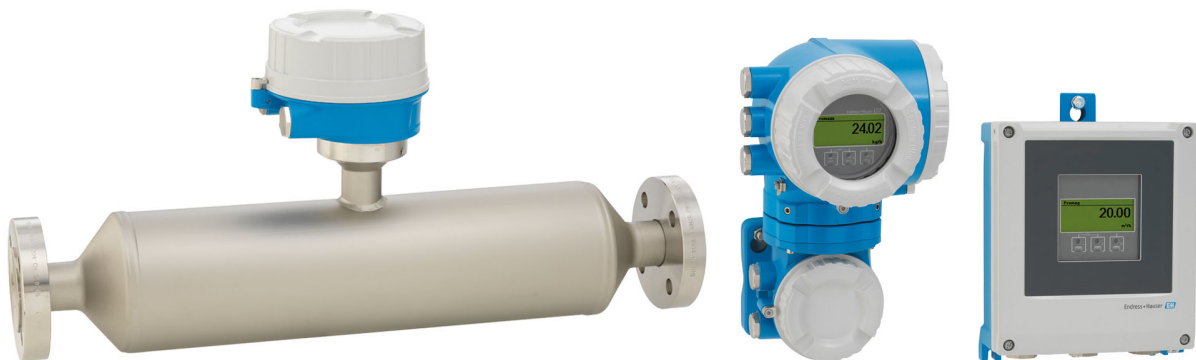


# Technical Information

## Proline Promass I 500

Coriolis flowmeter



Combines in-line viscosity and flow measurement with a transmitter remote version with up to 4 I/Os

### Application

- Measuring principle operates independently of physical fluid properties such as viscosity or density
- Measuring liquids and gases in applications requiring low pressure loss and gentle fluid treatment

### Device properties

- Straight, easy-to-clean single-tube system
- TMB technology
- Measuring tube made of Titanium
- Remote version with up to 4 I/Os
- Backlit display with touch control and WLAN access
- Standard cable between sensor and transmitter

### Your benefits

- Energy-saving – full bore design enables minimal pressure loss
- Fewer process measuring points – multivariable measurement (flow, density, temperature)
- Space-saving installation – no inlet/outlet run needs
- Full access to process and diagnostic information – numerous, freely combinable I/Os and fieldbuses
- 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 used









#### 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>Protective Earth (PE)</b> A terminal which must be connected to ground prior to establishing any other connections.  The ground terminals are situated inside and outside the device: <ul style="list-style-type: none"> <li>▪ Inner ground terminal: Connects the protective earth to the mains supply.</li> <li>▪ Outer ground terminal: Connects the device to the plant grounding system.</li> </ul>

#### Communication symbols




Symbol	Meaning
	<b>Wireless Local Area Network (WLAN)</b> Communication via a wireless, local network.
	<b>LED</b> Light emitting diode is off.
	<b>LED</b> Light emitting diode is on.
	<b>LED</b> Light emitting diode is flashing.

#### 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
1, 2, 3, ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
	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.

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

$F_c$  = Coriolis force

$\Delta m$  = moving mass

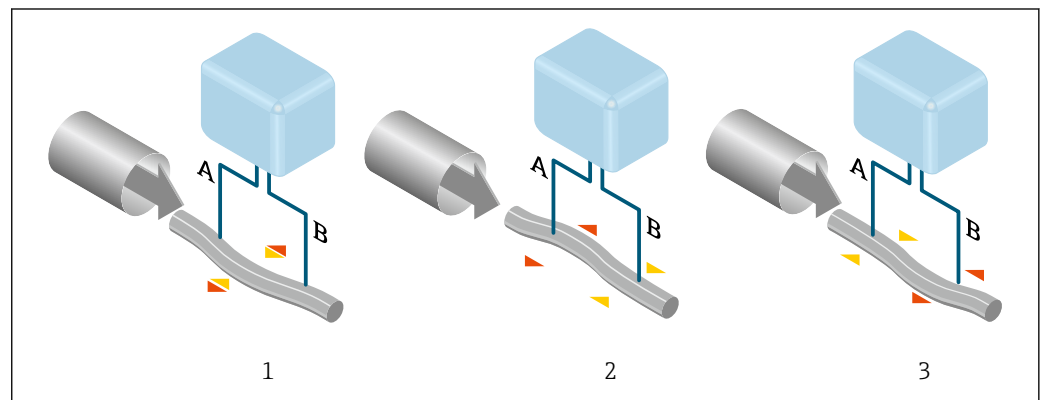
$\omega$  = rotational velocity

$v$  = 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).



A0029932

The phase difference (A-B) increases with increasing mass flow. Electrodynamical 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. Resonance frequency is thus a function of 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**

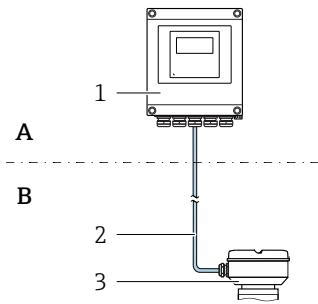
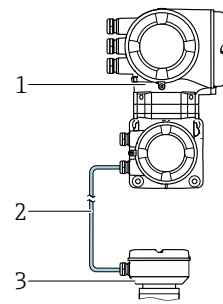
The temperature of the measuring tube is determined in order to calculate the compensation factor due to temperature effects. This signal corresponds to the process temperature and is also available as an output signal.

**Measuring system**

The measuring system consists of a transmitter and a sensor. The transmitter and sensor are mounted in physically separate locations. They are interconnected by connecting cables.

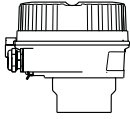

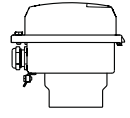
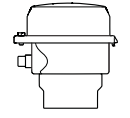

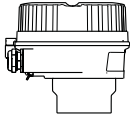
**Transmitter**

Two versions of the transmitter are available.

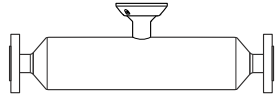
Proline 500 – digital	Proline 500
<p>For use in applications not required to meet special requirements due to ambient or operating conditions.</p>  <p><b>A</b> <b>B</b></p> <p>1 Transmitter 2 Connecting cable: cable, separate, standard 3 Sensor connection housing with integrated ISEM</p> <ul style="list-style-type: none"> <li>▪ Flexible and cost-effective separate installation.</li> <li>▪ A standard cable can be used as the connecting cable.</li> <li>▪ Electronics in the transmitter housing, ISEM (intelligent sensor electronics module) in the sensor connection housing</li> <li>▪ Signal transmission: digital Order code for "Integrated ISEM electronics", option <b>A</b> "Sensor"</li> </ul>	<p>For use in applications required to meet special requirements due to ambient or operating conditions.</p>  <p>1 Transmitter with integrated ISEM 2 Connecting cable: cable, separate 3 Sensor connection housing</p> <p>Non-hazardous area or Zone 2; Class I, Division 2 or Zone 1; Class I, Division 1</p> <ul style="list-style-type: none"> <li>▪ Application examples for sensors without electronics: <ul style="list-style-type: none"> <li>▪ Strong vibrations at the sensor.</li> <li>▪ Sensor in underground installations.</li> <li>▪ Permanent immersion of sensor in water, IP68 ingress protection.</li> </ul> </li> <li>▪ Electronics and ISEM (intelligent sensor electronics module) in the transmitter housing</li> <li>▪ Signal transmission: analog Order code for "Integrated ISEM electronics", option <b>B</b> "Transmitter"</li> </ul>
<p><b>Connecting cable</b> (can be ordered in various lengths) → 📄 115</p>	
<ul style="list-style-type: none"> <li>▪ Length: <ul style="list-style-type: none"> <li>– Zone 2; Class I, Division 2: max. 300 m (1000 ft)</li> <li>– Zone 1; Class I, Division 1: max. 150 m (500 ft)</li> </ul> </li> <li>▪ Standard cable with common shield (pair-stranded)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Length: max. 20 m (65 ft)</li> <li>▪ Cable with a common shield and individual shielded cores (3 pairs)</li> </ul>
<p><b>Hazardous area</b></p>	
<p>Use in: Zone 2; Class I, Division 2</p> <p>Mixed installation is possible:</p> <ul style="list-style-type: none"> <li>▪ Sensor: Zone 1; Class I, Division 1</li> <li>▪ Transmitter: Zone 2; Class I, Division 2</li> </ul>	<p>Use in: Zone 1; Class I, Division 1 oder Zone 2; Class I, Division 2</p>
<p><b>Device versions and materials</b></p>	
<ul style="list-style-type: none"> <li>▪ Transmitter housing <ul style="list-style-type: none"> <li>– Aluminum, coated: aluminum, AlSi10Mg, coated</li> <li>– Material: polycarbonate</li> </ul> </li> <li>▪ Material of window in transmitter housing <ul style="list-style-type: none"> <li>– Aluminum, coated: glass</li> <li>– Polycarbonate: plastic</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Transmitter housing <ul style="list-style-type: none"> <li>– Aluminum, coated: aluminum, AlSi10Mg, coated</li> <li>– Cast, stainless: cast, stainless steel, 1.4409 (CF3M) similar to 316L</li> </ul> </li> <li>▪ Window material: glass</li> </ul>
<p><b>Configuration</b></p>	
<ul style="list-style-type: none"> <li>▪ External operation via 4-line, backlit, graphic local display 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, SmartBlue app)</li> <li>– Web server (access via Web browser, e.g. Microsoft Internet Explorer, Microsoft Edge)</li> </ul> </li> </ul>	

### Sensor connection housing

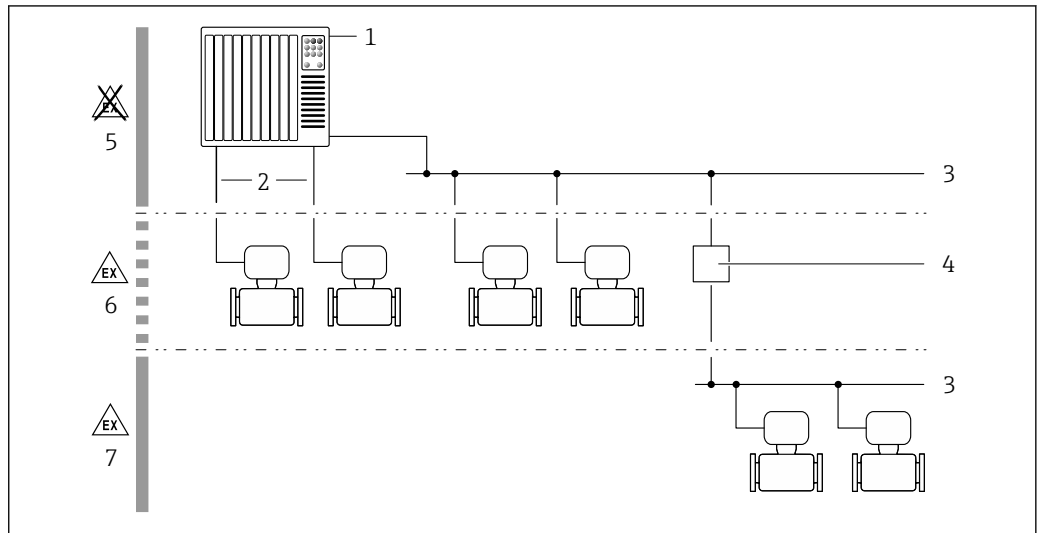
Different versions of the connection housing are available.

	<p>Order code for "Sensor connection housing", option A, "Aluminum, coated": Aluminum, AISi10Mg, coated</p> <p> This device version is only available in conjunction with the Proline 500 – digital transmitter.</p>
	<p>Order code for "Sensor connection housing", option B, "Stainless":</p> <ul style="list-style-type: none"> <li>▪ Hygienic version, stainless steel 1.4301 (304)</li> <li>▪ Optional: order code for "Sensor feature", option CC "Hygienic version, for maximum corrosion resistance": stainless steel 1.4404 (316L)</li> </ul>
	<p>Order code for "Sensor connection housing", option C, "Ultra-compact hygienic, stainless":</p> <ul style="list-style-type: none"> <li>▪ Hygienic version, stainless steel 1.4301 (304)</li> <li>▪ Optional: order code for "Sensor feature", option CC "Hygienic version, for maximum corrosion resistance": stainless steel 1.4404 (316L)</li> </ul> <p> This device version is only available in conjunction with the Proline 500 – digital transmitter.</p>
	<p>Order code for "Sensor connection housing", option L, "Cast, stainless": 1.4409 (CF3M) similar to 316L</p>

### Sensor

<p><b>Promass I</b></p>  <p style="text-align: right; font-size: small;">A0026709</p>	<ul style="list-style-type: none"> <li>▪ Sensitive fluid handling thanks to straight single-tube system</li> <li>▪ Simultaneous measurement of viscosity, flow, volume flow, density and temperature (multivariable)</li> <li>▪ Immune to process influences</li> <li>▪ Nominal diameter range: DN 8 to 80 (<math>\frac{3}{8}</math> to 3")</li> <li>▪ Materials: <ul style="list-style-type: none"> <li>- Sensor: stainless steel, 1.4301/1.4307 (304L)</li> <li>- Measuring tubes: titanium Grade 9</li> <li>- Process connections: stainless steel, 1.4301 (304), wetted parts: titanium Grade 2</li> </ul> </li> </ul>
--	--

Equipment architecture



A0027512

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 Segment coupler
- 5 Non-hazardous area
- 6 Hazardous area: Zone 2; Class I, Division 2
- 7 Hazardous area: Zone 1; Class I, Division 1

Safety

IT security

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

IT security measures, which provide additional protection for the device 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. An overview of the most important functions is provided in the following section.

Function/interface	Factory setting	Recommendation
Write protection via hardware write protection switch → 10	Not enabled.	On an individual basis following risk assessment.
Access code (also applies for Web server login or FieldCare connection) → 10	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) → 10	Serial number	Assign a customized access code during commissioning.
WLAN mode	Access Point	On an individual basis following risk assessment.
Web server → 10	Enabled.	On an individual basis following risk assessment.
CDI-RJ45 service interface → 11	-	On an individual basis following risk assessment.

*Protecting access via hardware write protection*

Write access to the device parameters 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 motherboard). 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.
- Follow the general rules for generating a secure password when defining and managing the access code or 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 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 or PROFINET (RJ45 connector).

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

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



For detailed information on device parameters, see:  
The "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.

 The device can be integrated in 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) →  101.

## Input

### Measured variable

#### Direct measured variables

- Mass flow
- Density
- Temperature
- Viscosity

#### 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
15 FB	$\frac{1}{2}$ FB	0 to 18 000	0 to 661.5
25	1	0 to 18 000	0 to 661.5
25 FB	1 FB	0 to 45 000	0 to 1 654
40	$1\frac{1}{2}$	0 to 45 000	0 to 1 654
40 FB	$1\frac{1}{2}$ FB	0 to 70 000	0 to 2 573
50	2	0 to 70 000	0 to 2 573
50 FB	2 FB	0 to 180 000	0 to 6 615
80	3	0 to 180 000	0 to 6 615

FB = Full bore

#### Measuring range for gases

The full scale value depends on the density and the sound velocity of the gas used and can be calculated with the formula below:

$$\dot{m}_{\max(G)} = \text{minimum} (\dot{m}_{\max(F)} \cdot \rho_G : x ; \rho_G \cdot c_G \cdot \pi/2 \cdot (d_i)^2 \cdot 3600)$$



$\dot{m}_{\max(G)}$	Maximum full scale value for gas [kg/h]
$\dot{m}_{\max(F)}$	Maximum full scale value for liquid [kg/h]
$\dot{m}_{\max(G)} < \dot{m}_{\max(F)}$	$\dot{m}_{\max(G)}$ can never be greater than $\dot{m}_{\max(F)}$
$\rho_G$	Gas density in [kg/m <sup>3</sup> ] at operating conditions
$x$	Constant dependent on nominal diameter
$c_G$	Sound velocity (gas) [m/s]
$d_i$	Measuring tube internal diameter [m]

DN		$x$
[mm]	[in]	[kg/m <sup>3</sup> ]
8	$\frac{3}{8}$	60
15	$\frac{1}{2}$	80
15 FB	$\frac{1}{2}$ FB	90
25	1	90



DN		x
[mm]	[in]	[kg/m <sup>3</sup> ]
25 FB	1 FB	90
40	1½	90
40 FB	1½ FB	90
50	2	90
50 FB	2 FB	110
80	3	110

FB = Full bore

 To calculate the measuring range, use the *Applicator* sizing tool →  117

#### Calculation example for gas

- Sensor: Promass I, DN 50
- Gas: Air with a density of 60.3 kg/m<sup>3</sup> (at 20 °C and 50 bar)
- Measuring range (liquid): 70 000 kg/h
- x = 90 kg/m<sup>3</sup> (for Promass I, DN 50)

Maximum possible full scale value:

$$\dot{m}_{\max(G)} = \dot{m}_{\max(F)} \cdot \rho_G : x = 70\,000 \text{ kg/h} \cdot 60.3 \text{ kg/m}^3 : 90 \text{ kg/m}^3 = 46\,900 \text{ kg/h}$$

#### Recommended measuring range

"Flow limit" section →  65

#### 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

##### Input and output versions

→  15

##### External measured values

To increase the accuracy of certain measured variables or to calculate the corrected volume flow for gases, the automation system can continuously write different measured values to the measuring device:

- Operating pressure to increase 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 accuracy (e.g. iTEMP)
- Reference density for calculating the corrected volume flow for gases

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


It is recommended to read in external measured values to calculate the corrected volume flow.

##### 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 →  14.

*Digital communication*

The measured values can be written from the automation system to the measuring via:

- FOUNDATION Fieldbus
- PROFIBUS DP
- PROFIBUS PA
- Modbus RS485
- EtherNet/IP
- PROFINET

**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 $\mu$ A
<b>Voltage drop</b>	Typically: 0.6 to 2 V for 3.6 to 22 mA (passive)
<b>Maximum input voltage</b>	$\leq$ 30 V (passive)
<b>Open-circuit voltage</b>	$\leq$ 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>	Adjustable: 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 4. The table 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 and 4.

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	↓	CA								
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
<b>Order code for "Output; input 2" (021) →</b>	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Not assigned	A	A	A	A	A	A	A	A	A	A
Current output 0/4 to 20 mA	B		B		B	B		B	B	B
Current output 0/4 to 20 mA (Ex i)		C		C			C			
User configurable input/output <sup>1)</sup>	D		D		D	D		D	D	D
Pulse/frequency/switch output	E		E		E	E		E	E	E
Double pulse output <sup>2)</sup>	F							F		
Pulse/frequency/switch output (Ex i)		G		G			G			
Relay output	H		H		H	H		H	H	H
Current input 0/4 to 20 mA	I		I		I	I		I	I	I
Status input	J		J		J	J		J	J	J
<b>Order code for "Output; input 3" (022), "Output; input 4" (023) <sup>3)</sup> →</b>	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Not assigned	A	A	A	A	A	A	A	A	A	A
Current output 0/4 to 20 mA	B				B			B	B	B
Current output 0/4 to 20 mA (Ex i)		C								
User configurable input/output	D				D			D	D	D
Pulse/frequency/switch output	E				E			E	E	E
Double pulse output (slave) <sup>2) 4)</sup>	F							F		
Pulse/frequency/switch output (Ex i)		G								
Relay output	H				H			H	H	H
Current input 0/4 to 20 mA	I				I			I	I	I
Status input	J				J			J	J	J

- 1) A specific input or output can be assigned to a user configurable input/output → 19.
- 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).
- 3) The order code for "Output; input 4" (023) is only available for the Proline 500 – digital transmitter.
- 4) The double pulse output (F) option is not available for input/output 4.

## Output signal

## HART current output

Current output	4 to 20 mA HART
Current span	Can be set to: 4 to 20 mA (active/passive)  Ex-i, passive
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: 0.07 to 999 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>▪ Electronic 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.

## PROFIBUS PA

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

## PROFIBUS DP

Signal encoding	NRZ code
Data transfer	9.6 kBaud...12 MBaud

## EtherNet/IP

Standards	In accordance with IEEE 802.3
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## PROFINET

Standards	In accordance with IEEE 802.3
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## FOUNDATION Fieldbus



FOUNDATION Fieldbus	H1, IEC 61158-2, galvanically isolated
Data transfer	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

#### Current output 0/4 to 20 mA


<b>Current output</b>	0/4 to 20 mA
<b>Maximum output values</b>	22.5 mA
<b>Current span</b>	Can be set to: <ul style="list-style-type: none"> <li>▪ 4 to 20 mA (active)</li> <li>▪ 0/4 to 20 mA (passive)</li> </ul>  Ex-i, passive
<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>	Adjustable: 0.07 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>▪ Electronic 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.

#### Pulse/frequency/switch output


<b>Function</b>	Can be set to 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> </ul>  Ex-i, passive
<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>Pulse output</b>	
<b>Maximum input values</b>	DC 30 V, 250 mA (passive)
<b>Maximum output current</b>	22.5 mA (active)

<b>Open-circuit voltage</b>	DC 28.8 V (active)
<b>Pulse width</b>	Adjustable: 0.05 to 2 000 ms
<b>Maximum pulse rate</b>	10 000 Impulse/s
<b>Pulse value</b>	Adjustable
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>▪ Mass flow</li> <li>▪ Volume flow</li> <li>▪ Corrected volume flow</li> </ul>
<b>Frequency output</b>	
<b>Maximum input values</b>	DC 30 V, 250 mA (passive)
<b>Maximum output current</b>	22.5 mA (active)
<b>Open-circuit voltage</b>	DC 28.8 V (active)
<b>Output frequency</b>	Adjustable: end value frequency 2 to 10 000 Hz ( $f_{\max} = 12\,500$ Hz)
<b>Damping</b>	Adjustable: 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> <li>▪ Electronic 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>
<b>Switch output</b>	
<b>Maximum input values</b>	DC 30 V, 250 mA (passive)
<b>Open-circuit voltage</b>	DC 28.8 V (active)
<b>Switching behavior</b>	Binary, conductive or non-conductive
<b>Switching delay</b>	Adjustable: 0 to 100 s
<b>Number of switching cycles</b>	Unlimited
<b>Assignable functions</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> <li>▪ Diagnostic behavior</li> <li>▪ Limit value <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</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> </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>	Adjustable: 0 to 1 000 Hz
<b>Damping</b>	Adjustable: 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>▪ Off</li> <li>▪ On</li> <li>▪ Diagnostic behavior</li> <li>▪ Limit value <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</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

Device diagnostics	Device condition can be read out via HART Command 48
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### PROFIBUS PA

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

### PROFIBUS DP

Status and alarm messages	Diagnostics in accordance with PROFIBUS PA Profile 3.02
---------------------------	---

### EtherNet/IP

Device diagnostics	Device condition can be read out in Input Assembly
--------------------	--

### PROFINET

Device diagnostics	According to "Application Layer protocol for decentralized periphery", Version 2.3
--------------------	--

### FOUNDATION Fieldbus

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

### Modbus RS485

Failure mode	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

Failure mode	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>▪ Freely 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>▪ Freely definable value between: 0 to 20.5 mA</li> </ul>
---------------------	---

**Pulse/frequency/switch output**

<b>Pulse output</b>	
<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>▪ Actual value</li> <li>▪ No pulses</li> </ul>
<b>Frequency output</b>	
<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>▪ Actual value</li> <li>▪ 0 Hz</li> <li>▪ Defined value (<math>f_{max}</math> 2 to 12 500 Hz)</li> </ul>
<b>Switch output</b>	
<b>Failure 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 backlighting 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
  - EtherNet/IP
  - PROFINET
- 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 →  97

## Web server

Plain text display	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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## Ex connection data

## Safety-related values

Order code for "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	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option LA	PROFIBUS DP	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option MA	Modbus RS485	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option SA	FOUNDATION Fieldbus	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option NA	EtherNet/IP	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option RA	PROFINET	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	

Order code for "Output; input 2"; "Output; input 3" "Output; input 4"	Output type	Safety-related values					
		Output; input 2		Output; input 3		Output; input 4 <sup>1)</sup>	
		24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
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	$U_N = 30 V_{DC}$ $I_N = 100 mA_{DC}/500 mA_{AC}$ $U_M = 250 V_{AC}$					

Order code for "Output; input 2"; "Output; input 3" "Output; input 4"	Output type	Safety-related values					
		Output; input 2		Output; input 3		Output; input 4 <sup>1)</sup>	
		24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
Option I	Current input 4 to 20 mA	U <sub>N</sub> = 30 V <sub>DC</sub> U <sub>M</sub> = 250 V <sub>AC</sub>					
Option J	Status input	U <sub>N</sub> = 30 V <sub>DC</sub> U <sub>M</sub> = 250 V <sub>AC</sub>					

1) The order code "Output; input 4" is only available for the Proline 500 – digital transmitter.

### Intrinsically safe values

Order code for "Output; input 1"	Output type	Intrinsically safe values "Output; input 1"	
		26 (+)	27 (-)
Option CA	Current output 4 to 20 mA HART Ex i	U <sub>i</sub> = 30 V I <sub>i</sub> = 100 mA P <sub>i</sub> = 1.25 W L <sub>i</sub> = 0 C <sub>i</sub> = 0	
Option HA	PROFIBUS PA Ex i	<b>Ex ia</b> <sup>1)</sup> U <sub>i</sub> = 30 V I <sub>i</sub> = 570 mA P <sub>i</sub> = 8.5 W L <sub>i</sub> = 10 μH C <sub>i</sub> = 5 nF	<b>Ex ic</b> <sup>2)</sup> U <sub>i</sub> = 32 V I <sub>i</sub> = 570 mA P <sub>i</sub> = 8.5 W L <sub>i</sub> = 10 μH C <sub>i</sub> = 5 nF
Option TA	FOUNDATION Fieldbus Ex i	<b>Ex ia</b> <sup>1)</sup> U <sub>i</sub> = 30 V I <sub>i</sub> = 570 mA P <sub>i</sub> = 8.5 W L <sub>i</sub> = 10 μH C <sub>i</sub> = 5 nF	<b>Ex ic</b> <sup>2)</sup> U <sub>i</sub> = 32 V I <sub>i</sub> = 570 mA P <sub>i</sub> = 8.5 W L <sub>i</sub> = 10 μH C <sub>i</sub> = 5 nF

1) Only available for the Zone 1; Class I, Division 1 version

2) Only available for the Zone 2; Class I, Division 2 version and only for the Proline 500 – digital transmitter

Order code for "Output; input 2"; "Output; input 3" "Output; input 4"	Output type	Intrinsically safe values or NIFW values					
		Output; input 2		Output; input 3		Output; input 4 <sup>1)</sup>	
		24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
Option C	Current output 4 to 20 mA Ex i	U <sub>i</sub> = 30 V I <sub>i</sub> = 100 mA P <sub>i</sub> = 1.25 W L <sub>i</sub> = 0 C <sub>i</sub> = 0					
Option G	Pulse/frequency/switch output Ex i	U <sub>i</sub> = 30 V I <sub>i</sub> = 100 mA P <sub>i</sub> = 1.25 W L <sub>i</sub> = 0 C <sub>i</sub> = 0					

1) The order code "Output; input 4" is only available for the Proline 500 – digital transmitter.

### Low flow cut off


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

### Galvanic isolation




The outputs are galvanically isolated from one another and from earth (PE).

## Protocol-specific data

## HART




Manufacturer ID	0x11
Device type ID	0x3B
HART protocol revision	7
Device description files (DTM, DD)	Information and files under: <a href="http://www.endress.com">www.endress.com</a>
HART load	Min. 250 Ω
System integration	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>

## 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="http://www.endress.com">www.endress.com</a></li> <li>▪ <a href="http://www.profibus.org">www.profibus.org</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>▪ Local display</li> <li>▪ Via operating tools (e.g. FieldCare)</li> </ul>
Compatibility with earlier model	<p>If the device is replaced, the measuring device Promass 500 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 500 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>
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 DP

Manufacturer ID	0x11
Ident number	0x156F

<b>Profile version</b>	3.02
<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> On the product page for the device: Documents/Software → Device drivers</li> <li>▪ <a href="http://www.profibus.org">www.profibus.org</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>▪ Via operating tools (e.g. FieldCare)</li> </ul>
<b>Compatibility with earlier model</b>	<p>If the device is replaced, the measuring device Promass 500 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 500 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>
<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>

### 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>	0x11
<b>Device type ID</b>	0x103B
<b>Baud rates</b>	Automatic <sup>10</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>	<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>▪ 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>Conformity class</b>	Conformance Class B
<b>Netload Class</b>	Netload Class II
<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>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>	<p>Information and files under:</p> <ul style="list-style-type: none"> <li>▪ <a href="http://www.endress.com">www.endress.com</a> On the product page for the device: Documents/Software → Device drivers</li> <li>▪ <a href="http://www.profibus.org">www.profibus.org</a></li> </ul>
<b>Supported connections</b>	<ul style="list-style-type: none"> <li>▪ 1 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>▪ Manufacturer-specific software (FieldCare, DeviceCare)</li> <li>▪ Web browser</li> <li>▪ Device master file (GSD), can be read out via the integrated Web server of the measuring device</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>▪ Process Device Manager (PDM)</li> <li>▪ Integrated Web server</li> </ul>





<b>Supported functions</b>	<ul style="list-style-type: none"> <li>▪ Identification &amp; Maintenance Simple device identification 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 onsite display for simple device identification and assignment</li> <li>▪ Device operation via operating tools (e.g. FieldCare, DeviceCare, SIMATIC PDM)</li> </ul>
<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>▪ Overview and description of the modules</li> <li>▪ Status coding</li> <li>▪ Startup configuration</li> <li>▪ Factory setting:</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:
<b>CFF revision</b>	<ul style="list-style-type: none"> <li>▪ <a href="http://www.endress.com">www.endress.com</a></li> <li>▪ <a href="http://www.fieldbus.org">www.fieldbus.org</a></li> </ul>
<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.fieldbus.org">www.fieldbus.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>	<p>The following methods are supported:</p> <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
<b>Device Link Capabilities</b>	
<b>Slot time</b>	4
<b>Min. delay between PDU</b>	8

<b>Max. response delay</b>	16
<b>System integration</b>	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>

### 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>	Supported by the following function codes: <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 transfer 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 500 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 on 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>



## Power supply

### Terminal assignment

### Transmitter: supply voltage, input/outputs

#### HART

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered → 15.									

#### FOUNDATION Fieldbus

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (A)	27 (B)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered → 15.									

