exception: → ☒ 24, ☒ 54
<b>C</b>	Horizontal orientation, transmitter at bottom	 A0015590	✓✓ <sup>3)</sup> Exception: → ☒ 24, ☒ 54
<b>D</b>	Horizontal orientation, transmitter at side	 A0015592	✓✓

- 1) This orientation is recommended to ensure self-draining.
- 2) Applications with low process temperatures may reduce the ambient temperature. To maintain the minimum ambient temperature for the transmitter, this orientation is recommended.
- 3) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.

If a sensor is installed horizontally with a curved measuring tube, match the position of the sensor to the fluid properties.



☒ 24 Orientation of sensor with curved measuring tube

- 1 Avoid this orientation for fluids with entrained solids: Risk of solids accumulating
- 2 Avoid this orientation for outgassing fluids: Risk of gas accumulating

**Inlet and outlet runs**

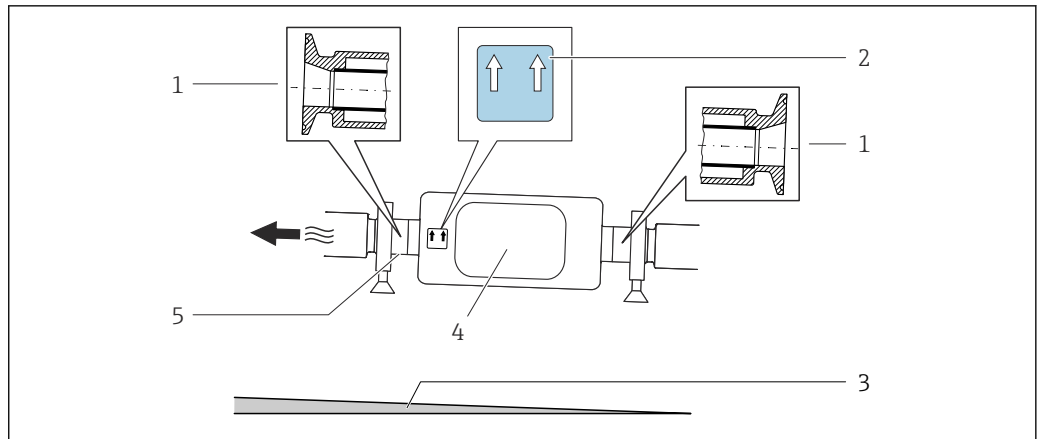
No special precautions need to be taken for fittings that create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs → ☒ 62.

**Special installation instructions**

**Drainability**

When installed vertically, the measuring tube can be drained completely and protected against buildup.



When the sensor is installed in a horizontal line, eccentric clamps can be used to ensure complete drainability. When the system is pitched in a specific direction and at a specific slope, gravity can be used to achieve complete drainability. The sensor must be mounted in the correct position to ensure full drainability in the horizontal position. Markings on the sensor show the correct mounting position to optimize drainability.



A0016583

- 1 Eccentric clamp connection
- 2 "This side up" label indicates which side is up
- 3 For DN 8 to 25 (3/8 to 1"): Gradient: approx. 2% or 21 mm/m (0.24 in/ft); for DN 40 to 50 (1½ to 2"): Gradient approx. 2° or 35 mm/m (0.42 in/ft)
- 4 Transmitter
- 5 Line on the underside indicates the lowest point of the eccentric process connection.

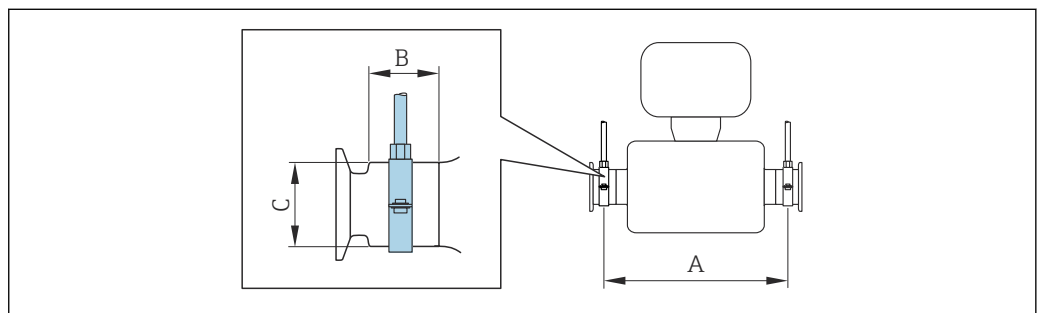
**Hygienic compatibility**

-  When installing in hygienic applications, please refer to the information in the "Certificates and approvals/hygienic compatibility" section →  111
- In the case of measuring devices with the order code for "Housing", option B "Stainless, hygienic", to seal the connection compartment cover, screw it closed finger-tight and tighten it by another 45° (corresponds to 15 Nm).

**Securing with mounting clamp in the case of hygiene connections**

It is not necessary to provide additional support for the sensor for operational performance purposes. If, however, additional support is required for installation purposes, the following dimensions must be observed.

Use mounting clamp with lining between clamp and measuring instrument.



A0030298

DN		A		B		C	
[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]
8	3/8	298	11.73	33	1.3	28	1.1
15	1/2	402	15.83	33	1.3	28	1.1
25	1	542	21.34	33	1.3	38	1.5
40	1 1/2	658	25.91	36.5	1.44	56	2.2
50	2	772	30.39	44.1	1.74	75	2.95

### Zero verification and zero adjustment

All measuring instruments are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions → 49. Therefore, a zero adjustment in the field is generally not required.

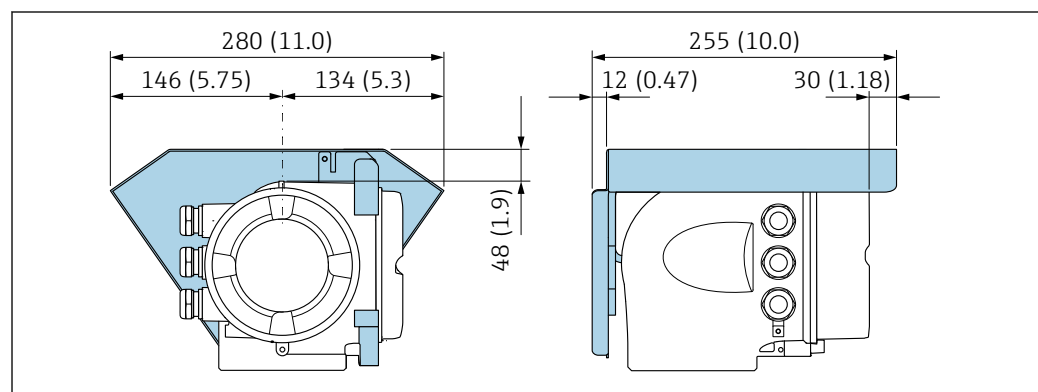
Experience shows that zero adjustment is advisable only in special cases:

- To achieve maximum measurement accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity fluids).
- For gas applications with low pressure

For information on checking the zero point and performing a zero adjustment, see the Operating Instructions for the device.

**i** To achieve the highest possible measurement accuracy at low flow rates, the installation must protect the sensor from mechanical stresses during operation.

### Weather protection cover



25 Engineering unit mm (in)

## Environment

### Ambient temperature range

Measuring device	<ul style="list-style-type: none"> <li>▪ -40 to +60 °C (-40 to +140 °F)</li> <li>▪ Order code for "Test, certificate", option JP: -50 to +60 °C (-58 to +140 °F)</li> </ul>
Readability of the local display	-20 to +60 °C (-4 to +140 °F) The readability of the display may be impaired at temperatures outside the temperature range.

**i** Dependency of ambient temperature on medium temperature → 57

- ▶ If operating outdoors:  
Avoid direct sunlight, particularly in warm climatic regions.

### Storage temperature

### Climate class

DIN EN 60068-2-38 (test Z/AD)

### Relative humidity

The device is suitable for use outdoors and indoors with a relative humidity of 4 to 95 %.

### Operating height

According to EN 61010-1

- ≤ 2 000 m (6 562 ft)
- > 2 000 m (6 562 ft) with additional overvoltage protection (e.g. Endress+Hauser HAW Series)



**Degree of protection**

**Transmitter**

- IP66/67, Type 4X enclosure, suitable for pollution degree 4
- When the housing is open: IP20, Type 1 enclosure, suitable for pollution degree 2
- Display module: IP20, Type 1 enclosure, suitable for pollution degree 2

**Optional**

Order code for "Sensor options", option CM "IP69"

**External WLAN antenna**

IP67

---

**Shock and vibration resistance**

**Vibration sinusoidal, in accordance with IEC 60068-2-6**

- 2 to 8.4 Hz, 3.5 mm peak
- 8.4 to 2 000 Hz, 1 g peak

**Vibration broad-band random, according to IEC 60068-2-64**

- 10 to 200 Hz, 0.003 g<sup>2</sup>/Hz
- 200 to 2 000 Hz, 0.001 g<sup>2</sup>/Hz
- Total: 1.54 g rms

**Shock half-sine, according to IEC 60068-2-27**

6 ms 30 g

**Rough handling shocks according to IEC 60068-2-31**

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**Internal cleaning**

- CIP cleaning
- SIP cleaning
- Cleaning with pigs

**Options**

Oil- and grease-free version for wetted parts, without declaration  
 Order code for "Service", option HA <sup>1)</sup>

---

**Mechanical load**

Transmitter housing:

- Protect against mechanical effects, such as shock or impact
  - Do not use as a ladder or climbing aid
- 

**Electromagnetic compatibility (EMC)**

- As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)
- As per IEC/EN 61000-6-2 and IEC/EN 61000-6-4
- Device version with PROFIBUS DP: Complies with emission limits for industry as per EN 50170 Volume 2, IEC 61784



The following applies for PROFIBUS DP: If baud rates > 1.5 MBaud, an EMC cable entry must be used and the cable shield must continue as far as the terminal wherever possible.



Details are provided in the Declaration of Conformity.



This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

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## Process

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**Medium temperature range**

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1) The cleaning refers to the measuring instrument only. Any accessories supplied are not cleaned.

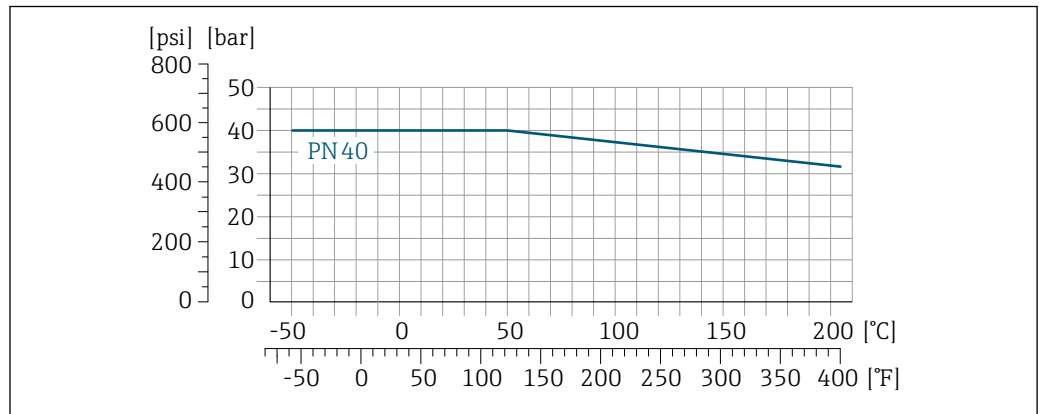
Standard version	-50 to +150 °C (-58 to +302 °F)	Order code for "Measuring tube mat., wetted surface", option BB, BC, BD
Extended temperature version	-50 to +205 °C (-58 to +401 °F)	Order code for "Measuring tube mat., wetted surface", option TD, TG

**Pressure/temperature ratings**

The following pressure/temperature diagrams apply to all pressure-bearing parts of the device and not just the process connection. The diagrams show the maximum permissible medium pressure depending on the specific medium temperature.

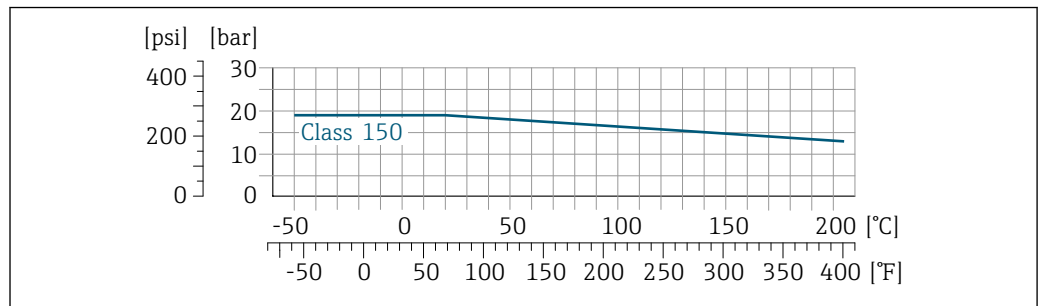
**i** Pressure-temperature ratings with the +151 to +205 °C (+304 to +401 °F) temperature range only for the extended temperature version of the measuring device.

**Flange similar to EN 1092-1 (DIN 2501)**



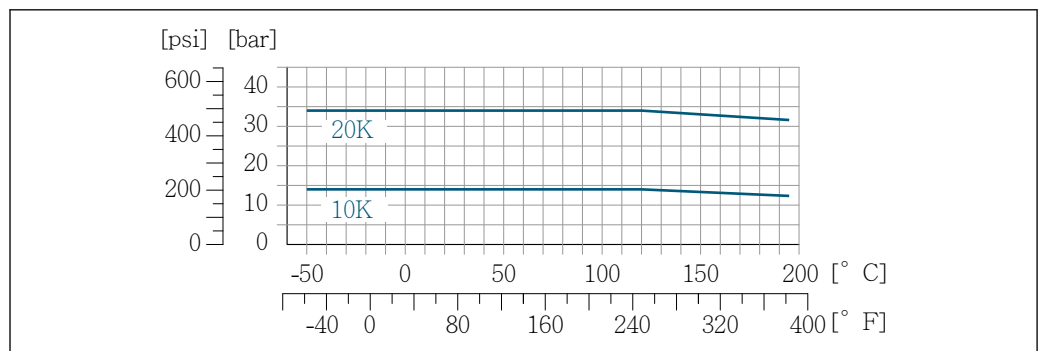
26 With flange material 1.4404 (F316/F316L).

**Flange similar to ASME B16.5**



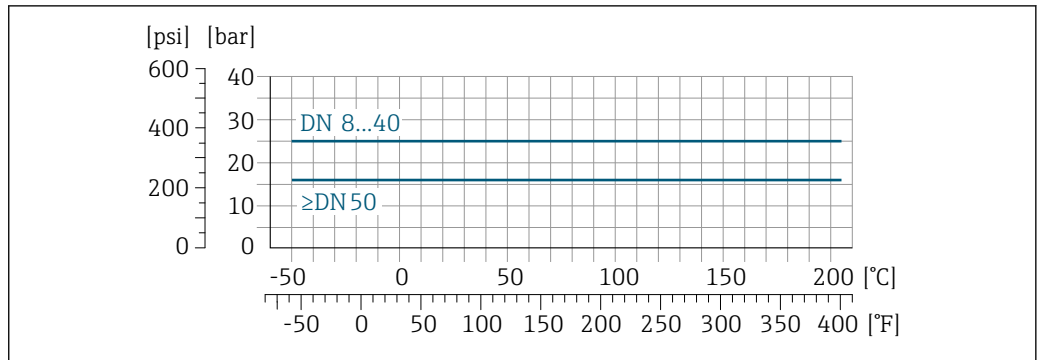
27 With flange material 1.4404 (F316/F316L)

**Flange JIS B2220**



28 With flange material 1.4404 (F316/F316L)

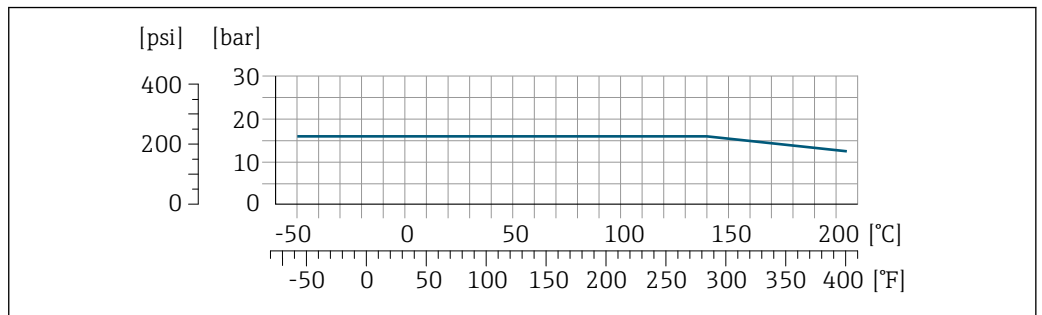
**Flange DIN 11864-2 Form A**



A0029908-EN

29 With flange material 1.4435 (316L)

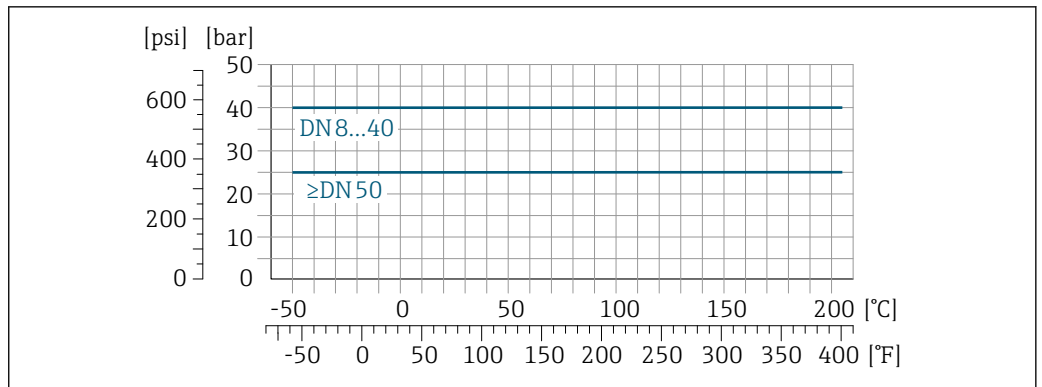
**Neumo BioConnect, BBS flange**



A0027782-EN

30 With flange material 1.4435 (316L)

**Thread DIN 11851**

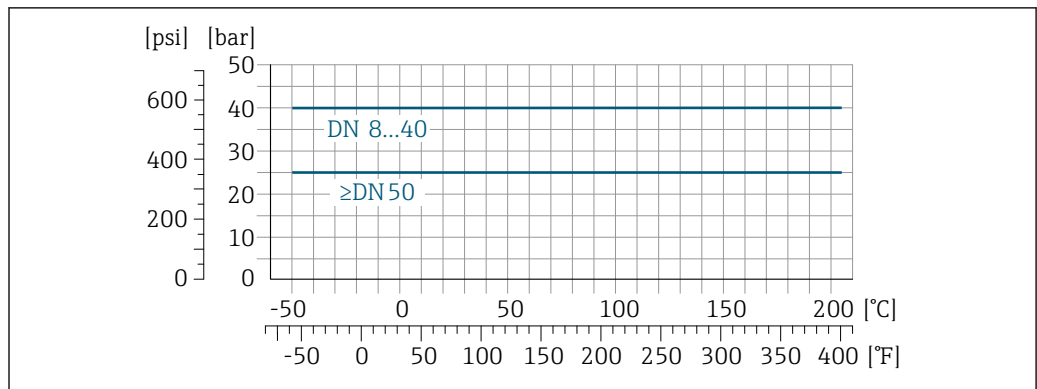


A0029909-EN

31 With flange material 1.4435 (316L)

DIN 11851 allows for applications up to +140 °C (+284 °F) if suitable sealing materials are used. Please take this into account when selecting seals and counterparts, as these components can limit the pressure and temperature range.

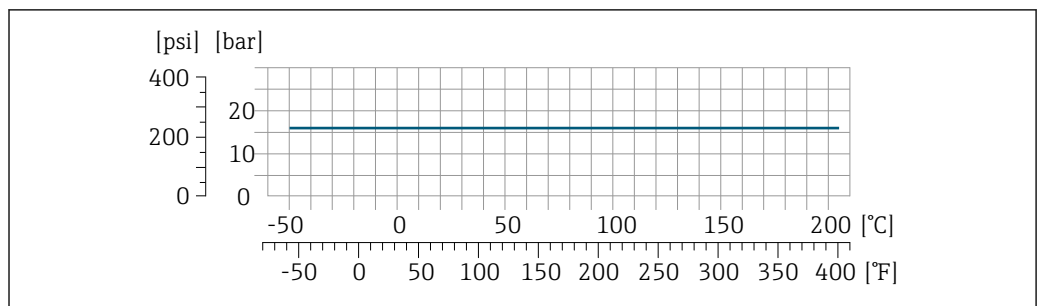
**Thread DIN 11864-1 Form A**



A0029910-EN

32 With connection material 1.4435 (316L)

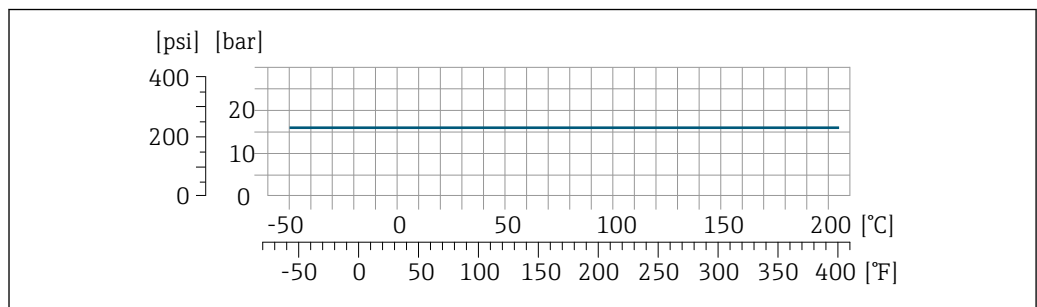
**Thread ISO 2853**



A0034703-EN

33 With connection material 1.4435 (316L)

**Thread SMS 1145**

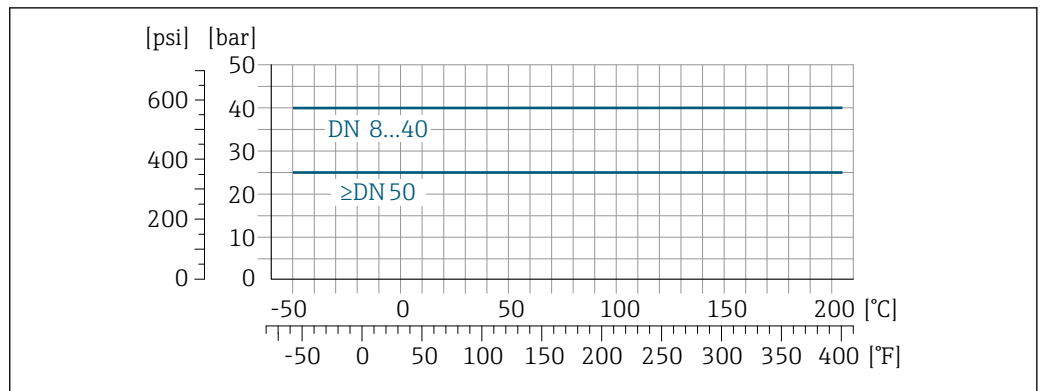


A0029889-EN

34 With connection material 1.4435 (316L)

SMS 1145 allows for applications up to 6 bar (87 psi) if suitable sealing materials are used. Please take this into account when selecting seals and counterparts, as these components can limit the pressure and temperature range.