#### PROFIBUS PA

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered → 15.									

#### PROFIBUS DP

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered → 15.									

#### Modbus RS485

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered → 15.									

#### PROFINET

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	PROFINET (RJ45 connector)		24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered → 15.									



#### EtherNet/IP

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	EtherNet/IP (RJ45 connector)		24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered → 15.									

**Transmitter and sensor connection housing: connecting cable**

The sensor and transmitter, which are mounted in separate locations, are interconnected by a connecting cable. The cable is connected via the sensor connection housing and the transmitter housing.

Terminal assignment and connection of the connecting cable:





- Proline 500 – digital →  33
- Proline 500 →  34

**Device plugs available**

Device plugs may not be used in hazardous areas!


**Device plugs for fieldbus systems:**

Order code for "Input; output 1"


- Option SA "FOUNDATION Fieldbus" →  30
- Option GA "PROFIBUS PA" →  30
- Option RA "PROFINET" →  30
- Option NA "EtherNet/IP" →  30

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


Order code for "Accessory mounted"

option NB, adapter RJ45 M12 (service interface) →  32


**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 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 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

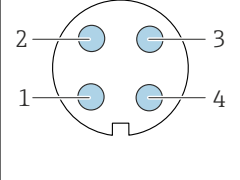
- 1) Cannot be combined with an external WLAN antenna (order code for "Enclosed accessories", option P8) of an RJ45 M12 adapter for the service interface (order code for "Accessories mounted", option NB) or of the remote display and operating module DKX001
- 2) Suitable for integrating the device in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

Order code for "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	-

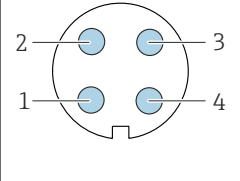
Pin assignment, device plug

**FOUNDATION Fieldbus**



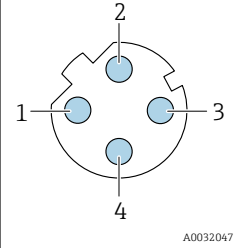
Pin	Assignment	Coding	Plug/socket
1	Signal +	A	Plug
2	Signal -		
3	Grounding		
4	Not assigned		

**PROFIBUS PA**



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

**PROFINET**



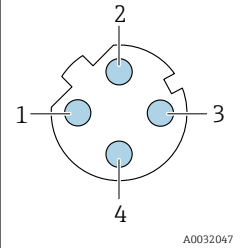
Pin	Assignment	Coding	Plug/socket
1	TD +	D	Socket
2	RD +		
3	TD -		
4	RD -		



Recommended plug:

- Binder, series 763, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q
- When using the device in a hazardous location, use a suitably certified plug.

**EtherNet/IP**



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

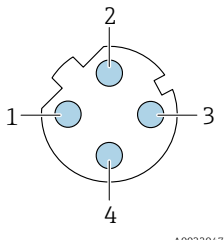


Recommended plug:

- Binder, series 763, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q
- When using the device in a hazardous location, use a suitably certified plug.

**Service interface**

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 763, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q
- When using the device in a hazardous location, use a suitably certified plug.

**Supply voltage**

Order code for "Power supply"	terminal voltage		Frequency range
Option D	DC24 V	±20%	–
Option E	AC100 to 240 V	-15...+10%	50/60 Hz
Option I	DC24 V	±20%	–
	AC100 to 240 V	-15...+10%	50/60 Hz

**Power consumption****Transmitter**

Max. 10 W (active power)

<b>switch-on current</b>	Max. 36 A (as per NAMUR Recommendation NE21)
--------------------------	--

**Current consumption****Transmitter**

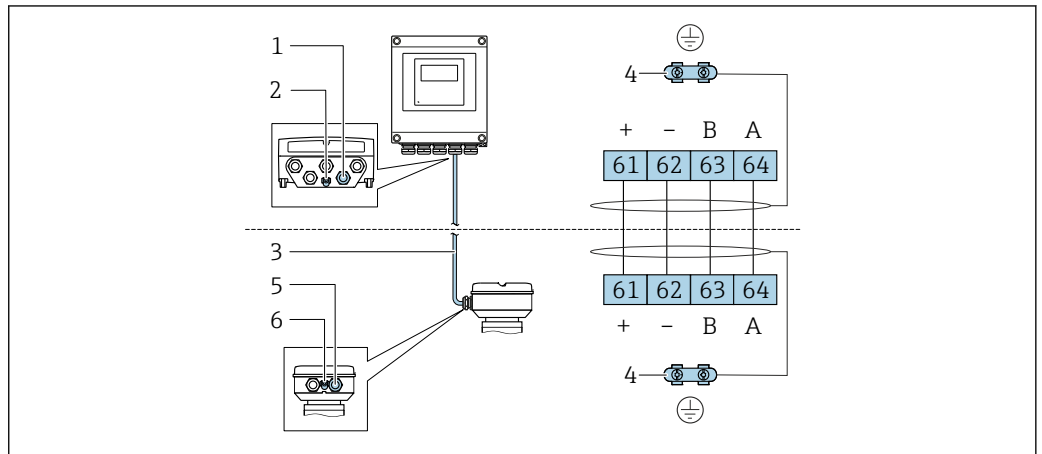
- Max. 400 mA (24 V)
- Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)

**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.

Electrical connection

Connection of connecting cable: Proline 500 – digital



A0028198

- 1 Cable entry for cable on transmitter housing
- 2 Protective ground (PE)
- 3 Connecting cable ISEM communication
- 4 Grounding via ground connection; on device plug versions grounding is through the plug itself
- 5 Cable entry for cable or connection of device plug on sensor connection housing
- 6 Protective ground (PE)

Depending on the device version of the sensor connection housing, the connecting cable is connected via terminals or device plugs.

Sensor connection housing Order code for "Housing"	Connection to sensor connection housing via	Connection to transmitter housing via
Option A: aluminum coated	Terminals	Terminals
Option B: stainless	Terminals	Terminals
Option C ultra-compact, hygienic, stainless	Device plug	Terminals
Option L: cast, stainless	Terminals	Terminals

Pin assignment, device plug

Device plugs are only available for device version, order code for "Housing":

Option C ultra-compact, hygienic, stainless

For connection to sensor connection housing.

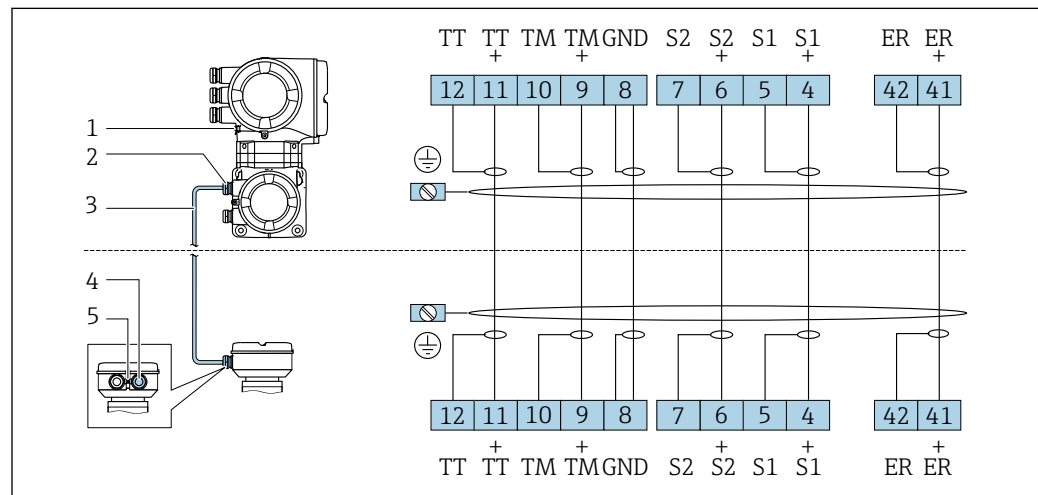
	Pin	Color <sup>1)</sup>	Assignment		Connection to terminal
	1	Brown	+	Supply voltage	61
2	White	A	ISEM communication	64	
3	Blue	B			
4	Black	-	Supply voltage	63	
5	-		-	62	
<b>Coding</b>			<b>Plug/socket</b>		
A			Plug		

1) Cable colors of connecting cable

A connecting cable with a device plug is optionally available.

### Connection of the connecting cable: Proline 500

The connecting cable is connected via terminals.



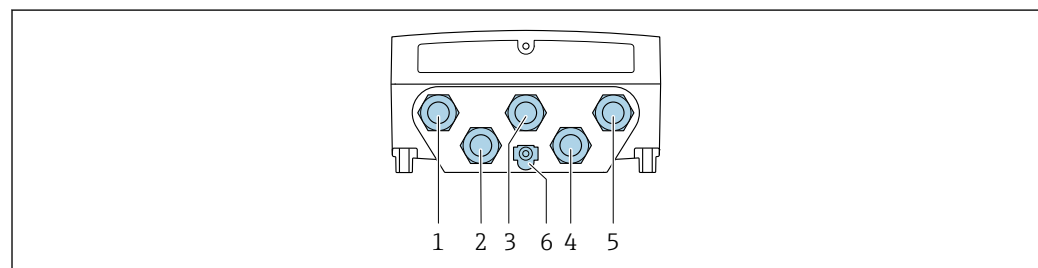
A0028197

- 1 Protective ground (PE)
- 2 Cable entry for connecting cable on transmitter connection housing
- 3 Connecting cable
- 4 Cable entry for connecting cable on sensor connection housing
- 5 Protective ground (PE)

### Connecting the transmitter

- i** Terminal assignment → 29
- i** Device plug pin assignment → 31

### Connecting the Proline 500 – digital transmitter



A0028200

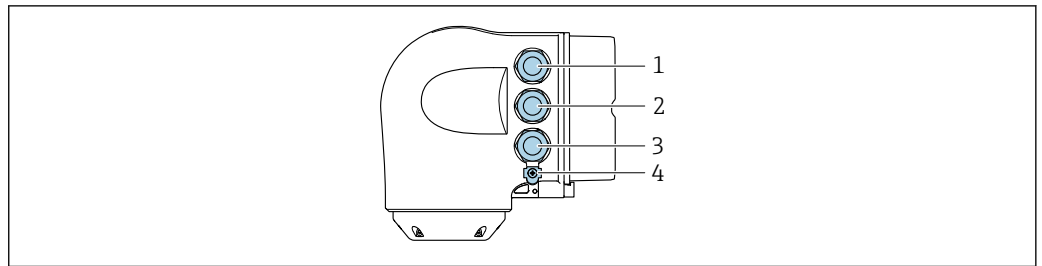
- 1 Terminal connection for supply voltage
- 2 Terminal connection for signal transmission, input/output
- 3 Terminal connection for signal transmission, input/output
- 4 Terminal connection for connecting cable between sensor and transmitter
- 5 Terminal connection for signal transmission, input/output or terminal for network connection (DHCP client) via service interface (CDI-RJ45); optional: terminal connection for external WLAN antenna
- 6 Protective ground (PE)

- i** An adapter for RJ45 and 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 connector mounted in the cable entry. Therefore the connection to the service interface can be established via an M12 connector without opening the device.

- i** Network connection (DHCP client) via service interface (CDI-RJ45) → 103

Connecting the Proline 500 transmitter



A0026781

- 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 (DHCP client) via service interface (CDI-RJ45); optional: terminal connection for external WLAN antenna
- 4 Protective ground (PE)

**i** An adapter for RJ45 and 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 connector mounted in the cable entry. Therefore the connection to the service interface can be established via an M12 connector without opening the device.

**i** Network connection (DHCP client) via service interface (CDI-RJ45) → 103

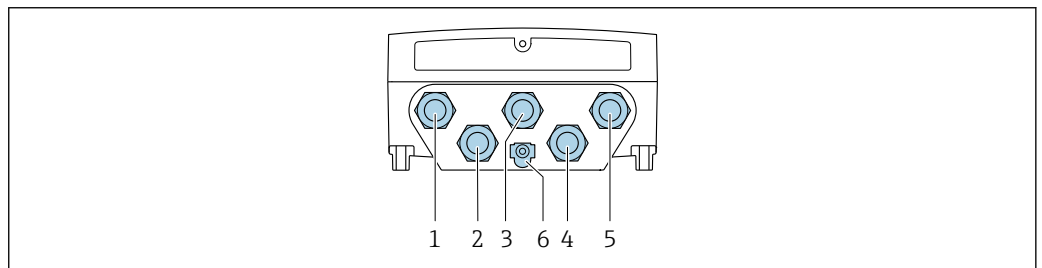
Connecting in a ring topology

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** Integrating the transmitter into a ring topology:

- EtherNet/IP → 101
- PROFINET → 102

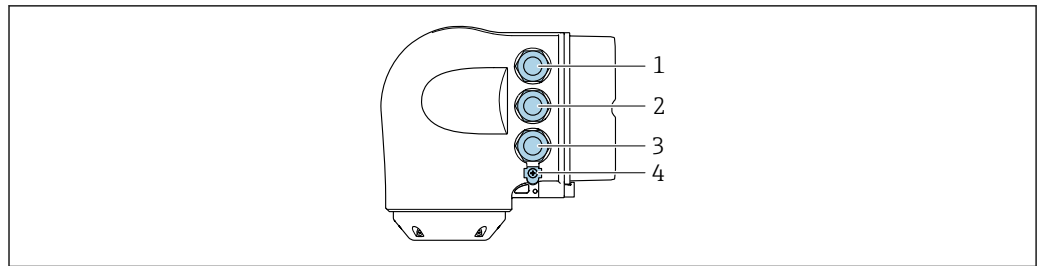
Transmitter: Proline 500 – digital



A0028200

- 1 Terminal connection for supply voltage
- 2 Terminal connection for signal transmission, input/output
- 3 Terminal connection for signal transmission: PROFINET or EtherNet/IP (RJ45 connector)
- 4 Terminal connection for connecting cable between sensor and transmitter
- 5 Terminal connection to service interface (CDI-RJ45)
- 6 Protective ground (PE)

## Transmitter: Proline 500



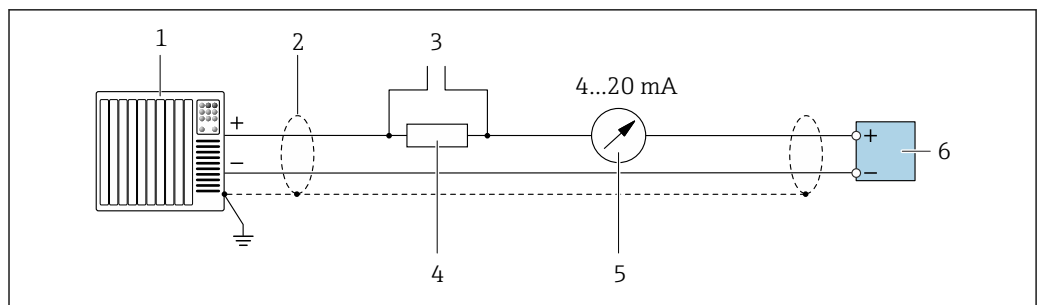
A0026781

- 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 Protective ground (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).

## Connection examples

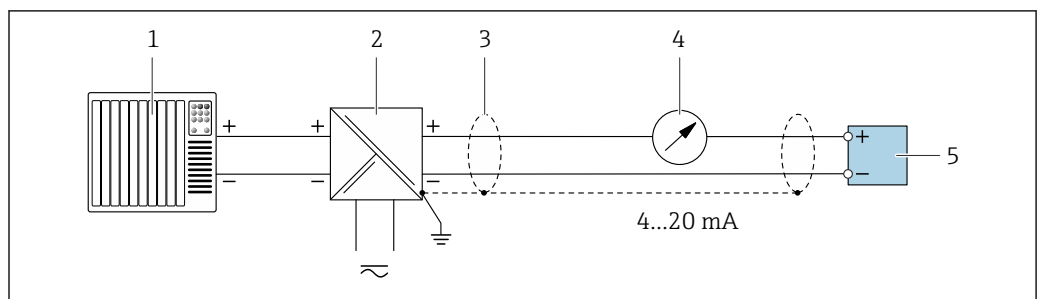
## Current output 4 to 20 mA HART



A0029055

**2** Connection example for 4 to 20 mA HART current output (active)

- 1 Automation system with current input (e.g. PLC)
- 2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 44
- 3 Connection for HART operating devices → 97
- 4 Resistor for HART communication ( $\geq 250 \Omega$ ): observe maximum load → 16
- 5 Analog display unit: observe maximum load → 16
- 6 Transmitter



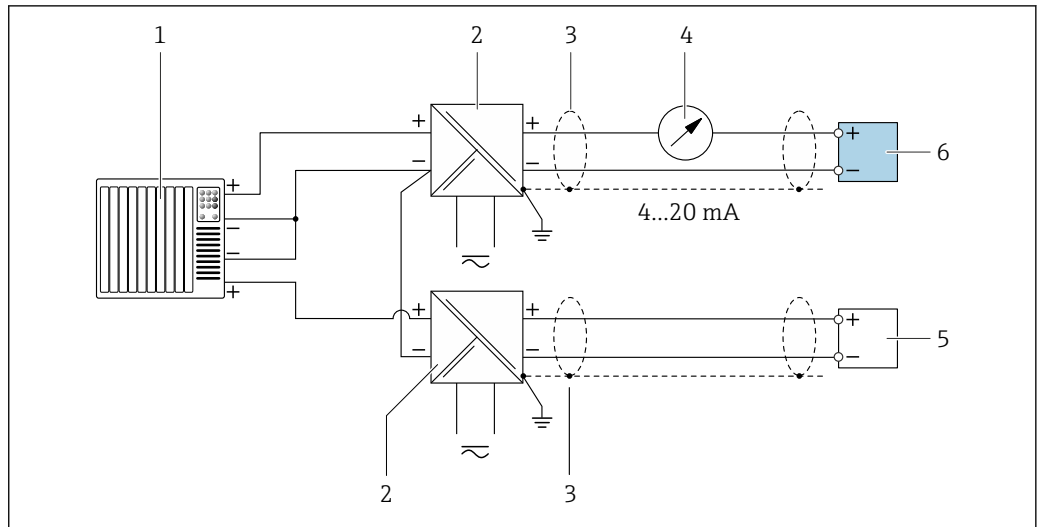
A0028762

**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 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 44
- 4 Analog display unit: observe maximum load → 16
- 5 Transmitter



HART input

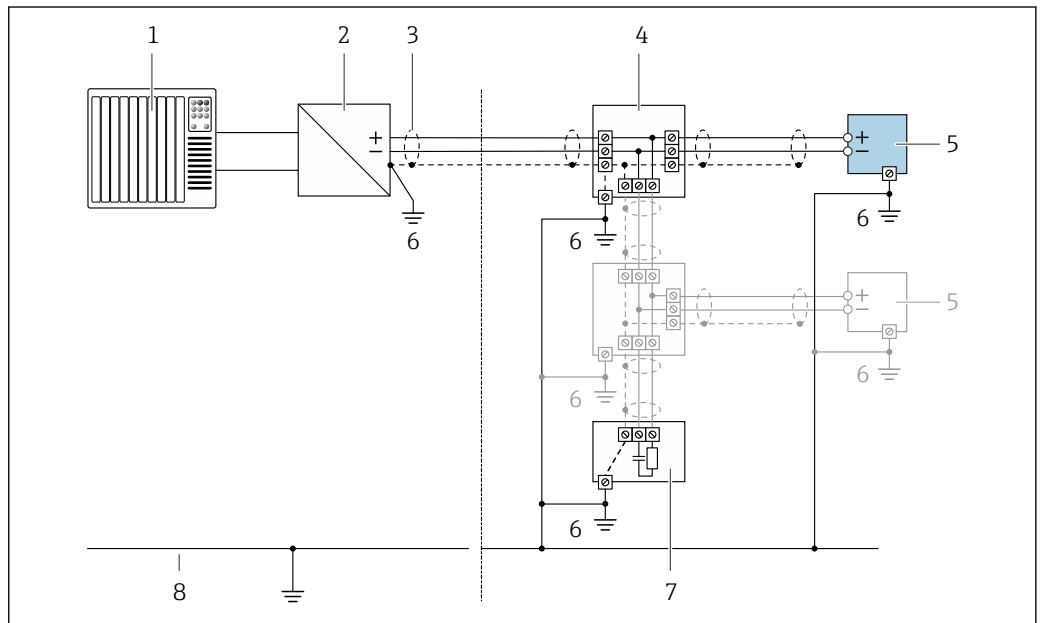


A0028763

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 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 4 Analog display unit: observe maximum load
- 5 Pressure transmitter (e.g. Cerabar M, Cerabar S): see requirements
- 6 Transmitter

PROFIBUS PA

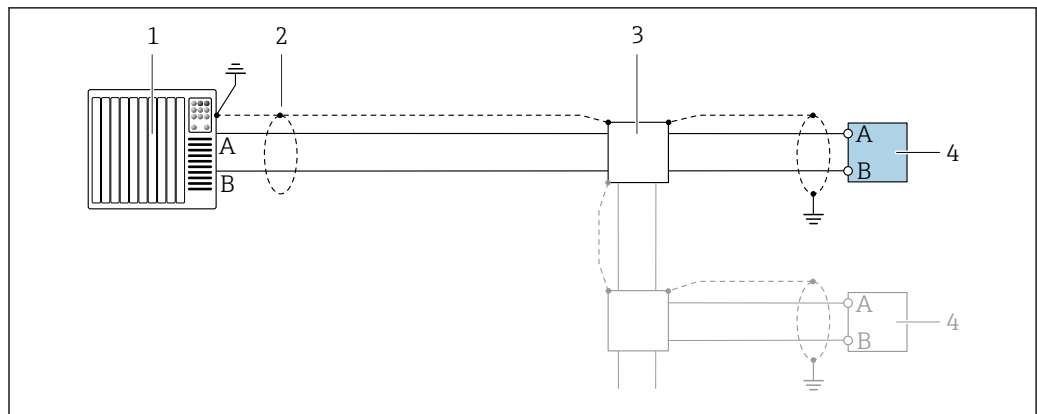


A0028768

5 Connection example for PROFIBUS PA

- 1 Control system (e.g. PLC)
- 2 PROFIBUS PA segment coupler
- 3 Cable shield: 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



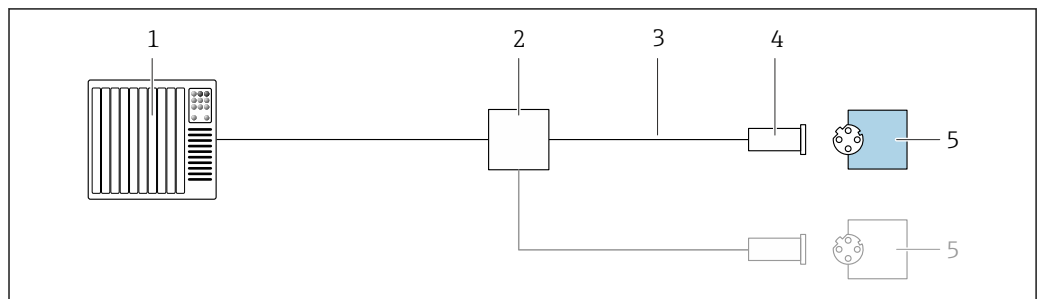
A0028765

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

- 1 Control system (e.g. PLC)
- 2 Cable shield: 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

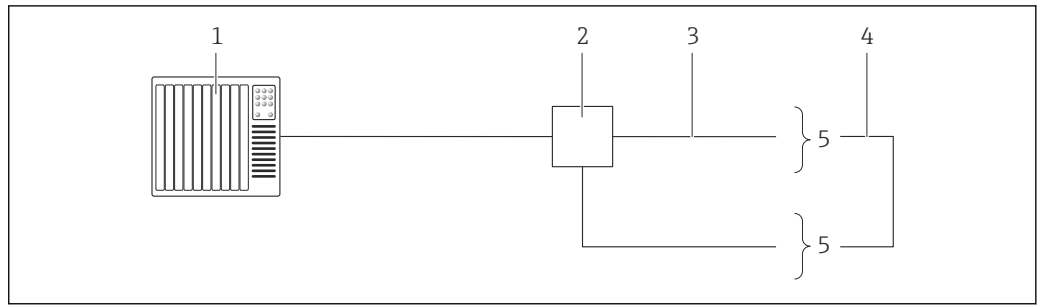


A0028767

7 Connection example for EtherNet/IP

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

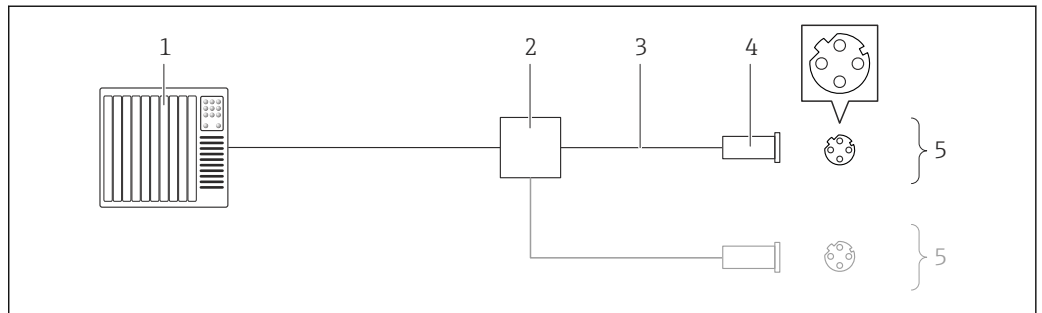
*EtherNet/IP: DLR (Device Level Ring)*



A0027544

- 1 Control system (e.g. PLC)
- 2 Ethernet switch
- 3 Observe cable specifications → 44
- 4 Connecting cable between the two transmitters
- 5 Transmitter

*PROFINET*

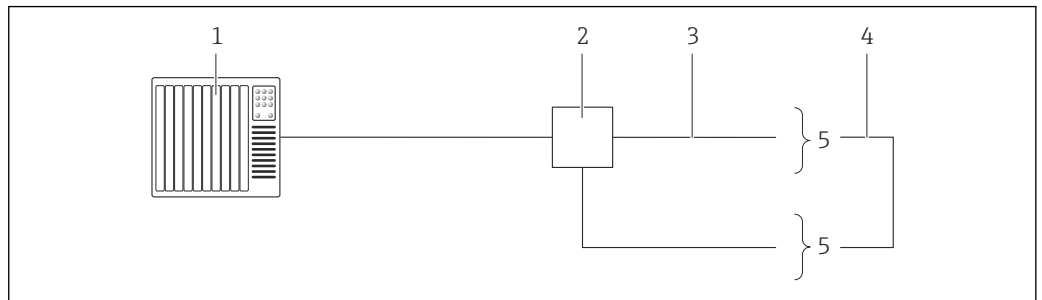


A0016805

8 Connection example for PROFINET

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

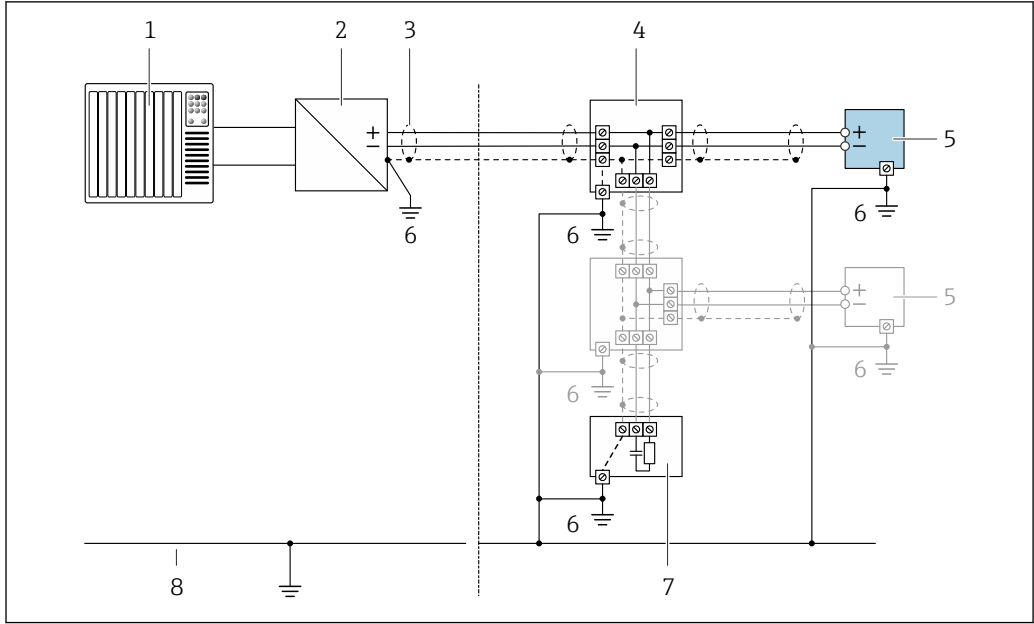
*PROFINET: MRP (Media Redundancy Protocol)*



A0027544

- 1 Control system (e.g. PLC)
- 2 Ethernet switch
- 3 Observe cable specifications → 44
- 4 Connecting cable between the two transmitters
- 5 Transmitter

FOUNDATION Fieldbus

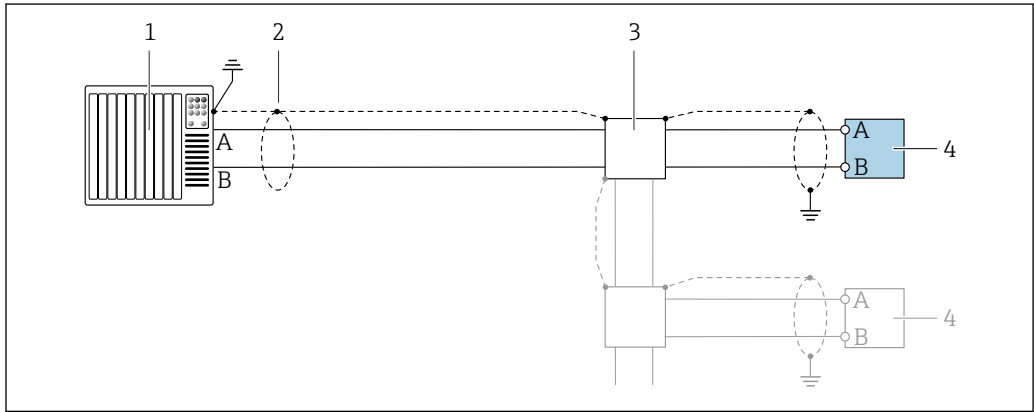


A0028768

9 Connection example for FOUNDATION Fieldbus

- 1 Control system (e.g. PLC)
- 2 Power Conditioner (FOUNDATION Fieldbus)
- 3 Cable shield: 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

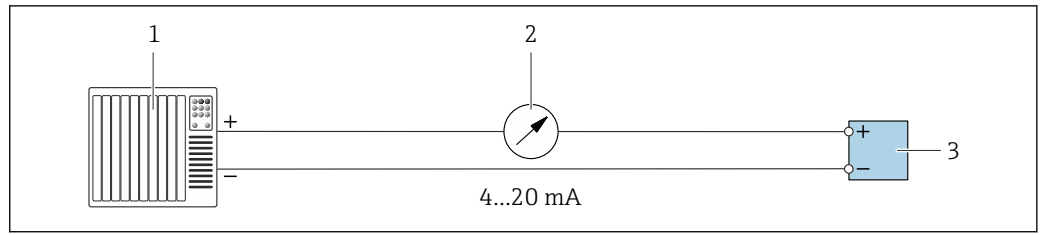


A0028765

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

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

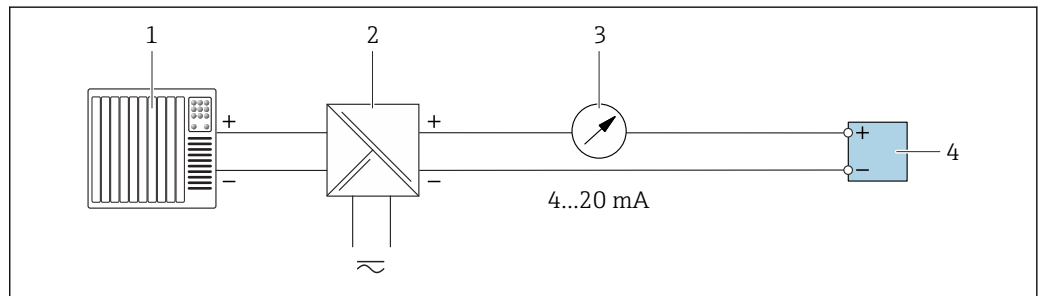
Current output 4-20 mA



A0028758

11 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
- 3 Transmitter

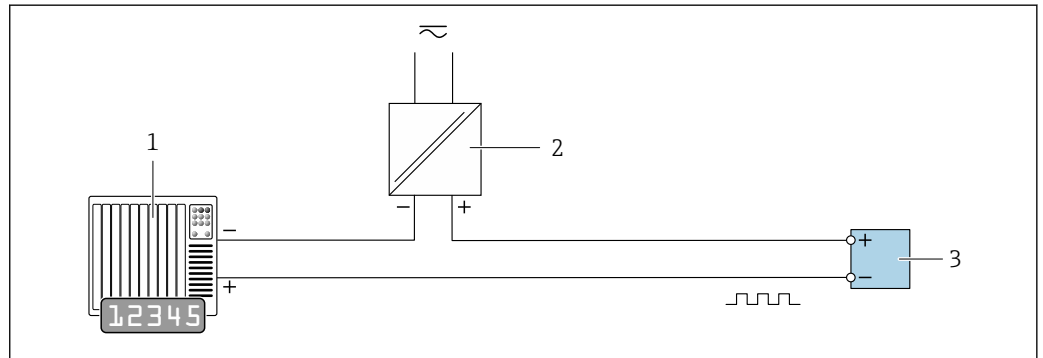


A0028759

12 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
- 4 Transmitter

Pulse/frequency output

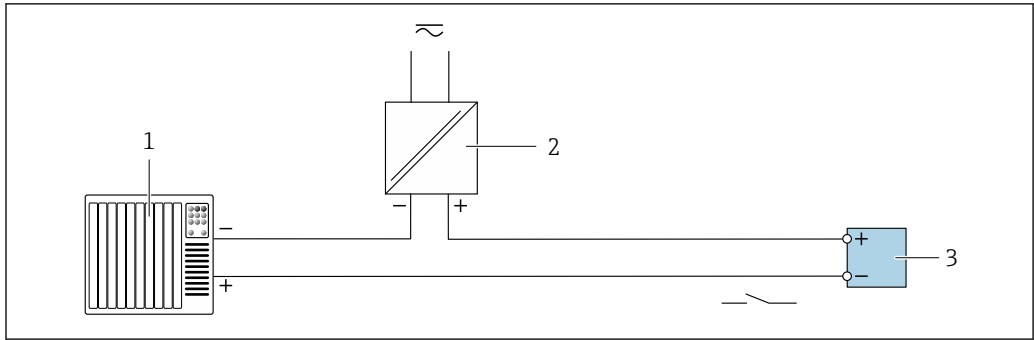


A0028761

13 Connection example for pulse/frequency output (passive)

- 1 Automation system with pulse/frequency input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values → 17

Switch output

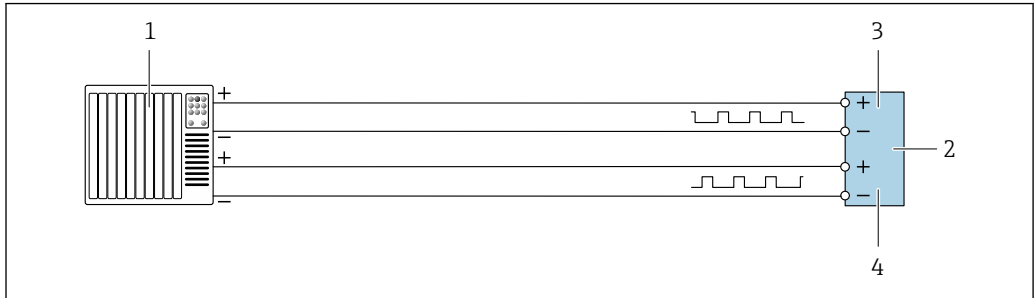


A0028760

14 Connection example for switch output (passive)

- 1 Automation system with switch input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values → 17

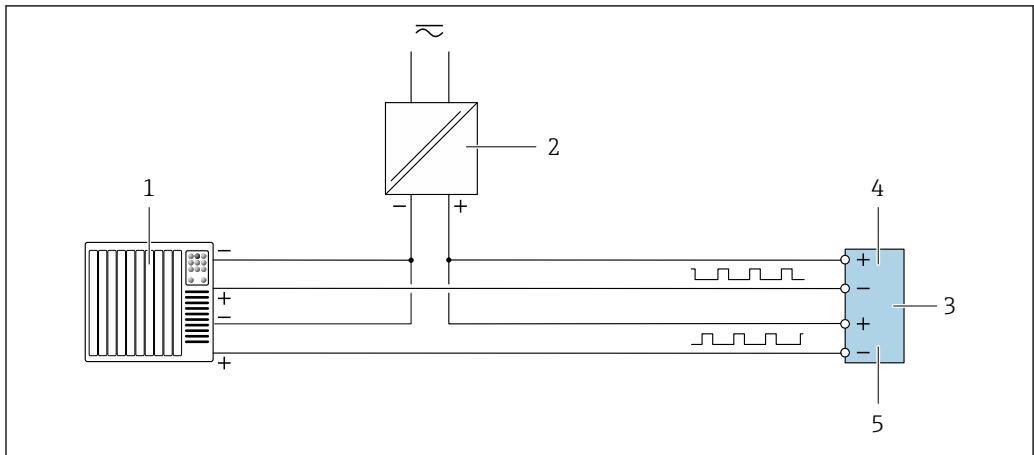
Double pulse output



A0029280

15 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

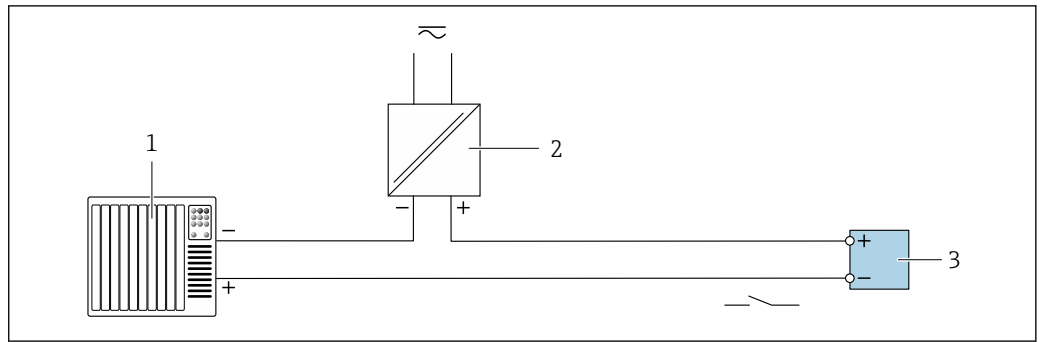


A0029279

16 Connection example for double pulse output (passive)

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

Relay output

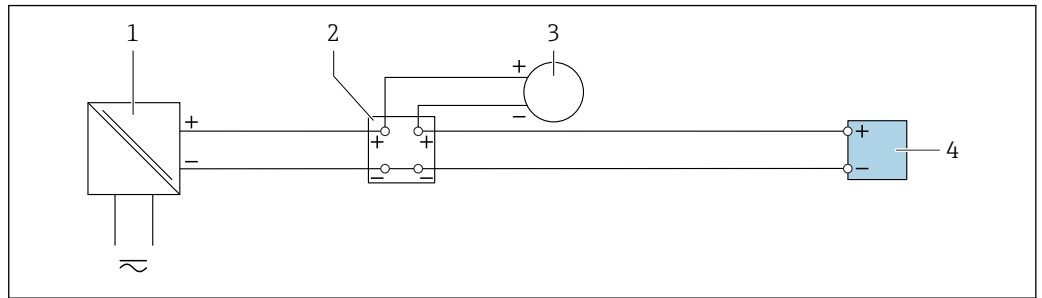


A0028760

17 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

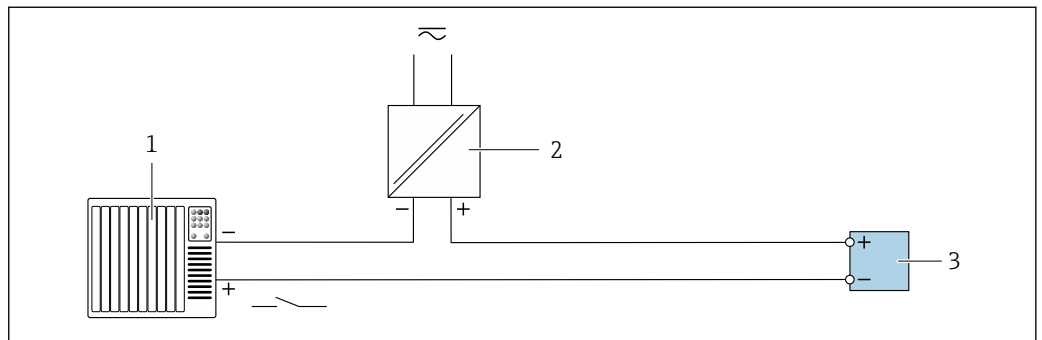


A0028915

18 Connection example for 4 to 20 mA current input

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

Status input



A0028764

19 Connection example for status input

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

Potential equalization

Requirements

No special measures for potential equalization are required.

Please consider the following to ensure correct measurement:

- Same electrical potential for the fluid and sensor
- Company-internal grounding concepts


---

#### 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  $\varnothing$  6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT 1/2"
  - G 1/2"
  - M20
- Device plug for digital communication: M12  
Only available for certain device versions →  30.
- Device plug for connecting cable: M12  
A device plug is always used for the device version with the order code for "Sensor connection housing", option C "Ultra-compact, hygienic, stainless".

---

#### 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

Standard installation cable is sufficient.

##### Protective ground cable

Cable  $\geq 2.08$  mm<sup>2</sup> (14 AWG)

The grounding impedance must be less than 1  $\Omega$ .

##### Signal cable

*Current output 4 to 20 mA HART*

A shielded cable is recommended. Observe grounding concept of the plant.

*PROFIBUS PA*

Twisted, shielded two-wire cable. Cable type A is recommended .



For further information on planning and installing PROFIBUS networks see:

- Operating Instructions "PROFIBUS DP/PA: Guidelines for planning and commissioning" (BA00034S)
- PNO Directive 2.092 "PROFIBUS PA User and Installation Guideline"
- IEC 61158-2 (MBP)

*PROFIBUS DP*

The IEC 61158 standard specifies two types of cable (A and B) for the bus line which can be used for every transmission rate. Cable type A is recommended.

<b>Cable type</b>	A
<b>Characteristic impedance</b>	135 to 165 $\Omega$ at a measuring frequency of 3 to 20 MHz
<b>Cable capacitance</b>	< 30 pF/m
<b>Wire cross-section</b>	> 0.34 mm <sup>2</sup> (22 AWG)
<b>Cable type</b>	Twisted pairs
<b>Loop resistance</b>	$\leq 110$ $\Omega$ /km



<b>Signal damping</b>	Max. 9 dB over the entire length of the cable cross-section
<b>Shield</b>	Copper braided shielding or braided shielding with foil shield. When grounding the cable shield, observe the grounding concept of the plant.



For further information on planning and installing PROFIBUS networks see:

- Operating Instructions "PROFIBUS DP/PA: Guidelines for planning and commissioning" (BA00034S)
- PNO Directive 2.092 "PROFIBUS PA User and Installation Guideline"
- IEC 61158-2 (MBP)

*EtherNet/IP*

The standard ANSI/TIA/EIA-568-B.2 Annex specifies CAT 5 as the minimum category for a cable used for EtherNet/IP. CAT 5e and CAT 6 are recommended.



For more information on planning and installing EtherNet/IP networks, please refer to the "Media Planning and Installation Manual. EtherNet/IP" of ODVA Organization

*PROFINET*

Standard IEC 61156-6 specifies CAT 5 as the minimum category for a cable used for PROFINET. CAT 5e and CAT 6 are recommended.



For more information on planning and installing PROFINET networks, see: "PROFINET Cabling and Interconnection Technology", Guideline for PROFINET

*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*

The EIA/TIA-485 standard specifies two types of cable (A and B) for the bus line which can be used for every transmission rate. Cable type A is recommended.

<b>Cable type</b>	A
<b>Characteristic impedance</b>	135 to 165 Ω at a measuring frequency of 3 to 20 MHz
<b>Cable capacitance</b>	< 30 pF/m
<b>Wire cross-section</b>	> 0.34 mm <sup>2</sup> (22 AWG)
<b>Cable type</b>	Twisted pairs
<b>Loop resistance</b>	≤ 110 Ω/km
<b>Signal damping</b>	Max. 9 dB over the entire length of the cable cross-section
<b>Shield</b>	Copper braided shielding or braided shielding with foil shield. When grounding the cable shield, observe the grounding concept of the plant.

*Current output 0/4 to 20 mA*

Standard installation cable is sufficient.

*Pulse/frequency/switch output*

Standard installation cable is sufficient.

*Double pulse output*

Standard installation cable is sufficient.

*Relay output*

Standard installation cable is sufficient.

*Current input 0/4 to 20 mA*

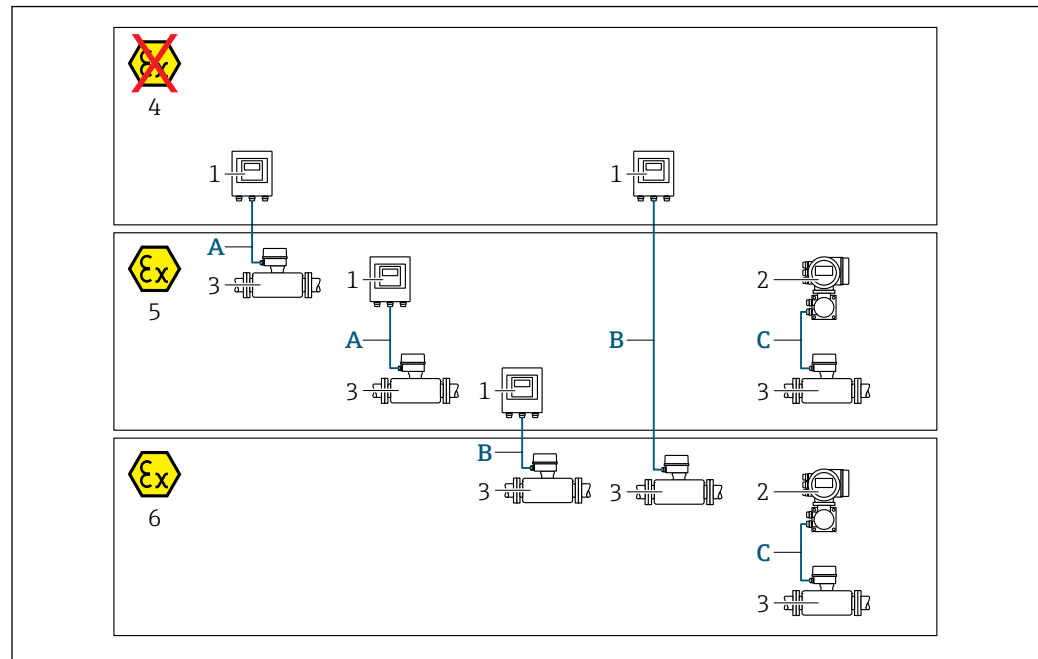
Standard installation cable is sufficient.

*Status input*

Standard installation cable is sufficient.

**Choice of connecting cable between the transmitter and sensor**

Depends on the type of transmitter and the installation zones



A0032476

- 1 Proline 500 digital transmitter  
 2 Proline 500 transmitter  
 3 Sensor Promass  
 4 Non-hazardous area  
 5 Hazardous area: Zone 2; Class I, Division 2  
 6 Hazardous area: Zone 1; Class I, Division 1  
 A Standard cable to 500 digital transmitter → 46  
 Transmitter installed in the non-hazardous area or hazardous area: Zone 2; Class I, Division 2 / sensor installed in the hazardous area: Zone 2; Class I, Division 2  
 B Standard cable to 500 digital transmitter → 47  
 Transmitter installed in the hazardous area: Zone 2; Class I, Division 2 / sensor installed in the hazardous area: Zone 1; Class I, Division 1  
 C Signal cable to 500 transmitter → 49  
 Transmitter and sensor installed in the hazardous area: Zone 2; Class I, Division 2 oder Zone 1; Class I, Division 1

A: Connecting cable between sensor and transmitter: Proline 500 – digital

*Standard cable*

A standard cable with the following specifications can be used as the connecting cable.

<b>Design</b>	4 cores (2 pairs); uninsulated stranded CU wires; pair-stranded with common shield
<b>Shielding</b>	Tin-plated copper-braid, optical cover $\geq 85\%$
<b>Loop resistance</b>	Power supply line (+, -): maximum 10 $\Omega$
<b>Cable length</b>	Maximum 300 m (1000 ft), see the following table.

Cross-section	Cable length [max.]
0.34 mm <sup>2</sup> (AWG 22)	80 m (270 ft)
0.50 mm <sup>2</sup> (AWG 20)	120 m (400 ft)
0.75 mm <sup>2</sup> (AWG 18)	180 m (600 ft)
1.00 mm <sup>2</sup> (AWG 17)	240 m (800 ft)
1.50 mm <sup>2</sup> (AWG 15)	300 m (1 000 ft)

*Optionally available connecting cable*

<b>Design</b>	2 × 2 × 0.34 mm <sup>2</sup> (AWG 22) PVC cable <sup>1)</sup> with common shield (2 pairs, uninsulated stranded CU wires; 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 ≥ 85 %
<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)
<b>Available cable length</b>	Fixed: 20 m (65 ft); variable: up to maximum 50 m (165 ft)

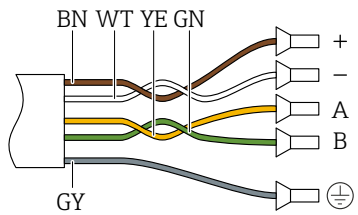
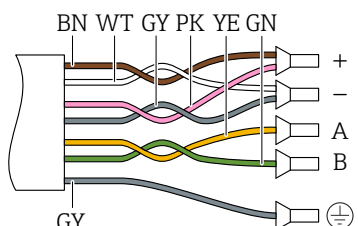
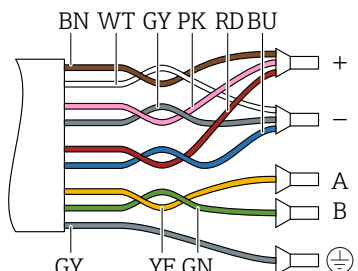
1) UV radiation can impair the cable outer sheath. Protect the cable from direct sunshine where possible.

*B: Connecting cable between sensor and transmitter: Proline 500 - digital*

*Standard cable*

A standard cable with the following specifications can be used as the connecting cable.

<b>Design</b>	4, 6, 8 cores (2, 3, 4 pairs); uninsulated stranded CU wires; pair-stranded with common shield
<b>Shielding</b>	Tin-plated copper-braid, optical cover ≥ 85 %
<b>Capacitance C</b>	Maximum 760 nF IIC, maximum 4.2 µF IIB
<b>Inductance L</b>	Maximum 26 µH IIC, maximum 104 µH IIB
<b>Inductance/resistance ratio (L/R)</b>	Maximum 8.9 µH/Ω IIC, maximum 35.6 µH/Ω IIB (e.g. in accordance with IEC 60079-25)
<b>Loop resistance</b>	Power supply line (+, -): maximum 5 Ω
<b>Cable length</b>	Maximum 150 m (500 ft), see the following table.

Cross-section	Cable length [max.]	Termination
2 x 2 x 0.50 mm <sup>2</sup> (AWG 20)	50 m (165 ft)	2 x 2 x 0.50 mm <sup>2</sup> (AWG 20)  <ul style="list-style-type: none"> <li>■ +, - = 0.5 mm<sup>2</sup></li> <li>■ A, B = 0.5 mm<sup>2</sup></li> </ul>
3 x 2 x 0.50 mm <sup>2</sup> (AWG 20)	100 m (330 ft)	3 x 2 x 0.50 mm <sup>2</sup> (AWG 20)  <ul style="list-style-type: none"> <li>■ +, - = 1.0 mm<sup>2</sup></li> <li>■ A, B = 0.5 mm<sup>2</sup></li> </ul>
4 x 2 x 0.50 mm <sup>2</sup> (AWG 20)	150 m (500 ft)	4 x 2 x 0.50 mm <sup>2</sup> (AWG 20)  <ul style="list-style-type: none"> <li>■ +, - = 1.5 mm<sup>2</sup></li> <li>■ A, B = 0.5 mm<sup>2</sup></li> </ul>

*Optionally available connecting cable*

<b>Connecting cable for</b>	Zone 1; Class I, Division 1
<b>Standard cable</b>	2 × 2 × 0.5 mm <sup>2</sup> (AWG 20) 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 ≥ 85 %
<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)
<b>Available cable length</b>	Fixed: 20 m (65 ft); variable: up to maximum 50 m (165 ft)

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

C: Connecting cable between sensor and transmitter: Proline 500



<b>Standard cable</b>	6 × 0.38 mm <sup>2</sup> PVC cable <sup>1)</sup> with common shield and individually shielded cores
<b>Conductor resistance</b>	≤50 Ω/km (0.015 Ω/ft)
<b>Capacitance: core/shield</b>	≤420 pF/m (128 pF/ft)
<b>Cable length (max.)</b>	20 m (65 ft)
<b>Cable lengths (available for order)</b>	5 m (15 ft), 10 m (32 ft), 20 m (65 ft)
<b>Operating temperature</b>	max. 105 °C (221 °F)

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

## Performance characteristics

**Reference operating conditions**

- Error limits based on ISO 11631
- Water with +15 to +45 °C (+59 to +113 °F) at 2 to 6 bar (29 to 87 psi)
- Specifications as per calibration protocol
- Accuracy based on accredited calibration rigs that are traced to ISO 17025.

 To obtain measured errors, use the *Applicator* sizing tool →  117

**Maximum measured error**

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

**Base accuracy**

 Design fundamentals →  53

*Mass flow and volume flow (liquids)*

±0.10 % o.r.

*Mass flow (gases)*

±0.50 % o.r.

*Density (liquids)*

Under reference operating conditions [g/cm <sup>3</sup> ]	Standard density calibration <sup>1)</sup> [g/cm <sup>3</sup> ]	Wide-range Density specification <sup>2) 3)</sup> [g/cm <sup>3</sup> ]
±0.0005	±0.02	±0.004

- 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	$\frac{3}{8}$	0.150	0.0055
15	$\frac{1}{2}$	0.488	0.0179
15 FB	$\frac{1}{2}$ FB	1.350	0.0496
25	1	1.350	0.0496
25 FB	1 FB	3.375	0.124
40	$1\frac{1}{2}$	3.375	0.124
40 FB	$1\frac{1}{2}$ FB	5.25	0.193
50	2	5.25	0.193
50 FB	2 FB	13.5	0.496
80	3	13.5	0.496

FB = Full bore

## Flow values

Flow values as turndown parameter 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
15 FB	18 000	1 800	900	360	180	36
25	18 000	1 800	900	360	180	36
25 FB	45 000	4 500	2 250	900	450	90
40	45 000	4 500	2 250	900	450	90
40 FB	70 000	7 000	3 500	1 400	700	140
50	70 000	7 000	3 500	1 400	700	140
50 FB	180 000	18 000	9 000	3 600	1 800	360
80	180 000	18 000	9 000	3 600	1 800	360

FB = Full bore

## 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
$\frac{1}{2}$ FB	661.5	66.15	33.08	13.23	6.615	1.323
1	661.5	66.15	33.08	13.23	6.615	1.323
1 FB	1 654	165.4	82.70	33.08	16.54	3.308
$1\frac{1}{2}$	1 654	165.4	82.70	33.08	16.54	3.308
$1\frac{1}{2}$ FB	2 573	257.3	128.7	51.46	25.73	5.146

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]
2	2 573	257.3	128.7	51.46	25.73	5.146
2 FB	6 615	661.5	330.8	132.3	66.15	13.23
3	6 615	661.5	330.8	132.3	66.15	13.23

FB = Full bore

**Accuracy of outputs**

The outputs have the following base accuracy specifications.

*Current output*

<b>Accuracy</b>	±5 µA
-----------------	-------

*Pulse/frequency output*


o.r. = of reading

<b>Accuracy</b>	Max. ±50 ppm o.r. (over the entire ambient temperature range)
-----------------	---

**Repeatability**

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

**Base repeatability**

 Design fundamentals → 53

*Mass flow and volume flow (liquids)*

±0.05 % o.r.

*Mass flow (gases)*

±0.25 % o.r.

*Density (liquids)*

±0.00025 g/cm<sup>3</sup>

*Temperature*

±0.25 °C ± 0.0025 · T °C (±0.45 °F ± 0.0015 · (T-32) °F)

**Response time**

The response time depends on the configuration (damping).

**Influence of ambient temperature**

**Current output**

<b>Temperature coefficient</b>	Max. 1 µA/°C
--------------------------------	--------------

**Pulse/frequency output**

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

**Influence of medium temperature**

**Mass flow and volume flow**

o.f.s. = of full scale value

When there is a difference between the temperature for zero point adjustment and the process temperature, the additional measured error of the sensor is typically ±0.0002 % o.f.s./°C (±0.0001 % o. f.s./°F).

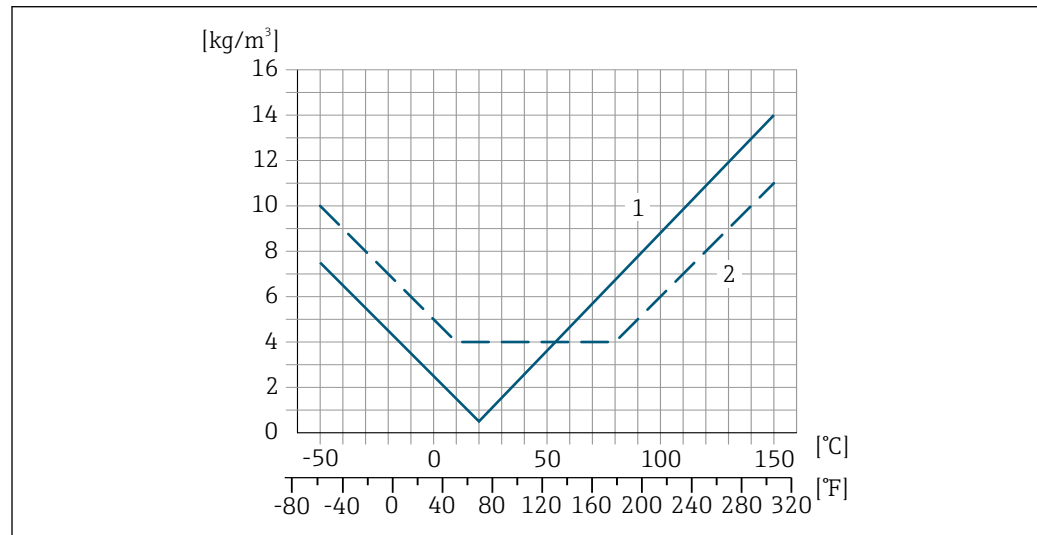
The effect is reduced if zero point adjustment is performed at process temperature.

**Density**

When there is a difference between the density calibration temperature and the process temperature, the typical measured error of the sensor is  $\pm 0.0001 \text{ g/cm}^3 / ^\circ\text{C}$  ( $\pm 0.00005 \text{ g/cm}^3 / ^\circ\text{F}$ ). Field density calibration is possible.