**Clamp connections DIN 11864-3 Form A**



35 With connection material 1.4435 (316L)

A0029910-EN

**Tri-Clamp; clamp connection ISO 2852, DIN 32676, BBS, Neumo BioConnect**

The clamp connections are suitable up to a maximum pressure of 16 bar (232 psi). Please observe the operating limits of the clamp and seal used as they can be over 16 bar (232 psi). The clamp and seal are not included in the scope of supply.

**Sensor housing**

The sensor housing is filled with dry nitrogen gas and protects the electronics and mechanics inside.

**i** If a measuring tube fails (e.g. due to process characteristics like corrosive or abrasive fluids), the fluid will initially be contained by the sensor housing.

If the sensor is to be purged with gas (gas detection), it should be equipped with purge connections.

**i** Do not open the purge connections unless the containment can be filled immediately with a dry, inert gas. Use only low pressure to purge.

Maximum pressure: 5 bar (72.5 psi)

**Burst pressure of the sensor housing**

The following sensor housing burst pressures are only valid for standard devices and/or devices equipped with closed purge connections (not opened/as delivered).

If a device fitted with purge connections (order code for "Sensor option", option CH "Purge connection") is connected to the purge system, the maximum pressure is determined by the purge system itself or by the device, depending on which component has the lower pressure classification.

The sensor housing burst pressure refers to a typical internal pressure which is reached prior to mechanical failure of the sensor housing and which was determined during type testing. The corresponding type test declaration can be ordered with the device (order code for "Additional approval", option LN "Sensor housing burst pressure, type test").

DN		Sensor housing burst pressure	
[mm]	[in]	[bar]	[psi]
8	3/8	190	2755
15	1/2	175	2538
25	1	165	2392
40	1 1/2	152	2204
50	2	103	1494

For information on the dimensions: see the "Mechanical construction" section → 64

**Flow limit**

Select the nominal diameter by optimizing between the required flow range and permissible pressure loss.

**i** For an overview of the full scale values for the measuring range, see the "Measuring range" section → [10](#)

- The minimum recommended full scale value is approx. 1/20 of the maximum full scale value
- In most applications, 20 to 50 % of the maximum full scale value can be considered ideal
- A low full scale value must be selected for abrasive media (such as liquids with entrained solids): flow velocity < 1 m/s (< 3 ft/s).

**i** To calculate the flow limit, use the *Applicator* sizing tool → [117](#)

**Pressure loss**

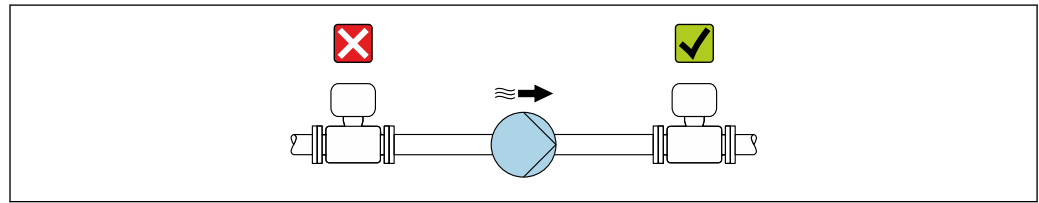
**i** To calculate the pressure loss, use the *Applicator* sizing tool → [117](#)

**Static pressure**

It is important that cavitation does not occur, or that gases entrained in the liquids do not outgas. This is prevented by means of a sufficiently high static pressure.

For this reason, the following mounting locations are recommended:

- At the lowest point in a vertical pipe
- Downstream from pumps (no danger of vacuum)



A0028777

**Thermal insulation**

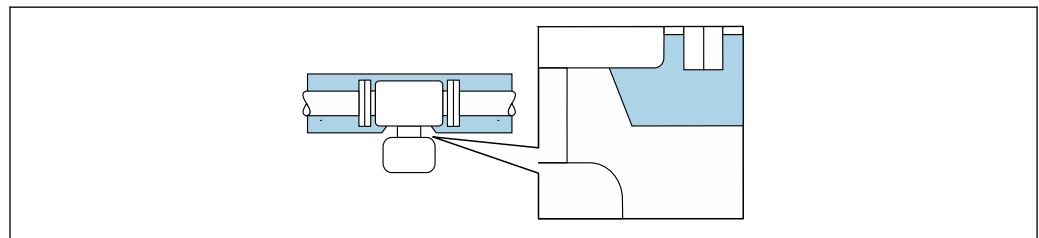
In the case of some fluids, it is important to keep the heat radiated from the sensor to the transmitter to a low level. A wide range of materials can be used for the required insulation.

The following device versions are recommended for versions with thermal insulation:

- Version with extended neck for insulation:  
Order code for "Sensor option", option CG with an extended neck length of 105 mm (4.13 in).
- Extended temperature version:  
Order code for "Measuring tube material", option TD or TG with an extended neck length of 105 mm (4.13 in).

**NOTICE****Electronics overheating on account of thermal insulation!**

- ▶ Recommended orientation: horizontal orientation, transmitter housing pointing downwards.
- ▶ Do not insulate the transmitter housing.
- ▶ Maximum permissible temperature at the lower end of the transmitter housing: 80 °C (176 °F)
- ▶ Regarding thermal insulation with an exposed extended neck: We advise against insulating the extended neck to ensure optimal heat dissipation.



A0034391

36 Thermal insulation with exposed extended neck

**Heating**

Some fluids require suitable measures to avoid loss of heat at the sensor.

#### Heating options

- Electrical heating, e.g. with electric band heaters <sup>2)</sup>
- Via pipes carrying hot water or steam
- Via heating jackets



Heating jackets for the sensors can be ordered as accessories from Endress+Hauser → 116.

#### NOTICE

##### Danger of overheating when heating

- ▶ Ensure that the temperature at the lower end of the transmitter housing does not exceed 80 °C (176 °F).
- ▶ Ensure that sufficient convection takes place at the transmitter neck.
- ▶ Ensure that a sufficiently large area of the transmitter neck remains exposed. The uncovered part serves as a radiator and protects the electronics from overheating and excessive cooling.
- ▶ When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation. For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.
- ▶ Consider the "830 ambient temperature too high" and "832 electronics temperature too high" process diagnostics if overheating cannot be ruled out based on a suitable system design.

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#### Vibrations

The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by plant vibrations.

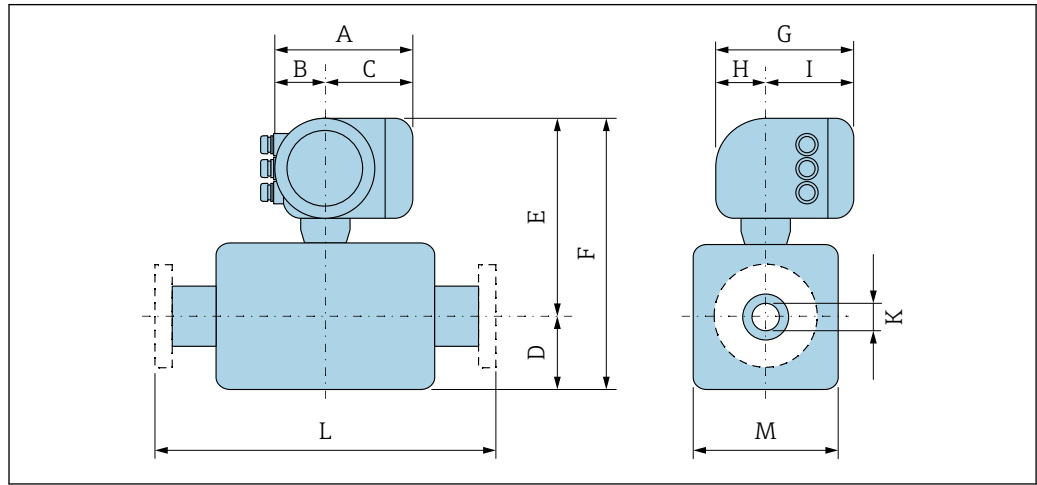
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2) The use of parallel electric band heaters is generally recommended (bidirectional electricity flow). Particular considerations must be made if a single-wire heating cable is to be used. Additional information is provided in the document EA01339D "Installation instructions for electrical trace heating systems" → 120

## Mechanical construction

Dimensions in SI units

Compact version



A0039785

Order code for "Housing", option A "Aluminum, coated"

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G <sup>3)</sup>	H	I <sup>3)</sup>	K	L	M
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
8	169	68	101	108	266	374	200	59	141	8.31	<sup>4)</sup>	92
15	169	68	101	108	266	374	200	59	141	12.0	<sup>4)</sup>	92
25	169	68	101	121	266	387	200	59	141	17.6	<sup>4)</sup>	92
40	169	68	101	178	297	475	200	59	141	26.0	<sup>4)</sup>	142
50	169	68	101	262	310	572	200	59	141	40.5	<sup>4)</sup>	169

- 1) Depending on the cable gland used: values up to + 30 mm
- 2) With order code for "Sensor option", option CG or order code for "Measuring tube material", option TD, TG: values +70 mm
- 3) For version without local display: values - 30 mm
- 4) Depending on the process connection

Order code for "Housing", option A "Aluminum, coated"; Ex d

DN	A <sup>1)</sup>	B	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G <sup>3)</sup>	H	I <sup>3)</sup>	K	L	M
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
8	188	85	103	108	267	375	217	58	159	8.31	<sup>4)</sup>	92
15	188	85	103	108	267	375	217	58	159	12.0	<sup>4)</sup>	92
25	188	85	103	121	267	388	217	58	159	17.6	<sup>4)</sup>	92
40	188	85	103	178	297	475	217	58	159	26.0	<sup>4)</sup>	142
50	188	85	103	262	310	572	217	58	159	40.5	<sup>4)</sup>	169

- 1) Depending on the cable gland used: values up to + 30 mm
- 2) With order code for "Sensor option", option CG or order code for "Measuring tube material", option TD, TG: values +70 mm
- 3) For version without local display: values - 40 mm
- 4) Depending on the process connection



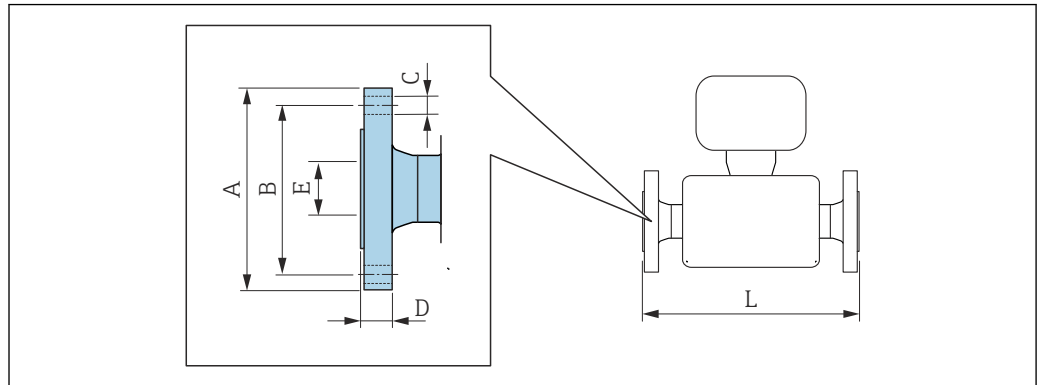
Order code for "Housing", option B "Stainless, hygienic"

DN	A <sup>1)</sup>	B	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G <sup>3)</sup>	H	I <sup>3)</sup>	K	L	M
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
8	183	73	110	108	266	374	200	65	135	8.31	<sup>4)</sup>	92
15	183	73	110	108	266	374	200	65	135	12.0	<sup>4)</sup>	92
25	183	73	110	121	266	387	200	65	135	17.6	<sup>4)</sup>	92
40	183	73	110	178	297	475	200	65	135	26.0	<sup>4)</sup>	142
50	183	73	110	262	310	572	200	65	135	40.5	<sup>4)</sup>	169

- 1) Depending on the cable gland used: values up to + 30 mm
- 2) With order code for "Sensor option", option CG or order code for "Measuring tube material", option TD, TG: values +70 mm
- 3) For version without local display: values - 13 mm
- 4) Depending on the process connection

## Flange connections

Fixed flange EN 1092-1, ASME B16.5, JIS B2220



A0015621

**i** Length tolerance for dimension L in mm:  
+1.5/-2.0

Flange according to EN 1092-1 (DIN 2501): PN 40 1.4404 (F316/F316L) Order code for "Process connection", option D2W						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	95	65	4 × Ø14	17.0	17.3	336
15	95	65	4 × Ø14	20.0	17.3	440
25	115	85	4 × Ø14	19.0	28.5	580
40	150	110	4 × Ø18	21.0	43.1	707
50	165	125	4 × Ø18	25.0	54.5	828

Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 3.2 to 12.5 µm

1) DN 8 with DN 15 flanges as standard

Flange according to ASME B16.5: Cl 150 1.4404 (F316/F316L) Order code for "Process connection", option AAW						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	90	60.3	4 × Ø15.7	11.2	15.7	336
15	90	60.3	4 × Ø15.7	11.2	15.7	440
25	110	79.4	4 × Ø15.7	14.2	26.7	580
40	125	98.4	4 × Ø15.7	17.5	40.9	707
50	150	120.7	8 × Ø19.1	19.1	52.6	828

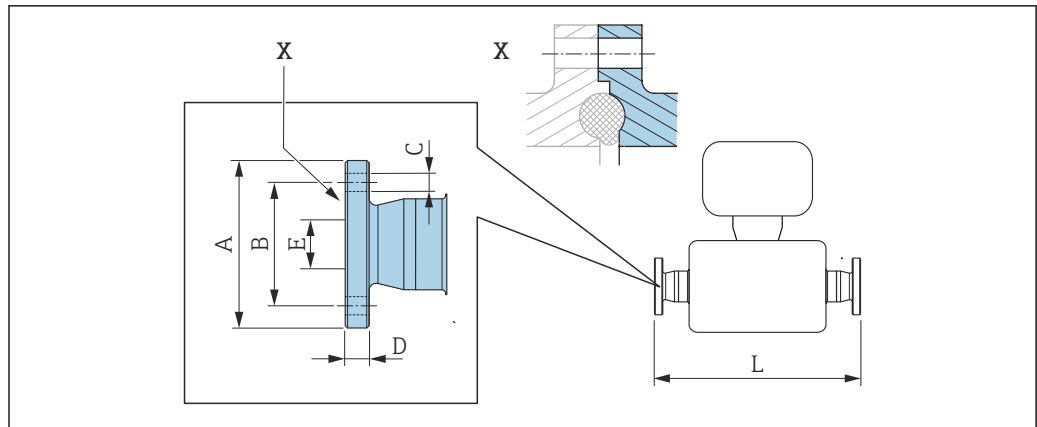
Surface roughness (flange): Ra 3.2 to 6.3 µm

1) DN 8 with DN 15 flanges as standard

<b>Flange JIS B2220: 20K</b> <b>1.4404 (F316/F316L)</b> <i>Order code for "Process connection", option NEW</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	95	70	4 × Ø15	16.0	15	336
15	95	70	4 × Ø15	16.0	15	440
25	125	90	4 × Ø19	17.5	25	580
40	140	105	4 × Ø19	20.0	40	707
50	155	120	8 × Ø19	27.5	50	828
Surface roughness (flange): Ra 3.2 to 6.3 µm						

1) DN 8 with DN 15 flanges as standard

Fixed flange DIN 11864-2



A0015627

37 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

**Flange DIN 11864-2 Form A, for pipe according to DIN11866 series A, flange with notch 1.4435 (316L)**

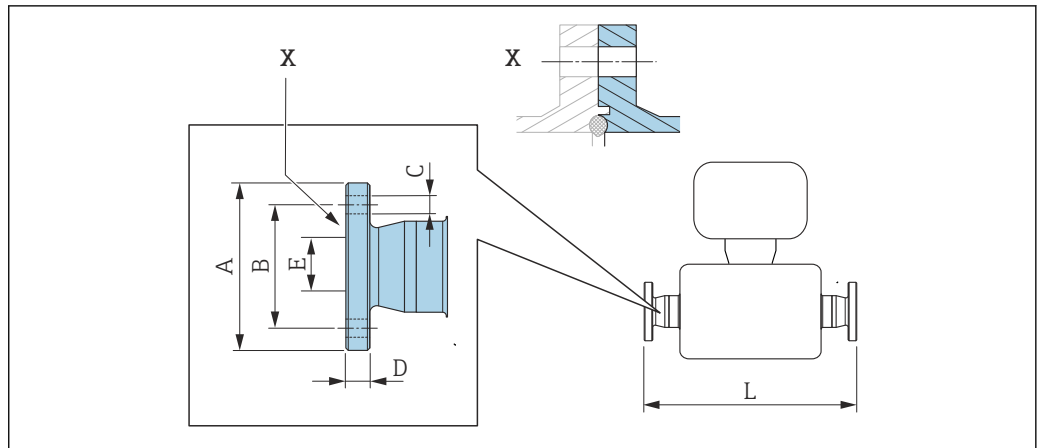
Order code for "Process connection", option KJW

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8	59.0	42	4 × Ø9	10	16.00	384
15	59.0	42	4 × Ø9	10	16.00	488
25	70.0	53	4 × Ø9	10	26.00	626
40	82.0	65	4 × Ø9	10	38.00	753
50	94.0	77	4 × Ø9	10	50.00	877

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD

Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

BBS fixed flange



A0016910

38 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

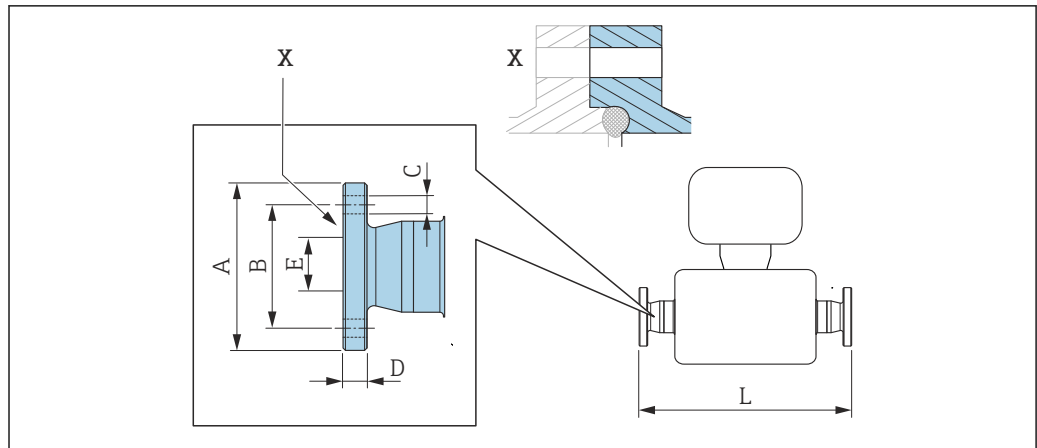
<b>BBS flange small (sterile orbital), for pipe according to DIN 11866 series A, female 1.4435 (316L)</b>						
Order code for "Process connection", option BSK						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8	59	42	4 × Ø9	10	10.00	384
15	59	42	4 × Ø9	10	16.00	488
25	70	53	4 × Ø9	10	26.00	626
40	82	65	4 × Ø9	10	38.00	753
50	94	77	4 × Ø9	10	50.00	877

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

<b>BBS flange small (sterile orbital), for pipe according to DIN 11866 series B, female 1.4435 (316L)</b>						
Order code for "Process connection", option BSL						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8	59	42	4 × Ø9	10	14.00	384
15	62	45	4 × Ø9	10	18.10	488
25	74	57	4 × Ø9	10	29.70	626
40	88	71	4 × Ø9	10	44.30	753
50	103	85	4 × Ø9	10	56.30	877

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

Neumo BioConnect fixed flange



A0016907

39 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

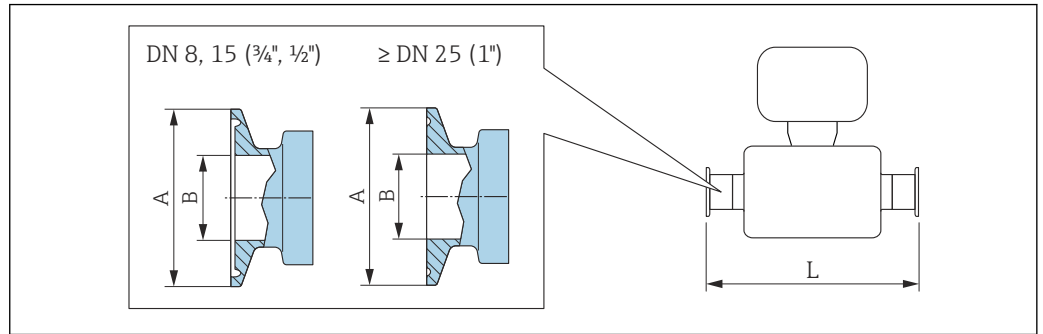
**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

Neumo BioConnect flange (sterile orbital), for pipe according to DIN 11866 series A, flange form R 1.4435 (316L) Order code for "Process connection", option BSB						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8	65	45	4 × Ø9	10	10.00	384
15	75	55	4 × Ø9	10	16.00	488
25	85	65	4 × Ø9	12	26.00	626
40	100	80	4 × Ø9	12	38.00	753
50	110	90	4 × Ø9	14	50.00	877

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

**Clamp connections**

*Tri-Clamp*



A0023342

40 Unit mm (in)

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

**Tri-Clamp, for pipe according to DIN 11866 series C 1.4435 (316L)**  
Order code for "Process connection", option FHW

DN [mm]	Clamp [in]	A [mm]	B [mm]	L [mm]
8	1/2	25.0	9.40	362
15	3/4	25.0	15.75	466
25	1 <sup>1)</sup>	50.4	22.10	606
40	1 1/2 <sup>1)</sup>	50.4	34.80	731
50	2 <sup>1)</sup>	63.9	47.50	853

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

1) The connection corresponds to the hygienic clamp dimensions according to ASME BPE.