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

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



- 1 Field density calibration, 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 table below shows the effect on accuracy of mass flow due to a difference between calibration pressure and process pressure.

o.r. = of reading

- It is possible to compensate for the effect by:
  - Reading in the current pressure measured value via the current 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	$\frac{3}{8}$	No effect	No effect
15	$\frac{1}{2}$	No effect	No effect
15 FB	$\frac{1}{2}$ FB	+0.003	+0.0002
25	1	+0.003	+0.0002
25 FB	1 FB	No effect	No effect
40	$1\frac{1}{2}$	No effect	No effect
40 FB	$1\frac{1}{2}$ FB	No effect	No effect
50	2	No effect	No effect
50 FB	2 FB	No effect	No effect



DN		[% o.r./bar]	[% o.r./psi]
[mm]	[in]		
80	3	No effect	No effect
FB = Full bore			

**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

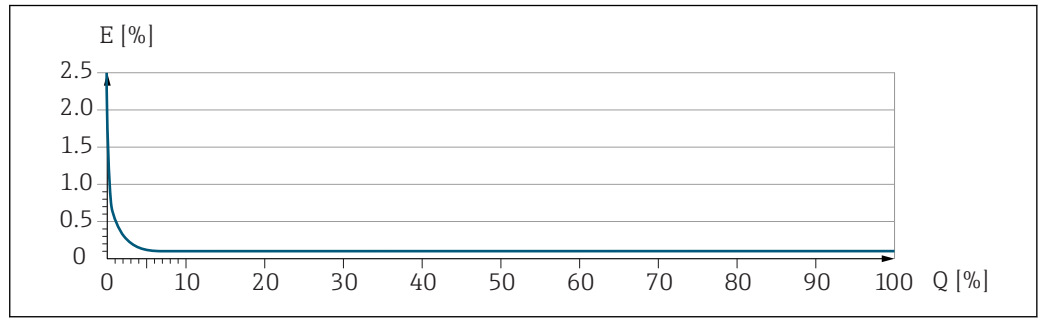
*Calculation of the maximum measured error as a function of the flow rate*

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 for maximum measured error**

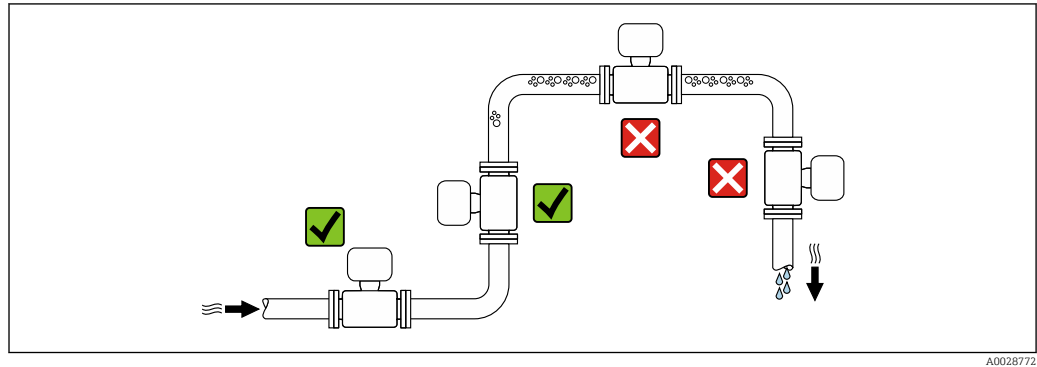


E Maximum measured error in % o.r. (example)  
 Q Flow rate in % of maximum full scale value

**Installation**

No special measures such as supports etc. are necessary. External forces are absorbed by the construction of the device.

## Mounting location



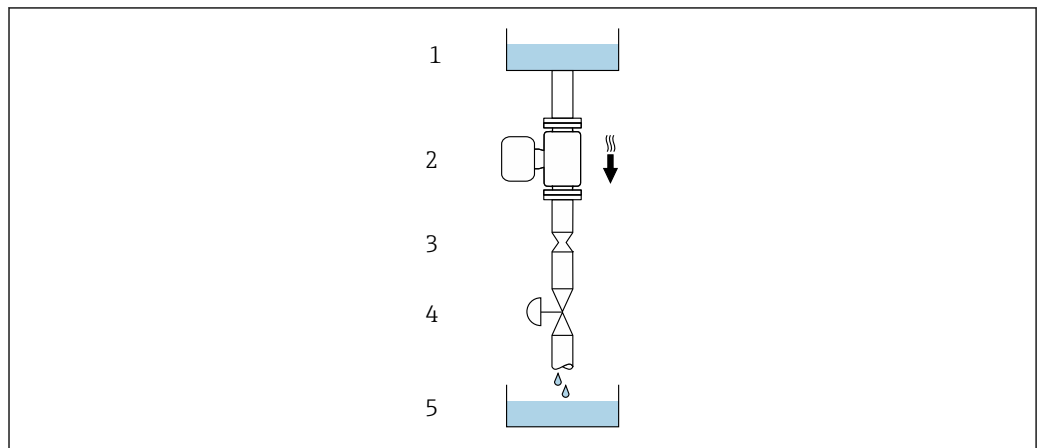
A0028772

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

- 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

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

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

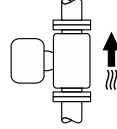
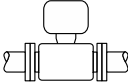
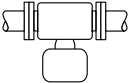

DN		Ø orifice plate, pipe restriction	
[mm]	[in]	[mm]	[in]
8	$\frac{3}{8}$	6	0.24
15	$\frac{1}{2}$	10	0.40
15 FB	$\frac{1}{2}$ FB	15	0.60
25	1	14	0.55
25 FB	1 FB	24	0.95
40	$1\frac{1}{2}$	22	0.87
40 FB	$1\frac{1}{2}$ FB	35	1.38
50	2	28	1.10

DN		Ø orifice plate, pipe restriction	
[mm]	[in]	[mm]	[in]
50 FB	2 FB	54	2.13
80	3	50	1.97

FB = Full bore

**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>
<b>C</b>	Horizontal orientation, transmitter at bottom	 A0015590	✓✓ <sup>3)</sup>
<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 decrease 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.

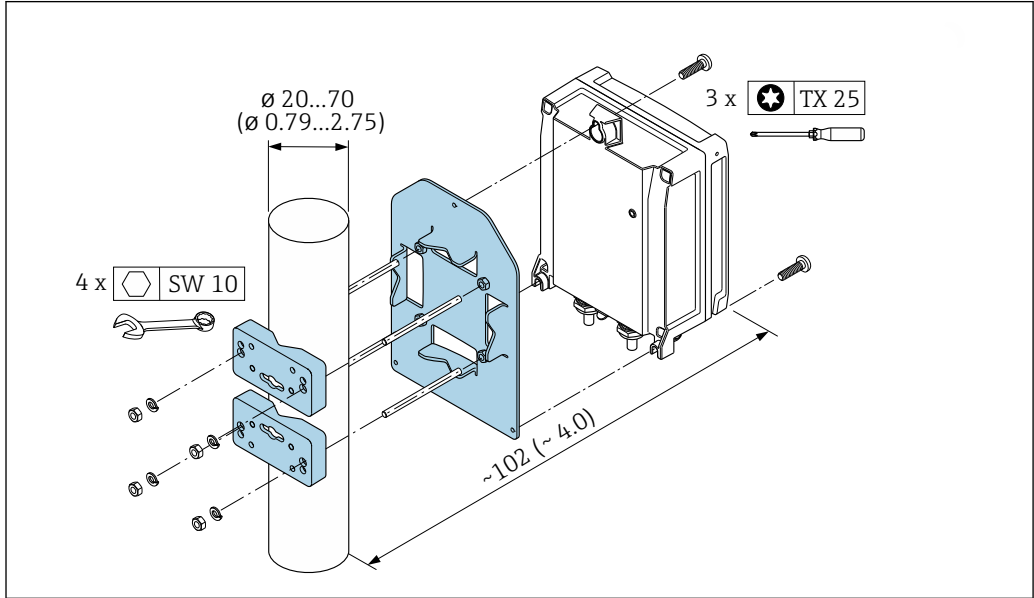
**Inlet and outlet runs**

No special precautions need to be taken for fittings which create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs → 65.

Mounting the transmitter housing

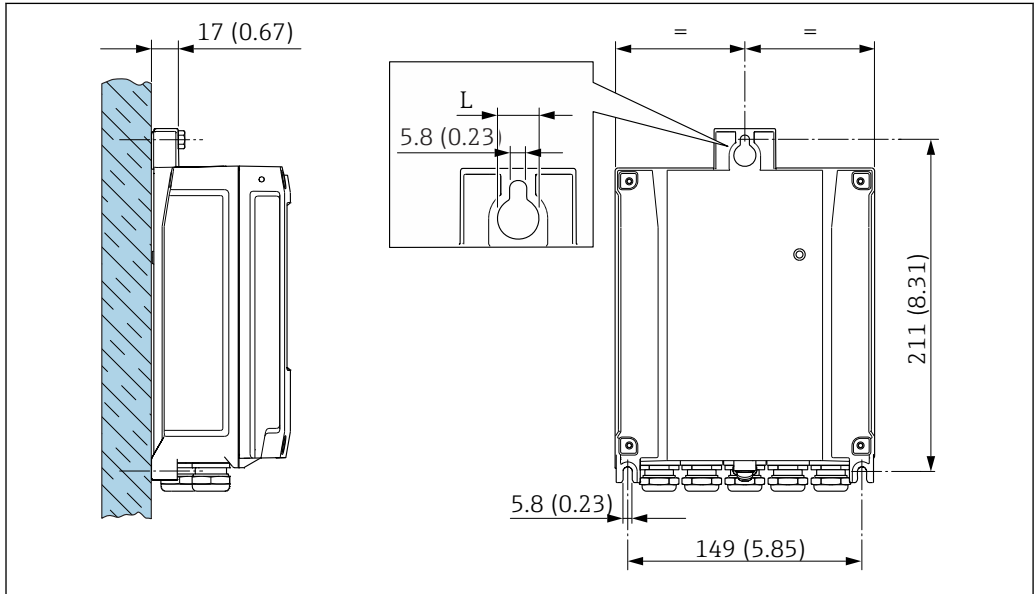
Proline 500 – digital transmitter

Post mounting



21 Engineering unit mm (in)

Wall mounting



22 Engineering unit mm (in)

L Depends on order code for "Transmitter housing"

- Order code for "Transmitter housing"
- Option A, aluminum coated: L = 14 mm (0.55 in)
  - Option D, polycarbonate: L = 13 mm (0.51 in)

**Proline 500 transmitter**

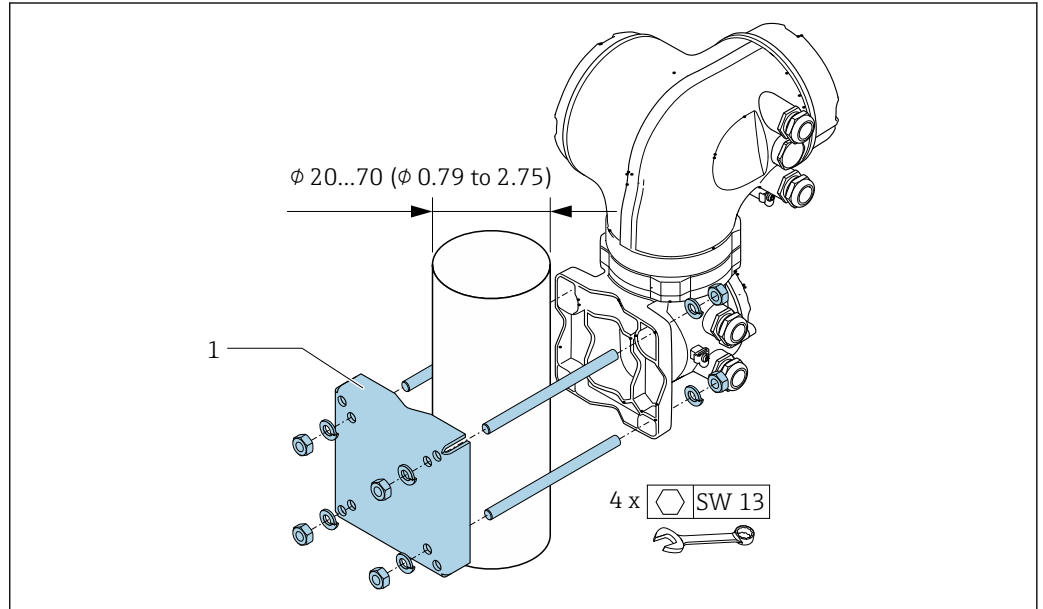
Post mounting



**Order code for "Transmitter housing", option L "Cast, stainless": cast transmitters are very heavy.**

They are unstable if they are not mounted on a secure, fixed post.

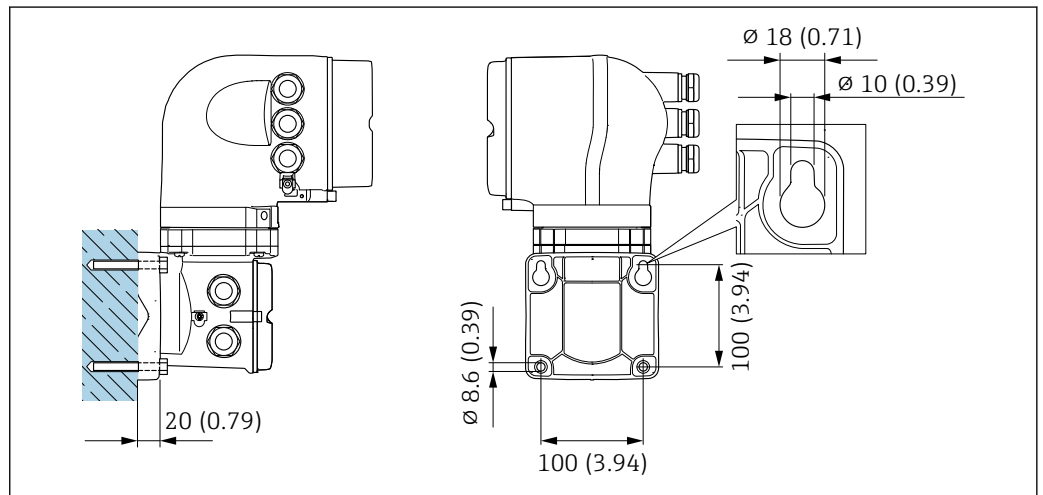
- ▶ Only mount the transmitter on a secure, fixed post on a stable surface.



A0029057

23 Engineering unit mm (in)

Wall mounting



A0029068

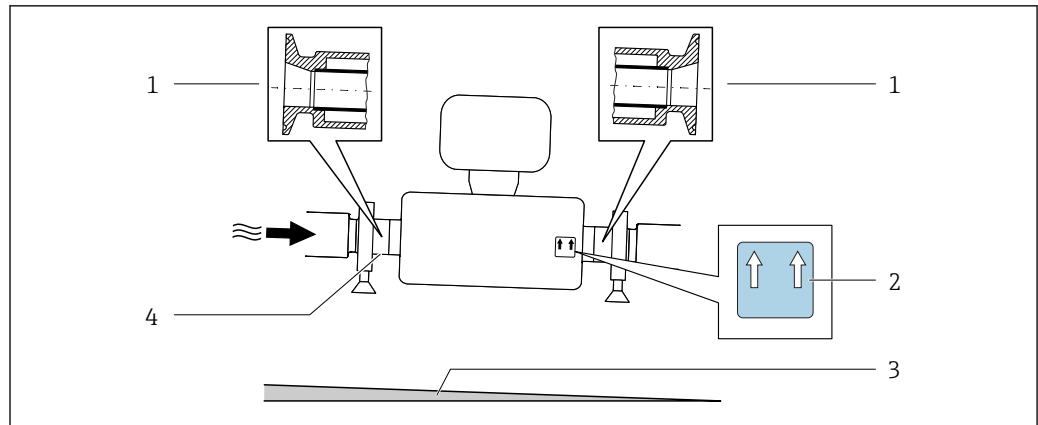
24 Engineering unit mm (in)

**Special mounting 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.



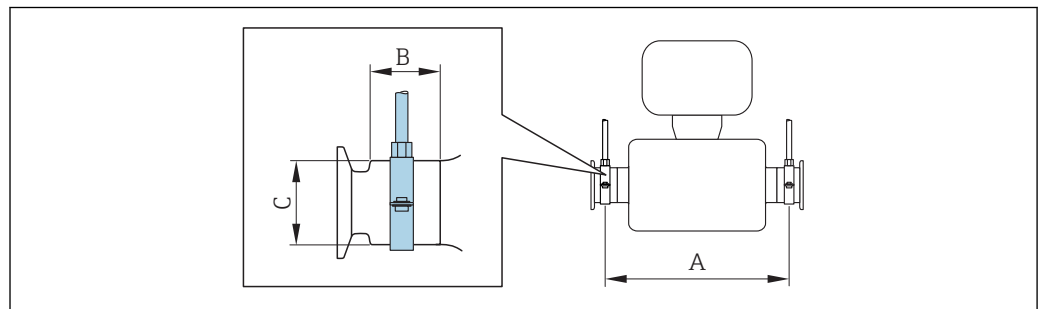
A0030297

- 1 Eccentric clamp connection
- 2 "This side up" label indicates which side is up
- 3 Slope the device in accordance with the hygiene guidelines. Slope: approx. 2 % or 21 mm/m (0.24 in/feet)
- 4 Line on the underside indicates the lowest point of the eccentric process connection.

### 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	8	373	14.69	20	0.79	40	1.57
15	15	409	16.1	20	0.79	40	1.57
15 FB	15 FB	539	21.22	30	1.18	44.5	1.75
25	25	539	21.22	30	1.18	44.5	1.75
25 FB	25 FB	668	26.3	28	1.1	60	2.36
40	40	668	26.3	28	1.1	60	2.36
40 FB	40 FB	780	30.71	35	1.38	80	3.15
50	50	780	30.71	35	1.38	80	3.15
50 FB	50 FB	1152	45.35	57	2.24	90	3.54
80	80	1152	45.35	57	2.24	90	3.54

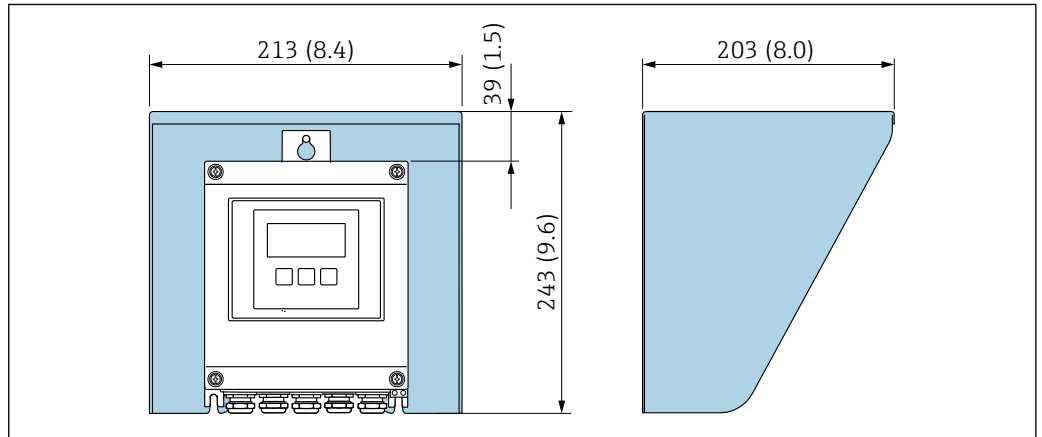
### Zero point adjustment

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

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

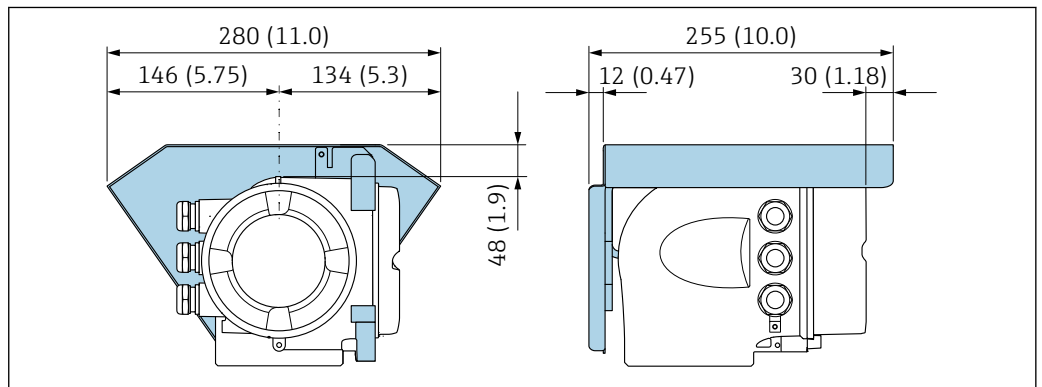
- To achieve maximum measuring accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity fluids).

**Protective cover**



A0029552

25 Weather protection cover for Proline 500 – digital



A0029553

26 Weather protection cover for Proline 500

## Environment



**Ambient temperature range**

<b>Measuring device</b>	<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>
<b>Readability of the local display</b>	<p>-20 to +60 °C (-4 to +140 °F)</p> <p>The readability of the display may be impaired at temperatures outside the temperature range.</p>

**i** Dependency of ambient temperature on medium temperature → 60

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

**i** You can order a weather protection cover from Endress+Hauser. → 115.

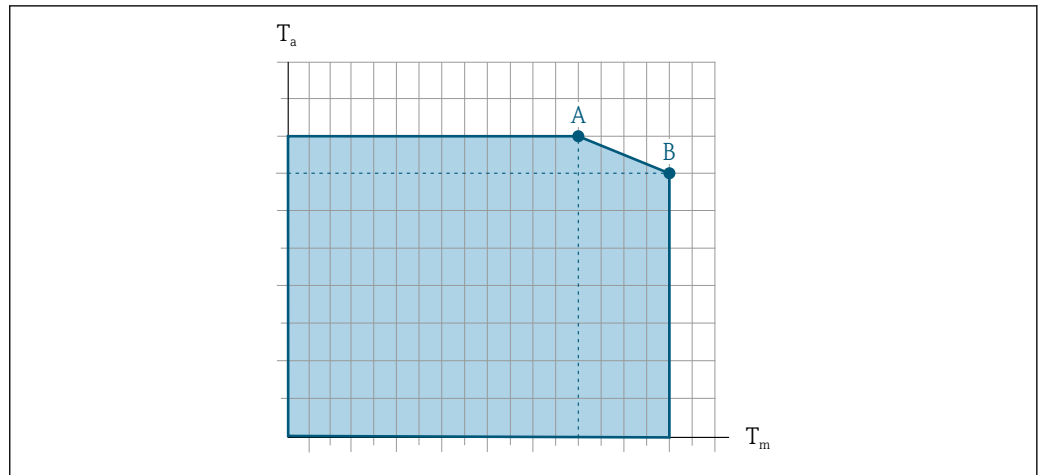
<b>Storage temperature</b>	-50 to +80 °C (-58 to +176 °F)
<b>Climate class</b>	DIN EN 60068-2-38 (test Z/AD)
<b>Degree of protection</b>	<p><b>Transmitter</b></p> <ul style="list-style-type: none"> <li>■ As standard: IP66/67, type 4X enclosure</li> <li>■ When housing is open: IP20, type 1 enclosure</li> <li>■ Display module: IP20, type 1 enclosure</li> </ul> <p><b>Sensor</b></p> <ul style="list-style-type: none"> <li>■ As standard: IP66/67, type 4X enclosure</li> <li>■ With the order code for "Sensor options", option <b>CM</b>: IP69 can also be ordered</li> </ul> <p><b>External WLAN antenna</b></p> <p>IP67</p>
<b>Vibration resistance</b>	<ul style="list-style-type: none"> <li>■ Oscillation, sinusoidal, following IEC 60068-2-6 2 to 8.4 Hz, 3.5 mm peak</li> <li>■ Oscillation, broadband noise following IEC 60068-2-64 <ul style="list-style-type: none"> <li>- 10 to 200 Hz, 0.003 g<sup>2</sup>/Hz</li> <li>- 200 to 2 000 Hz, 0.001 g<sup>2</sup>/Hz</li> <li>- Total: 1.54 g rms</li> </ul> </li> </ul>
<b>Shock resistance</b>	Shock, half-sine according to IEC 60068-2-27 6 ms 50 g
<b>Shock resistance</b>	Shock due to rough handling following IEC 60068-2-31
<b>Interior cleaning</b>	<ul style="list-style-type: none"> <li>■ Cleaning in place (CIP)</li> <li>■ Sterilization in place (SIP)</li> <li>■ Cleaning with pigs</li> </ul> <p><b>Options</b></p> <p>Oil- and grease-free version for wetted parts, without declaration Order code for "Service", option HA</p>
<b>Electromagnetic compatibility (EMC)</b>	<ul style="list-style-type: none"> <li>■ As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)</li> <li>■ Device version with PROFIBUS DP: Complies with emission limits for industry as per EN 50170 Volume 2, IEC 61784</li> </ul> <p> The following applies for PROFIBUS DP: If baud rates &gt; 1.5 MBaud, an EMC cable entry must be used and the cable shield must continue as far as the terminal wherever possible.</p> <p> Details are provided in the Declaration of Conformity.</p>

## Process

<b>Medium temperature range</b>	-50 to +150 °C (-58 to +302 °F)
---------------------------------	---------------------------------



Dependency of ambient temperature on medium temperature



A0031121

27 Exemplary representation, values in the table below.

$T_a$  Ambient temperature

$T_m$  Medium temperature

A Maximum permitted medium temperature  $T_m$  at  $T_{a\max} = 60\text{ °C}$  (140 °F); higher medium temperatures  $T_m$  require a reduced ambient temperature  $T_a$

B Maximum permitted ambient temperature  $T_a$  for the maximum specified medium temperature  $T_m$  of the sensor

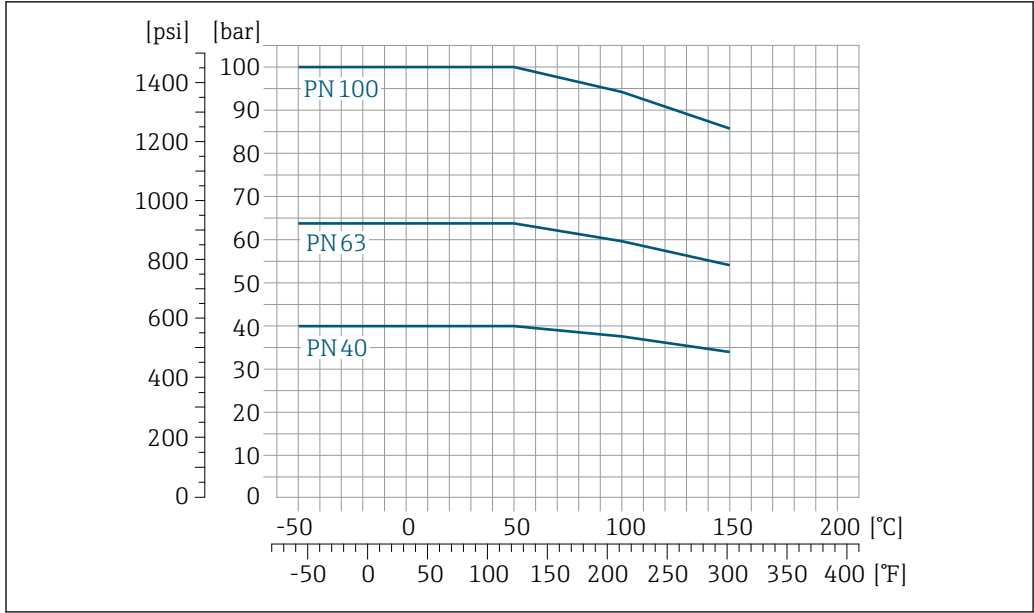
**i** Values for devices used in the hazardous area:  
Separate Ex documentation (XA) for the device → 119.

Version	Not insulated				Insulated			
	A		B		A		B	
	$T_a$	$T_m$	$T_a$	$T_m$	$T_a$	$T_m$	$T_a$	$T_m$
Promass I 500 – digital	60 °C (140 °F)	140 °C (284 °F)	55 °C (131 °F)	150 °C (302 °F)	60 °C (140 °F)	90 °C (194 °F)	45 °C (113 °F)	150 °C (302 °F)
Promass I 500								

**Density** 0 to 5 000 kg/m<sup>3</sup> (0 to 312 lb/cf)

**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.

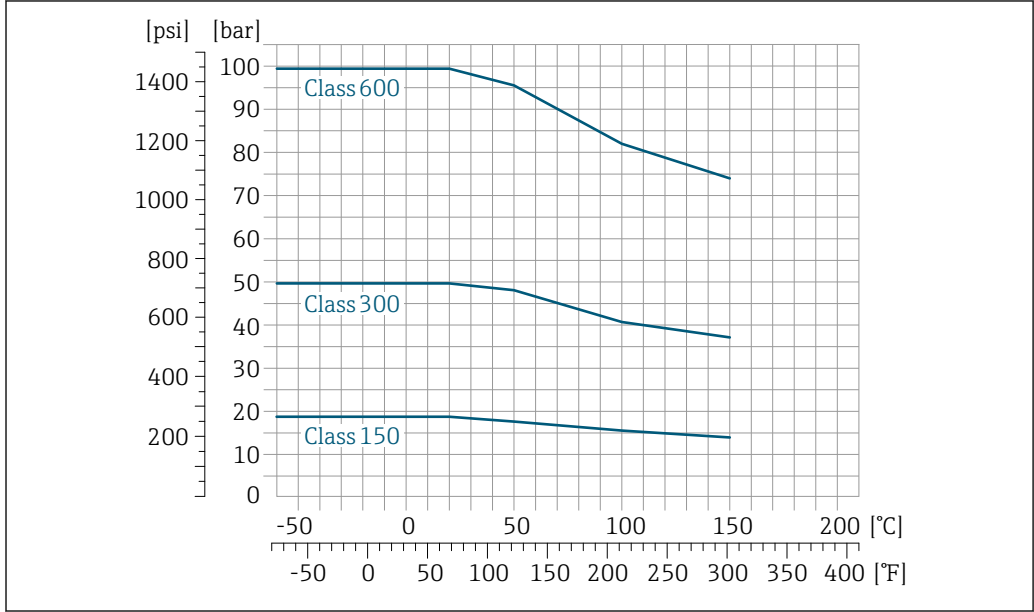
Flange according to EN 1092-1 (DIN 2501)



A0029882-EN

28 With flange material 1.4301 (304); wetted parts: titanium

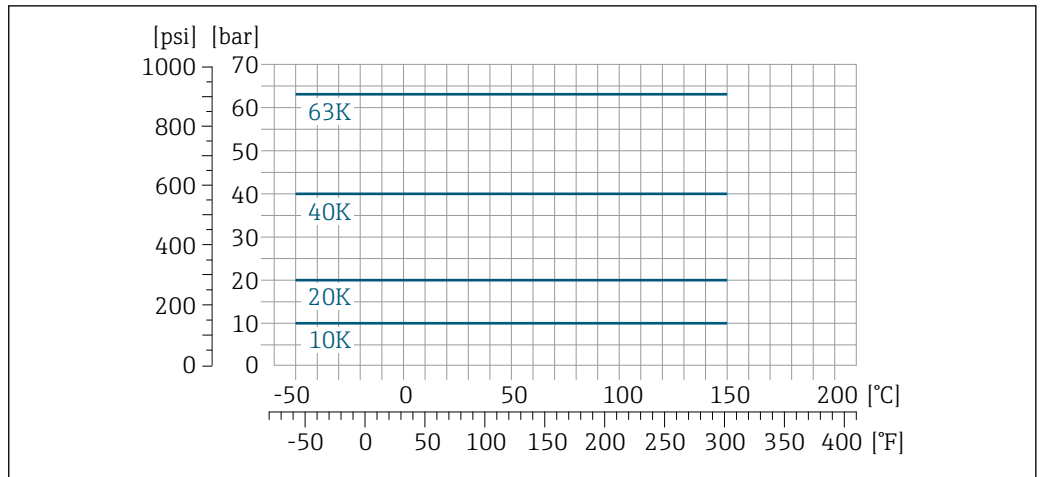
Flange according to ASME B16.5



A0029883-EN

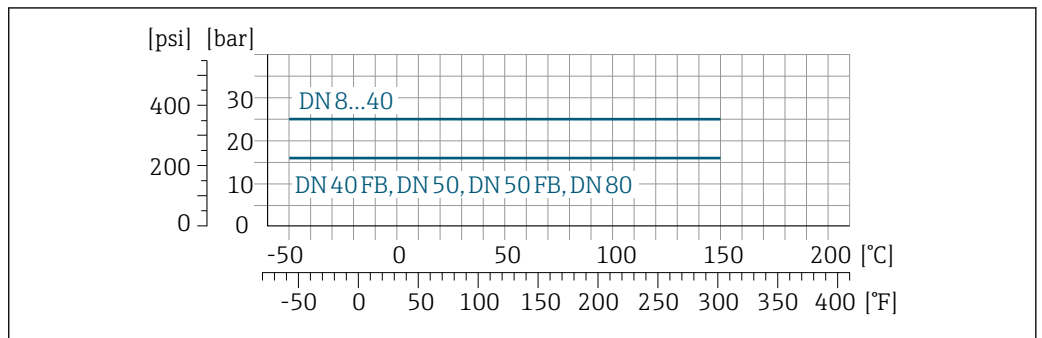
29 With flange material 1.4301 (304); wetted parts: titanium

**Flange JIS B2220**



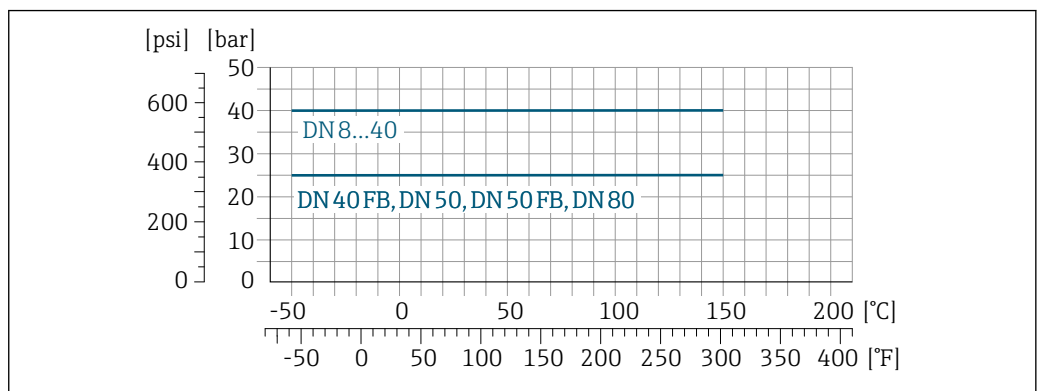
30 With flange material 1.4301 (304). Wetted parts: titanium.

**Flange DIN 11864-2 Form A**



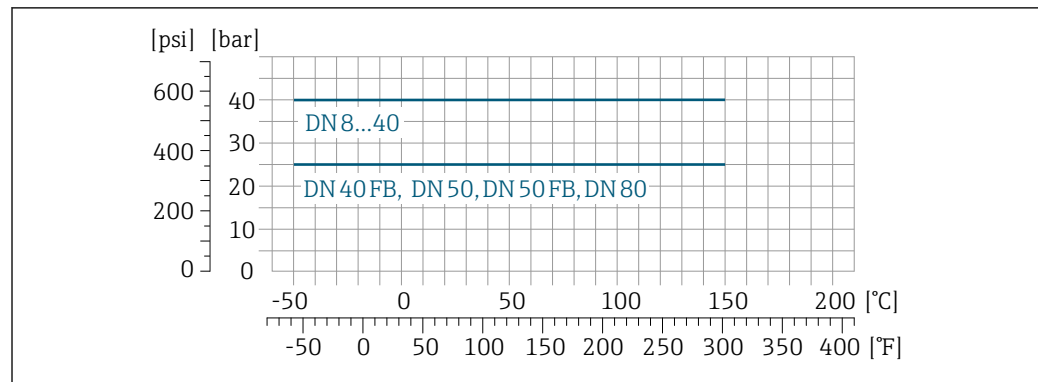
31 With flange material Grade 2 titanium

**Thread DIN 11851**



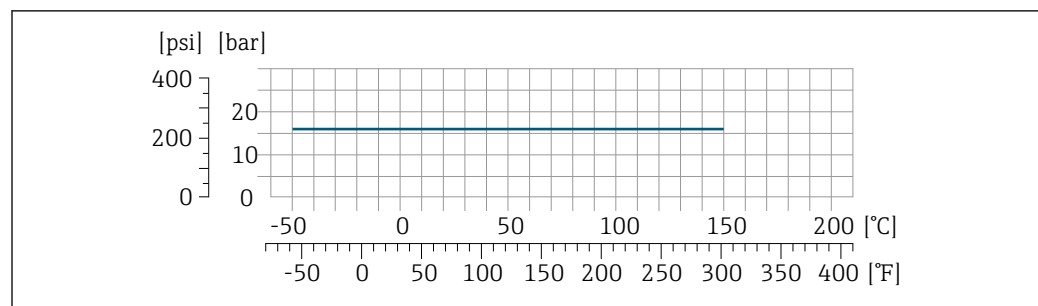
32 With connection material Grade 2 titanium

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**

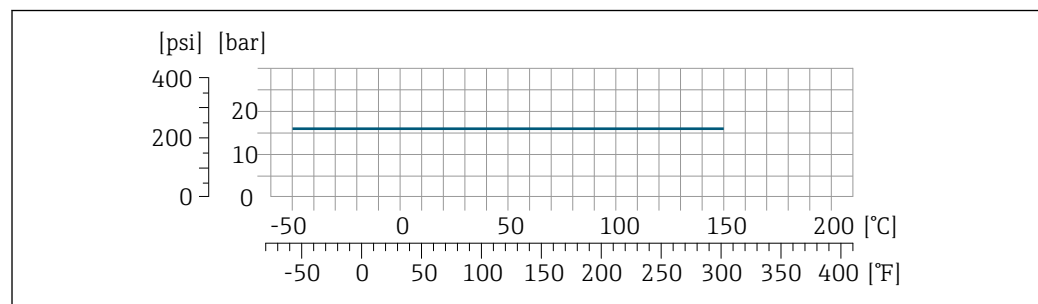
A0029887-EN

33 With connection material Grade 2 titanium

**Thread ISO 2853**

A0029888-EN

34 With connection material Grade 2 titanium

**Thread SMS 1145**

A0029888-EN

35 With connection material Grade 2 titanium

SMS 1145 allows for applications up to 16 bar (232 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.

**Tri-Clamp**

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.

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).

**Sensor housing nominal pressure rating and burst pressure**

The following sensor housing nominal pressure ratings/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 nominal pressure is determined by the purge system itself or by the device, depending on which component has the lower nominal 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 nominal pressure (designed with a safety factor $\geq 4$ )		Sensor housing burst pressure	
[mm]	[in]	[bar]	[psi]	[bar]	[psi]
8	$\frac{3}{8}$	40	580	220	3 190
15	$\frac{1}{2}$	40	580	220	3 190
15 FB	$\frac{1}{2}$ FB	40	580	235	3 408
25	1	40	580	235	3 408
25 FB	1 FB	40	580	220	3 190
40	$1\frac{1}{2}$	40	580	220	3 190
40 FB	$1\frac{1}{2}$ FB	40	580	235	3 408
50	2	40	580	235	3 408
50 FB	2 FB	40	580	460	6 670
80	3	40	580	460	6 670
FB = Full bore					

For information on the dimensions: see the "Mechanical construction" section → 67

**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 → 12

- 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).
- For gas measurement the following rules apply:
  - The flow velocity in the measuring tubes should not exceed half the sound velocity (0.5 Mach).
  - The maximum mass flow depends on the density of the gas: formula → 12

**i** To calculate the flow limit, use the *Applicator* sizing tool → 117

**Pressure loss**

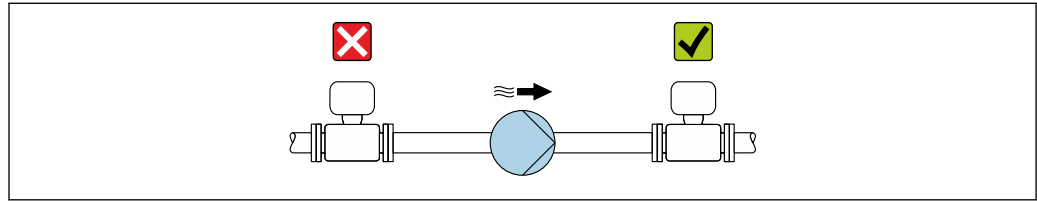
**i** To calculate the pressure loss, use the *Applicator* sizing tool → 117

**System 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 system 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:

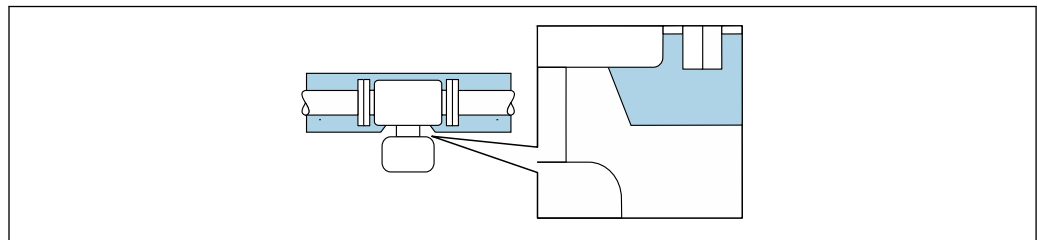
Version with extended neck for insulation:

Order code for "Sensor option", option CG with an extended neck length of 105 mm (4.13 in).

### NOTICE

#### Electronics overheating on account of thermal insulation!

- ▶ Recommended orientation: horizontal orientation, sensor connection housing pointing downwards.
- ▶ Do not insulate the sensor connection housing.
- ▶ Maximum permissible temperature at the lower end of the sensor connection housing: 80 °C (176 °F)
- ▶ Thermal insulation with extended neck free: We recommend that you do not insulate the extended neck in order to ensure optimum dissipation of heat.



A0034391

36 Thermal insulation with extended neck free

## Heating

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

### Heating options

- Electrical heating, e.g. with electric band heaters
- Via pipes carrying hot water or steam
- Via heating jackets

**i** 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 transmitted neck remains exposed. The uncovered part serves as a radiator and protects the electronics from overheating and excessive cooling.
- ▶ If 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.

## Vibrations

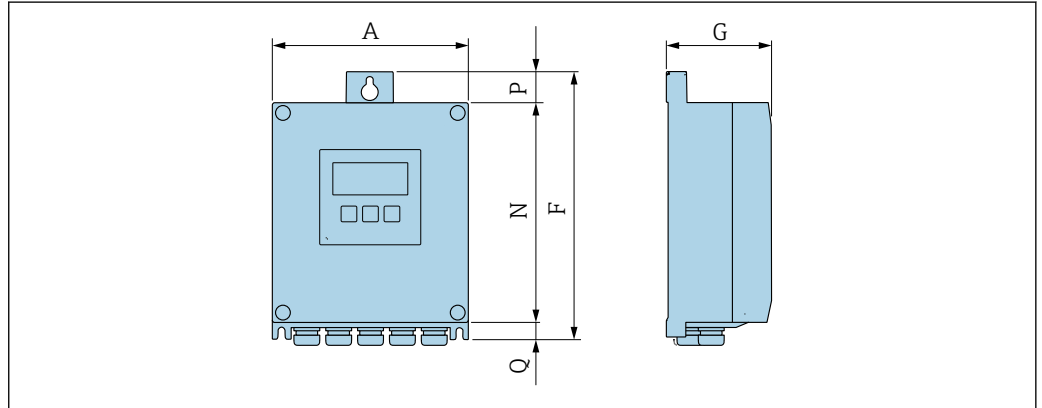
The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by plant vibrations.

## Mechanical construction

**Dimensions in SI units**

**Housing of Proline 500 – digital transmitter**

Non-hazardous area or hazardous area: Zone 2; Class I, Division 2



A0033789

Order code for "Transmitter housing", option A "Aluminum, coated" and order code for "Integrated ISEM electronics", option A "Sensor"

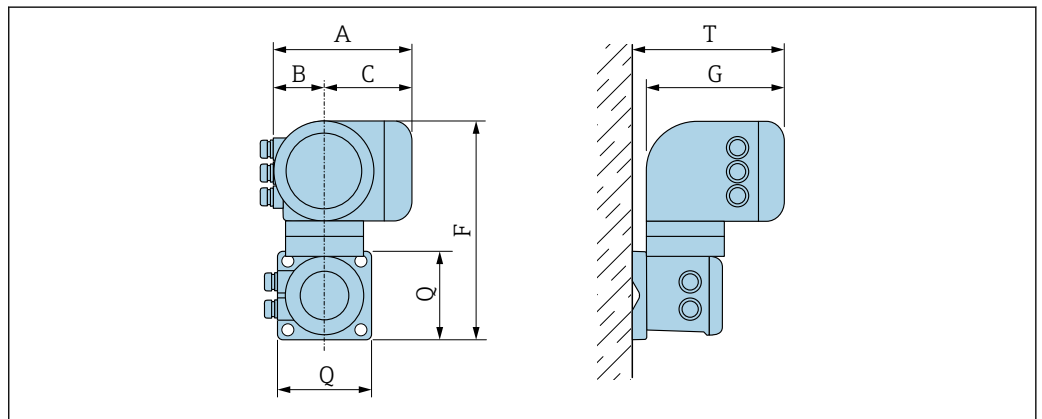
A [mm]	F [mm]	G [mm]	N [mm]	P [mm]	Q [mm]
167	232	80	187	24	21

Order code for "Transmitter housing", option D "Polycarbonate" and order code for "Integrated ISEM electronics", option A "Sensor"

A [mm]	F [mm]	G [mm]	N [mm]	P [mm]	Q [mm]
177	234	90	197	17	22

**Housing of Proline 500 transmitter**

Hazardous area: Zone 2; Class I, Division 2 or Zone 1; Class I, Division 1



A0033788

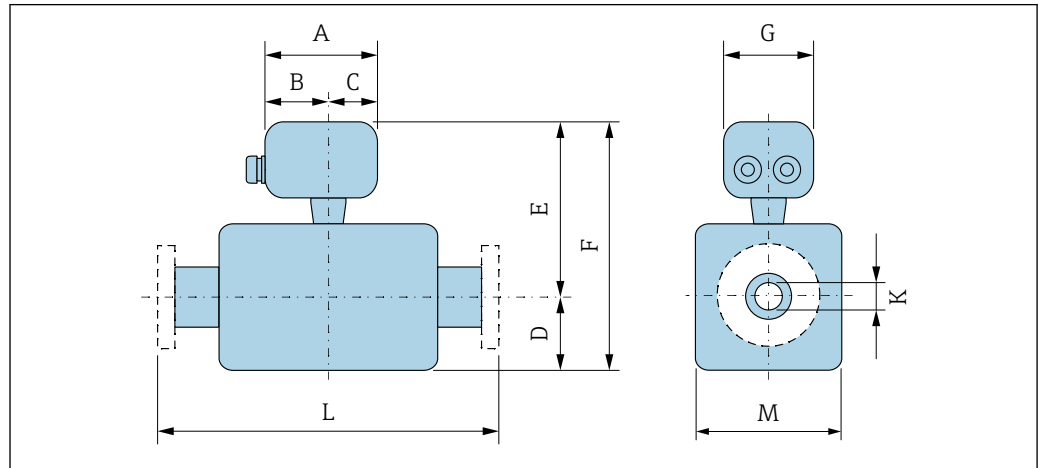
Order code for "Transmitter housing", option A "Aluminum, coated" and order code for "Integrated ISEM electronics", option B "Transmitter"

A [mm]	B [mm]	C [mm]	F [mm]	G [mm]	Q [mm]	T [mm]
188	85	103	318	217	130	239

Order code for "Transmitter housing", option L "Cast, stainless" and order code for "Integrated ISEM electronics", option B "Transmitter"

A [mm]	B [mm]	C [mm]	F [mm]	G [mm]	Q [mm]	T [mm]
188	85	103	295	217	130	239

Sensor connection housing



A0033784

Order code for "Sensor connection housing", option A "Aluminum, coated"

DN [mm]	A <sup>1)</sup> [mm]	B <sup>1)</sup> [mm]	C [mm]	D [mm]	E <sup>2)</sup> [mm]	F <sup>2)</sup> [mm]	G [mm]	K [mm]	L [mm]	M [mm]
8	148	94	54	57	207	264	136	8.55	<sup>3)</sup>	115
15	148	94	54	57	207	264	136	11.38	<sup>3)</sup>	115
15 FB	148	94	54	57	207	264	136	17.07	<sup>3)</sup>	115
25	148	94	54	57	207	264	136	17.07	<sup>3)</sup>	115
25 FB	148	94	54	71	217	288	136	26.4	<sup>3)</sup>	142
40	148	94	54	71	217	288	136	26.4	<sup>3)</sup>	142
40 FB	148	94	54	84	231	315	136	35.62	<sup>3)</sup>	169
50	148	94	54	84	231	315	136	35.62	<sup>3)</sup>	169
50 FB	148	94	54	109.5	256.5	366	136	54.9	<sup>3)</sup>	169
80	148	94	54	109.5	256.5	366	136	54.9	<sup>3)</sup>	220

- 1) Depending on the cable gland used: values up to + 30 mm
- 2) With order code for "Sensor option", option CG: values +70 mm
- 3) Depends on the process connection in question

Order code for "Sensor connection housing", option B "Stainless"

DN [mm]	A <sup>1)</sup> [mm]	B [mm]	C [mm]	D [mm]	E <sup>2)</sup> [mm]	F <sup>2)</sup> [mm]	G [mm]	K [mm]	L [mm]	M [mm]
8	137	78	59	57	202	259	134	8.55	<sup>3)</sup>	115
15	137	78	59	57	202	259	134	11.38	<sup>3)</sup>	115
15 FB	137	78	59	57	202	259	134	17.07	<sup>3)</sup>	115
25	137	78	59	57	202	259	134	17.07	<sup>3)</sup>	115
25 FB	137	78	59	71	212	283	134	26.4	<sup>3)</sup>	142



DN	A <sup>1)</sup>	B	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G	K	L	M
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
40	137	78	59	71	212	283	134	26.4	<sup>3)</sup>	142
40 FB	137	78	59	84	226	310	134	35.62	<sup>3)</sup>	169
50	137	78	59	84	226	310	134	35.62	<sup>3)</sup>	169
50 FB	137	78	59	109.5	251.5	361	134	54.9	<sup>3)</sup>	169
80	137	78	59	109.5	251.5	361	134	54.9	<sup>3)</sup>	220

- 1) Depending on the cable gland used: values up to + 30 mm
- 2) With order code for "Sensor option", option CG: values +70 mm
- 3) Depends on the process connection in question

*Order code for "Sensor connection housing", option C "Ultra-compact hygienic, stainless"*

DN	A <sup>1)</sup>	B	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G	K	L	M
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
8	124	68	56	57	202	259	112	8.55	<sup>3)</sup>	115
15	124	68	56	57	202	259	112	11.38	<sup>3)</sup>	115
15 FB	124	68	56	57	202	259	112	17.07	<sup>3)</sup>	115
25	124	68	56	57	202	259	112	17.07	<sup>3)</sup>	115
25 FB	124	68	56	71	212	283	112	26.4	<sup>3)</sup>	142
40	124	68	56	71	212	283	112	26.4	<sup>3)</sup>	142
40 FB	124	68	56	84	226	310	112	35.62	<sup>3)</sup>	169
50	124	68	56	84	226	310	112	35.62	<sup>3)</sup>	169
50 FB	124	68	56	109.5	251.5	361	112	54.9	<sup>3)</sup>	169
80	124	68	56	109.5	251.5	361	112	54.9	<sup>3)</sup>	220

- 1) Depending on the cable gland used: values up to + 30 mm
- 2) With order code for "Sensor option", option CG: values +70 mm
- 3) Depends on the process connection in question

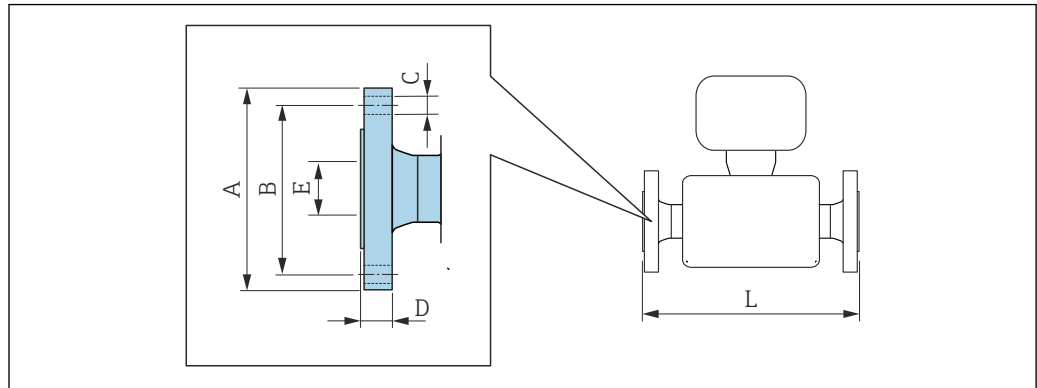
*Order code for "Sensor connection housing", option L "Cast, stainless"*

DN	A <sup>1)</sup>	B	C	D	E <sup>2)</sup>	F <sup>2)</sup>	G	K	L	M
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
8	145	86	59	57	230	287	136	8.55	<sup>3)</sup>	115
15	145	86	59	57	230	287	136	11.38	<sup>3)</sup>	115
15 FB	145	86	59	57	230	287	136	17.07	<sup>3)</sup>	115
25	145	86	59	57	230	287	136	17.07	<sup>3)</sup>	115
25 FB	145	86	59	71	240	311	136	26.4	<sup>3)</sup>	142
40	145	86	59	71	240	311	136	26.4	<sup>3)</sup>	142
40 FB	145	86	59	84	254	338	136	35.62	<sup>3)</sup>	169
50	145	86	59	84	254	338	136	35.62	<sup>3)</sup>	169
50 FB	145	86	59	109.5	279.5	389	136	54.9	<sup>3)</sup>	169
80	145	86	59	109.5	279.5	389	136	54.9	<sup>3)</sup>	220

- 1) Depending on the cable gland used: values up to + 30 mm
- 2) With order code for "Sensor option", option CG: values +70 mm
- 3) Depends on the process connection in question

## 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) Form B1 (DIN 2526 Form C): PN 40 1.4301 (304), wetted parts: titanium 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	16	17.30	403
15	95	65	4 × Ø14	16	17.30	439
15 FB	95	65	4 × Ø14	15	17.07	573
25	115	85	4 × Ø14	19	28.50	579
25 FB	115	85	4 × Ø14	18	25.60	702
40	150	110	4 × Ø18	22	43.10	707.5
40 FB	150	110	4 × Ø18	20	35.62	821
50	165	125	4 × Ø18	24	54.50	829
50 FB	165	125	4 × Ø18	36	54.8	1211.5
80	200	160	8 × Ø18	33	82.5	1211

FB = Full bore  
Surface roughness: Ra 3.2 to 12.5 µm

1) DN 8 with DN 15 flanges as standard

Flange according to EN 1092-1 (DIN 2501) Form B2 (DIN 2526 Form E): PN 63 1.4301 (304), wetted parts: titanium Order code for "Process connection", option D3W						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
50	180	135	4 × Ø22	34	54.5	833
50 FB	180	135	4 × Ø22	45	54.8	1211.5
80	215	170	8 × Ø22	41	81.7	1211

FB = Full bore  
Surface roughness (flange): Ra 0.8 to 3.2 µm

<b>Flange according to EN 1092-1 (DIN 2501) Form B2 (DIN 2526 Form E): PN 100</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option D4W</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	105	75	4 × Ø14	25	17.30	403
15	105	75	4 × Ø14	25	17.30	439
15 FB	105	75	4 × Ø14	26	17.07	573
25	140	100	4 × Ø18	29	28.50	579
25 FB	140	100	4 × Ø18	31	25.60	702
40	170	125	4 × Ø22	32	42.50	707.5
40 FB	170	125	4 × Ø22	33	35.62	821
50	195	145	4 × Ø26	36	53.90	833
50 FB	195	145	4 × Ø26	48	54.8	1211.5
80	230	180	8 × Ø26	58	80.9	1236.5

FB = Full bore  
Surface roughness (flange): Ra 0.8 to 3.2 µm

1) DN 8 with DN 15 flanges as standard

<b>Flange according to ASME B16.5: Class 150</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option AAW</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	90	60.3	4 × Ø15.7	20	15.70	403
15	90	60.3	4 × Ø15.7	20	15.70	439
15 FB	90	60.3	4 × Ø15.7	19	17.07	573
25	110	79.4	4 × Ø15.7	23	26.70	579
25 FB	110	79.4	4 × Ø15.7	22	25.60	702
40	125	98.4	4 × Ø15.7	26	40.90	707.5
40 FB	125	98.4	4 × Ø15.7	24	35.62	821
50	150	120.7	4 × Ø19.1	28	52.60	829
50 FB	150	120.7	4 × Ø19.1	40	54.8	1211.5
80	190	152.4	4 × Ø19.1	37	78	1211

FB = Full bore  
Surface roughness (flange): Ra 3.2 to 6.3 µm

1) DN 8 with DN 15 flanges as standard

<b>Flange according to ASME B16.5: Class 300</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option ABW</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	95	66.7	4 × Ø15.7	20	15.70	403
15	95	66.7	4 × Ø15.7	20	15.70	439
15 FB	95	66.7	4 × Ø15.7	19	17.07	573
25	125	88.9	4 × Ø19.1	23	26.70	579

<b>Flange according to ASME B16.5: Class 300</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option ABW</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
25 FB	125	88.9	4 × Ø19.1	22	25.60	702
40	155	114.3	4 × Ø22.4	26	40.90	707.5
40 FB	155	114.3	4 × Ø22.4	24	35.62	821
50	165	127.0	8 × Ø19.1	28	52.60	829
50 FB	165	127.0	8 × Ø19.1	43	54.8	1211.5
80	210	168.3	8 × Ø22.3	42	78	1211

FB = Full bore  
Surface roughness (flange): Ra 3.2 to 6.3 µm

1) DN 8 with DN 15 flanges as standard

<b>Flange according to ASME B16.5: Class 600</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option ACW</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	95	66.7	4 × Ø15.7	20	13.80	403
15	95	66.7	4 × Ø15.7	20	13.80	439
15 FB	95	66.7	4 × Ø15.7	22	17.07	573
25	125	88.9	4 × Ø19.1	23	24.40	579
25 FB	125	88.9	4 × Ø19.1	25	25.60	702
40	155	114.3	4 × Ø22.4	28	38.10	707.5
40 FB	155	114.3	4 × Ø22.4	29	35.62	821
50	165	127.0	8 × Ø19.1	33	49.30	833
50 FB	165	127.0	8 × Ø19.1	46	54.8	1211.5
80	210	168.3	8 × Ø22.3	53	73.7	1223

FB = Full bore  
Surface roughness (flange): Ra 3.2 to 6.3 µm

1) DN 8 with DN 15 flanges as standard

<b>Flange JIS B2220: 10K</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option NDW</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
50	155	120	4 × Ø19	28	50	829
50 FB	195	145	4 × Ø26	48	54.8	1211.5
80	200	160	8 × Ø18	37	82.5	1211

FB = Full bore  
Surface roughness (flange): Ra 3.2 to 6.3 µm

<b>Flange JIS B2220: 20K</b> <b>1.4301 (304), wetted parts: titanium</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	20	15.00	403
15	95	70	4 × Ø15	20	15.00	439
15 FB	95	70	4 × Ø15	19	17.07	573
25	125	90	4 × Ø19	23	25.00	579
25 FB	125	90	4 × Ø19	22	25.60	702
40	140	105	4 × Ø19	26	40.00	707.5
40 FB	140	105	4 × Ø19	24	35.62	821
50	155	120	8 × Ø19	28	50.00	829
50 FB	155	120	8 × Ø19	42	54.8	1211.5
80	200	160	8 × Ø23	36	80	1211

FB = Full bore  
Surface roughness (flange): Ra 3.2 to 6.3 µm

1) DN 8 with DN 15 flanges as standard

<b>Flange JIS B2220: 40K</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option NFW</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	115	80	4 × Ø19	25	15.00	403
15	115	80	4 × Ø19	25	15.00	439
15 FB	115	80	4 × Ø19	26	17.07	573
25	130	95	4 × Ø19	27	25.00	579
25 FB	130	95	4 × Ø19	29	25.60	702
40	160	120	4 × Ø23	30	38.00	707.5
40 FB	160	120	4 × Ø23	31	35.62	821
50	165	130	8 × Ø19	32	50.00	829
50 FB	165	130	8 × Ø19	43	54.8	1211.5
80	210	170	8 × Ø23	46	75	1211

FB = Full bore  
Surface roughness (flange): Ra 3.2 to 6.3 µm

1) DN 8 with DN 15 flanges as standard

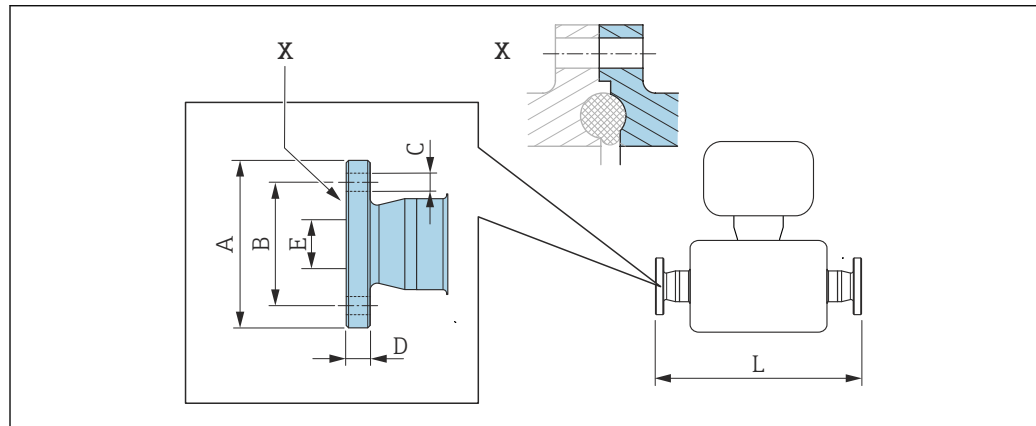
<b>Flange JIS B2220: 63K</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option NHW</i>						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	120	85	4 × Ø19	28	12.00	403
15	120	85	4 × Ø19	28	12.80	439
15 FB	120	85	4 × Ø19	29	17.07	573
25	140	100	4 × Ø23	30	22.00	579

<b>Flange JIS B2220: 63K</b> 1.4301 (304), wetted parts: titanium Order code for "Process connection", option NHW						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
25 FB	140	100	4 × Ø23	32	25.60	702
40	175	130	4 × Ø25	36	35.00	707.5
40 FB	175	130	4 × Ø25	37	35.62	821
50	185	145	8 × Ø23	40	48.00	833
50 FB	185	145	8 × Ø23	47	54.8	1211.5
80	230	185	8 × Ø25	55	73	1226.5

FB = Full bore  
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 gray is provided by the supplier.