**1/2" Tri-Clamp, for pipe according to DIN 11866 series C 1.4435 (316L)**  
Order code for "Process connection", option FCW

DN [mm]	Clamp [in]	A [mm]	B [mm]	L [mm]
15	1/2	25.0	9.40	466

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD

**3/4" Tri-Clamp, for pipe according to DIN 11866 series C 1.4435 (316L)**  
Order code for "Process connection", option FFW

DN [mm]	Clamp [in]	A [mm]	B [mm]	L [mm]
8	3/4	25.0	15.75	362

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

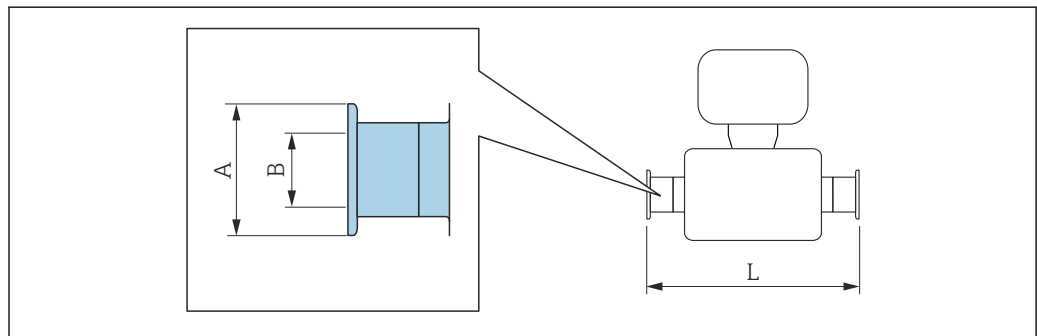
<b>1" Tri-Clamp, for pipe according to DIN 11866 series C 1.4435 (316L)</b>				
<i>Order code for "Process connection", option FPW</i>				
DN [mm]	Clamp [in]	A [mm]	B [mm]	L [mm]
8	1 <sup>1)</sup>	50.4	22.10	362
15	1 <sup>1)</sup>	50.4	22.10	466
Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG				

1) The connection corresponds to the hygienic clamp dimensions according to ASME BPE.

<b>Tri-Clamp eccentric, for pipe according to DIN 11866 series C 1.4435 (316L)</b>					
DN [mm]	Order code for "Process connection", option	Clamp [in]	A [mm]	B [mm]	L [mm]
8	FEB	½	25.0	9.40	362
15	FED	¾	25.0	15.75	466
25	FEF	1 <sup>1)</sup>	50.4	22.10	606
40	FEH	1½ <sup>1)</sup>	50.4	34.80	738
50	FEK	2 <sup>1)</sup>	63.9	47.50	860
Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG Additional information regarding "Eccentric clamps"					

1) The connection corresponds to the hygienic clamp dimensions according to ASME BPE.

#### Clamp connection DIN 32676, ISO 2852



A0015625

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

<b>Clamp DIN 32676, for pipe according to DIN 11866 series A 1.4435 (316L)</b>			
<i>Order code for "Process connection", option KPW</i>			
DN [mm]	A [mm]	B [mm]	L [mm]
8	34.0	16.00	362
15	34.0	16.00	466
25	50.5	26.00	606



<b>Clamp DIN 32676, for pipe according to DIN 11866 series A</b> <b>1.4435 (316L)</b> <i>Order code for "Process connection", option KPW</i>			
<b>DN</b> <b>[mm]</b>	<b>A</b> <b>[mm]</b>	<b>B</b> <b>[mm]</b>	<b>L</b> <b>[mm]</b>
40	50.5	38.00	732
50	64.0	50.00	854

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

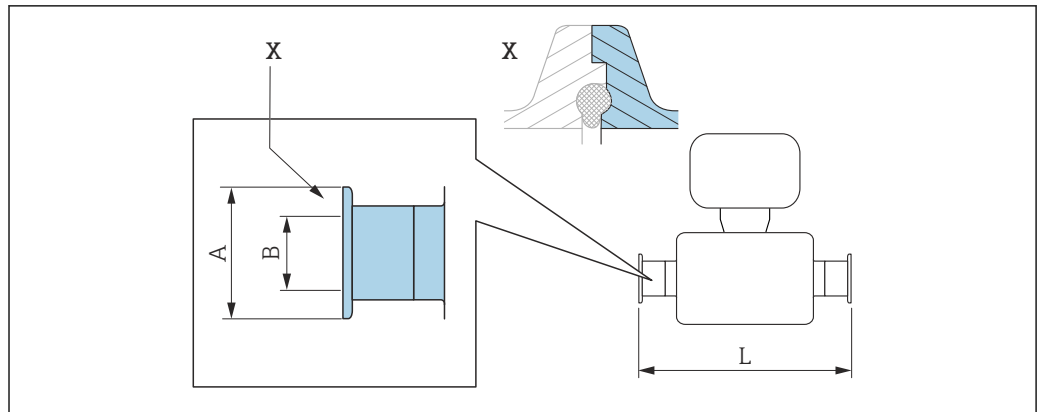
<b>Clamp ISO 2852, for pipe according to ISO 2037</b> <b>1.4435 (316L)</b> <i>Order code for "Process connection", option JSA</i>			
<b>DN</b> <b>[mm]</b>	<b>A</b> <b>[mm]</b>	<b>B</b> <b>[mm]</b>	<b>L</b> <b>[mm]</b>
8	50.5	22.6	362
15	50.5	22.6	466
25	50.5	22.6	606
40	50.5	35.6	731
50	64.0	48.6	853

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

<b>Clamp ISO 2852, for pipe according to DIN11866 series B</b> <b>1.4435 (316L)</b> <i>Order code for "Process connection", option JSC</i>			
<b>DN</b> <b>[mm]</b>	<b>A</b> <b>[mm]</b>	<b>B</b> <b>[mm]</b>	<b>L</b> <b>[mm]</b>
8	34.0	14.00	362
15	34.0	18.10	466
25	50.5	29.70	606
40	64.0	44.30	731
50	77.5	56.30	853

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

Clamp connection DIN 11864-3



A0016903

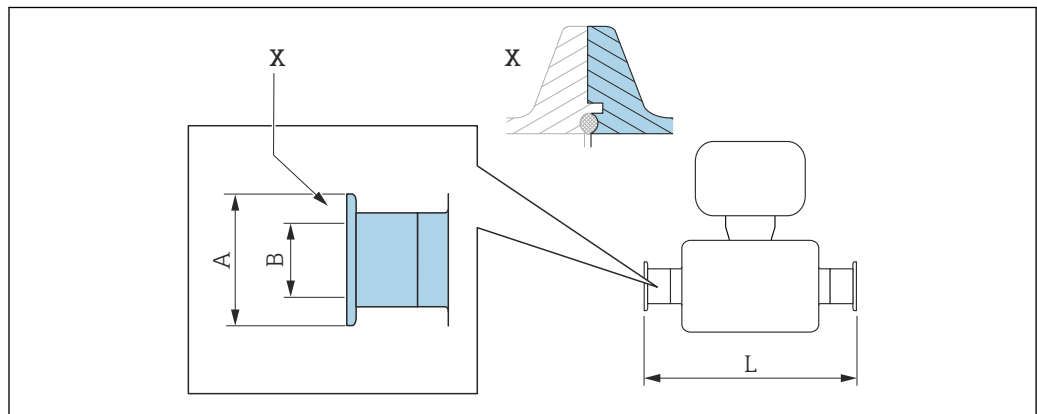
41 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

Clamp DIN 11864-3 Form A, with notch, for pipe according to DIN 11866 series A 1.4435 (316L) Order code for "Process connection", option K LW			
DN [mm]	A [mm]	B [mm]	L [mm]
8	34.0	16.05	370
15	34.0	16.05	474
25	50.5	26.05	614
40	64.0	38.05	738
50	77.5	50.05	853

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

BBS clamp connection



A0016908

42 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

**BBS Quick Connect (sterile orbital), for pipe according to DIN 11866 series A, female 1.4435 (316L)**  
*Order code for "Process connection", option BSE*

DN [mm]	A [mm]	B [mm]	L [mm]
8	25.0	10.00	362
15	50.5	16.00	466
25	50.5	26.00	606
40	64.0	38.00	732
50	77.5	50.00	854

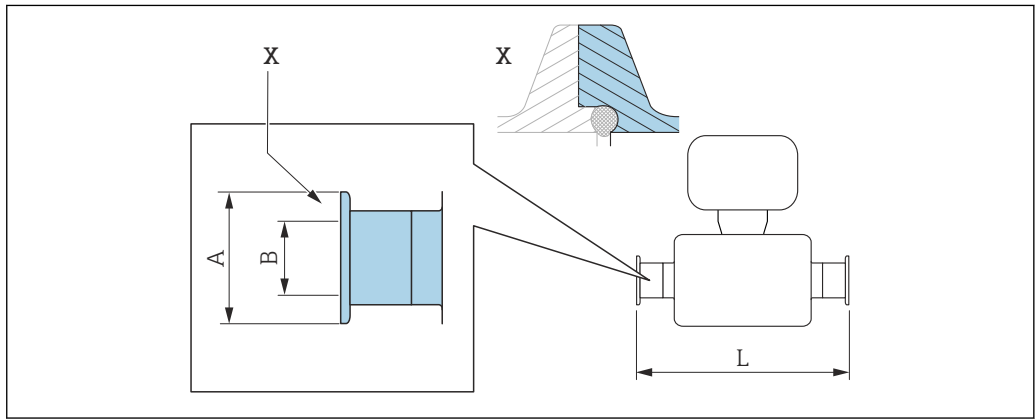
Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

**BBS Quick Connect (sterile orbital) for pipe according to DIN11866 series B, female 1.4435 (316L)**  
*Order code for "Process connection", option BSJ*

DN [mm]	A [mm]	B [mm]	L [mm]
8	25.0	14.00	362
15	50.5	18.10	466
25	50.5	29.70	606
40	64.0	44.30	738
50	77.5	56.30	860

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

*Neumo BioConnect clamp connection*



43 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in mm:  
 +1.5 / -2.0

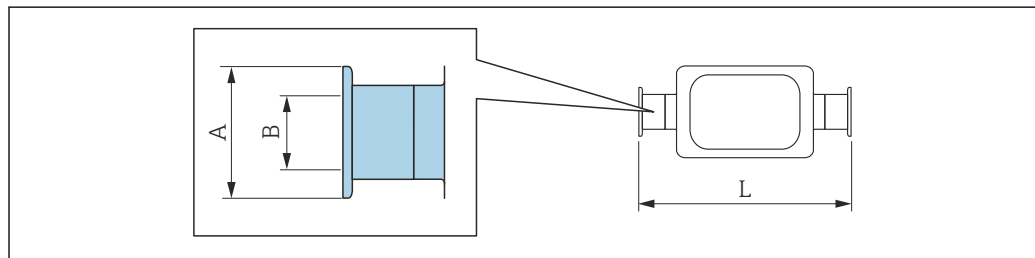
**Clamp, Neumo BioConnect (sterile orbital), for pipe according to DIN 11866 series A, clamp form R 1.4435 (316L)**

Order code for "Process connection", option BSA

DN [mm]	A [mm]	B [mm]	L [mm]
8	25.0	10.00	362
15	25.0	16.00	466
25	50.4	26.00	606
40	64.0	38.00	732
50	77.4	50.00	854

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD

Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

*Eccentric clamp connection DIN 32676, ISO 2852*

A0016543

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

**Eccentric clamp DIN 32676, for pipe according to DIN 11866 series A 1.4435 (316L)**

Order code for "Process connection", option KRW

DN [mm]	A [mm]	B [mm]	L [mm]
8	34.0	10.00	362
15	34.0	16.00	466
25	50.5	26.00	606
50	64.0	50.00	860

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD

Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

**Eccentric clamp ISO 2852, for pipe according to DIN 11866 series B 1.4435 (316L)**

Order code for "Process connection", option JEC

DN [mm]	A [mm]	B [mm]	L [mm]
8	34.0	10.30	362
15	34.0	14.00	466
25	34.0	18.10	606
40	50.5	29.70	738

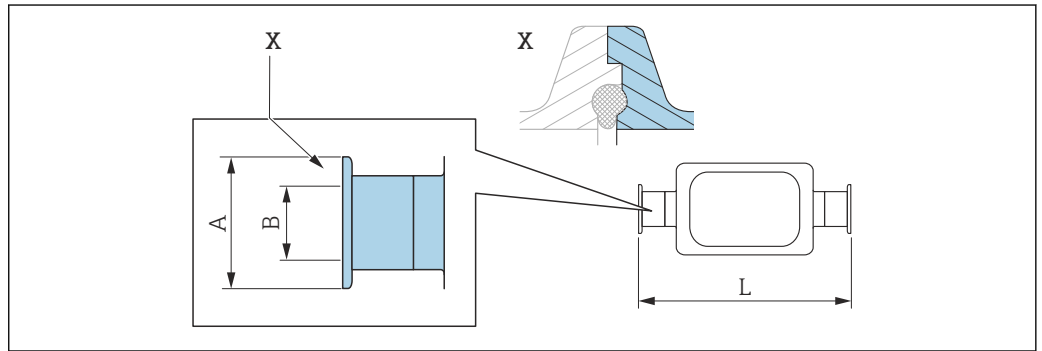
<b>Eccentric clamp ISO 2852, for pipe according to DIN11866 series B 1.4435 (316L)</b>			
<i>Order code for "Process connection", option JEC</i>			
<b>DN [mm]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
50	64.0	44.30	853

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG  
 Additional information regarding "Eccentric clamps"

<b>Eccentric clamp ISO 2852, for pipe according to DIN11866 series B, for connection to DN15 pipes 1.4435 (316L)</b>			
<i>Order code for "Process connection", option JED</i>			
<b>DN [mm]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
25	50.5	18.10	606

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG  
 Additional information regarding "Eccentric clamps"

*Eccentric clamp connection DIN 11864-3*



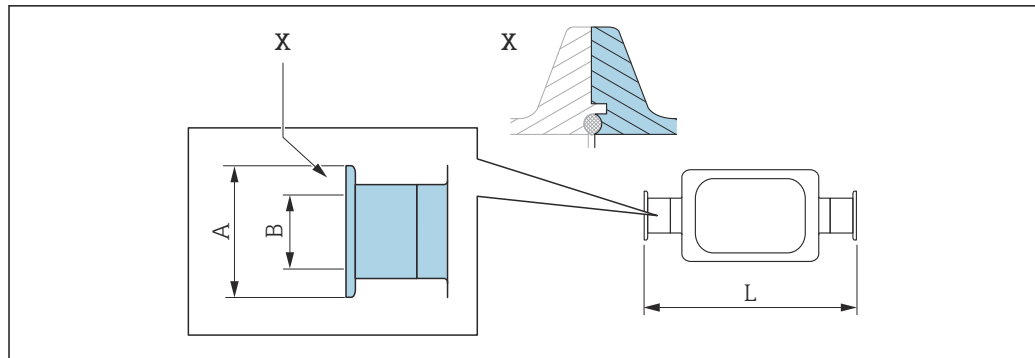
44 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

<b>Eccentric clamp DIN 11864-3 Form A, with notch, for pipe according to DIN 11866 series A 1.4435 (316L)</b>			
<i>Order code for "Process connection", option KNW</i>			
<b>DN [mm]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	34.0	10.00	370
15	34.0	16.00	474
25	50.5	26.00	624
50	77.5	50.00	869

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG  
 Additional information regarding "Eccentric clamps"

## BBS eccentric clamp connection



A0016909

45 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

**BBS Quick Connect (sterile orbital), eccentric, for pipe according to DIN11866 series A, female 1.4435 (316L)**

Order code for "Process connection", option BEJ

DN [mm]	A [mm]	B [mm]	L [mm]
8	25.0	10.00	362
15	50.5	16.00	466
25	50.5	26.00	606
50	77.5	50.00	860

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD

Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

Additional information regarding "Eccentric clamps"

**BBS Quick Connect (sterile orbital), eccentric, for pipe according to DIN11866 series B, female 1.4435 (316L)**

Order code for "Process connection", option BEK

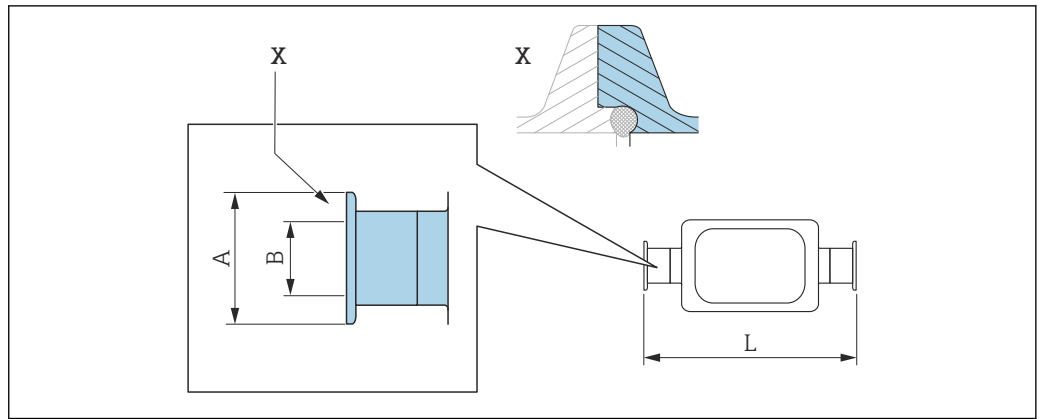
DN [mm]	A [mm]	B [mm]	L [mm]
8	25.0	10.30	362
15	50.5	14.00	466
25	50.5	18.10	606
40	50.5	29.70	738
50	64.0	44.30	860

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD

Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

Additional information regarding "Eccentric clamps"

Neumo BioConnect eccentric clamp connection



A0016906

46 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

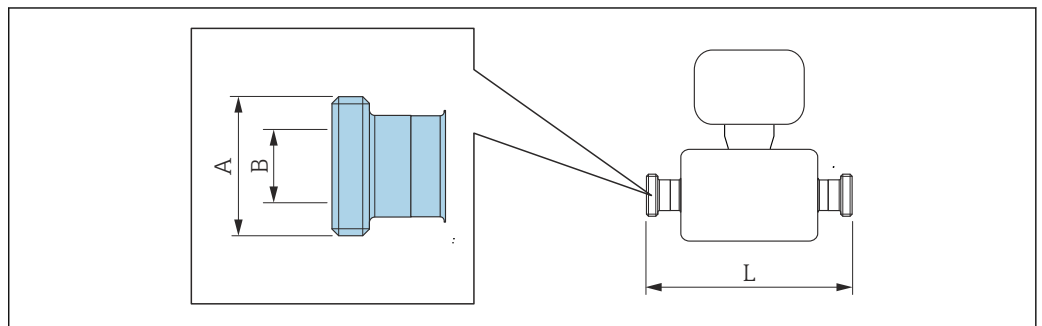
**Neumo BioConnect eccentric clamp connection, for pipe according to DIN 11866 series C, clamp form R 1.4435 (316L)**  
Order code for "Process connection", option BEA

DN [mm]	A [mm]	B [mm]	L [mm]
8	25	10	362
15	25	16	466
25	50.4	26	610
50	77.4	50	859

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG  
Additional information regarding "Eccentric clamps"

Glands

Threaded adapter DIN 11851, DIN 11864-1, SMS 1145, BBS



A0015628

**i** Length tolerance for dimension L in mm:  
+1.5 / -2.0

<b>Threaded adapter DIN 11851, for pipe according to DIN 11866 series A 1.4435 (316L)</b>			
<i>Order code for "Process connection", option KCW</i>			
<b>DN [mm]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	Rd 34 × 1/8	16	362
15	Rd 34 × 1/8	16	466
25	Rd 52 × 1/6	26	606
40	Rd 65 × 1/6	38	738
50	Rd 78 × 1/6	50	864

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

<b>Threaded adapter DIN 11851, Rd 28 × 1/8", for pipe according to DIN 11866 series A 1.4435 (316L)</b>			
<i>Order code for "Process connection", option KAW</i>			
<b>DN [mm]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	Rd 28 × 1/8"	10.00	362
15	Rd 28 × 1/8"	10.00	466

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

<b>Threaded adapter DIN 11864-1 Form A, for pipe according to DIN 11866 series A 1.4435 (316L)</b>			
<i>Order code for "Process connection", option KGW</i>			
<b>DN [mm]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	Rd 34 × 1/8"	16	362
15	Rd 34 × 1/8"	16	466
25	Rd 52 × 1/6"	26	620
40	Rd 65 × 1/6"	38	738
50	Rd 78 × 1/6"	50	864

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

<b>Threaded adapter SMS 1145 1.4435 (316L)</b>			
<i>Order code for "Process connection", option SAW</i>			
<b>DN [mm]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	Rd 40 × 1/6"	22.50	362
15	Rd 40 × 1/6"	22.50	466
25	Rd 40 × 1/6"	22.50	606
40	Rd 60 × 1/6"	35.50	742
50	Rd 70 × 1/6"	48.50	864

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG



**BBS threaded adapter (sterile orbital), for pipe according to DIN 11866 series A 1.4435 (316L)**  
*Order code for "Process connection", option BSC*

DN [mm]	A [mm]	B [mm]	L [mm]
8	M22 × 1.5	10.00	362
15	M30 × 2	16.00	466
25	M42 × 2	26.00	606
40	M52 × 2	38.00	732
50	M68 × 2	50.00	854