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

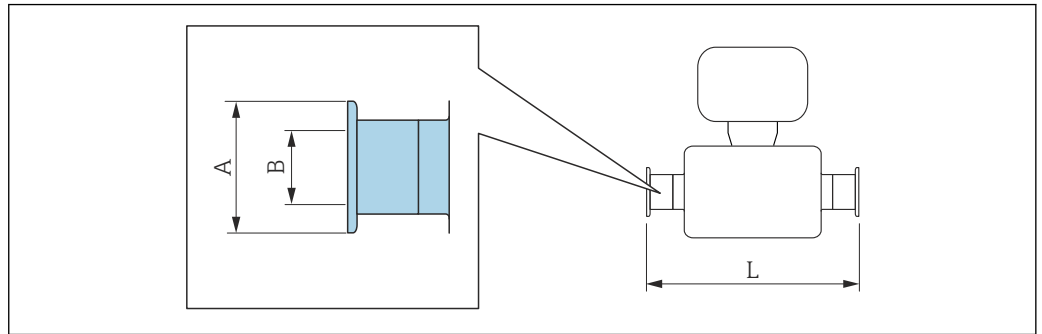
<b>Flange DIN11864-2 Form A, for pipe according to DIN11866 series A, flange with notch</b> Titanium Order code for "Process connection", option KFW						
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
8 <sup>1)</sup>	54	37	4 × Ø9	10	10	448
15	59	42	4 × Ø9	10	16	484
25	70	53	4 × Ø9	10	26	622
40	82	65	4 × Ø9	10	38	750
50	94	77	4 × Ø9	10	50	872
80	133	112	8 × Ø11	12	81	1269

3A version available: order code for "Additional approval", option LP in conjunction with  
Ra ≤ 0.8 µm: order code for "Measuring tube material", option CB or  
Ra ≤ 0.4 µm: order code for "Measuring tube material", option CD

1) DN 8 with DN 15 flanges as standard

**Clamp connections**

*Tri-Clamp*



A0015625

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

<b>Tri-Clamp ( ≥ 1" ), DIN 11866 series C</b>				
<b>Titanium</b>				
<i>Order code for "Process connection", option FTW</i>				
<b>DN [mm]</b>	<b>Clamp [in]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	1	50.4	22.1	426
15	1	50.4	22.1	462
15 FB	see ¾" Tri-Clamp connection			
25	1	50.4	22.1	602
25 FB	1	50.4	22.1	730.5
40	1 ½	50.4	34.8	730.5
40 FB	1 ½	50.4	34.8	850
50	2	63.9	47.5	850
50 FB <sup>1)</sup>	2 ½	77.4	60.3	1268.5
80	3	90.9	72.9	1268.5

FB = Full bore  
 3A version available: order code for "Additional approval", option LP in conjunction with  
 Ra ≤ 0.8 µm: order code for "Measuring tube material", option CB or  
 Ra ≤ 0.4 µm: order code for "Measuring tube material", option CD

1) Order code for "Process connection", option FRW

<b>¾" Tri-Clamp, DIN 11866 series C</b>				
<b>Titanium</b>				
<i>Order code for "Process connection", option FEW</i>				
<b>DN [mm]</b>	<b>Clamp [in]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	¾	25.0	16.0	426
15	¾	25.0	16.0	462
15 FB	¾	25.0	16.0	602

FB = Full bore  
 3A version available: order code for "Additional approval", option LP in conjunction with  
 Ra ≤ 0.8 µm: order code for "Measuring tube material", option CB or  
 Ra ≤ 0.4 µm: order code for "Measuring tube material", option CD

<b>½" Tri-Clamp, DIN 11866 series C</b>				
<b>Titanium</b>				
<i>Order code for "Process connection", option FBW</i>				
<b>DN [mm]</b>	<b>Clamp [in]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	½	25.0	9.5	426
15	½	25.0	9.5	462

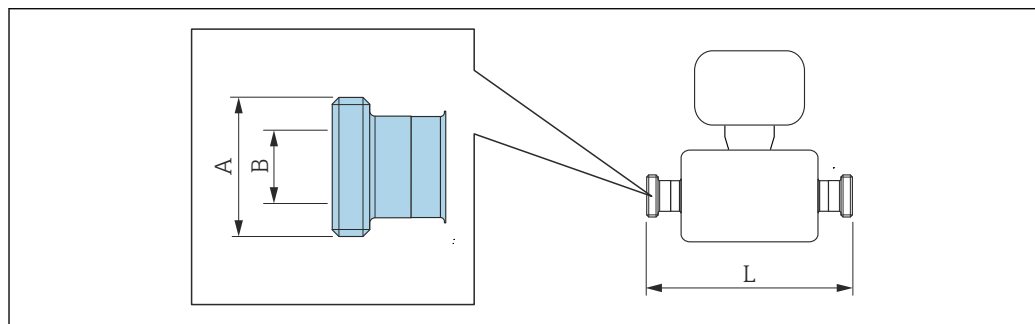
3A version available: order code for "Additional approval", option LP in conjunction with  
 Ra ≤ 0.8 µm: order code for "Measuring tube material", option CB or  
 Ra ≤ 0.4 µm: order code for "Measuring tube material", option CD

<b>Eccentric Tri-Clamp, DIN 11866 series C</b>					
<b>Titanium</b>					
<b>DN [mm]</b>	<b>Order Code for "Process connection", Option</b>	<b>Clamp [in]</b>	<b>A [mm]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	FEA	½	25	9.5	426
15	FEC	¾	25	15.75	462
15 FB	FEE	1	50.5	22.1	602
25	FEE	1	50.5	22.1	602
25 FB	FEG	1½	50.5	34.8	730.5
40	FEG	1½	50.5	34.8	730.5
40 FB	FEJ	2	64	47.5	850
50	FEJ	2	64	47.5	850
50 FB	FEL	2 ½	77.5	60.3	1268.5
50 FB	FEM	3	91	72.9	1268.5
80	FEL	2 ½	77.5	60.3	1268.5
80	FEM	3	91	72.9	1268.5

FB = Full bore  
 3A version available: order code for "Additional approval", option LP in conjunction with  
 Ra ≤ 0.8 µm: order code for "Measuring tube material", option CB or  
 Ra ≤ 0.4 µm: order code for "Measuring tube material", option CD  
 Additional information on "Eccentric clamps"

### Cable glands

Thread DIN 11851



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



<b>Thread DIN 11851, for pipe according to DIN11866, series A Titanium</b>			
<i>Order code for "Process connection", option KCW</i>			
<b>DN [mm]</b>	<b>A [in]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	Rd 34 × 1/8	16	426
15	Rd 34 × 1/8	16	462
15 FB	Rd 34 × 1/8	16	602
25	Rd 52 × 1/6	26	602
25 FB	Rd 52 × 1/6	26	737
40	Rd 65 × 1/6	38	730.5
40 FB	Rd 65 × 1/6	38	856
50	Rd 78 × 1/6	50	856
50 FB	Rd 78 × 1/6	50	1268.5
80	Rd 110 × 1/4	81	1268.5

FB = Full bore  
3A version available: order code for "Additional approval", option LP in conjunction with  
Ra ≤ 0.8 µm: order code for "Measuring tube material", option CB

<b>Thread Rd 28 × 1/8" DIN 11851, for pipe according to DIN11866 series A Titanium</b>			
<i>Order code for "Process connection", option KAW</i>			
<b>DN [mm]</b>	<b>A [in]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8	Rd 28 × 1/8	10	426
15	Rd 28 × 1/8	10	462

3A version available: order code for "Additional approval", option LP in conjunction with  
Ra ≤ 0.8 µm: order code for "Measuring tube material", option CB

<b>Thread DIN11864-1 Form A, for pipe according to DIN11866, series A Titanium</b>			
<i>Order code for "Process connection", option KEW</i>			
<b>DN [mm]</b>	<b>A [in]</b>	<b>B [mm]</b>	<b>L [mm]</b>
8 <sup>1)</sup>	Rd 28 × 1/8	10	426
15	Rd 34 × 1/8	16	462
15 FB	Rd 34 × 1/8	16	602
25	Rd 52 × 1/6	26	602
25 FB	Rd 52 × 1/6	26	735
40	Rd 65 × 1/6	38	730.5
40 FB	Rd 65 × 1/6	38	856
50	Rd 78 × 1/6	50	856
50 FB	Rd 78 × 1/6	50	1268.5
80	Rd 110 × 1/4	81	1268.5

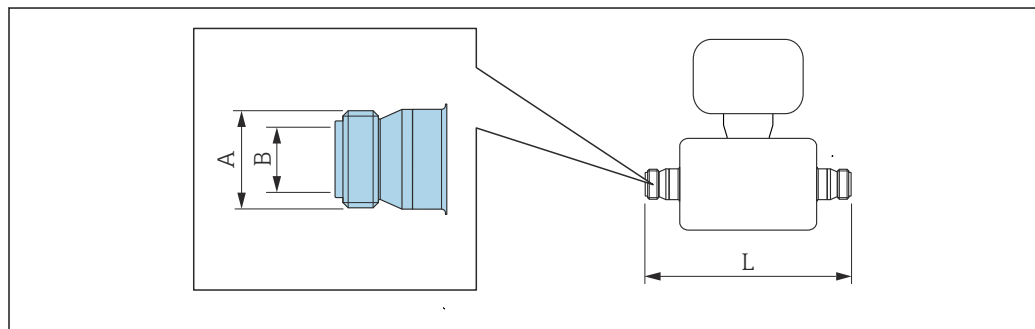
FB = Full bore  
3A version available (order code for "Additional approval", option LP) in combination with Ra ≤ 0.8 µm, Ra ≤ 0.4 µm (order code for "Measuring tube material", option CB, CD)

1) DN 8 with DN 10 thread as standard

Thread SMS 1145 Titanium Order code for "Process connection", option SAW			
DN [mm]	A [in]	B [mm]	L [mm]
8	Rd 40 × 1/6	22.5	426
15	Rd 40 × 1/6	22.5	462
25	Rd 40 × 1/6	22.5	602
25 FB	Rd 40 × 1/6	22.5	737
40	Rd 60 × 1/6	35.5	738.5
40 FB	Rd 60 × 1/6	35.5	858
50	Rd 70 × 1/6	48.5	858
50 FB	Rd 70 × 1/6	48.5	1258.5
80	Rd 98 × 1/6	72	1268.5

FB = Full bore  
3A version available ( $Ra \leq 0.8 \mu\text{m}$ ) (order code for "Additional approval", option LP)

## Thread ISO 2853



A0015623

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

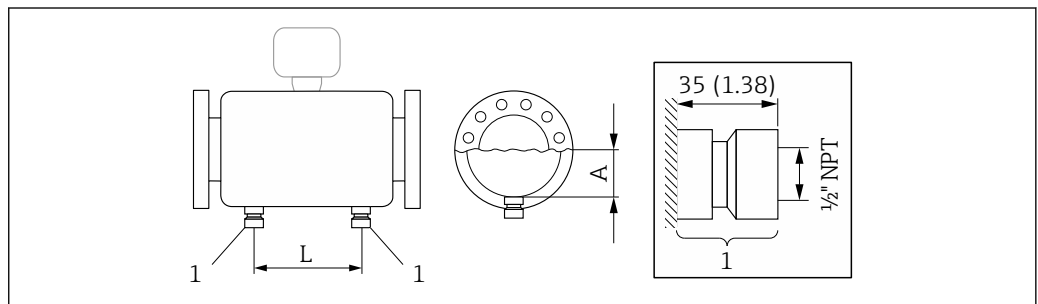
Thread ISO 2853, for pipe according to ISO 2037 Titanium Order code for "Process connection", option JSE			
DN [mm]	A [in]	B [mm]	L [mm]
8 <sup>1)</sup>	37.13	22.6	434
15	37.13	22.6	470
15 FB	37.13	22.6	610
25 FB	37.13	22.6	745
40	50.65	35.6	736.5
40 FB	50.65	35.6	861
50	64.16	48.6	858
50 FB	64.1	48.6	1268.5

<b>Thread ISO 2853, for pipe according to ISO 2037</b> <b>Titanium</b> <i>Order code for "Process connection", option JSE</i>			
DN [mm]	A [in]	B [mm]	L [mm]
80	91.19	72.9	1268.5
FB = Full bore 3A version available (order code for "Additional approval", option LP) in combination with $Ra \leq 0.8 \mu\text{m}$ , $Ra \leq 0.4 \mu\text{m}$ (order code for "Measuring tube material", option CB, CD)			

- 1) DN 8 with DN 15 thread as standard

**Accessories**

*Rinse connections*

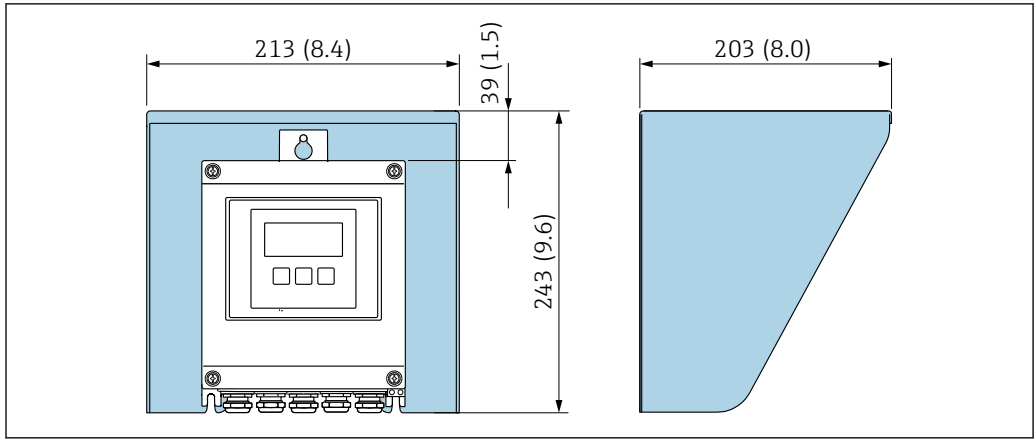


A0029968

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

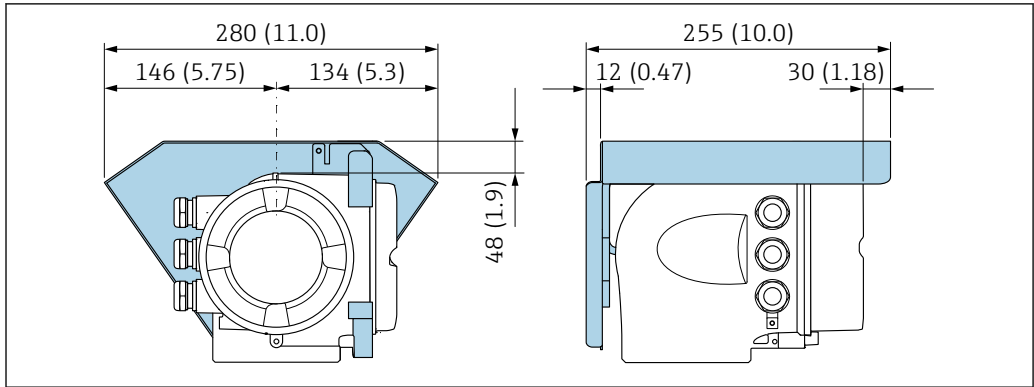
DN [mm]	A [mm]	L [mm]
8	90.65	122
15	90.65	158
15 FB	90.65	158
25	90.65	296
25 FB	90.65	296
40	103.35	392
40 FB	103.35	392
50	117.75	488
50 FB	145.5	814
80	145.5	814

Protective cover



38 Weather protection cover for Proline 500 – digital

A0029552



39 Weather protection cover for Proline 500

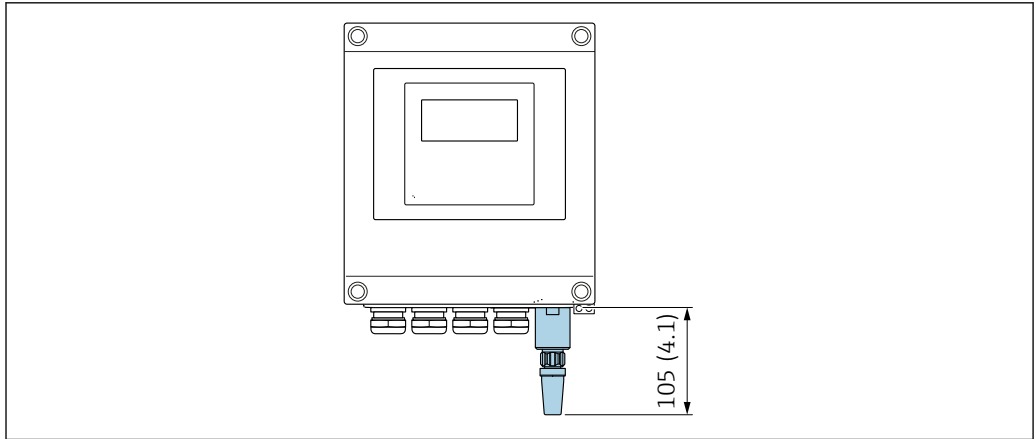
A0029553

External WLAN antenna

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

Proline 500 – digital

External WLAN antenna mounted on device

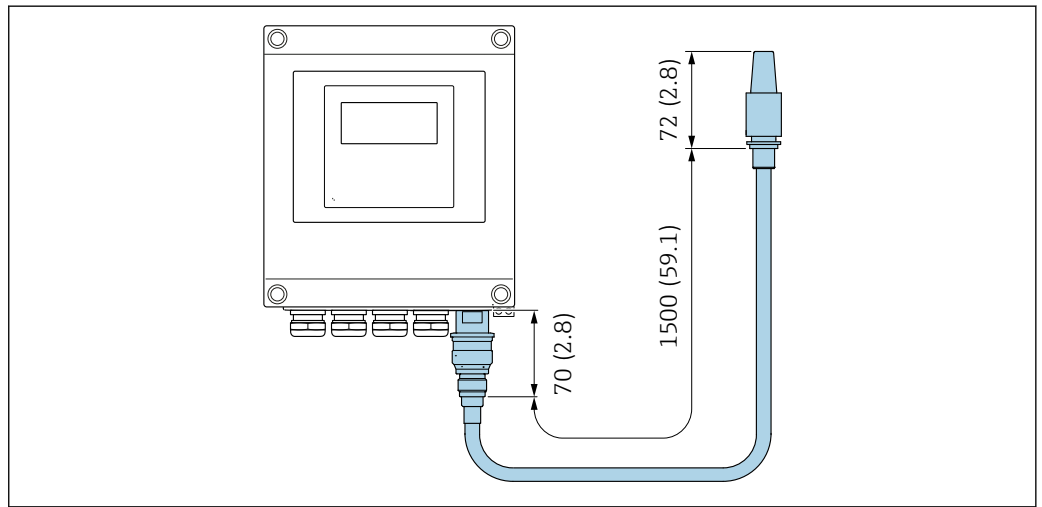


40 Engineering unit mm (in)

A0033607

*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.

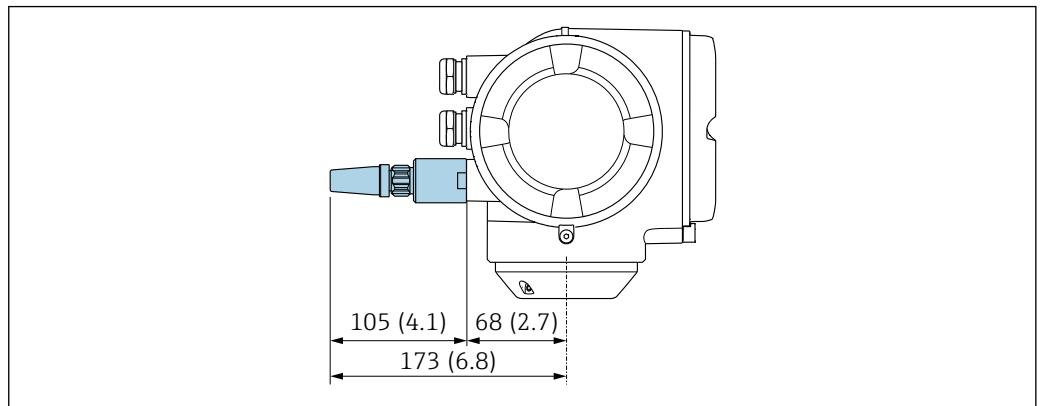


A0033606

41 Engineering unit mm (in)

*Proline 500*

*External WLAN antenna mounted on device*

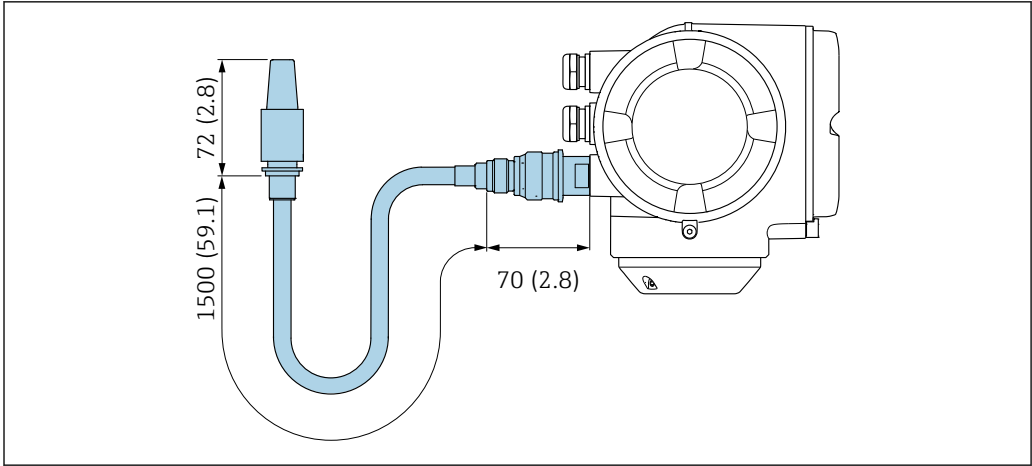


A0028923

42 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.



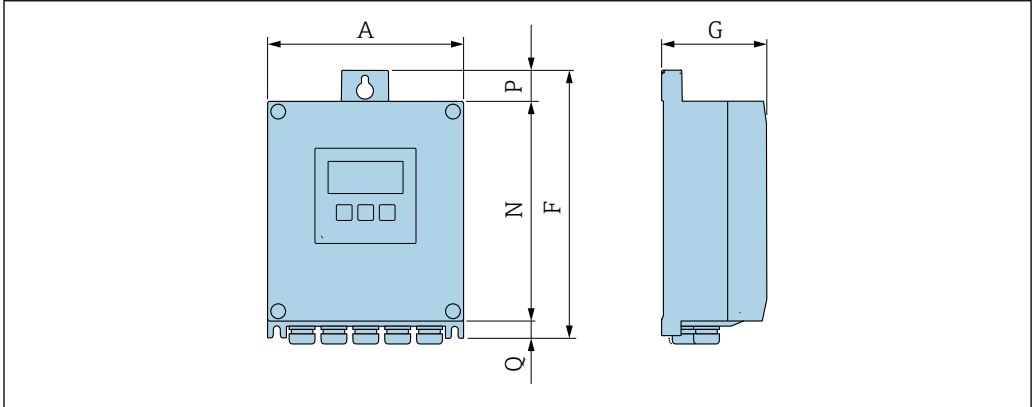
A0033597

43 Engineering unit mm (in)

Dimensions in US units

Housing of Proline 500 – digital transmitter

Non-hazardous area or hazardous area: Zone 2; Class I, Division 2



A0033789

Order code for "Transmitter housing", option A "Aluminum, coated" and order code for "Integrated ISEM electronics", option A "Sensor"

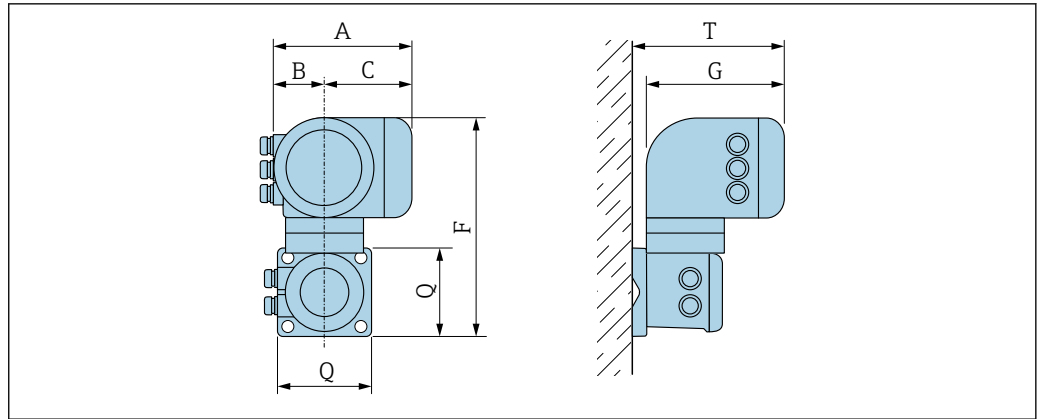
A [in]	F [in]	G [in]	N [in]	P [in]	Q [in]
6.57	9.13	3.15	7.36	0.94	0.83

Order code for "Transmitter housing", option D "Polycarbonate" and order code for "Integrated ISEM electronics", option A "Sensor"

A [in]	F [in]	G [in]	N [in]	P [in]	Q [in]
6.97	9.21	3.54	7.76	0.67	0.87

Housing of Proline 500 transmitter

Hazardous area: Zone 2; Class I, Division 2 or Zone 1; Class I, Division 1



A003378B

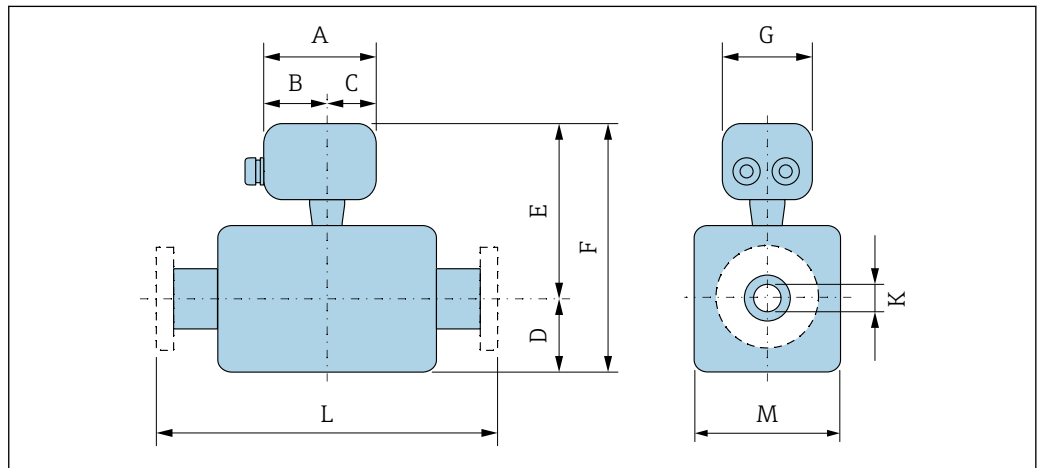
Order code for "Transmitter housing", option A "Aluminum, coated" and order code for "Integrated ISEM electronics", option B "Transmitter"

A [in]	B [in]	C [in]	F [in]	G [in]	Q [in]	T [in]
7.40	3.35	4.06	12.5	8.54	5.12	9.41

Order code for "Transmitter housing", option L "Cast, stainless" and order code for "Integrated ISEM electronics", option B "Transmitter"

A [in]	B [in]	C [in]	F [in]	G [in]	Q [in]	T [in]
7.40	3.35	4.06	11.6	8.54	5.12	9.41

**Sensor connection housing**



A003378A

Order code for "Sensor connection housing", option A "Aluminum, coated"

DN [in]	A <sup>1)</sup> [in]	B <sup>1)</sup> [in]	C [in]	D [in]	E <sup>2)</sup> [in]	F <sup>2)</sup> [in]	G [in]	K [in]	L [in]	M [in]
3/8	5.83	3.70	2.13	2.24	8.15	10.39	5.35	0.34	<sup>3)</sup>	4.53
1/2	5.83	3.70	2.13	2.24	8.15	10.39	5.35	0.45	<sup>3)</sup>	4.53
1/2 FB	5.83	3.70	2.13	2.24	8.15	10.39	5.35	0.67	<sup>3)</sup>	4.53
1	5.83	3.70	2.13	2.24	8.15	10.39	5.35	0.67	<sup>3)</sup>	4.53
1 FB	5.83	3.70	2.13	2.8	8.54	11.34	5.35	1.04	<sup>3)</sup>	5.59

DN [in]	A <sup>1)</sup> [in]	B <sup>1)</sup> [in]	C [in]	D [in]	E <sup>2)</sup> [in]	F <sup>2)</sup> [in]	G [in]	K [in]	L [in]	M [in]
1½	5.83	3.70	2.13	2.8	8.54	11.34	5.35	1.04	<sup>3)</sup>	5.59
1½ FB	5.83	3.70	2.13	3.31	9.09	12.4	5.35	1.40	<sup>3)</sup>	6.65
2	5.83	3.70	2.13	3.31	9.09	12.4	5.35	1.40	<sup>3)</sup>	6.65
2 FB	5.83	3.70	2.13	4.31	10.1	14.41	5.35	2.16	<sup>3)</sup>	6.65
3	5.83	3.70	2.13	4.31	10.1	14.41	5.35	2.16	<sup>3)</sup>	8.66

- 1) Depending on the cable gland used: values up to +1.18 in  
 2) With order code for "Sensor option", option CG: values +2.76 in  
 3) Depends on the process connection in question

*Order code for "Sensor connection housing", option B "Stainless, hygienic"*

DN [in]	A <sup>1)</sup> [in]	B [in]	C [in]	D [in]	E <sup>2)</sup> [in]	F <sup>2)</sup> [in]	G [in]	K [in]	L [in]	M [in]
$\frac{3}{8}$	5.39	3.07	2.32	2.24	7.95	10.2	5.28	0.34	<sup>3)</sup>	4.53
$\frac{1}{2}$	5.39	3.07	2.32	2.24	7.95	10.2	5.28	0.45	<sup>3)</sup>	4.53
$\frac{1}{2}$ FB	5.39	3.07	2.32	2.24	7.95	10.2	5.28	0.67	<sup>3)</sup>	4.53
1	5.39	3.07	2.32	2.24	7.95	10.2	5.28	0.67	<sup>3)</sup>	4.53
1 FB	5.39	3.07	2.32	2.8	8.35	11.14	5.28	1.04	<sup>3)</sup>	5.59
1½	5.39	3.07	2.32	2.8	8.35	11.14	5.28	1.04	<sup>3)</sup>	5.59
1½ FB	5.39	3.07	2.32	3.31	8.9	12.2	5.28	1.40	<sup>3)</sup>	6.65
2	5.39	3.07	2.32	3.31	8.9	12.2	5.28	1.40	<sup>3)</sup>	6.65
2 FB	5.39	3.07	2.32	4.31	9.9	14.21	5.28	2.16	<sup>3)</sup>	6.65
3	5.39	3.07	2.32	4.31	9.9	14.21	5.28	2.16	<sup>3)</sup>	8.66

- 1) Depending on the cable gland used: values up to +1.18 in  
 2) With order code for "Sensor option", option CG: values +2.76 in  
 3) Depends on the process connection in question

*Order code for "Sensor connection housing", option C "Ultra-compact hygienic, stainless"*

DN [in]	A <sup>1)</sup> [in]	B [in]	C [in]	D [in]	E <sup>2)</sup> [in]	F <sup>2)</sup> [in]	G [in]	K [in]	L [in]	M [in]
$\frac{3}{8}$	4.88	2.68	2.20	2.24	7.95	10.2	4.41	0.34	<sup>3)</sup>	4.53
$\frac{1}{2}$	4.88	2.68	2.20	2.24	7.95	10.2	4.41	0.45	<sup>3)</sup>	4.53
$\frac{1}{2}$ FB	4.88	2.68	2.20	2.24	7.95	10.2	4.41	0.67	<sup>3)</sup>	4.53
1	4.88	2.68	2.20	2.24	7.95	10.2	4.41	0.67	<sup>3)</sup>	4.53
1 FB	4.88	2.68	2.20	2.8	8.35	11.14	4.41	1.04	<sup>3)</sup>	5.59
1½	4.88	2.68	2.20	2.8	8.35	11.14	4.41	1.04	<sup>3)</sup>	5.59
1½ FB	4.88	2.68	2.20	3.31	8.9	12.2	4.41	1.40	<sup>3)</sup>	6.65
2	4.88	2.68	2.20	3.31	8.9	12.2	4.41	1.40	<sup>3)</sup>	6.65
2 FB	4.88	2.68	2.20	4.31	9.9	14.21	4.41	2.16	<sup>3)</sup>	6.65
3	4.88	2.68	2.20	4.31	9.9	14.21	4.41	2.16	<sup>3)</sup>	8.66

- 1) Depending on the cable gland used: values up to +1.18 in  
 2) With order code for "Sensor option", option CG: values +2.76 in  
 3) Depends on the process connection in question



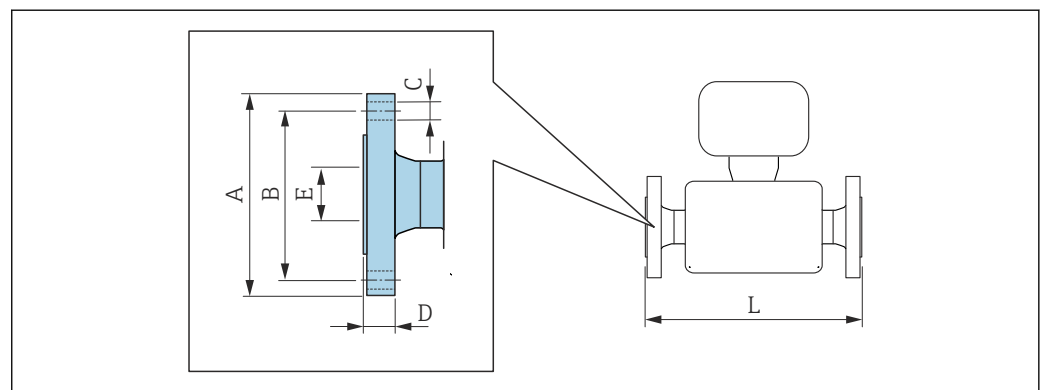
Order code for "Sensor connection housing", option L "Cast, stainless"

DN [in]	A <sup>1)</sup> [in]	B [in]	C [in]	D [in]	E <sup>2)</sup> [in]	F <sup>2)</sup> [in]	G [in]	K [in]	L [in]	M [in]
3/8	5.71	3.39	2.32	2.24	9.06	11.3	5.35	0.34	<sup>3)</sup>	4.53
1/2	5.71	3.39	2.32	2.24	9.06	11.3	5.35	0.45	<sup>3)</sup>	4.53
1/2 FB	5.71	3.39	2.32	2.24	9.06	11.3	5.35	0.67	<sup>3)</sup>	4.53
1	5.71	3.39	2.32	2.24	9.06	11.3	5.35	0.67	<sup>3)</sup>	4.53
1 FB	5.71	3.39	2.32	2.8	9.45	12.24	5.35	1.04	<sup>3)</sup>	5.59
1 1/2	5.71	3.39	2.32	2.8	9.45	12.24	5.35	1.04	<sup>3)</sup>	5.59
1 1/2 FB	5.71	3.39	2.32	3.31	10	13.31	5.35	1.40	<sup>3)</sup>	6.65
2	5.71	3.39	2.32	3.31	10	13.31	5.35	1.40	<sup>3)</sup>	6.65
2 FB	5.71	3.39	2.32	4.31	11	15.31	5.35	2.16	<sup>3)</sup>	6.65
3	5.71	3.39	2.32	4.31	11	15.31	5.35	2.16	<sup>3)</sup>	8.66

- 1) Depending on the cable gland used: values up to +1.18 in
- 2) With order code for "Sensor option", option CG: values +2.76 in
- 3) Depends on the process connection in question

**Flange connections**

Fixed flange ASME B16.5



A0015621

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

**Flange according to ASME B16.5: Class 150  
1.4301 (304), wetted parts: titanium  
Order code for "Process connection", option AAW**

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
3/8 <sup>1)</sup>	3.54	2.37	4 × Ø0.62	0.79	0.62	15.87
1/2	3.54	2.37	4 × Ø0.62	0.79	0.62	17.28
1/2 FB	3.54	2.37	4 × Ø0.62	0.75	0.67	22.56
1	4.33	3.13	4 × Ø0.62	0.91	1.05	22.8
1 FB	4.33	3.13	4 × Ø0.62	0.87	1.01	27.64
1 1/2	4.92	3.87	4 × Ø0.62	1.02	1.61	27.85
1 1/2 FB	4.92	3.87	4 × Ø0.62	0.94	1.4	32.32
2	5.91	4.75	4 × Ø0.75	1.1	2.07	32.64

<b>Flange according to ASME B16.5: Class 150</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option AAW</i>						
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
2 FB	5.91	4.75	4 × Ø0.75	1.57	2.16	47.7
3	7.48	6.00	4 × Ø0.75	1.46	3.07	47.68
FB = Full bore Surface roughness (flange): Ra 125 to 248 µin						

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

<b>Flange according to ASME B16.5: Class 300</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option ABW</i>						
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
3/8 <sup>1)</sup>	3.74	2.63	4 × Ø0.62	0.79	0.62	15.87
1/2	3.74	2.63	4 × Ø0.62	0.79	0.62	17.28
1/2 FB	3.74	2.63	4 × Ø0.62	0.75	0.67	22.56
1	4.92	3.50	4 × Ø0.75	0.91	1.05	22.8
1 FB	4.92	3.50	4 × Ø0.75	0.87	1.01	27.64
1 1/2	6.10	4.50	4 × Ø0.88	1.02	1.61	27.85
1 1/2 FB	6.10	4.50	4 × Ø0.88	0.94	1.4	32.32
2	6.50	5.00	8 × Ø0.75	1.1	2.07	32.64
2 FB	6.50	5.00	8 × Ø0.75	1.69	2.16	47.7
3	8.27	6.63	8 × Ø0.88	1.65	3.07	47.68
FB = Full bore Surface roughness (flange): Ra 125 to 248 µin						

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

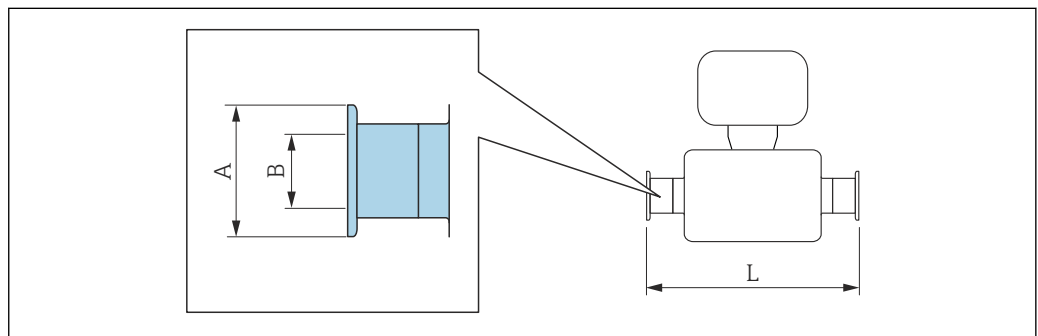
<b>Flange according to ASME B16.5: Class 600</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option ACW</i>						
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
3/8 <sup>1)</sup>	3.74	2.63	4 × Ø0.62	0.79	0.54	15.87
1/2	3.74	2.63	4 × Ø0.62	0.79	0.54	17.28
1/2 FB	3.74	2.63	4 × Ø0.62	0.87	0.67	22.56
1	4.92	3.50	4 × Ø0.75	0.91	0.96	22.8
1 FB	4.92	3.50	4 × Ø0.75	0.98	1.01	27.64
1 1/2	6.10	4.50	4 × Ø0.88	1.1	1.5	27.85
1 1/2 FB	6.10	4.50	4 × Ø0.88	1.14	1.4	32.32
2	6.50	5.00	8 × Ø0.75	1.3	1.94	32.8
2 FB	6.50	5.00	8 × Ø0.75	1.81	2.16	47.7

<b>Flange according to ASME B16.5: Class 600</b> <b>1.4301 (304), wetted parts: titanium</b> <i>Order code for "Process connection", option ACW</i>						
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
3	8.27	6.63	8 × Ø0.88	2.09	2.9	48.15
FB = Full bore Surface roughness (flange): Ra 125 to 248 µin						

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

**Clamp connections**

*Tri-Clamp*



A0015625

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

<b>Tri-Clamp ( ≥ 1"), DIN 11866 series C</b> <b>Titanium</b> <i>Order code for "Process connection", option FTW</i>				
DN [in]	Clamp [in]	A [in]	B [in]	L [in]
3/8	1	1.98	0.87	16.77
1/2	1	1.98	0.87	18.19
1/2 FB	see 3/4" Tri-Clamp connection			
1	1	1.98	0.87	23.7
1 FB	1	1.98	0.87	28.76
1 1/2	1 1/2	1.98	1.37	28.76
1 1/2 FB	1 1/2	1.98	1.37	33.46
2	2	2.52	1.87	33.46
2 FB <sup>1)</sup>	2 1/2	3.05	2.37	49.92
3	3	3.58	2.87	49.92
FB = Full bore 3A version available: order code for "Additional approval", option LP in conjunction with Ra ≤ 32 µin: order code for "Measuring tube material", option CB or Ra ≤ 16 µin: order code for "Measuring tube material", option CD				

- 1) Order code for "Process connection", option FRW

<b>3/4" Tri-Clamp, DIN 11866 series C Titanium</b>				
<i>Order code for "Process connection", option FEW</i>				
DN [in]	Clamp [in]	A [in]	B [in]	L [in]
3/8	3/4	0.98	0.63	16.77
1/2	3/4	0.98	0.63	18.19
1/2 FB	3/4	0.98	0.63	23.7

FB = Full bore  
 3A version available: order code for "Additional approval", option LP in conjunction with  
 Ra ≤ 32 μin: order code for "Measuring tube material", option CB or  
 Ra ≤ 16 μin: order code for "Measuring tube material", option CD

<b>1/2" Tri-Clamp, DIN 11866 series C Titanium</b>				
<i>Order code for "Process connection", option FBW</i>				
DN [in]	Clamp [in]	A [in]	B [in]	L [in]
3/8	1/2	0.98	0.37	16.77
1/2	1/2	0.98	0.37	18.19

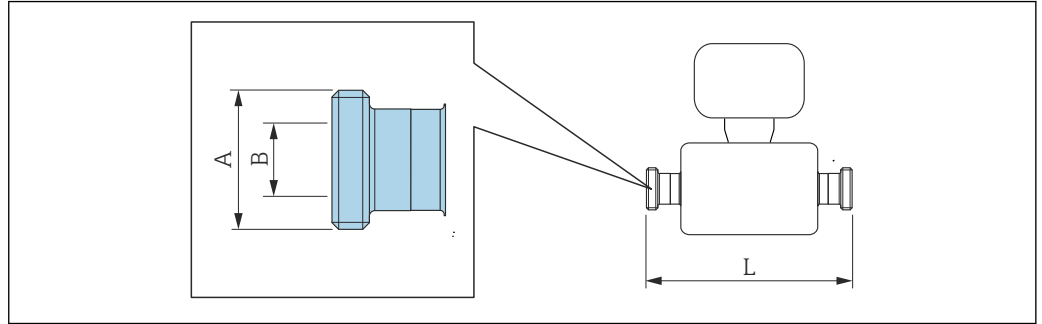
3A version available: order code for "Additional approval", option LP in conjunction with  
 Ra ≤ 32 μin: order code for "Measuring tube material", option CB or  
 Ra ≤ 16 μin: order code for "Measuring tube material", option CD

<b>Eccentric Tri-Clamp, DIN 11866 series C Titanium</b>					
DN [in]	Order Code for "Process connection", Option	Clamp [in]	A [in]	B [in]	L [in]
3/8	FEA	1/2	0.98	0.37	16.77
1/2	FEC	3/4	0.98	0.62	18.19
1/2 FB	FEE	1	1.99	0.87	23.7
1	FEE	1	1.99	0.87	23.7
1 FB	FEG	1 1/2	1.99	1.37	28.76
1 1/2	FEG	1 1/2	1.99	1.37	28.76
1 1/2 FB	FEJ	2	2.52	1.87	33.46
2	FEJ	2	2.52	1.87	33.46
2 FB	FEL	2 1/2	3.05	2.37	49.94
2 FB	FEM	3	3.58	2.87	49.94
3	FEL	2 1/2	3.05	2.37	49.94
3	FEM	3	3.58	2.87	49.94

FB = Full bore  
 3A version available: order code for "Additional approval", option LP in conjunction with  
 Ra ≤ 32 μin: order code for "Measuring tube material", option CB or  
 Ra ≤ 16 μin: order code for "Measuring tube material", option CD  
 Additional information on "Eccentric clamps"

**Cable glands**

Thread SMS 1145



A0015628

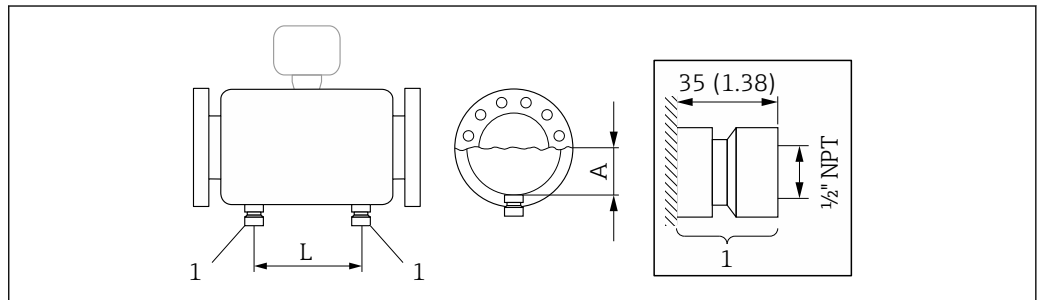
**i** Length tolerance for dimension L in inch:  
+0.06 / -0.08

Thread SMS 1145 Titanium Order code for "Process connection", option SAW			
DN [in]	A [in]	B [in]	L [in]
3/8	Rd 40 × 1/6	0.89	16.77
1/2	Rd 40 × 1/6	0.89	18.19
1	Rd 40 × 1/6	0.89	23.7
1 FB	Rd 40 × 1/6	0.89	29.02
1 1/2	Rd 60 × 1/6	1.4	29.07
1 1/2 FB	Rd 60 × 1/6	1.4	33.78
2	Rd 70 × 1/6	1.91	33.78
2 FB	Rd 70 × 1/6	1.91	49.55
3	Rd 98 × 1/6	2.83	49.94

FB = Full bore  
Ra ≤ 32 µin: order code for "Measuring tube material", option CB or

**Accessories**

Rinse connections

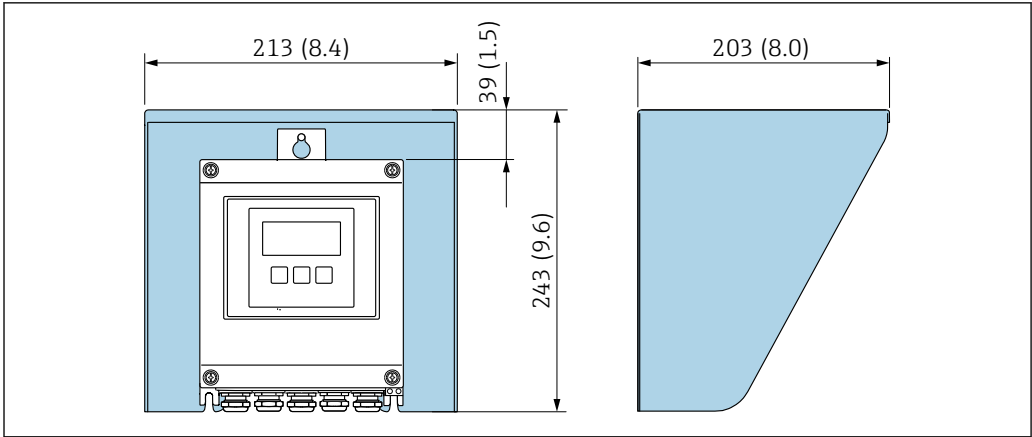


A0029968

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

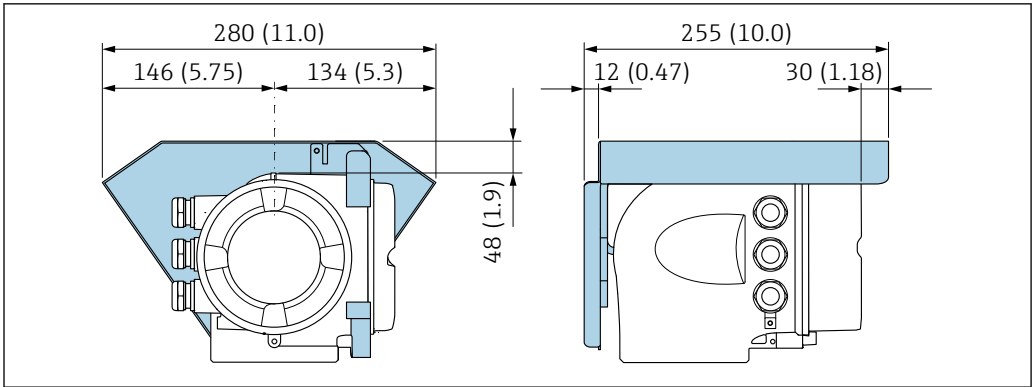
DN	A	L
[in]	[in]	[in]
3/8	3.569	4.8
1/2	3.569	6.22
1/2 FB	3.569	6.22
1	3.569	11.65
1 FB	3.569	11.65
1 1/2	4.069	15.43
1 1/2 FB	4.069	15.43
2	4.636	19.21
2 FB	5.73	32.05
3	5.73	32.05

Protective cover



A0029552

44 Weather protection cover for Proline 500 – digital



A0029553

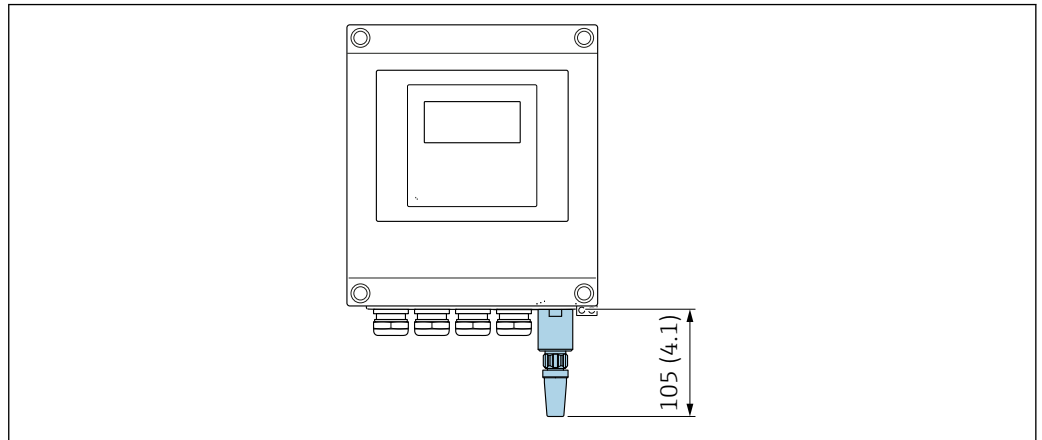
45 Weather protection cover for Proline 500

External WLAN antenna

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

*Proline 500 – digital*

*External WLAN antenna mounted on device*

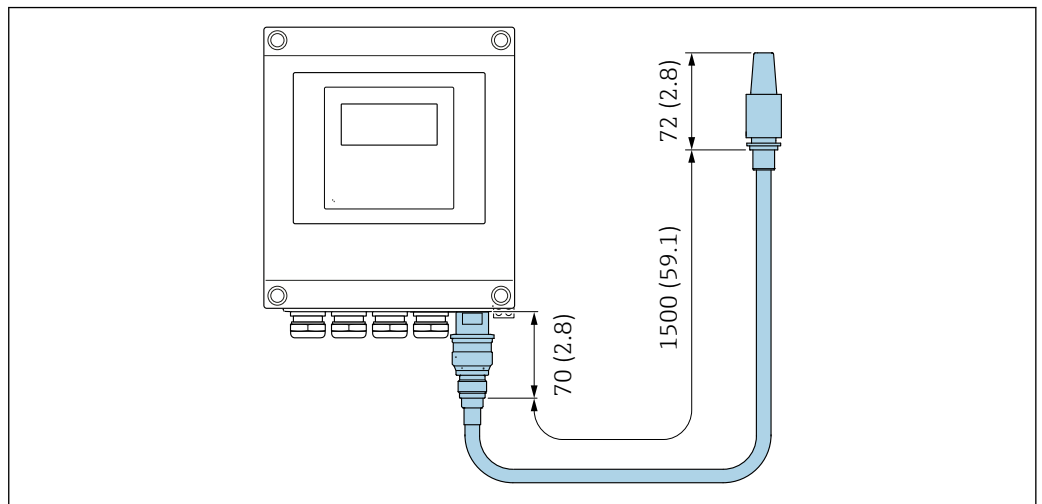


A0033607

46 Engineering unit mm (in)

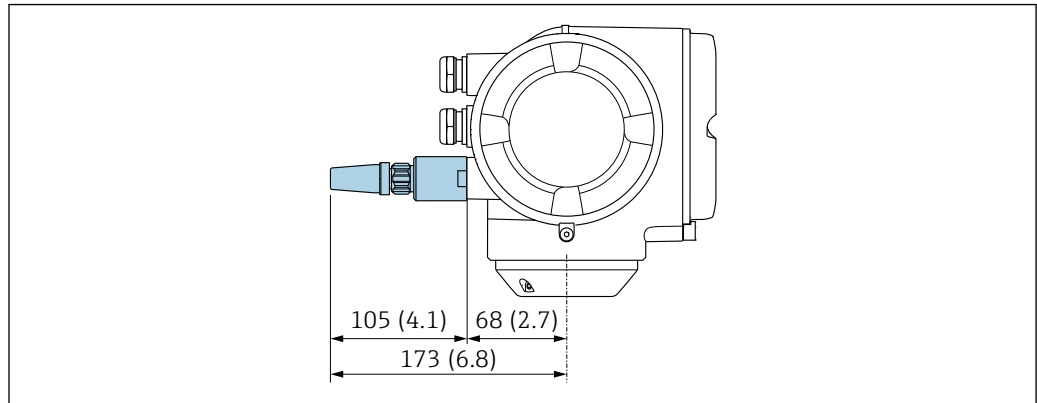
*External WLAN antenna mounted with cable*

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



A0033606

47 Engineering unit mm (in)

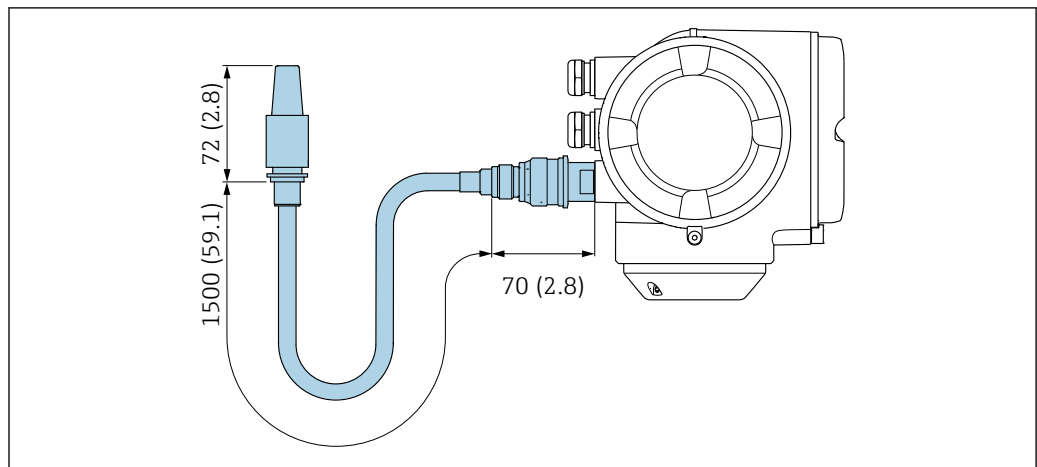
*Proline 500**External WLAN antenna mounted on device*

A0028923

48 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

49 Engineering unit mm (in)

**Weight**

All values (weight exclusive of packaging material) refer to devices with EN/DIN PN 40 flanges.