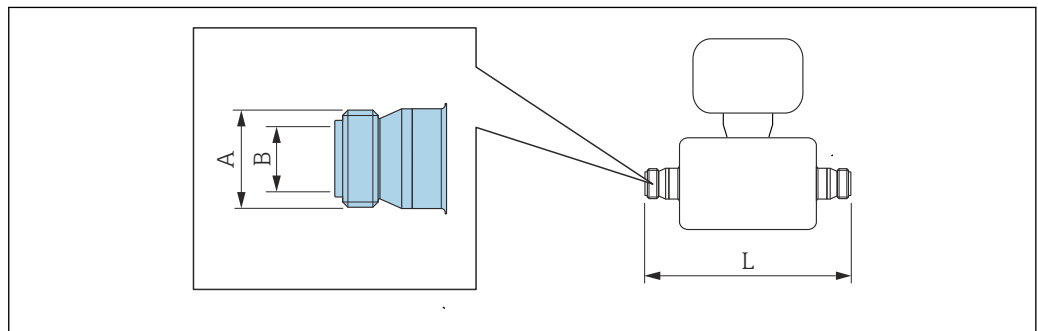
Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

**BBS threaded adapter (sterile orbital), for pipe according to DIN 11866 series B 1.4435 (316L)**  
*Order code for "Process connection", option BSD*

DN [mm]	A [mm]	B [mm]	L [mm]
8	M26 × 1.5	14.00	362
15	M30 × 2	18.10	466
25	M42 × 2	29.70	606
40	M56 × 2	44.30	738
50	M68 × 2	56.30	860

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

*Threaded adapter ISO 2853*



A0015623

 Length tolerance for dimension L in mm:  
 +1.5 / -2.0

**Threaded adapter ISO 2853, for pipe according to ISO 2037 1.4435 (316L)**  
*Order code for "Process connection", option JSD*

DN [mm]	A [mm]	B [mm]	L [mm]
8	37.13	22.60	370
15	37.13	22.60	474
25	37.13	22.60	614

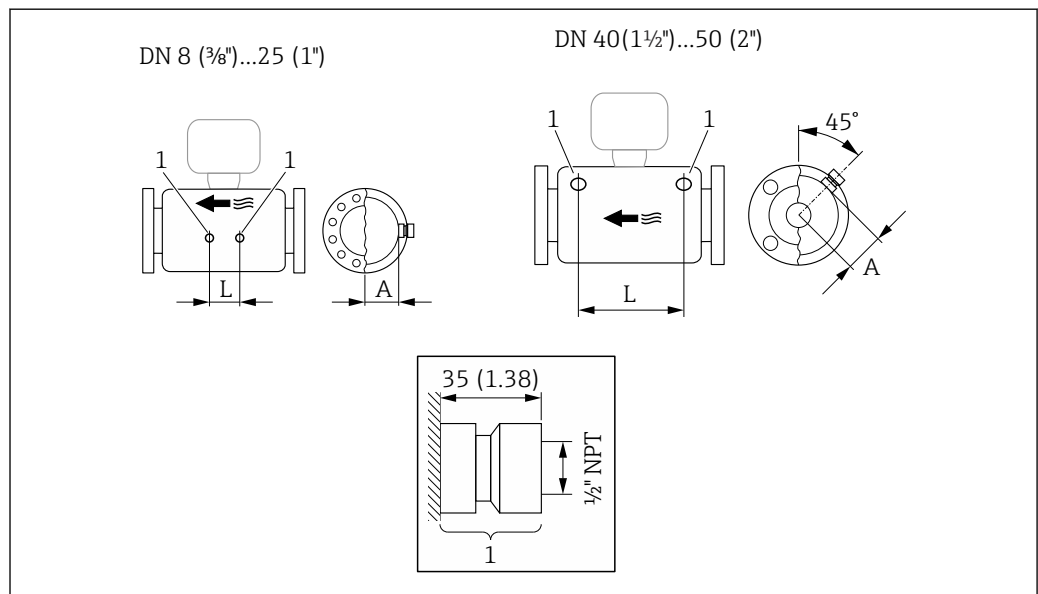
**Threaded adapter ISO 2853, for pipe according to ISO 2037  
1.4435 (316L)**  
Order code for "Process connection", option JSD

DN [mm]	A [mm]	B [mm]	L [mm]
40	50.65	35.60	742
50	64.10	48.60	864

Ra ≤ 0.76 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 0.38 µm electropolished: order code for "Measuring tube material", option BC, TG

**Accessories**

*Rinse connections*



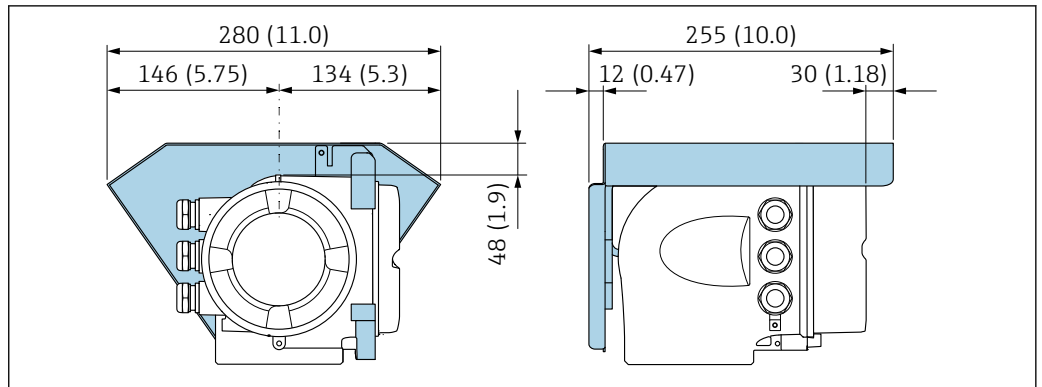
A0029971

47

1 Connection nipple for purge connections: order code for "Sensor options", option CH "Purge connection"

DN [mm]	A [mm]	L [mm]
8	47	110
15	47	204
25	47	348
40	68.15	418
50	81.65	473

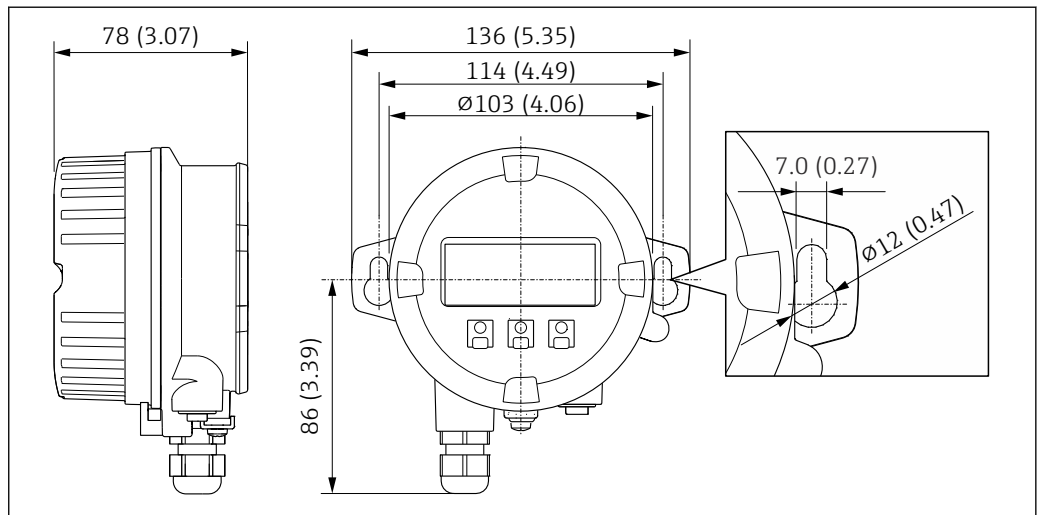
Weather protection cover



A0029553

48 Engineering unit mm (in)

Remote display and operating module DKX001



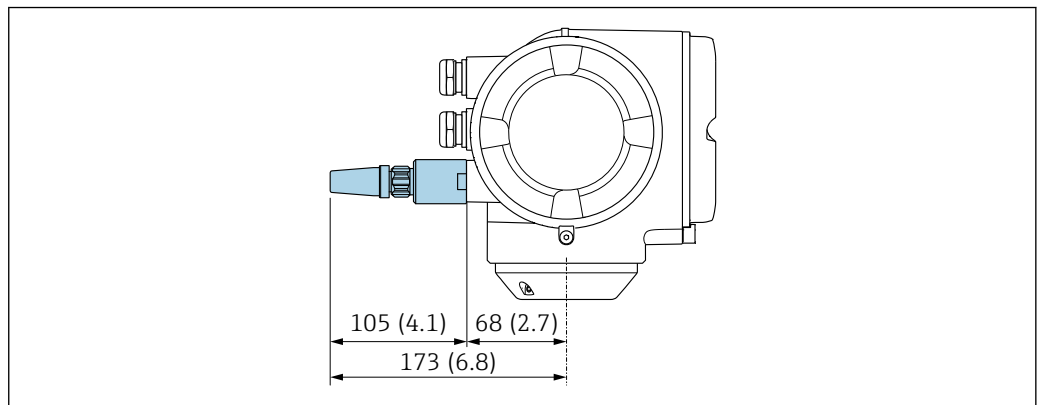
A0028921

49 Engineering unit mm (in)

External WLAN antenna

**i** The external WLAN antenna is not suitable for use in hygienic applications.

External WLAN antenna mounted on device

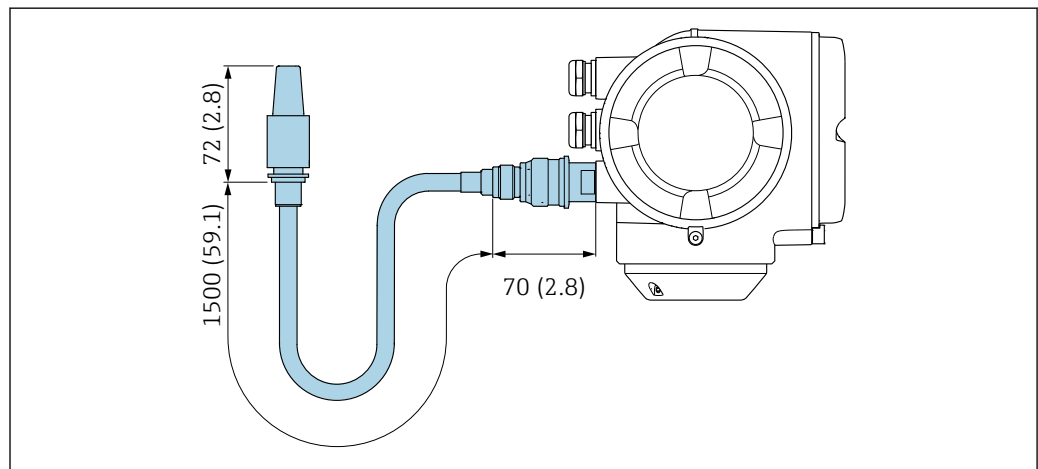


A0028923

50 Engineering unit mm (in)

*External WLAN antenna mounted with cable*

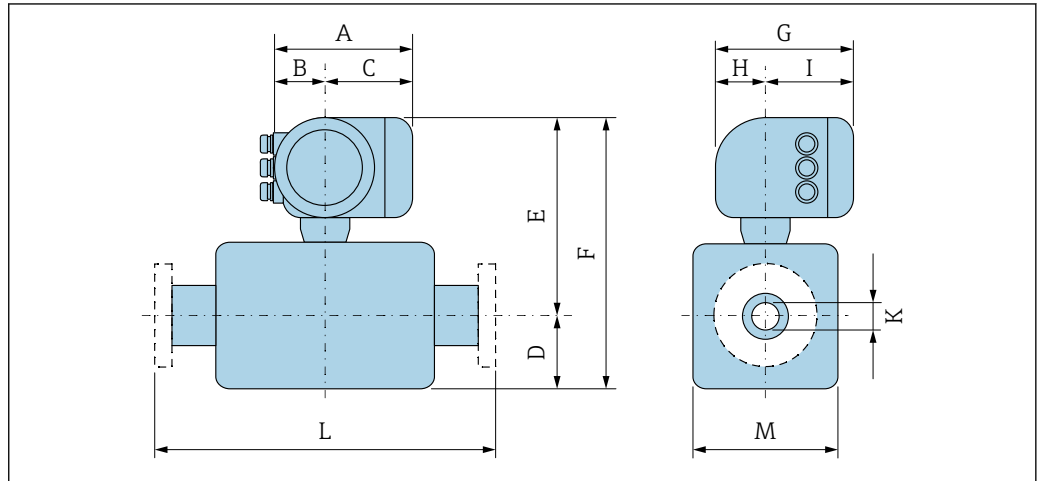
The external WLAN antenna can be mounted separately from the transmitter if the transmission/reception conditions at the transmitter mounting location are poor.



51 Engineering unit mm (in)

Dimensions in US units

Compact version



A0033783

Order code for "Housing", option A "Aluminum, coated"

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G <sup>3)</sup>	H	I <sup>3)</sup>	K	L	M
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
3/8	6.65	2.68	3.98	4.25	10.47	14.72	7.87	2.32	5.55	0.33	<sup>4)</sup>	3.62
1/2	6.65	2.68	3.98	4.25	10.47	14.72	7.87	2.32	5.55	0.47	<sup>4)</sup>	3.62
1	6.65	2.68	3.98	4.76	10.47	15.24	7.87	2.32	5.55	0.69	<sup>4)</sup>	3.62
1 1/2	6.65	2.68	3.98	7.01	11.69	18.7	7.87	2.32	5.55	1.02	<sup>4)</sup>	5.59
2	6.65	2.68	3.98	10.31	12.2	22.52	7.87	2.32	5.55	1.59	<sup>4)</sup>	6.65

- 1) Depending on the cable gland used: values up to + 1.18 in
- 2) With order code for "Sensor option", option CG or order code for "Measuring tube material", option TD, TG: values +2.76 in
- 3) For version without local display: values - 1.18 in
- 4) Depending on the process connection

Order code for "Housing", option A "Aluminum, coated"; Ex d

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G <sup>3)</sup>	H	I <sup>3)</sup>	K	L	M
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
3/8	7.40	3.35	4.06	4.25	10.51	14.76	8.54	2.28	6.26	0.33	<sup>4)</sup>	3.62
1/2	7.40	3.35	4.06	4.25	10.51	14.76	8.54	2.28	6.26	0.47	<sup>4)</sup>	3.62
1	7.40	3.35	4.06	4.76	10.51	15.28	8.54	2.28	6.26	0.69	<sup>4)</sup>	3.62
1 1/2	7.40	3.35	4.06	7.01	11.69	18.7	8.54	2.28	6.26	1.02	<sup>4)</sup>	5.59
2	7.40	3.35	4.06	10.31	12.2	22.52	8.54	2.28	6.26	1.59	<sup>4)</sup>	6.65

- 1) Depending on the cable gland used: values up to + 1.18 in
- 2) With order code for "Sensor option", option CG or order code for "Measuring tube material", option TD, TG: values +2.76 in
- 3) For version without local display: values - 1.57 in
- 4) Depending on the process connection

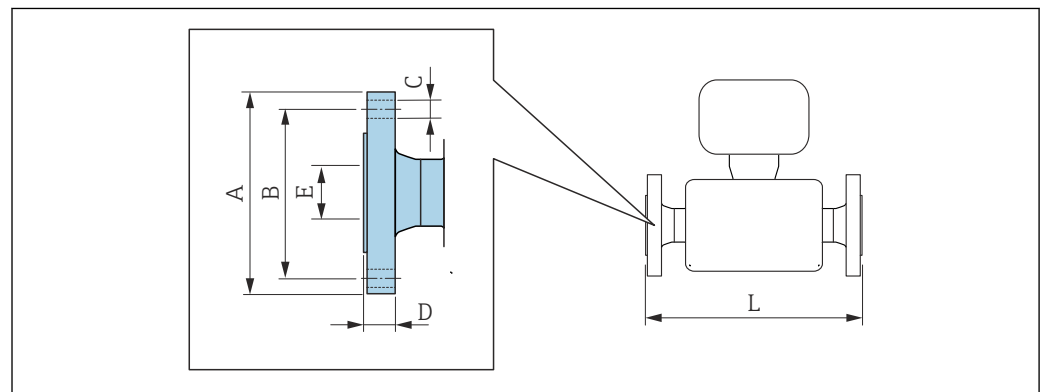
Order code for "Housing", option B "Stainless, hygienic"

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G <sup>3)</sup>	H	I <sup>3)</sup>	K	L	M
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
3/8	7.20	2.87	4.33	4.25	10.47	14.72	7.87	2.56	5.31	0.33	<sup>4)</sup>	3.62
1/2	7.20	2.87	4.33	4.25	10.47	14.72	7.87	2.56	5.31	0.47	<sup>4)</sup>	3.62
1	7.20	2.87	4.33	4.76	10.47	15.24	7.87	2.56	5.31	0.69	<sup>4)</sup>	3.62
1 1/2	7.20	2.87	4.33	7.01	11.69	18.7	7.87	2.56	5.31	1.02	<sup>4)</sup>	5.59
2	7.20	2.87	4.33	10.31	12.2	22.52	7.87	2.56	5.31	1.59	<sup>4)</sup>	6.65

- 1) Depending on the cable gland used: values up to + 1.18 in
- 2) With order code for "Sensor option", option CG or order code for "Measuring tube material", option TD, TG: values +2.76 in
- 3) For version without local display: values - 0.51 in
- 4) Depending on the process connection

**Flange connections**

Fixed flange ASME B16.5



A0015621

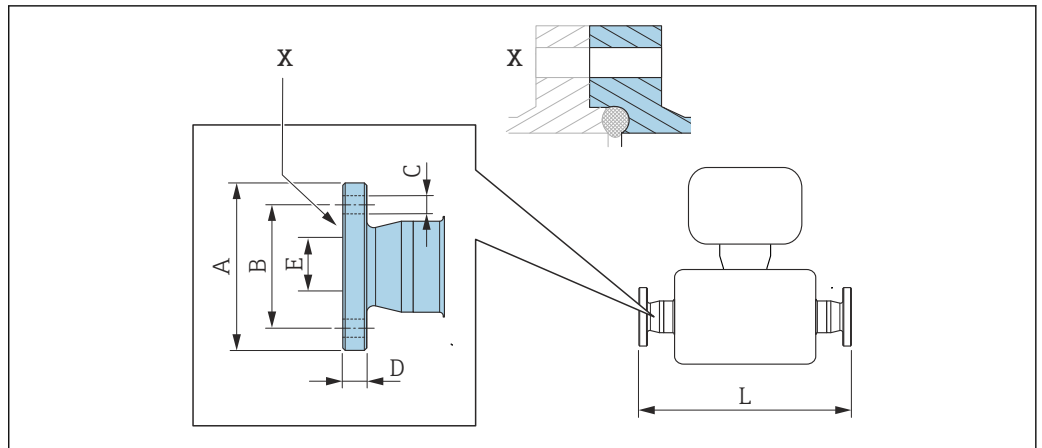
**i** Length tolerance for dimension L in inches:  
+0.06/-0.08

Flange according to ASME B16.5: Cl 150 1.4404 (F316/F316L) Order code for "Process connection", option AAW						
DN	A	B	C	D	E	L
[in]	[in]	[in]	[in]	[in]	[in]	[in]
3/8 <sup>1)</sup>	3.54	2.37	4 × Ø0.62	0.44	0.62	13.23
1/2	3.54	2.37	4 × Ø0.62	0.44	0.62	17.32
1	4.33	3.13	4 × Ø0.62	0.56	1.05	22.83
1 1/2	4.92	3.87	4 × Ø0.62	0.69	1.61	27.83
2	5.91	4.75	4 × Ø0.75	0.75	2.07	32.6

Surface roughness (flange): Ra 3.2 to 6.3 µm

- 1) DN 3/8" with DN 1/2" flanges as standard

Neumo BioConnect fixed flange



A0016907

52 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in inch:  
+0.06 / -0.08

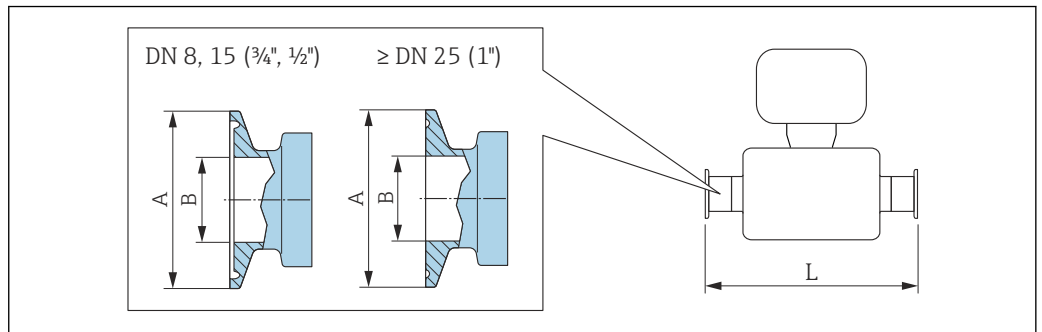
**Neumo BioConnect flange (sterile orbital), for pipe according to DIN 11866 series A, flange form R 1.4435 (316L)**  
Order code for "Process connection", option BSB

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
3/8	2.56	1.77	4 × Ø0.35	0.39	0.39	15.12
1/2	2.95	2.17	4 × Ø0.35	0.39	0.63	19.21
1	3.35	2.56	4 × Ø0.35	0.47	1.02	24.65
1 1/2	3.94	3.15	4 × Ø0.35	0.47	1.5	29.65
2	4.33	3.54	4 × Ø0.35	0.55	1.97	34.53

Ra ≤ 30 µm: order code for "Measuring tube material", option BB, TD  
Ra ≤ 15 µm electropolished: order code for "Measuring tube material", option BC, TG

Clamp connections

Tri-Clamp



A0023342

53 Unit mm (in)

**i** Length tolerance for dimension L in inch:  
+0.06 / -0.08

<b>Tri-Clamp; for pipe according to DIN 11866 series C 1.4435 (316L)</b>				
<i>Order code for "Process connection", option FHW</i>				
<b>DN [in]</b>	<b>Clamp [in]</b>	<b>A [in]</b>	<b>B [in]</b>	<b>L [in]</b>
3/8	1/2	0.98	0.37	14.25
1/2	3/4	0.98	0.62	18.35
1	1	1.98	0.87	23.86
1 1/2	1 1/2	1.98	1.37	28.78
2	2	2.52	1.87	33.58

Ra ≤ 30 µin: order code for "Measuring tube material", option BB, TD  
Ra ≤ 15 µin electropolished: order code for "Measuring tube material", option BC, TG

<b>1/2" Tri-Clamp; for pipe according to DIN 11866 series C 1.4435 (316L)</b>				
<i>Order code for "Process connection", option FCW</i>				
<b>DN [in]</b>	<b>Clamp [in]</b>	<b>A [in]</b>	<b>B [in]</b>	<b>L [in]</b>
1/2	1/2	0.98	0.37	18.35

Ra ≤ 30 µin: order code for "Measuring tube material", option BB, TD

<b>3/4" Tri-Clamp; for pipe according to DIN 11866 series C 1.4435 (316L)</b>				
<i>Order code for "Process connection", option FFW</i>				
<b>DN [in]</b>	<b>Clamp [in]</b>	<b>A [in]</b>	<b>B [in]</b>	<b>L [in]</b>
3/8	3/4	0.98	0.62	14.25

Ra ≤ 30 µin: order code for "Measuring tube material", option BB, TD  
Ra ≤ 15 µin electropolished: order code for "Measuring tube material", option BC, TG

<b>1" Tri-Clamp; for pipe according to DIN 11866 series C 1.4435 (316L)</b>				
<i>Order code for "Process connection", option FPW</i>				
<b>DN [in]</b>	<b>Clamp [in]</b>	<b>A [in]</b>	<b>B [in]</b>	<b>L [in]</b>
3/8	1	1.98	0.87	14.25
1/2	1	1.98	0.87	18.35

Ra ≤ 30 µin: order code for "Measuring tube material", option BB, TD  
Ra ≤ 15 µin electropolished: order code for "Measuring tube material", option BC, TG

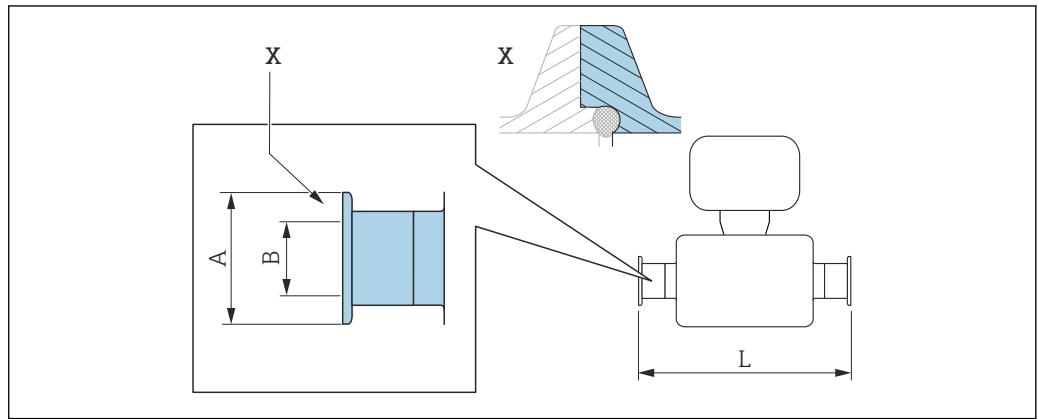
<b>Tri-Clamp eccentric; for pipe according to DIN 11866 series C 1.4435 (316L)</b>					
<b>DN [in]</b>	<b>Order code for "Process connection", option</b>	<b>Clamp [in]</b>	<b>A [in]</b>	<b>B [in]</b>	<b>L [in]</b>
3/8	FEB	1/2	0.98	0.37	14.25
1/2	FED	3/4	0.98	0.62	18.35
1	FEF	1	1.98	0.87	23.86
1 1/2	FEH	1 1/2	1.98	1.37	29.06



Tri-Clamp eccentric; for pipe according to DIN 11866 series C 1.4435 (316L)					
DN [in]	Order code for "Process connection", option	Clamp [in]	A [in]	B [in]	L [in]
2	FEK	2	2.52	1.87	33.86

Ra ≤ 30 µin: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 15 µin electropolished: order code for "Measuring tube material", option BC, TG  
 Additional information regarding "Eccentric clamps"

Neumo BioConnect clamp connection



A0016905

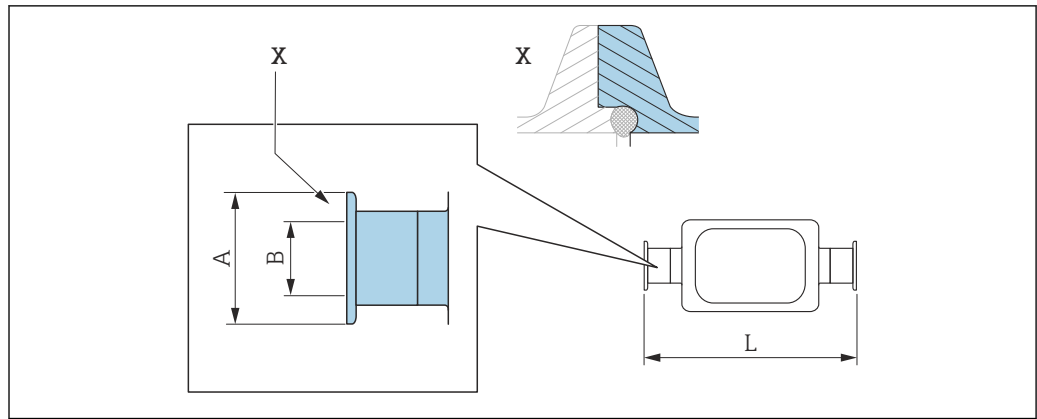
54 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

**i** Length tolerance for dimension L in inch:  
 +0.06 / -0.08

Clamp; Neumo BioConnect (sterile orbital), for pipe according to DIN 11866 series A, clamp form R 1.4435 (316L)			
Order code for "Process connection", option BSA			
DN [in]	A [in]	B [in]	L [in]
3/8	0.98	0.39	14.25
1/2	0.98	0.63	18.35
1	1.98	1.02	23.86
1 1/2	2.52	1.5	28.82
2	3.05	1.97	33.62

Ra ≤ 30 µin: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 15 µin electropolished: order code for "Measuring tube material", option BC, TG

Neumo BioConnect eccentric clamp connection



A0016906

55 Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.

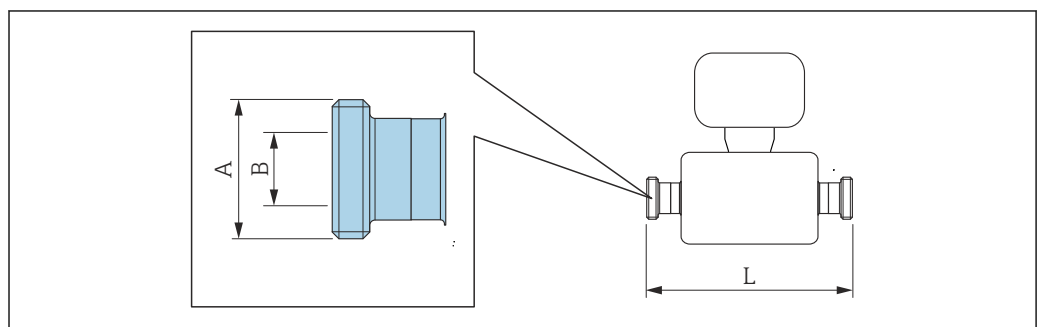
**i** Length tolerance for dimension L in inch:  
+0.06 / -0.08

Neumo BioConnect eccentric clamp connection, for pipe according to DIN 11866 series C, clamp form R 1.4435 (316L) Order code for "Process connection", option BEA			
DN [in]	A [in]	B [in]	L [in]
3/8	0.98	0.39	14.25
1/2	0.98	0.63	18.35
1	1.98	1.02	24.02
2	3.05	1.97	43.39

Ra ≤ 30 µin: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 15 µin electropolished: order code for "Measuring tube material", option BC, TG  
 Additional information regarding "Eccentric clamps"

Glands

Threaded adapter SMS 1145



A0015628

**i** Length tolerance for dimension L in inch:  
+0.06 / -0.08

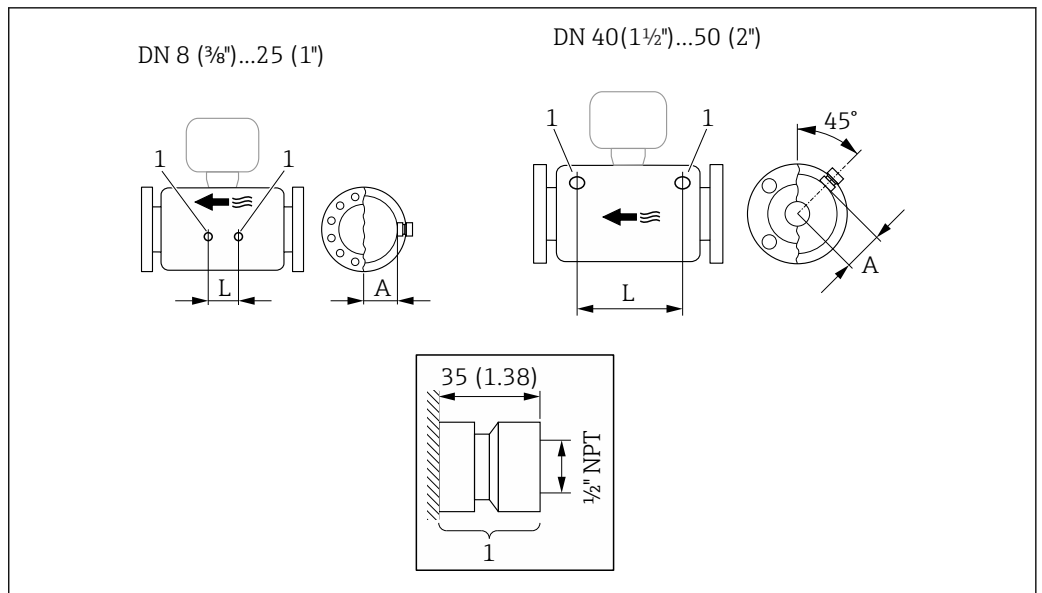
**Threaded adapter SMS 1145**  
**1.4435 (316L)**  
*Order code for "Process connection", option SAW*

DN [in]	A [in]	B [in]	L [in]
3/8	Rd 40 × 1/6	0.89	14.25
1/2	Rd 40 × 1/6	0.89	18.35
1	Rd 40 × 1/6	0.89	23.86
1 1/2	Rd 60 × 1/6	1.4	29.21
2	Rd 70 × 1/6	1.91	34.02

Ra ≤ 30 µin: order code for "Measuring tube material", option BB, TD  
 Ra ≤ 15 µin electropolished: order code for "Measuring tube material", option BC, TG

**Accessories**

*Rinse connections*



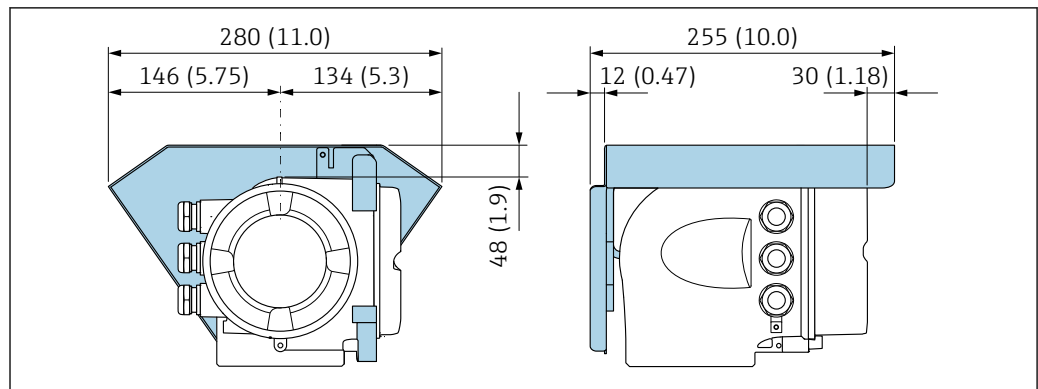
A0029971

56

1 Connection nipple for purge connections: order code for "Sensor options", option CH "Purge connection"

DN [in]	A [in]	L [in]
3/8	1.85	4.33
1/2	1.85	8.03
1	1.85	13.7
1 1/2	2.683	16.46
2	3.215	18.62

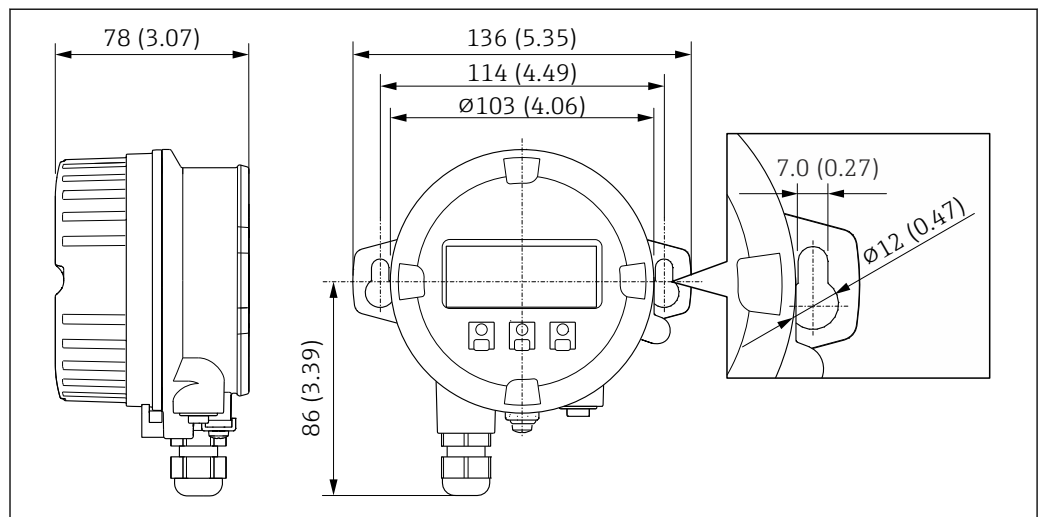
Weather protection cover



A0029553

57 Engineering unit mm (in)

Remote display and operating module DKX001



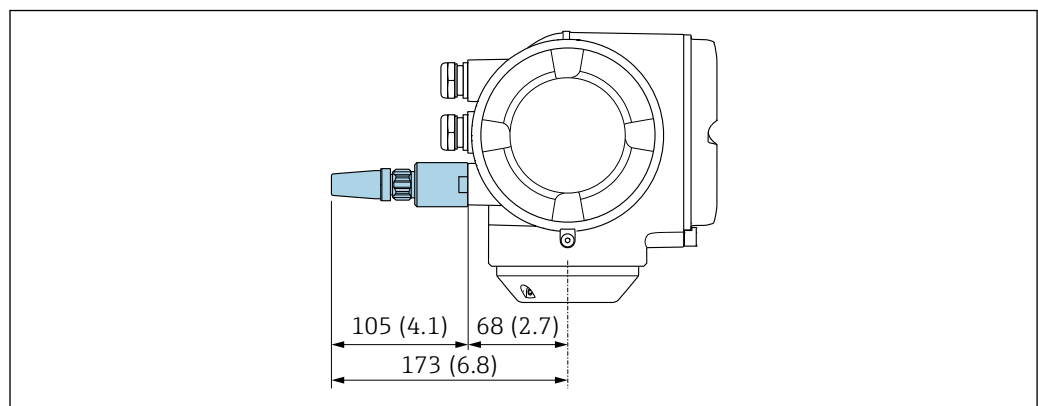
A0028921

58 Engineering unit mm (in)

External WLAN antenna

**i** The external WLAN antenna is not suitable for use in hygienic applications.

External WLAN antenna mounted on device

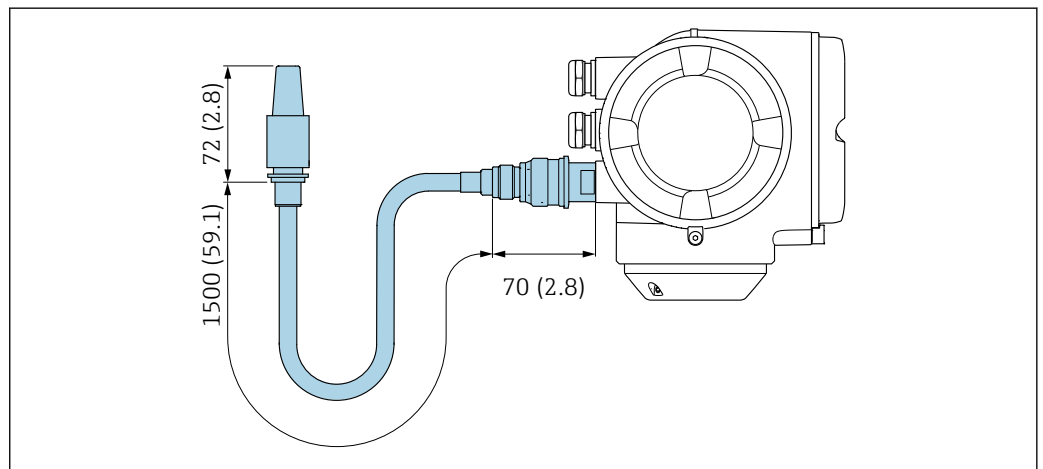


A0028923

59 Engineering unit mm (in)

*External WLAN antenna mounted with cable*

The external WLAN antenna can be mounted separately from the transmitter if the transmission/reception conditions at the transmitter mounting location are poor.



A0033597

60 Engineering unit mm (in)

**Weight**

All values (weight exclusive of packaging material) refer to devices with EN/DIN PN 40 flanges. Weight specifications including transmitter as per order code for "Housing", option A "Aluminum, coated".

Different values due to different transmitter versions:

- Transmitter version for the hazardous area  
(Order code for "Housing", option A "Aluminum, coated"; Ex d): +2 kg (+4.4 lbs)
- Transmitter version for hygienic area  
(Order code for "Housing", option B "Stainless, hygienic"): +0.2 kg (+0.44 lbs)

**Weight in SI units**

DN [mm]	Weight [kg]
8	12
15	14
25	20
40	36
50	59

**Weight in US units**

DN [in]	Weight [lbs]
3/8	26
1/2	31
1	44
1 1/2	79
2	130

**Materials**

**Transmitter housing**

Order code for "Housing":

- Option **A** "Aluminum, coated": aluminum, AlSi10Mg, coated
- Option **B** "Stainless, hygienic": stainless steel, 1.4404 (316L)

*Window material*

Order code for "Housing":

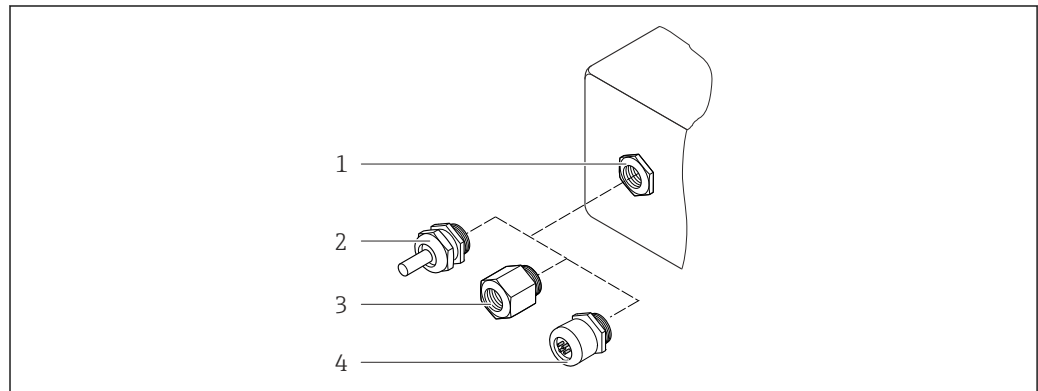
- Option **A** "Aluminum, coated": glass
- Option **B** "Stainless, hygienic": polycarbonate

*Seals*

Order code for "Housing":

Option **B** "Stainless, hygienic": EPDM and silicone

**Cable entries/cable glands**



A0028352

61 Possible cable entries/cable glands

- 1 Female thread M20 × 1.5
- 2 Cable gland M20 × 1.5
- 3 Adapter for cable entry with female thread G ½" or NPT ½"
- 4 Device plug

Order code for "Housing", option A "Aluminum, coated"

The various cable entries are suitable for hazardous and non-hazardous areas.

Cable entry/cable gland	Material
Compression fitting M20 × 1.5	Non-Ex: plastic
	Z2, D2, Ex d/de: brass with plastic
Adapter for cable entry with female thread G ½"	Nickel-plated brass
Adapter for cable entry with female thread NPT ½"	

Order code for "Housing", option B "Stainless, hygienic"

The various cable entries are suitable for hazardous and non-hazardous areas.

Cable entry/cable gland	Material
Cable gland M20 × 1.5	Plastic
Adapter for cable entry with female thread G ½"	Nickel-plated brass
Adapter for cable entry with female thread NPT ½"	

**Device plug**

Electrical connection	Material
Plug M12x1	<ul style="list-style-type: none"> <li>▪ Socket: Stainless steel, 1.4404 (316L)</li> <li>▪ Contact housing: Polyamide</li> <li>▪ Contacts: Gold-plated brass</li> </ul>

#### Sensor housing

- Acid and alkali-resistant outer surface
- Stainless steel 1.4301 (304)


#### Measuring tubes

Stainless steel, 1.4435 BN2 (316L)

#### Process connections

- Flanges according to EN 1092-1 (DIN 2501) / according to ASME B16.5 / according to JIS B2220:  
Stainless steel, 1.4404 (F316/F316L)
- All other process connections:  
Stainless steel, 1.4435 BN2 (316L)



Available process connections →  96

#### Seals

Welded process connections without internal seals

#### Accessories

##### *Protective cover*

Stainless steel, 1.4404 (316L)

##### *External WLAN antenna*

- Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brass
- Adapter: Stainless steel and nickel-plated brass
- Cable: Polyethylene
- Plug: Nickel-plated brass
- Angle bracket: Stainless steel

**Process connections**

- Fixed flange connections:
  - EN 1092-1 (DIN 2501) flange
  - EN 1092-1 (DIN 2512N) flange
  - ASME B16.5 flange
  - JIS B2220 flange
  - DIN 11864-2 Form A flange, DIN 11866 series A, flange with notch
  - BBS flange small (sterile orbital), DIN 11866 series A, female
  - BBS flange small (sterile orbital), DIN 11866 series B, female
- Clamp connections:
  - Tri-Clamp (OD tubes), DIN 11866 series C
  - DIN 11864-3 Form A clamp, DIN 11866 series A, with notch
  - DIN 32676 clamp, DIN 11866 series A
  - ISO 2852 clamp, ISO 2037
  - ISO 2852 clamp, DIN 11866 series B
  - BBS Quick-Connect (sterile orbital), DIN 11866 series A, female
  - BBS Quick-Connect (sterile orbital), DIN 11866 series B, female
  - Neumo BioConnect clamp, DIN 11866 series A, clamp form R
- Eccentric clamp connections:
  - Eccen. Tri-Clamp, DIN 11866 series C
  - DIN 11864-3 Form A clamp, DIN 11866 series A, with notch
  - DIN 32676 clamp, DIN 11866 series A
  - ISO 2852 clamp, DIN 11866 series B
  - BBS Quick-Connect (sterile orbital), DIN 11866 series A, female
  - BBS Quick-Connect (sterile orbital), DIN 11866 series B, female
  - Neumo BioConnect clamp, DIN 11866 series A, clamp form R
- Thread:
  - DIN 11851 thread, DIN 11866 series A
  - SMS 1145 thread
  - ISO 2853 thread, ISO 2037
  - DIN 11864-1 Form A thread, DIN 11866 series A
  - BBS thread (sterile orbital), DIN 11866 series A
  - BBS thread (sterile orbital), DIN 11866 series B



Process connection materials → 95

**Surface roughness**

All data refer to parts in contact with the medium.

The following surface roughness categories can be ordered:

Category	Method	Option(s) order code "Measuring tube mat., wetted surface"
Ra ≤ 0.76 µm (30 µin) <sup>1)</sup>	Mechanically polished	BB, TD
Ra ≤ 0.38 µm (15 µin) <sup>1)</sup>	Mechanical and electropolished	BC, TG

1) Ra according to ISO 21920



## Display and user interface

### Operation concept

#### Operator-oriented menu structure for user-specific tasks

- Commissioning
- Operation
- Diagnosis
- Expert level

#### Quick and safe commissioning

- Guided menus ("Make-it-run" wizards) for applications
- Menu guidance with brief descriptions of the individual parameter functions
- Access to the device via web server
- WLAN access to the device via mobile handheld terminal, tablet or smart phone

#### Reliable operation

- Operation in local language
- Uniform operating philosophy applied to device and operating tools
- If replacing electronic modules, transfer the device configuration via the integrated memory (HistoROM backup) which contains the process and measuring device data and the event logbook. No need to reconfigure.

#### Efficient diagnostics increase measurement reliability

- Troubleshooting measures can be called up via the device and in the operating tools
- Diverse simulation options, logbook for events that occur and optional line recorder functions

### Languages

Can be operated in the following languages:

- Via local operation  
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Vietnamese, Czech, Swedish
- Via web browser  
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Vietnamese, Czech, Swedish
- Via "FieldCare", "DeviceCare" operating tool: English, German, French, Spanish, Italian, Chinese, Japanese

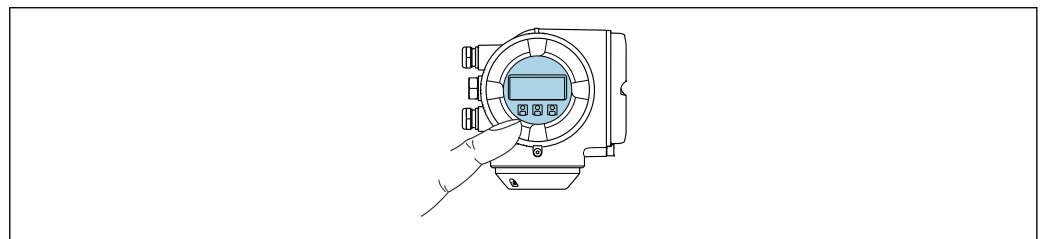
### Onsite operation


#### Via display module

Features:

- Order code for "Display; operation", option F "4-line, illuminated, graphic display; touch control"
- Order code for "Display; operation", option G "4-line, illuminated, graphic display; touch control + WLAN"

 Information about WLAN interface →  105




 62 Operation with touch control

#### Display elements

- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured

#### Operating elements

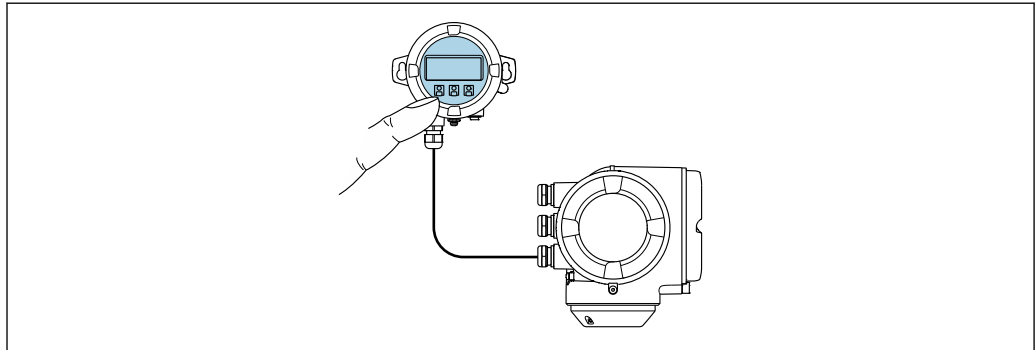
- External operation via touch control (3 optical keys) without opening the housing: , , 
- Operating elements also accessible in the various zones of the hazardous area

### Via remote display and operating module DKX001



The remote display and operating module DKX001 is available as an optional extra → 115..

- The remote display and operating module DKX001 is only available for the following housing version: order code for "Housing": option A "Aluminum, coated"
- The measuring instrument is always supplied with a dummy cover when the remote display and operating module DKX001 is ordered directly with the measuring instrument. Display or operation at the transmitter is not possible in this case.
- If ordered subsequently, the remote display and operating module DKX001 may not be connected at the same time as the existing measuring instrument display module. Only one display or operation unit may be connected to the transmitter at any one time.



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63 Operation via remote display and operating module DKX001

#### Display and operating elements

The display and operating elements correspond to those of the display module → 97.

#### Housing material

The housing material of the display and operating module DKX001 depends on the choice of transmitter housing material.

Transmitter housing		Remote display and operating module
Order code for "Housing"	Material	Material
Option A "Aluminum, coated"	AlSi10Mg, coated	AlSi10Mg, coated

#### Cable entry

Corresponds to the choice of transmitter housing, order code for "Electrical connection".

#### Connecting cable

→ 48

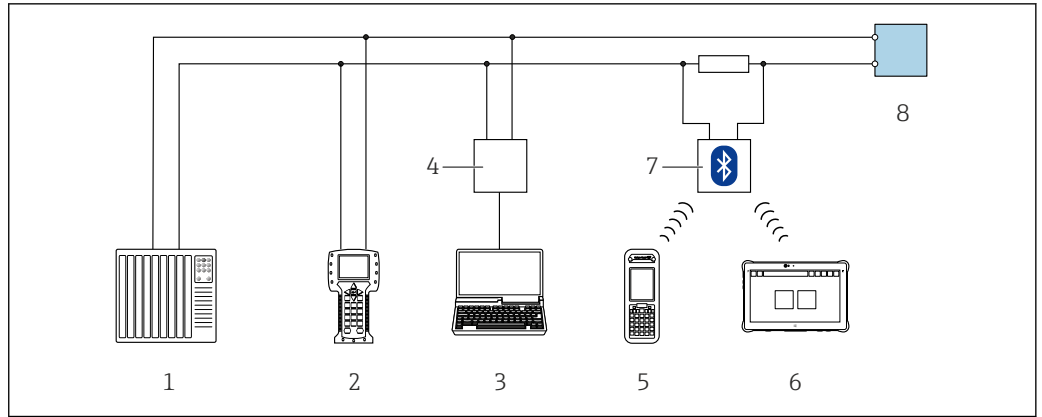
#### Dimensions

→ 83

## Remote operation

### Via HART protocol

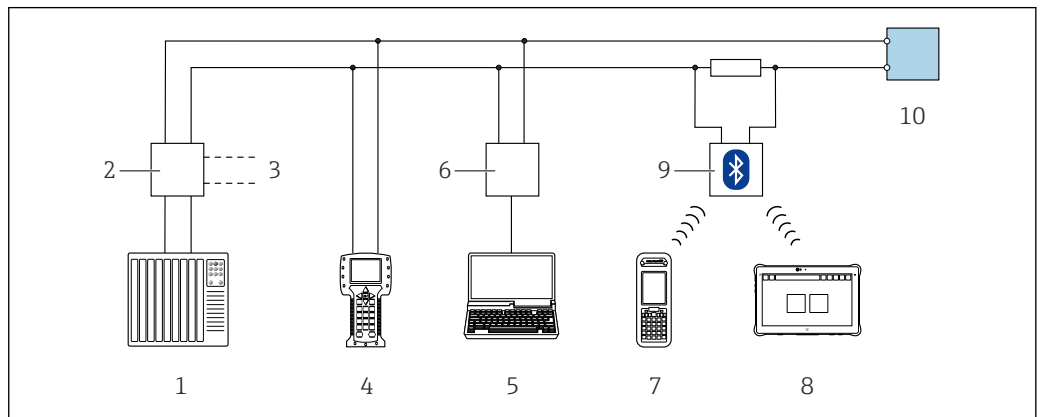
This communication interface is available in device versions with a HART output.



A0028747

64 Options for remote operation via HART protocol (active)

- 1 Control system (e.g. PLC)
- 2 Field Communicator 475
- 3 Computer with web browser (e.g. Microsoft Edge) to access the integrated device web server or computer with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
- 4 Commubox FXA195 (USB)
- 5 Field Xpert SFX350 or SFX370
- 6 Field Xpert SMT70
- 7 VIATOR Bluetooth modem with connecting cable
- 8 Transmitter



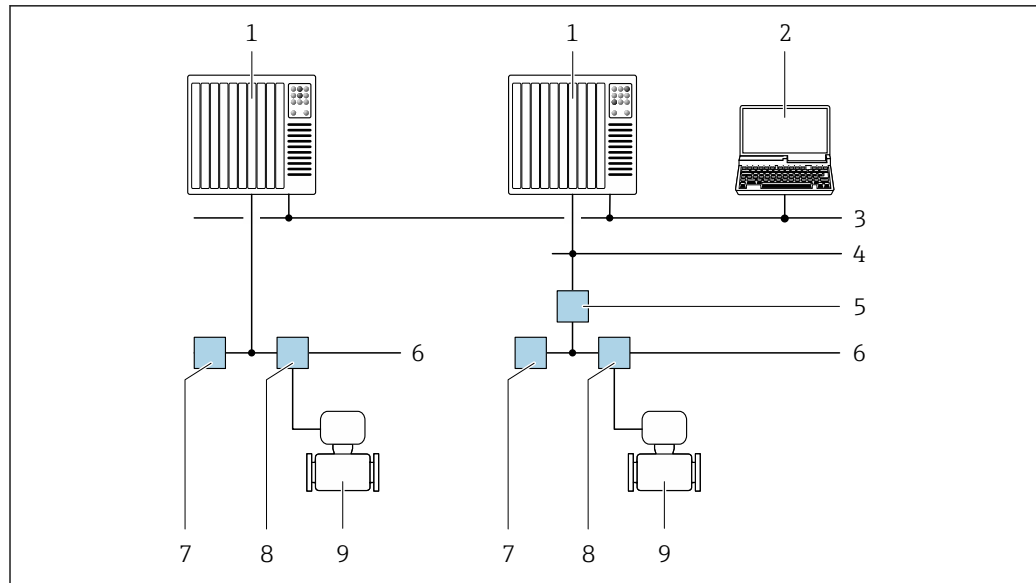
A0028746

65 Options for remote operation via HART protocol (passive)

- 1 Control system (e.g. PLC)
- 2 Transmitter power supply unit, e.g. RN221N (with communication resistor)
- 3 Connection for Commubox FXA195 and Field Communicator 475
- 4 Field Communicator 475
- 5 Computer with web browser (e.g. Microsoft Edge) to access the integrated device web server or computer with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
- 6 Commubox FXA195 (USB)
- 7 Field Xpert SFX350 or SFX370
- 8 Field Xpert SMT70
- 9 VIATOR Bluetooth modem with connecting cable
- 10 Transmitter

### Via FOUNDATION Fieldbus network

This communication interface is available in device versions with FOUNDATION Fieldbus.



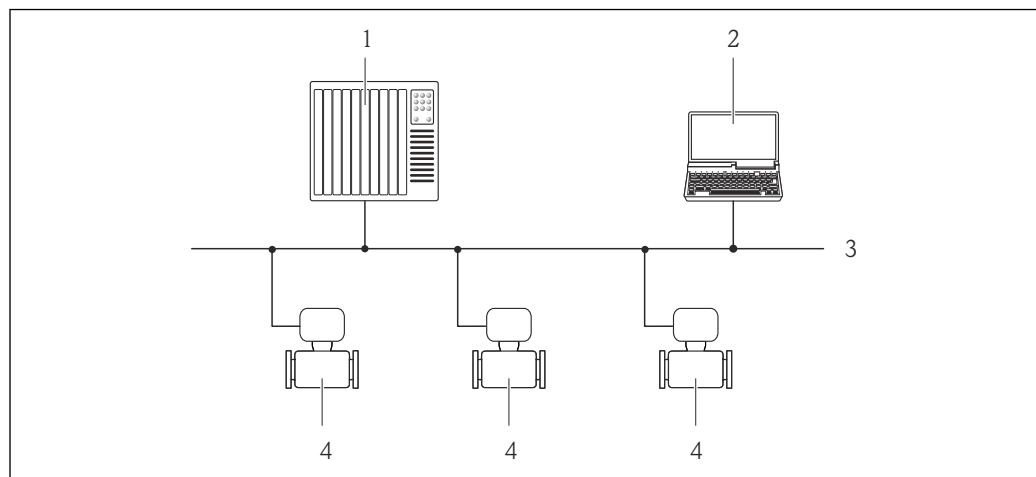
A0028837

66 Options for remote operation via FOUNDATION Fieldbus network

- 1 Automation system
- 2 Computer with FOUNDATION Fieldbus network card
- 3 Industry network
- 4 High Speed Ethernet FF-HSE network
- 5 Segment coupler FF-HSE/FF-H1
- 6 FOUNDATION Fieldbus FF-H1 network
- 7 Power supply FF-H1 network
- 8 T-box
- 9 Measuring device

#### Via PROFIBUS DP network

This communication interface is available in device versions with PROFIBUS DP.



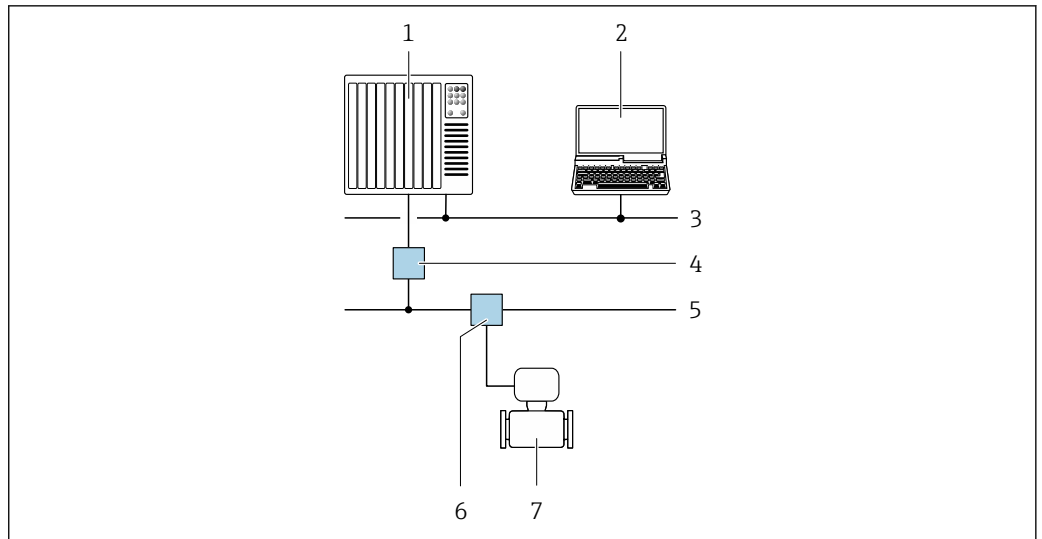
A0020903

67 Options for remote operation via PROFIBUS DP network

- 1 Automation system
- 2 Computer with PROFIBUS network card
- 3 PROFIBUS DP network
- 4 Measuring device

#### Via PROFIBUS PA network

This communication interface is available in device versions with PROFIBUS PA.



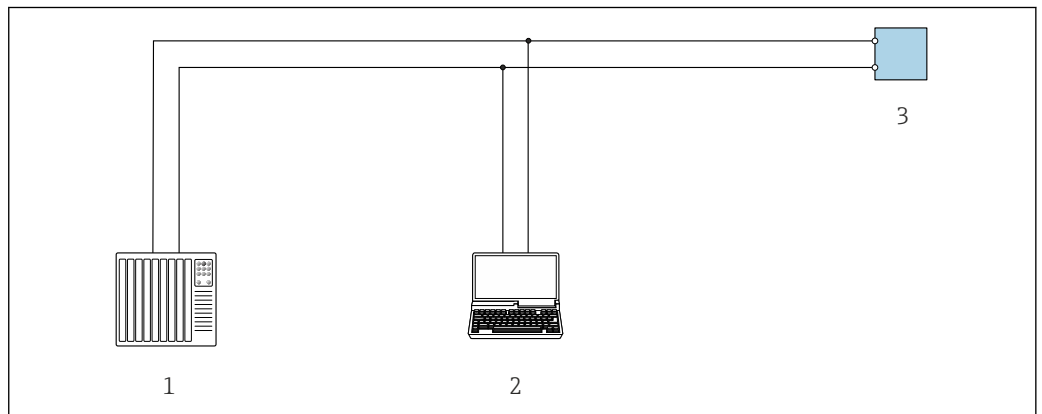
A0028838

68 Options for remote operation via PROFIBUS PA network

- 1 Automation system
- 2 Computer with PROFIBUS network card
- 3 PROFIBUS DP network
- 4 Segment coupler PROFIBUS DP/PA
- 5 PROFIBUS PA network
- 6 T-box
- 7 Measuring device

**Via Modbus RS485 protocol**

This communication interface is available in device versions with a Modbus RS485 output.



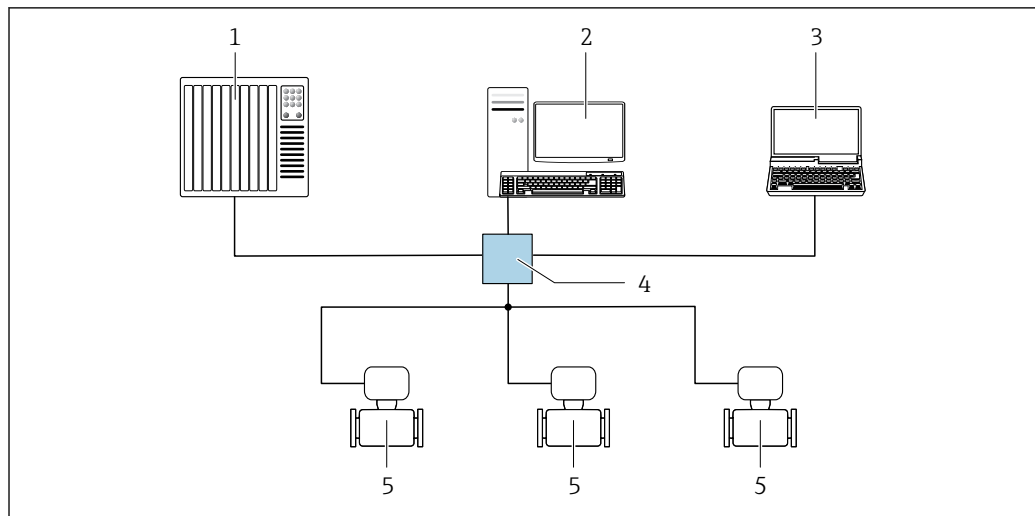
A0029437

69 Options for remote operation via Modbus RS485 protocol (active)


- 1 Control system (e.g. PLC)
- 2 Computer with web browser (e.g. Microsoft Edge) to access the integrated device web server or with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 3 Transmitter

**Via EtherNet/IP network**

This communication interface is available in device versions with EtherNet/IP.

*Star topology*

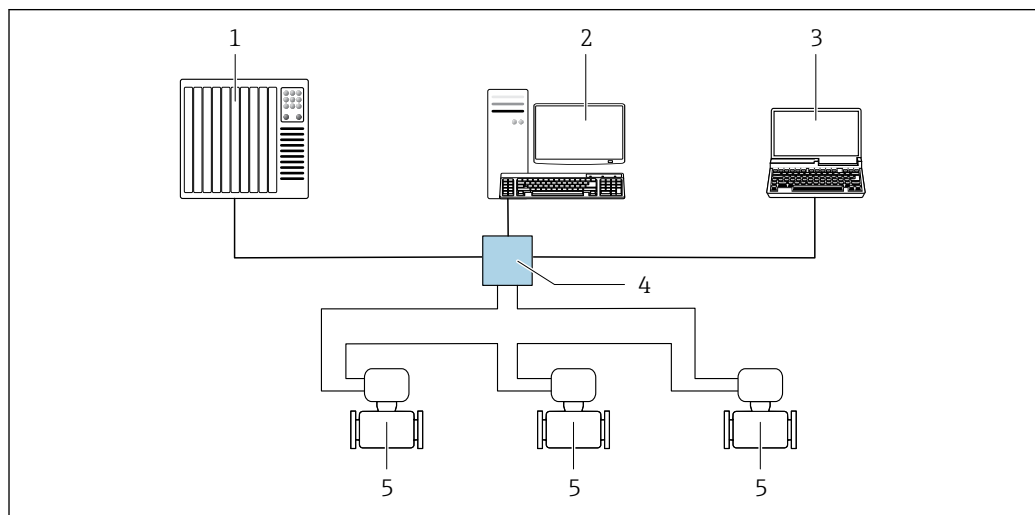
A0032078

 70 Options for remote operation via EtherNet/IP network: star topology


- 1 Automation system, e.g. "RSLogix" (Rockwell Automation)
- 2 Workstation for measuring device operation: with Custom Add-On Profile for "RSLogix 5000" (Rockwell Automation) or with Electronic Data Sheet (EDS)
- 3 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated Web server or computer with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP"
- 4 Standard Ethernet switch, e.g. Scalance X204 (Siemens)
- 5 Measuring device

*Ring topology*

The device is integrated via the terminal connection for signal transmission (output 1) and the service interface (CDI-RJ45).



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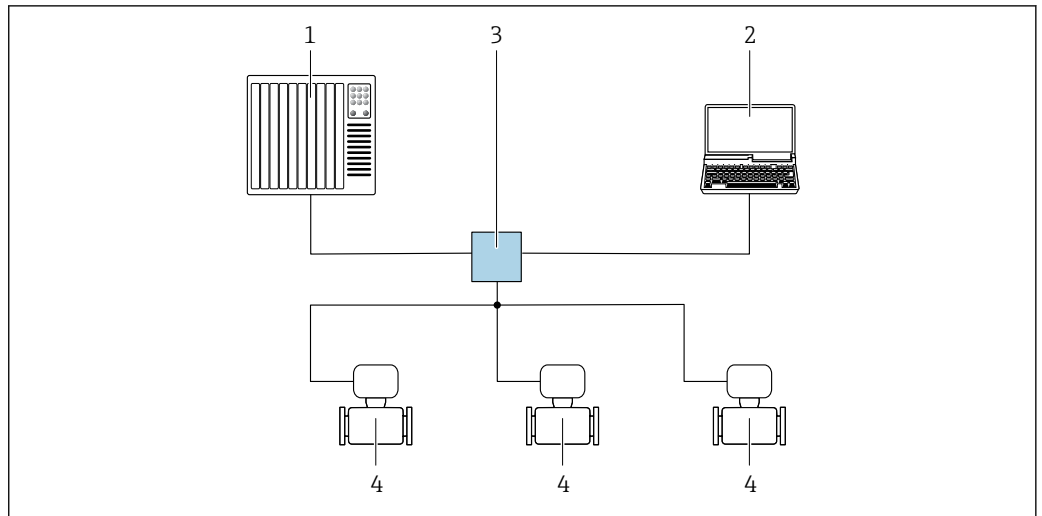
 71 Options for remote operation via EtherNet/IP network: ring topology

- 1 Automation system, e.g. "RSLogix" (Rockwell Automation)
- 2 Workstation for measuring device operation: with Custom Add-On Profile for "RSLogix 5000" (Rockwell Automation) or with Electronic Data Sheet (EDS)
- 3 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated Web server or computer with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP"
- 4 Standard Ethernet switch, e.g. Scalance X204 (Siemens)
- 5 Measuring device

**Via PROFINET network**

This communication interface is available in device versions with PROFINET.

Star topology



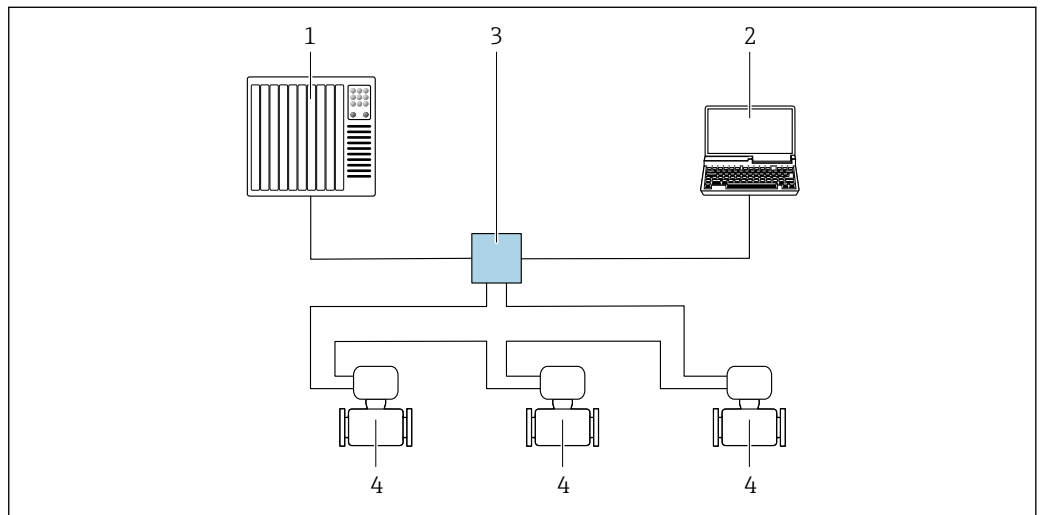
A0026545

72 Options for remote operation via PROFINET network: star topology

- 1 Automation system, e.g. Simatic S7 (Siemens)
- 2 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated Web server or computer with operating tool (e.g. FieldCare, DeviceCare, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
- 3 Standard Ethernet switch, e.g. Scalance X204 (Siemens)
- 4 Measuring device

Ring topology

The device is integrated via the terminal connection for signal transmission (output 1) and the service interface (CDI-RJ45).

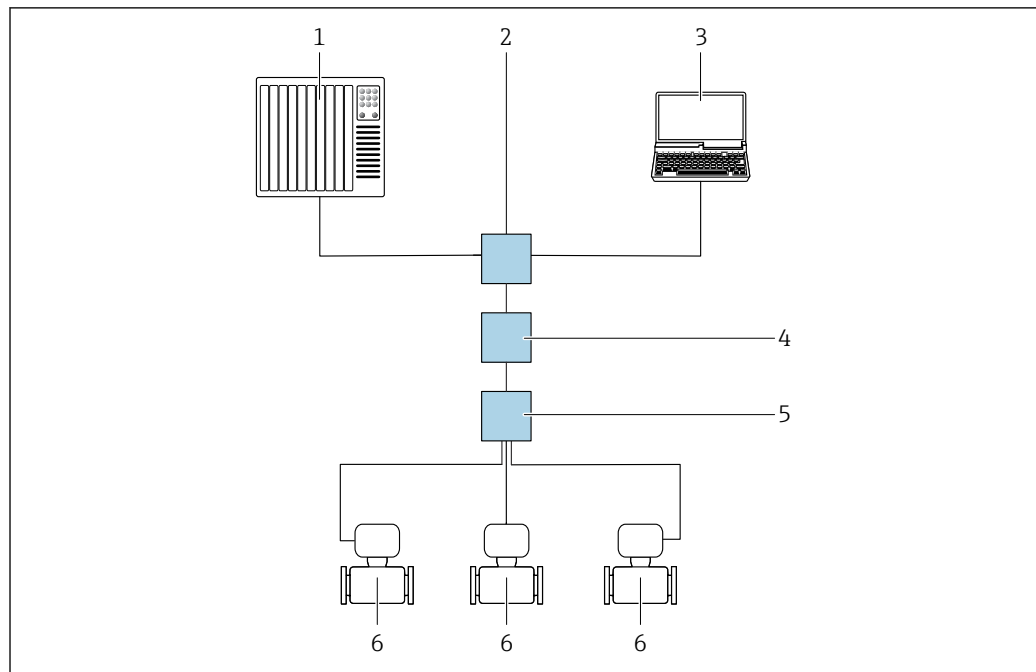


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73 Options for remote operation via PROFINET network: ring topology

- 1 Automation system, e.g. Simatic S7 (Siemens)
- 2 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated Web server or computer with operating tool (e.g. FieldCare, DeviceCare, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
- 3 Standard Ethernet switch, e.g. Scalance X204 (Siemens)
- 4 Measuring device

## Via APL network



A0046117

74 Options for remote operation via APL network

- 1 Automation system, e.g. Simatic S7 (Siemens)
- 2 Ethernet switch, e.g. Scalance X204 (Siemens)
- 3 Computer with Web browser (e.g. Internet Explorer) for access to integrated Web server or computer with operating tool (e.g. FieldCare, DeviceCare with PROFINET COM DTM or SIMATIC PDM with FDI-Package)
- 4 APL power switch (optional)
- 5 APL field switch
- 6 Measuring device

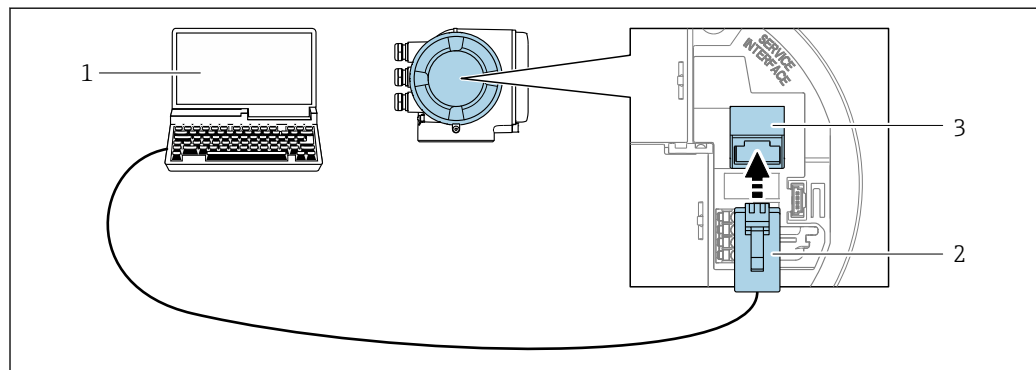
## Service interface

## Via service interface (CDI-RJ45)

A point-to-point connection can be established to configure the device onsite. With the housing open, the connection is established directly via the service interface (CDI-RJ45) of the device.

**i** An adapter for the RJ45 to the M12 plug is optionally available for the non-hazardous area:  
Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"

The adapter connects the service interface (CDI-RJ45) to an M12 plug mounted in the cable entry. The connection to the service interface can be established via an M12 plug without opening the device.



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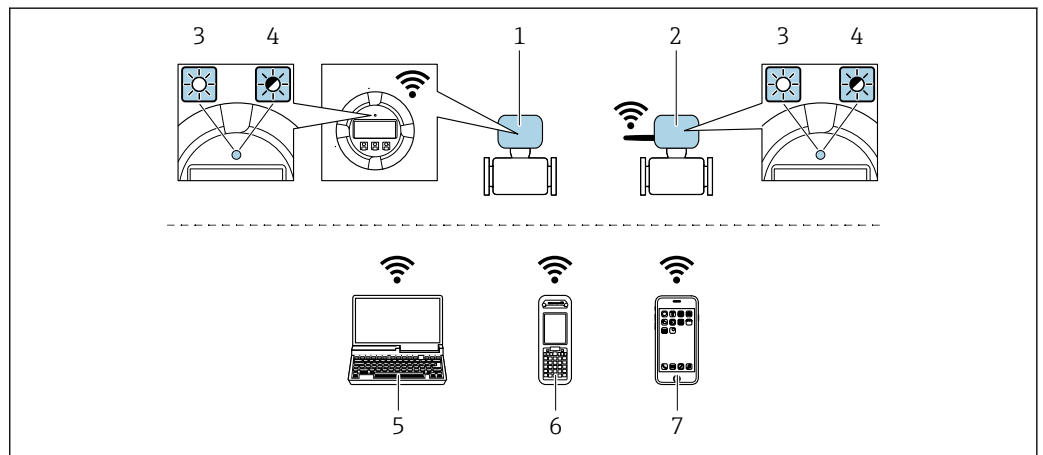
75 Connection via service interface (CDI-RJ45)

- 1 Computer with web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated web server or with "FieldCare" operating tool, "DeviceCare" with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 2 Standard Ethernet connecting cable with RJ45 plug
- 3 Service interface (CDI-RJ45) of the measuring device with access to the integrated Web server



**Via WLAN interface**

The optional WLAN interface is available on the following device version:  
 Order code for "Display; operation", option G "4-line, illuminated; touch control + WLAN"



A0034570

- 1 Transmitter with integrated WLAN antenna
- 2 Transmitter with external WLAN antenna
- 3 LED lit constantly: WLAN reception is enabled on measuring device
- 4 LED flashing: WLAN connection established between operating unit and measuring device
- 5 Computer with WLAN interface and web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device web server or with operating tool (e.g. FieldCare, DeviceCare)
- 6 Mobile handheld terminal with WLAN interface and web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device web server or operating tool (e.g. FieldCare, DeviceCare)
- 7 Smart phone or tablet (e.g. Field Xpert SMT70)

Function	WLAN: IEEE 802.11 b/g (2.4 GHz) <ul style="list-style-type: none"> <li>▪ Access Point with DHCP server (factory setting)</li> <li>▪ Network</li> </ul>
Encryption	WPA2-PSK AES-128 (in accordance with IEEE 802.11i)
Configurable WLAN channels	1 to 11
Degree of protection	IP67
Available antennas	<ul style="list-style-type: none"> <li>▪ Internal antenna</li> <li>▪ External antenna (optional)</li> </ul> In the event of poor transmission/reception conditions at the place of installation. Available as an accessory . ⓘ Only 1 antenna is active at any one time!
Range	<ul style="list-style-type: none"> <li>▪ Internal antenna: typically 10 m (32 ft)</li> <li>▪ External antenna: typically 50 m (164 ft)</li> </ul>
Materials (external antenna)	<ul style="list-style-type: none"> <li>▪ Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brass</li> <li>▪ Adapter: Stainless steel and nickel-plated brass</li> <li>▪ Cable: Polyethylene</li> <li>▪ Plug: Nickel-plated brass</li> <li>▪ Angle bracket: Stainless steel</li> </ul>

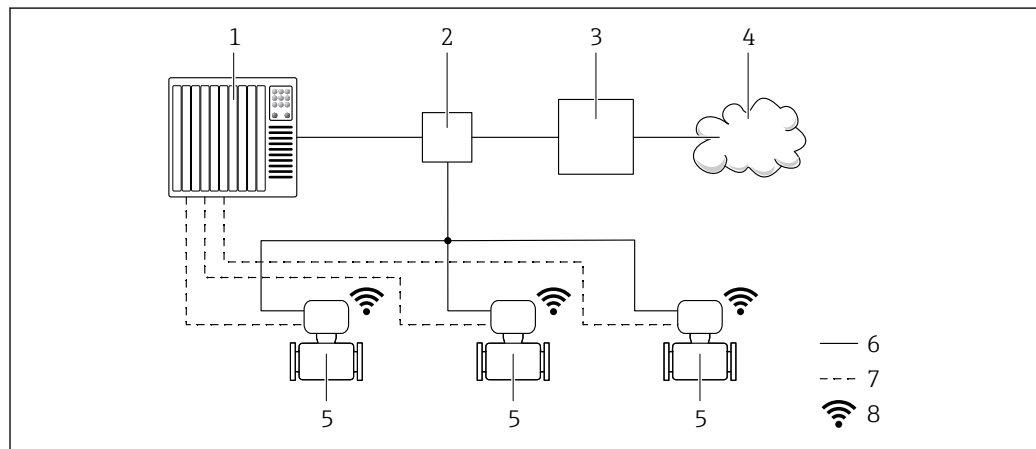
**Network integration**

ⓘ Network integration is only available for the HART communication protocol.

With the optional "OPC-UA Server" application package, the device can be integrated into an Ethernet network via the service interface (CDI-RJ45 and WLAN) and communicate with OPC-UA clients. If the device is used in this way, IT security must be considered.

ⓘ Transmitters with an Ex de approval may **not** be connected via the service interface (CDI-RJ45)!  
 Order code for "Approval transmitter + sensor", options (Ex de):  
 BA, BB, C1, C2, GA, GB, MA, MB, NA, NB

For permanent access to device data and for device configuration via the Web server, the device is incorporated directly in a network via the service interface (CDI-RJ45). In this way, the device can be accessed any time from the control station. The measured values are processed separately via the inputs and outputs through the automation system.



A0033618

- 1 Automation system, e.g. Simatic S7 (Siemens)
- 2 Ethernet switch
- 3 Edge Gateway
- 4 Cloud
- 5 Measuring device
- 6 Ethernet network
- 7 Measured values via inputs and outputs
- 8 Optional WLAN interface



The optional WLAN interface is available on the following device version:

Order code for "Display; operation", option **G** "4-line, backlit, graphic display; touch control + WLAN"





Special Documentation for the OPC-UA Server application package → 119.

## Supported operating tools

Different operating tools can be used for local or remote access to the measuring device. Depending on the operating tool used, access is possible with different operating units and via a variety of interfaces.

Supported operating tools	Operating unit	Interface	Additional information
Web browser	Notebook, PC or tablet with Web browser	<ul style="list-style-type: none"> <li>▪ CDI-RJ45 service interface</li> <li>▪ WLAN interface</li> <li>▪ Ethernet-based fieldbus (EtherNet/IP, PROFINET)</li> </ul>	Special Documentation for device → 119
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> <li>▪ CDI-RJ45 service interface</li> <li>▪ WLAN interface</li> <li>▪ Fieldbus protocol</li> </ul>	→ 117
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> <li>▪ CDI-RJ45 service interface</li> <li>▪ WLAN interface</li> <li>▪ Fieldbus protocol</li> </ul>	→ 117

Supported operating tools	Operating unit	Interface	Additional information
Field Xpert	SMT70/77/50	<ul style="list-style-type: none"> <li>■ All fieldbus protocols</li> <li>■ WLAN interface</li> <li>■ Bluetooth</li> <li>■ CDI-RJ45 service interface</li> </ul>	Operating Instructions BA01202S Device description files: Use update function of handheld terminal
SmartBlue app	Smartphone or tablet with iOS or Android	WLAN	→  117

 Other operating tools based on FDT technology with a device driver such as DTM/iDTM or DD/EDD can be used for device operation. These operating tools are available from the individual manufacturers. Integration into the following operating tools, among others, is supported:

- FactoryTalk AssetCentre (FTAC) from Rockwell Automation → [www.rockwellautomation.com](http://www.rockwellautomation.com)
- Process Device Manager (PDM) from Siemens → [www.siemens.com](http://www.siemens.com)
- Asset Management Solutions (AMS) from Emerson → [www.emersonprocess.com](http://www.emersonprocess.com)
- FieldCommunicator 375/475 from Emerson → [www.emersonprocess.com](http://www.emersonprocess.com)
- Field Device Manager (FDM) from Honeywell → [www.process.honeywell.com](http://www.process.honeywell.com)
- FieldMate from Yokogawa → [www.yokogawa.com](http://www.yokogawa.com)
- PACTWare → [www.pactware.com](http://www.pactware.com)

The related device description files are available: [www.endress.com](http://www.endress.com) → Download Area

### Web server



With the integrated web server, the device can be operated and configured via a web browser using Ethernet-APL, and via the service interface (CDI-RJ45) or WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is displayed and can be used to monitor device health. Furthermore the device data can be managed and the network parameters can be configured.

Access to the network is required for the Ethernet-APL connection.

A device that has a WLAN interface (can be ordered as an option) is required for the WLAN connection: order code for "Display; operation", option G "4-line, illuminated; touch control + WLAN". The device acts as an Access Point and enables communication by computer or a mobile handheld terminal.


### Supported functions

Data exchange between the operating unit (such as a notebook, for example,) and measuring instrument:

- Upload the configuration from the measuring instrument (XML format, configuration backup)
- Save the configuration to the measuring instrument (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file or PDF file, document the measuring point configuration)
- Export the Heartbeat Technology verification report (PDF file, only available with the **Heartbeat Verification** →  113 application package)
- Flash firmware version for device firmware upgrade, for example
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package →  113)

### HistoROM data management

The measuring device features HistoROM data management. HistoROM data management comprises both the storage and import/export of key device and process data, making operation and servicing far more reliable, secure and efficient.

 When the device is delivered, the factory settings of the configuration data are stored as a backup in the device memory. This memory can be overwritten with an updated data record, for example after commissioning.

### Additional information on the data storage concept

There are different types of data storage units in which device data are stored and used by the device:

	HistoROM backup	T-DAT	S-DAT
<b>Available data</b>	<ul style="list-style-type: none"> <li>▪ Event logbook, e.g. diagnostic events</li> <li>▪ Parameter data record backup</li> <li>▪ Device firmware package</li> <li>▪ Driver for system integration for exporting via web server, e.g.:               <ul style="list-style-type: none"> <li>▪ GSD for PROFIBUS DP</li> <li>▪ GSD for PROFIBUS PA</li> <li>▪ GSDML for PROFINET</li> <li>▪ EDS for EtherNet/IP</li> <li>▪ DD for FOUNDATION Fieldbus</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Measured value logging ("Extended HistoROM" order option)</li> <li>▪ Current parameter data record (used by firmware at run time)</li> <li>▪ Indicator (minimum/maximum values)</li> <li>▪ Totalizer value</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sensor data: e.g. nominal diameter</li> <li>▪ Serial number</li> <li>▪ Calibration data</li> <li>▪ Device configuration (e.g. SW options, fixed I/O or multi I/O)</li> </ul>
<b>Storage location</b>	Fixed on the user interface PC board in the connection compartment	Can be plugged into the user interface PC board in the connection compartment	In the sensor plug in the transmitter neck part

#### Data backup

##### Automatic

- The most important device data (sensor and transmitter) are automatically saved in the DAT modules
- If the transmitter or measuring device is replaced: once the T-DAT containing the previous device data has been exchanged, the new measuring device is ready for operation again immediately without any errors
- If exchanging the electronics module (e.g. I/O electronics module): Once the electronics module has been replaced, the software of the module is compared against the current device firmware. The module software is upgraded or downgraded where necessary. The electronics module is available for use immediately afterwards and no compatibility problems occur.

##### Manual

Additional parameter data record (complete parameter settings) in the integrated device memory HistoROM backup for:

- Data backup function  
Backup and subsequent restoration of a device configuration in the device memory HistoROM backup
- Data comparison function  
Comparison of the current device configuration with the device configuration saved in the device memory HistoROM backup

#### Data transmission

##### Manual

- Transfer of a device configuration to another device using the export function of the specific operating tool, e.g. with FieldCare, DeviceCare or Web server: to duplicate the configuration or to store in an archive (e.g. for backup purposes)
- Transmission of the drivers for system integration via Web server, e.g.:
  - GSD for PROFIBUS DP
  - GSD for PROFIBUS PA
  - GSDML for PROFINET
  - EDS for EtherNet/IP
  - DD for FOUNDATION Fieldbus

#### Event list

##### Automatic

- Chronological display of up to 20 event messages in the events list
- If the **Extended HistoROM** application package (order option) is enabled: up to 100 event messages are displayed in the events list along with a time stamp, plain text description and remedial measures
- The events list can be exported and displayed via a variety of interfaces and operating tools e.g. DeviceCare, FieldCare or Web server

**Data logging**

**Manual**

If the **Extended HistoROM** application package (order option) is enabled:

- Recording of 1 to 4 channels of up to 1 000 measured values (up to 250 measured values per channel)
- User configurable recording interval
- Export the measured value log via a variety of interfaces and operating tools e.g. FieldCare, DeviceCare or web server

## Certificates and approvals

Current certificates and approvals for the product are available at [www.endress.com](http://www.endress.com) on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Downloads**.

**CE mark**

The device meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.

Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

**UKCA marking**

The device meets the legal requirements of the applicable UK regulations (Statutory Instruments). These are listed in the UKCA Declaration of Conformity along with the designated standards. By selecting the order option for UKCA marking, Endress+Hauser confirms a successful evaluation and testing of the device by affixing the UKCA mark.

Contact address Endress+Hauser UK:  
 Endress+Hauser Ltd.  
 Floats Road  
 Manchester M23 9NF  
 United Kingdom  
[www.uk.endress.com](http://www.uk.endress.com)


**RCM marking**

The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".

**Ex approval**

The measuring device is certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate.

Devices with the order code for "Approval; transmitter + sensor", option BA, BB, BC or BD have equipment protection level (EPL) Ga/Gb (Zone 0 in the measuring tube).

 The separate Ex documentation (XA) containing all the relevant explosion protection data is available from your Endress+Hauser sales center.

**ATEX/IECEX**

Currently, the following versions for use in hazardous areas are available:

*Ex db eb*

Category	Type of protection
II1/2G	Ex db eb ia IIC T6...T1 Ga/Gb Ex db eb ia IIB T6...T1 Ga/Gb
II2G	Ex db eb ia IIC T6...T1 Gb Ex db eb ia IIB T6...T1 Gb

*Ex db*

Category	Type of protection
II1/2G	Ex db ia IIC T6...T1 Ga/Gb Ex db ia IIB T6...T1 Ga/Gb
II2G	Ex db ia IIC T6...T1 Gb Ex db ia IIB T6...T1 Gb

*Ex ec*

Category	Type of protection
II3G	Ex ec IIC T5...T1 Gc

*Ex tb*

Category	Type of protection
II2D	Ex tb IIIC T** °C Db

**cCSA<sub>US</sub>**

Currently, the following versions for use in hazardous areas are available:

**IS (Ex i) and XP (Ex d)**

- Class I, II, III Division 1 Groups A-G
- Class I, II, III Division 1 Groups C-G

**NI (Ex ec)**

Class I Division 2 Groups A - D

**Ex db eb**

- Class I, Zone 1 AEx/ Ex db eb ia IIC T6...T1 Ga/Gb  
Class I, Zone 1 AEx/ Ex db eb ia IIB T6...T1 Ga/Gb
- Class I, Zone 1 AEx/Ex db eb ia IIC T6...T1 Gb  
Class I, Zone 1 AEx/Ex db eb ia IIB T6...T1 Gb

**Ex db**

- Class I, Zone 1 AEx/ Ex db ia IIC T6...T1 Ga/Gb  
Class I, Zone 1 AEx/ Ex db ia IIB T6...T1 Ga/Gb
- Class I, Zone 1 AEx/ Ex db ia IIC T6...T1 Gb  
Class I, Zone 1 AEx/ Ex db ia IIB T6...T1 Gb


**Ex ec**

Class I, Zone 2 AEx/ Ex ec IIC T5...T1 Gc

**Ex tb**

Zone 21 AEx/ Ex tb IIIC T\*\* °C Db

**Hygienic compatibility**

- 3-A approval
  - Only measuring instruments with the order code for "Additional approval", option LP "3A" have 3-A approval.
  - The 3-A approval refers to the measuring instrument.
  - When installing the measuring instrument, ensure that no liquid can accumulate on the outside of the measuring instrument.  
A remote display module must be installed in accordance with the 3-A Standard.
  - Accessories (e.g. heating jacket, weather protection cover, wall holder unit) must be installed in accordance with the 3-A Standard.  
Each accessory can be cleaned. Disassembly may be necessary under certain circumstances.
- EHEDG-tested  
Only devices with the order code for "Additional approval", option LT "EHEDG" have been tested and meet the requirements of the EHEDG.  
To meet the requirements for EHEDG certification, the device must be used with process connections in accordance with the EHEDG position paper entitled "Easy cleanable Pipe couplings and Process connections" ([www.ehedg.org](http://www.ehedg.org)).  
To meet the requirements for EHEDG certification, the device must be installed in a position that ensures drainability.
- FDA
- Food Contact Materials Regulation (EC) 1935/2004
-  Observe the special installation instructions

**HART certification**

**HART interface**

The measuring device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:

- Certified according to HART 7
- The device can also be operated with certified devices of other manufacturers (interoperability)

**FOUNDATION Fieldbus certification**

**FOUNDATION Fieldbus interface**

The measuring device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:

- Certified in accordance with FOUNDATION Fieldbus H1
- Interoperability Test Kit (ITK), revision version 6.2.0 (certificate available on request)
- Physical Layer Conformance Test
- The device can also be operated with certified devices of other manufacturers (interoperability)

**Certification PROFIBUS**

**PROFIBUS interface**

The measuring device is certified and registered by the PNO (PROFIBUS Nutzerorganisation e.V./ PROFIBUS User Organization). The measuring system meets all the requirements of the following specifications:

- Certified according to PA Profile 3.02
- The device can also be operated with certified devices of other manufacturers (interoperability)

**EtherNet/IP certification**

The measuring device is certified and registered by the ODVA (Open Device Vendor Association). The measuring system meets all the requirements of the following specifications:

- Certified in accordance with the ODVA Conformance Test
- EtherNet/IP Performance Test
- EtherNet/IP PlugFest compliance
- The device can also be operated with certified devices of other manufacturers (interoperability)

**Certification PROFINET**

**PROFINET interface**

The measuring device is certified and registered by the PNO (PROFIBUS Nutzerorganisation e.V. / PROFIBUS User Organization). The measuring system meets all the requirements of the following specifications:

- Certified according to:
  - Test specification for PROFINET devices
  - PROFINET Security Level 2 – Netload Class 2 0 Mbps
- The device can also be operated with certified devices of other manufacturers (interoperability)
- The device supports PROFINET S2 system redundancy.

**PROFINET with Ethernet-APL certification****PROFINET interface**

The measuring device is certified and registered by the PNO (PROFIBUS Nutzerorganisation e. V./ PROFIBUS User Organization). The measuring system meets all the requirements of the following specifications:

- Certified according to:
  - Test specification for PROFINET devices
  - PROFINET PA Profile 4
  - PROFINET netload robustness Class 2 10 Mbit/s
  - APL conformance test
- The device can also be operated with certified devices of other manufacturers (interoperability)
- The device supports PROFINET S2 system redundancy.

**Pressure Equipment Directive**

The measuring devices can be ordered with or without PED or PESR. If a device with PED or PESR is required, this must be ordered explicitly. For devices with nominal diameters less than or equal to DN 25 (1"), this is neither possible nor necessary. A UK order option must be selected for PESR under the order code for "Approvals".

- With the marking
  - a) PED/G1/x (x = category) or
  - b) PESR/G1/x (x = category)
 on the sensor nameplate, Endress+Hauser confirms compliance with the "Essential Safety Requirements"
  - a) specified in Annex I of the Pressure Equipment Directive 2014/68/EU or
  - b) Schedule 2 of Statutory Instruments 2016 No. 1105.
- Devices bearing this marking (PED or PESR) are suitable for the following types of medium:
  - Media in Group 1 and 2 with a vapor pressure greater than, or smaller and equal to 0.5 bar (7.3 psi)
  - Unstable gases
- Devices not bearing this marking (without PED or PESR) are designed and manufactured according to sound engineering practice. They meet the requirements of
  - a) Art. 4 Para. 3 of the Pressure Equipment Directive 2014/68/EU or
  - b) Part 1, Para. 8 of Statutory Instruments 2016 No. 1105.
 The scope of application is indicated
  - a) in diagrams 6 to 9 in Annex II of the Pressure Equipment Directive 2014/68/EU or
  - b) Schedule 3, Para. 2 of Statutory Instruments 2016 No. 1105.

**Radio approval**

The measuring device has radio approval.



For detailed information on the radio approval, see the Special Documentation → 119

**Additional certification****CRN approval**

Some device versions have CRN approval. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device.

**Tests and certificates****External standards and guidelines**

- EN 60529  
Degrees of protection provided by enclosures (IP code)
- IEC/EN 60068-2-6  
Environmental influences: Test procedure - Test Fc: vibrate (sinusoidal).
- IEC/EN 60068-2-31  
Environmental influences: Test procedure - Test Ec: shocks due to rough handling, primarily for devices.
- EN 61010-1  
Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
- EN 61326-1/-2-3  
EMC requirements for electrical equipment for measurement, control and laboratory use
- NAMUR NE 21  
Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment



- NAMUR NE 32  
Data retention in the event of a power failure in field and control instruments with microprocessors
- NAMUR NE 43  
Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53  
Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 80  
The application of the pressure equipment directive to process control devices
- NAMUR NE 105  
Specifications for integrating fieldbus devices in engineering tools for field devices
- NAMUR NE 107  
Self-monitoring and diagnosis of field devices
- NAMUR NE 131  
Requirements for field devices for standard applications
- NAMUR NE 132  
Coriolis mass meter
- ETSI EN 300 328  
Guidelines for 2.4 GHz radio components.
- EN 301489  
Electromagnetic compatibility and radio spectrum matters (ERM).

## Ordering information

Detailed ordering information is available from your nearest sales organization [www.addresses.endress.com](http://www.addresses.endress.com) or in the Product Configurator at [www.endress.com](http://www.endress.com):

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Configuration**.



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

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

## Application packages

Many different application packages are available to enhance the functionality of the device. Such packages might be needed to address safety aspects or specific application requirements.

The application packages can be ordered with the device or subsequently from Endress+Hauser. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: [www.endress.com](http://www.endress.com).



Detailed information on the application packages:  
Special Documentation → 118

### Diagnostic functionality

Order code for "Application package", option EA "Extended HistoROM"

Comprises extended functions concerning the event log and the activation of the measured value memory.

Event log:

Memory volume is extended from 20 message entries (standard version) to up to 100 entries.

Data logging (line recorder):

- Memory capacity for up to 1000 measured values is activated.
- 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user.
- Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.



For detailed information, see the Operating Instructions for the device.

## Heartbeat Technology

Order code for "Application package", option EB "Heartbeat Verification + Monitoring"

### Heartbeat Verification

Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment".

- Functional testing in the installed state without interrupting the process.
- Traceable verification results on request, including a report.
- Simple testing process via local operation or other operating interfaces.
- Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications.
- Extension of calibration intervals according to operator's risk assessment.

### Heartbeat Monitoring

Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to:

- Draw conclusions - using these data and other information - about the impact process influences (e.g. corrosion, abrasion, buildup etc.) have on the measuring performance over time.
- Schedule servicing in time.
- Monitor the process or product quality, e.g. gas pockets .



For detailed information, see the Special Documentation for the device.

## Concentration measurement

Order code for "Application package", option ED "Concentration"

Calculation and outputting of fluid concentrations.

The measured density is converted to the concentration of a substance of a binary mixture using the "Concentration" application package:

- Choice of predefined fluids (e.g. various sugar solutions, acids, alkalis, salts, ethanol etc.).
- Common or user-defined units ("Brix", "Plato", "% mass", "% volume, mol/l etc.) for standard applications.
- Concentration calculation from user-defined tables.



For detailed information, see the Special Documentation for the device.

## Special density

Order code for "Application package", option EE "Special density"

Many applications use density as a key measured value for monitoring quality or controlling processes. The measuring instrument measures the density of the fluid as standard and makes this value available to the control system.

The "Special Density" application package offers high-precision density measurement over a wide density and temperature range particularly for applications subject to varying process conditions.



For detailed information, see the Operating Instructions for the device.

## OPC-UA Server

Order code for "Application package", option EL "OPC-UA Server"

The application package provides an integrated OPC-UA server for comprehensive device services for IoT and SCADA applications.














For detailed information, see the Special Documentation for the device.

## Accessories



Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: [www.endress.com](http://www.endress.com).

### Device-specific accessories







### For the transmitter

Accessories	Description
Proline 300 transmitter	<p>Transmitter for replacement or storage. Use the order code to define the following specifications:</p> <ul style="list-style-type: none"> <li>▪ Approvals</li> <li>▪ Output</li> <li>▪ Input</li> <li>▪ Display/operation</li> <li>▪ Housing</li> <li>▪ Software</li> </ul> <p> Order code: 8X3BXX</p> <p> Installation Instructions EA01200D</p>
Remote display and operating module DKX001	<ul style="list-style-type: none"> <li>▪ If ordered directly with the measuring device: Order code for "Display; operation", option O "Remote display 4-line, illuminated; 10 m (30 ft) cable; touch control"</li> <li>▪ If ordered separately: <ul style="list-style-type: none"> <li>▪ Measuring device: order code for "Display; operation", option M "W/o, prepared for remote display"</li> <li>▪ DKX001: Via the separate product structure DKX001</li> </ul> </li> <li>▪ If ordered subsequently: DKX001: Via the separate product structure DKX001</li> </ul> <p><b>Mounting bracket for DKX001</b></p> <ul style="list-style-type: none"> <li>▪ If ordered directly: order code for "Accessory enclosed", option RA "Mounting bracket, pipe 1/2"</li> <li>▪ If ordered subsequently: order number: 71340960</li> </ul> <p><b>Connecting cable (replacement cable)</b> Via the separate product structure: DKX002</p> <p> Further information on display and operating module DKX001 →  98.</p> <p> Special Documentation SD01763D</p>
External WLAN antenna	<p>External WLAN antenna with 1.5 m (59.1 in) connecting cable and two angle brackets. Order code for "Accessory enclosed", option P8 "Wireless antenna wide area".</p> <p> <ul style="list-style-type: none"> <li>▪ The external WLAN antenna is not suitable for use in hygienic applications.</li> <li>▪ Additional information regarding the WLAN interface →  105.</li> </ul> </p> <p> Order number: 71351317</p> <p> Installation Instructions EA01238D</p>
Weather protection cover	<p>Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight.</p> <p> Order number: 71343505</p> <p> Installation Instructions EA01160D</p>



## For the sensor

Accessories	Description
Heating jacket	<p>Is used to stabilize the temperature of the fluids in the sensor. Water, water vapor and other non-corrosive liquids are permitted for use as fluids.</p> <p> If using oil as a heating medium, please consult with Endress+Hauser.</p> <p>Use the order code with the product root DK8003.</p> <p> Special Documentation SD02.160D</p>





## Communication-specific accessories

Accessories	Description
Commubox FXA195 HART	<p>For intrinsically safe HART communication with FieldCare via the USB port.</p> <p> Technical Information TI00404F</p>
HART loop converter HMX50	<p>Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values.</p> <p> <ul style="list-style-type: none"> <li>▪ Technical Information TI00429F</li> <li>▪ Operating Instructions BA00371F</li> </ul> </p>
Fieldgate FXA42	<p>Transmission of the measured values of connected 4 to 20 mA analog measuring instruments, as well as digital measuring instruments</p> <p> <ul style="list-style-type: none"> <li>▪ Technical Information TI01297S</li> <li>▪ Operating Instructions BA01778S</li> <li>▪ Product page: <a href="http://www.endress.com/fxa42">www.endress.com/fxa42</a></li> </ul> </p>
Field Xpert SMT50	<p>The Field Xpert SMT50 tablet PC for device configuration enables mobile plant asset management in the non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress.</p> <p>This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle.</p> <p> <ul style="list-style-type: none"> <li>▪ Technical Information TI01555S</li> <li>▪ Operating Instructions BA02053S</li> <li>▪ Product page: <a href="http://www.endress.com/smt50">www.endress.com/smt50</a></li> </ul> </p>
Field Xpert SMT70	<p>The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in hazardous and non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress.</p> <p>This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage the field instruments throughout their entire life cycle.</p> <p> <ul style="list-style-type: none"> <li>▪ Technical Information TI01342S</li> <li>▪ Operating Instructions BA01709S</li> <li>▪ Product page: <a href="http://www.endress.com/smt70">www.endress.com/smt70</a></li> </ul> </p>
Field Xpert SMT77	<p>The Field Xpert SMT77 tablet PC for device configuration enables mobile plant asset management in areas categorized as Ex Zone 1.</p> <p> <ul style="list-style-type: none"> <li>▪ Technical Information TI01418S</li> <li>▪ Operating Instructions BA01923S</li> <li>▪ Product page: <a href="http://www.endress.com/smt77">www.endress.com/smt77</a></li> </ul> </p>


Service-specific accessories

Accessories	Description
Applicator	<p>Software for selecting and sizing Endress+Hauser measuring instruments:</p> <ul style="list-style-type: none"> <li>Choice of measuring instruments for industrial requirements</li> <li>Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and measurement accuracy.</li> <li>Graphic display of the calculation results</li> <li>Determination of the partial order code, administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.</li> </ul> <p>Applicator is available: Via the Internet: <a href="https://portal.endress.com/webapp/applicator">https://portal.endress.com/webapp/applicator</a></p>
Netilion	<p>IloT ecosystem: Unlock knowledge With the Netilion IloT ecosystem, Endress+Hauser allows you to optimize your plant performance, digitize workflows, share knowledge, and enhance collaboration. Drawing upon decades of experience in process automation, Endress+Hauser offers the process industry an IloT ecosystem designed to effortlessly extract insights from data. These insights allow process optimization, leading to increased plant availability, efficiency, and reliability - ultimately resulting in a more profitable plant. <a href="http://www.netilion.endress.com">www.netilion.endress.com</a></p>
FieldCare	<p>FDT-based plant asset management tool from Endress+Hauser. It can configure all intelligent field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.</p> <p> Operating Instructions BA00027S and BA00059S</p>
DeviceCare	<p>Tool to connect and configure Endress+Hauser field devices.</p> <p> Innovation brochure IN01047S</p>


System components

Accessories	Description
Memograph M graphic data manager	<p>The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick.</p> <p> <ul style="list-style-type: none"> <li>Technical Information TI00133R</li> <li>Operating Instructions BA00247R</li> </ul> </p>
Cerabar M	<p>The pressure transmitter for measuring the absolute and gauge pressure of gases, steam and liquids. It can be used to read in the operating pressure value.</p> <p> <ul style="list-style-type: none"> <li>Technical Information TI00426P and TI00436P</li> <li>Operating Instructions BA00200P and BA00382P</li> </ul> </p>
Cerabar S	<p>The pressure transmitter for measuring the absolute and gauge pressure of gases, steam and liquids. It can be used to read in the operating pressure value.</p> <p> <ul style="list-style-type: none"> <li>Technical Information TI00383P</li> <li>Operating Instructions BA00271P</li> </ul> </p>
iTEMP	<p>The temperature transmitters can be used in all applications and are suitable for the measurement of gases, steam and liquids. They can be used to read in the medium temperature.</p> <p> "Fields of Activity" document FA00006T</p>

## Supplemental documentation

-  For an overview of the scope of the associated Technical Documentation, refer to the following:
- *Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): Enter the serial number from the nameplate
  - *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

### Standard documentation

-  Supplementary information on the semi-standard options is available in the relevant Special Documentation in the TSP database.

### Brief Operating Instructions

*Brief Operating Instructions for the sensor*

Measuring instrument	Documentation code
Proline Promass P	KA01286D

*Brief Operating Instructions for the transmitter*

Measuring device	Documentation code							PROFINET with Ethernet-APL
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET	
Proline 300	KA01309D	KA01229D	KA01227D	KA01386D	KA01311D	KA01339D	KA01341D	KA01517D

### Operating Instructions

Measuring device	Documentation code							PROFINET with Ethernet-APL
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET	
Promass P 300	BA01489D	BA01522D	BA01511D	BA01861D	BA01500D	BA01732D	BA01743D	BA02114D

### Description of Device Parameters

Measuring device	Documentation code							PROFINET with Ethernet-APL
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET	
Promass 300	GP01057D	GP01094D	GP01058D	GP01134D	GP01059D	GP01114D	GP01115D	GP01168D

### Supplementary device-dependent documentation

#### Safety instructions

Safety instructions for electrical equipment for hazardous areas.

Contents	Documentation code
ATEX/IECEX Ex d/Ex de	XA01405D
ATEX/IECEX Ex ec	XA01439D
cCSAus XP	XA01373D
cCSAus Ex d/ Ex de	XA01372D
cCSAus Ex nA	XA01507D
INMETRO Ex d/Ex de	XA01468D

Contents	Documentation code
INMETRO Ex ec	XA01470D
NEPSI Ex d/Ex de	XA01469D
NEPSI Ex nA	XA01471D
EAC Ex d/Ex de	XA01656D
EAC Ex nA	XA01657D
JPN Ex d	XA01778D

*Remote display and operating module DKX001*

Contents	Documentation code
ATEX/IECEX Ex i	XA01494D
ATEX/IECEX Ex ec	XA01498D
cCSAus IS	XA01499D
cCSAus Ex nA	XA01513D
INMETRO Ex i	XA01500D
INMETRO Ex ec	XA01501D
NEPSI Ex i	XA01502D
NEPSI Ex nA	XA01503D

**Functional Safety Manual**

Contents	Documentation code
Proline Promass 300	SD01727D


**Special documentation**

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Remote display and operating module DKX001	SD01763D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
OPC-UA server <sup>1)</sup>	SD02039D

1) This Special Documentation is only available for device versions with a HART output.

Contents	Documentation code							
	HART	FOUNDATIO N Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	PROFINET	Ethernet/IP	PROFINET over Ethernet- APL
Web server	SD01662D	SD01665D	SD01664D	SD02226D	SD01663D	SD01969D	SD01968D	SD02762D
Heartbeat Technology	SD01642D	SD01696D	SD01698D	SD02202D	SD01697D	SD01988D	SD01982	SD02731D
Concentration measurement	SD01644D	SD01706D	SD01708D	SD02212D	SD01707D	SD02005D	SD02004D	SD02735D
Gas fraction handler	SD02584D	-	-	-	SD02584D	SD02584D	-	SD02584D

**Installation instructions**

Contents	Note
Installation instructions for spare part sets and accessories	Documentation code: specified for each individual accessory →  115.

**Registered trademarks****HART®**

Registered trademark of the FieldComm Group, Austin, Texas USA

**PROFIBUS®**

Registered trademark of the PROFIBUS Nutzerorganisation e.V. (PROFIBUS User Organization), Karlsruhe, Germany

**FOUNDATION™ Fieldbus**

Registration-pending trademark of the FieldComm Group, Austin, Texas, USA

**Modbus®**

Registered trademark of SCHNEIDER AUTOMATION, INC.

**EtherNet/IP™**

Trademark of ODVA, Inc.

**Ethernet-APL™**

Registered trademark of the PROFIBUS Nutzerorganisation e.V. (PROFIBUS User Organization), Karlsruhe, Germany

**PROFINET®**

Registered trademark of the PROFIBUS Nutzerorganisation e.V. (PROFIBUS User Organization), Karlsruhe, Germany

**TRI-CLAMP®**

Registered trademark of Ladish & Co., Inc., Kenosha, USA



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