**Transmitter**

- Proline 500 – digital polycarbonate: 1.4 kg (3.1 lbs)
- Proline 500 – digital aluminum: 2.4 kg (5.3 lbs)
- Proline 500 aluminum: 6.5 kg (14.3 lbs)
- Proline 500 cast, stainless: 15.6 kg (34.4 lbs)

**Sensor**

- Sensor with aluminum connection housing version: see the information in the following table
- Cast connection housing version, stainless: +3.7 kg (+8.2 lbs)

**Weight in SI units**

DN [mm]	Weight [kg]
8	11
15	13
15 FB	19



DN [mm]	Weight [kg]
25	20
25 FB	39
40	40
40 FB	65
50	67
50 FB	118
80	122
FB = Full bore	

#### Weight in US units

DN [in]	Weight [lbs]
3/8	24
½	29
½ FB	42
1	44
1 FB	86
1½	88
1½ FB	143
2	148
2 FB	260
3	269
FB = Full bore	

## Materials

### Transmitter housing

#### *Housing of Proline 500 – digital transmitter*

Order code for "Transmitter housing":

- Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated
- Option **D** "Polycarbonate": polycarbonate

#### *Housing of Proline 500 transmitter*

Order code for "Transmitter housing":

- Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated
- Option **L** "Cast, stainless": cast, stainless steel, 1.4409 (CF3M) similar to 316L

#### *Window material*

Order code for "Transmitter housing":

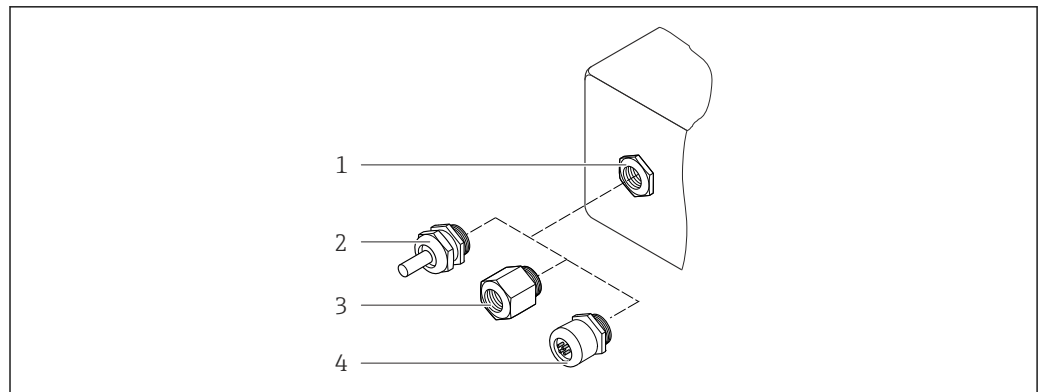
- Option **A** "Aluminum, coated": glass
- Option **D** "Polycarbonate": plastic
- Option **L** "Cast, stainless": glass

### Sensor connection housing

Order code for "Sensor connection housing":

- Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated
- Option **B** "Stainless":
  - Stainless steel 1.4301 (304)
  - Optional: Order code for "Sensor feature", option **CC** "Hygienic version, for maximum corrosion resistance": stainless steel, 1.4404 (316L)
- Option **C** "Ultra-compact, stainless":
  - Stainless steel 1.4301 (304)
  - Optional: Order code for "Sensor feature", option **CC** "Hygienic version, for maximum corrosion resistance": stainless steel, 1.4404 (316L)
- Option **L** "Cast, stainless": 1.4409 (CF3M) similar to 316L

### Cable entries/cable glands






A0028352

50 Possible cable entries/cable glands

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

Cable entries and adapters	Material
Cable gland M20 × 1.5	Plastic
<ul style="list-style-type: none"> <li>▪ Adapter for cable entry with internal thread G ½"</li> <li>▪ Adapter for cable entry with internal thread NPT ½"</li> </ul> <p><b>i</b> Only available for certain device versions:</p> <ul style="list-style-type: none"> <li>▪ Order code for "Transmitter housing":               <ul style="list-style-type: none"> <li>– Option <b>A</b> "Aluminum, coated"</li> <li>– Option <b>D</b> "Polycarbonate"</li> </ul> </li> <li>▪ Order code for "Sensor connection housing":               <ul style="list-style-type: none"> <li>– Proline 500 – digital:                   <ul style="list-style-type: none"> <li>Option <b>A</b> "Aluminum coated"</li> <li>Option <b>B</b> "Stainless"</li> <li>Option <b>L</b> "Cast, stainless"</li> </ul> </li> <li>– Proline 500:                   <ul style="list-style-type: none"> <li>Option <b>B</b> "Stainless"</li> <li>Option <b>L</b> "Cast, stainless"</li> </ul> </li> </ul> </li> </ul>	Nickel-plated brass

Cable entries and adapters	Material
<ul style="list-style-type: none"> <li>▪ Adapter for cable entry with internal thread G ½"</li> <li>▪ Adapter for cable entry with internal thread NPT ½"</li> </ul> <p> Only available for certain device versions:</p> <ul style="list-style-type: none"> <li>▪ Order code for "Transmitter housing": Option <b>L</b> "Cast, stainless"</li> <li>▪ Order code for "Sensor connection housing": Option <b>L</b> "Cast, stainless"</li> </ul>	Stainless steel, 1.4404 (316L)
<p>Adapter for device plug</p> <p> Device plug for digital communication: Only available for certain device versions →  30.</p> <ul style="list-style-type: none"> <li>▪ Device plug for connecting cable: A device plug is always used for the device version, order code for "Sensor connection housing", option <b>C</b> (ultra-compact, hygienic, stainless).</li> </ul>	Stainless steel, 1.4404 (316L)

### 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>

### Connecting cable

*Connecting cable for sensor - Proline 500 – digital transmitter*

PVC cable with copper shield

*Connecting cable for sensor - Proline 500 transmitter*

- Standard cable: PVC cable with copper shield
- Reinforced cable: PVC cable with copper shield and additional steel wire braided jacket

 UV rays can impair the cable outer sheath. Protect the cable from exposure to sun as much as possible.

### Sensor housing



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

### Measuring tubes

Grade 9 titanium

### Process connections

- Flanges according to EN 1092-1 (DIN 2501) / according to ASME B16.5/ according to JIS:
  - Stainless steel 1.4301 (304)
  - Wetted parts: Grade 2 titanium
- All other process connections:  
Grade 2 titanium

 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 (acrylic ester-styrene-acrylonitrile) 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
- Clamp connections:
  - Tri-Clamp (OD tubes), DIN 11866 series C
- Eccentric clamp connection:
  - Eccen. Tri-Clamp, DIN 11866 series C
- 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



Process connection materials → 95

**Surface roughness**

All data relate to parts in contact with fluid. The following surface roughness quality can be ordered.

- Not polished
- $Ra_{max} = 0.8 \mu\text{m}$  (32  $\mu\text{in}$ )
- $Ra_{max} = 0.4 \mu\text{m}$  (16  $\mu\text{in}$ )

## Operability

**Operating concept****Operator-oriented menu structure for user-specific tasks**

- Commissioning
- Operation
- Diagnostics
- Expert level

**Fast and safe commissioning**

- Guided menus ("Make-it-run" wizards) for applications
- Menu guidance with brief descriptions of the individual parameter functions
- Device access via Web server or SmartBlue app → 117
- WLAN access to the device via mobile handheld terminal, tablet or smart phone

**Reliable operation**

- Operation in local language → 97
- 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 availability**

- 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:

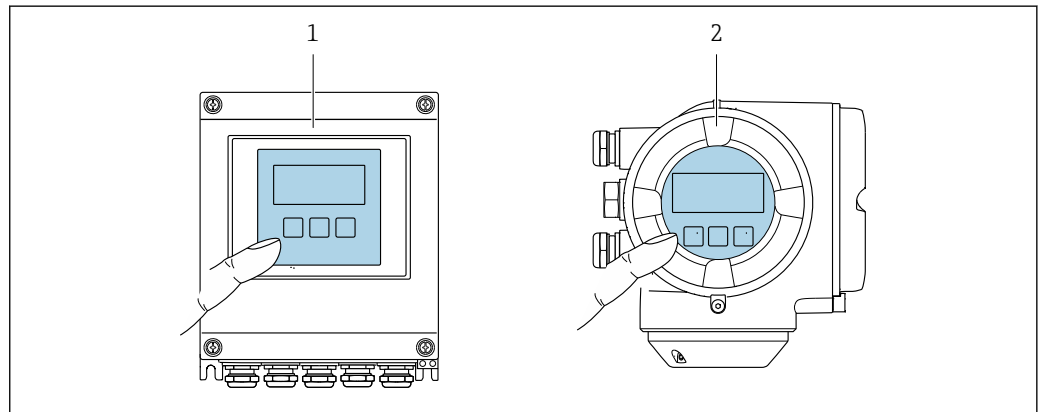
- Via local operation  
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Bahasa (Indonesian), Vietnamese, Czech, Swedish
- Via Web browser  
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese,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


**Local operation****Via display module**

Two display modules are available:

- 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 →  103






 51 Operation with touch control

- 1 Proline 500 – digital
- 2 Proline 500

*Display elements*

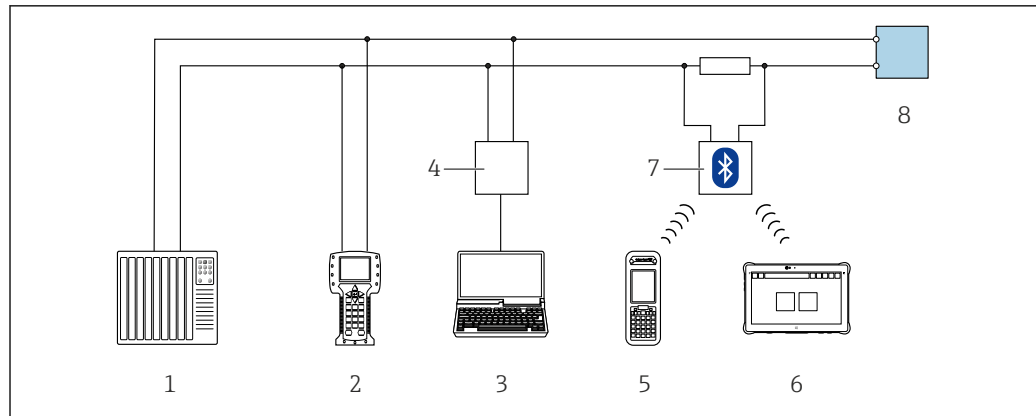
- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: -20 to +60 °C (-4 to +140 °F)  
The readability of the display may be impaired at temperatures outside the temperature range.

*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

**Remote operation****Via HART protocol**

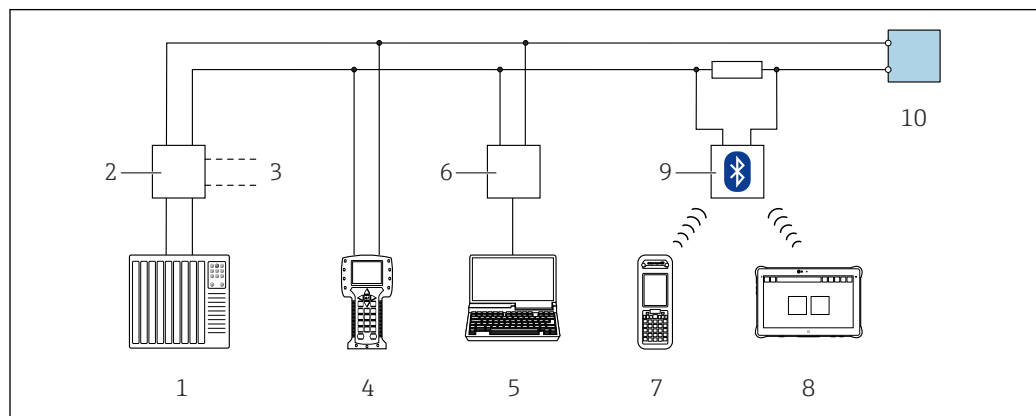
This communication interface is available in device versions with a HART output.



A0028747

52 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. Internet Explorer) for access to the integrated device Web server or computer with an 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



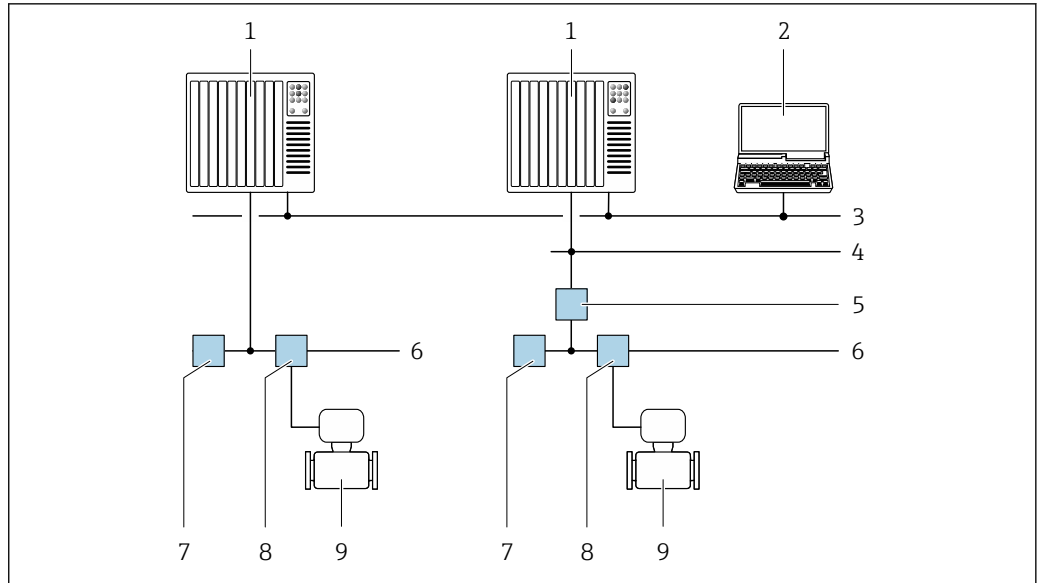
A0028746

53 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. Internet Explorer) for access to the integrated device Web server or computer with an 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.



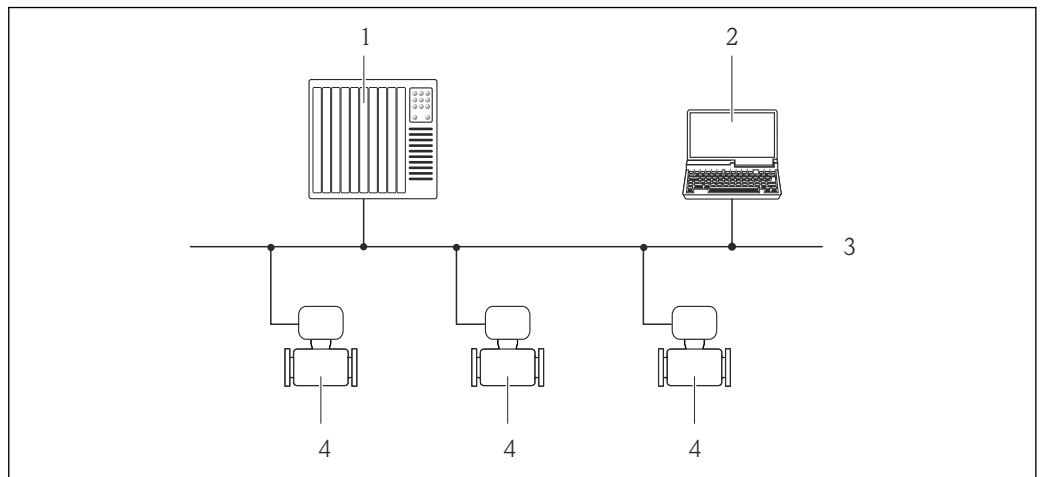
A0028837

54 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.



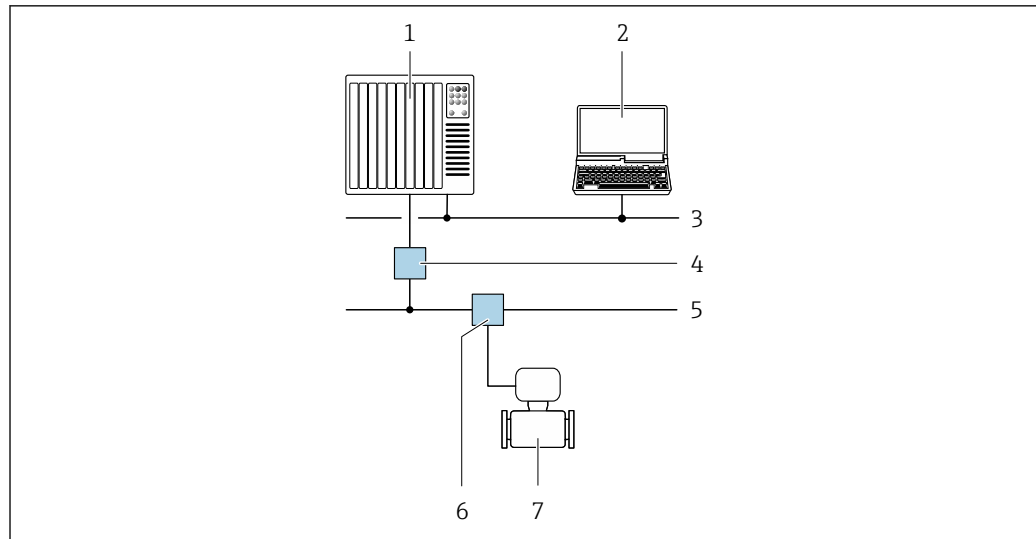
A0020903

55 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.



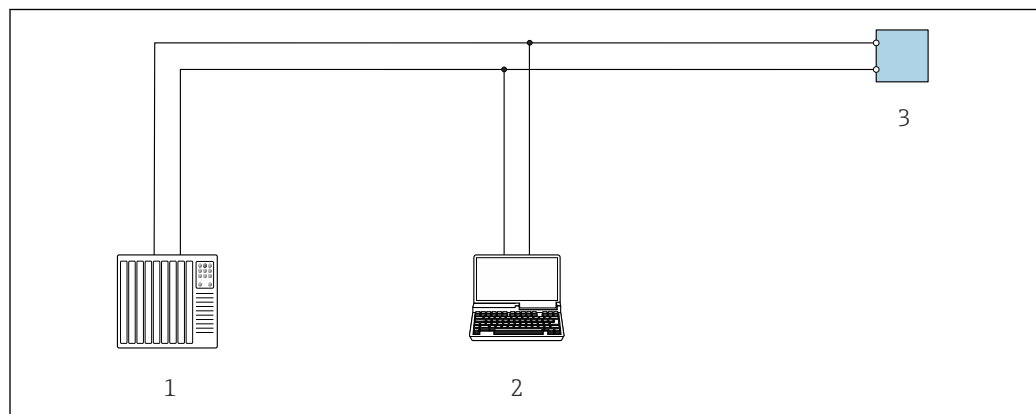
A0028838

56 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

57 Options for remote operation via Modbus-RS485 protocol (active)

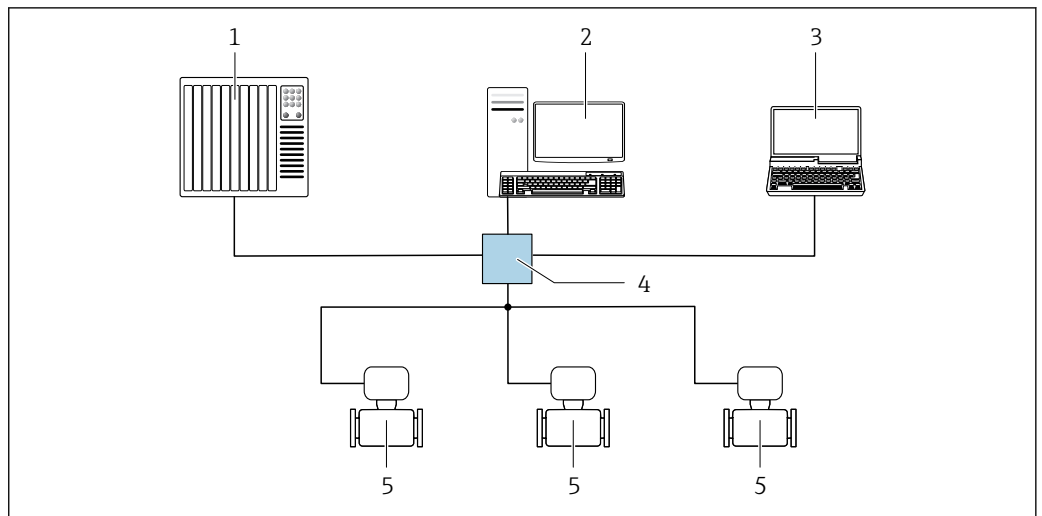
- 1 Control system (e.g. PLC)
- 2 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated device Web server or with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 3 Transmitter

#### Via EtherNet/IP network

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



Star topology



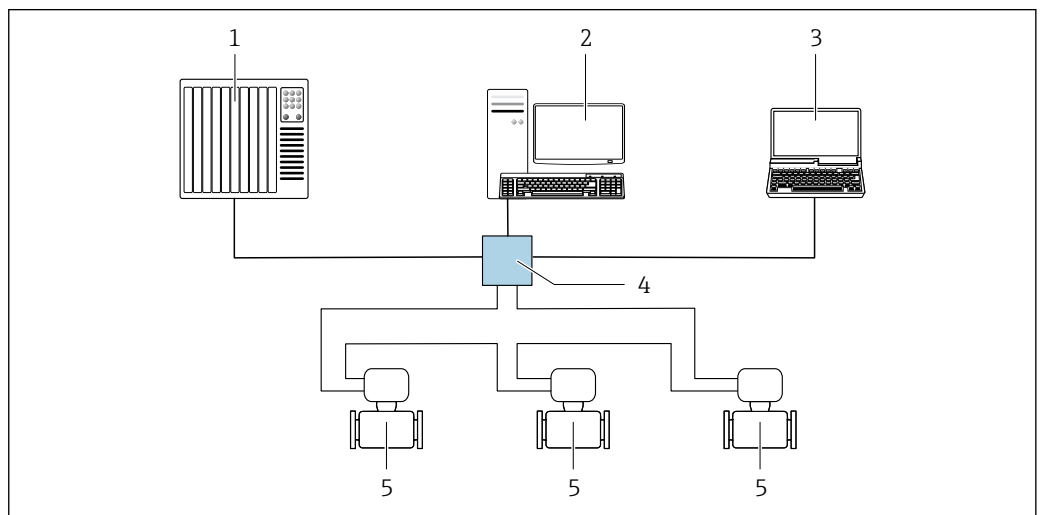
A0032078

58 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 device Web server or computer with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP"
- 4 Ethernet switch
- 5 Measuring device

Ring topology

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



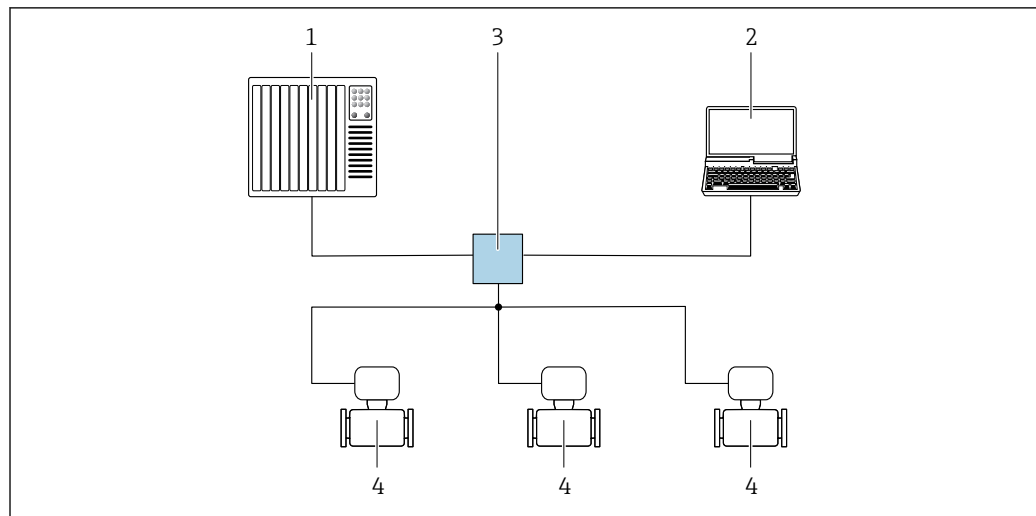
A0033725

59 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 device Web server or computer with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP"
- 4 Ethernet switch
- 5 Measuring device

**Via PROFINET network**

This communication interface is available in device versions with PROFINET.

*Star topology*

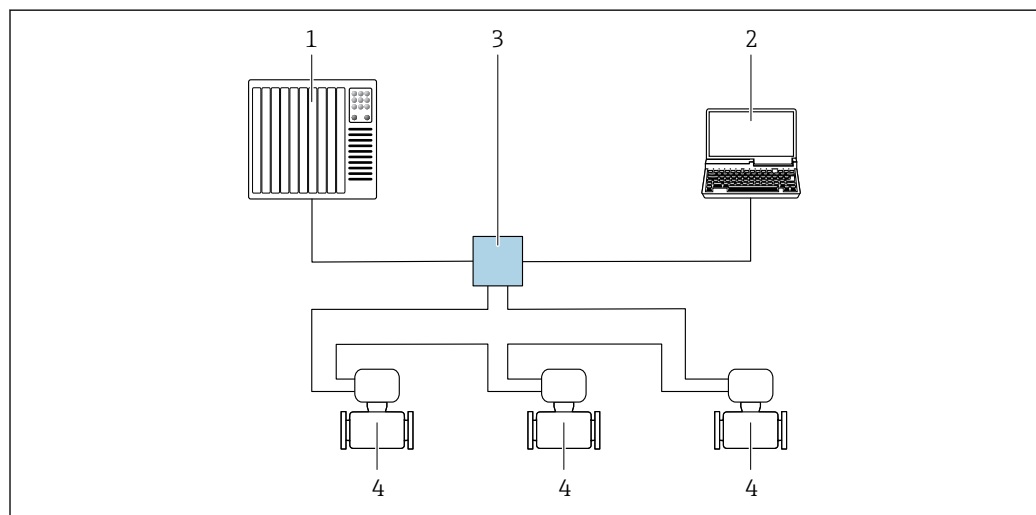
A0026545

60 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 device Web server or computer with operating tool (e.g. FieldCare, DeviceCare, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
- 3 Switch, e.g. Scalance X204 (Siemens)
- 4 Measuring device

*Ring topology*

This communication interface is available in device versions with PROFINET.



A0033719

61 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 device Web server or computer with operating tool (e.g. FieldCare, DeviceCare, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
- 3 Switch, e.g. Scalance X204 (Siemens)
- 4 Measuring device

**Service interface**

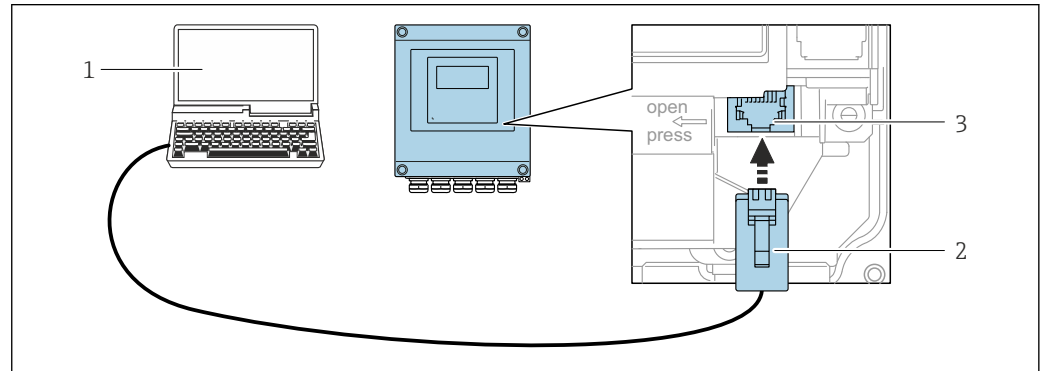
**Via service interface (CDI-RJ45)**

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 RJ45 and the M12 connector 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 connector mounted in the cable entry. Therefore the connection to the service interface can be established via an M12 connector without opening the device.

*Proline 500 – digital transmitter*

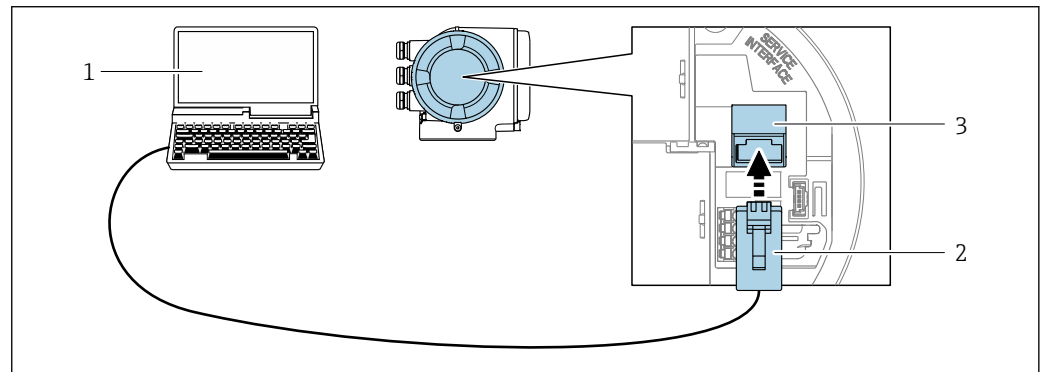


A0029163

**62** Connection via service interface (CDI-RJ45)

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

*Proline 500 transmitter*



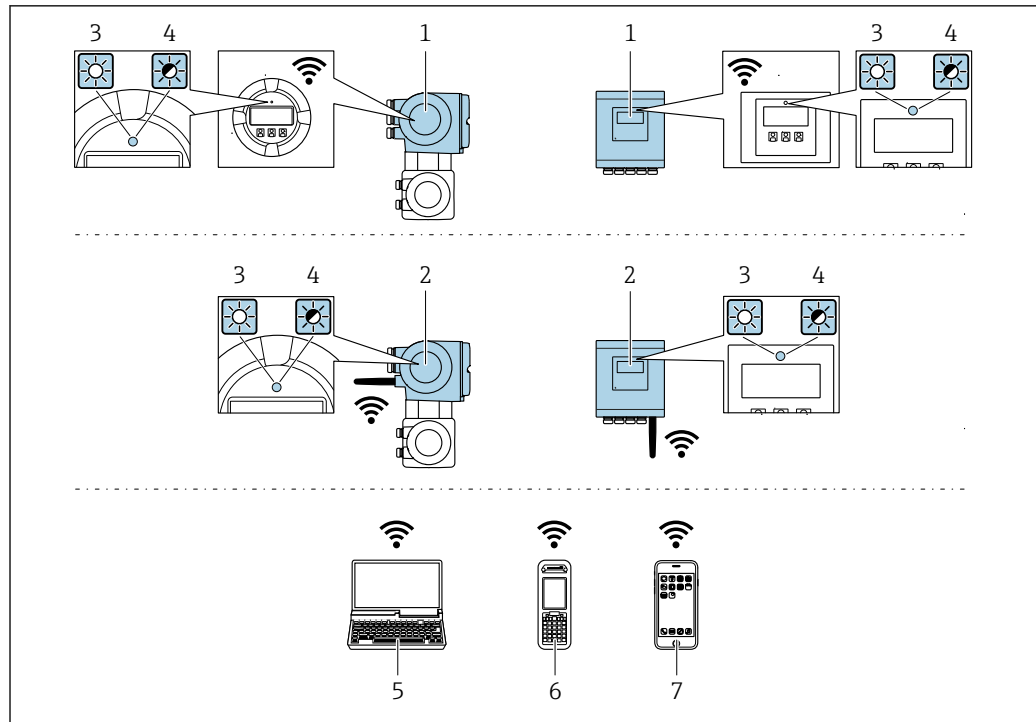
A0027563

**63** Connection via service interface (CDI-RJ45)

- 1 Computer with Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or with "FieldCare", "DeviceCare" operating tool with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 2 Standard Ethernet connecting cable with RJ45 connector
- 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, graphic display; touch control + WLAN"



A0034569

- 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)

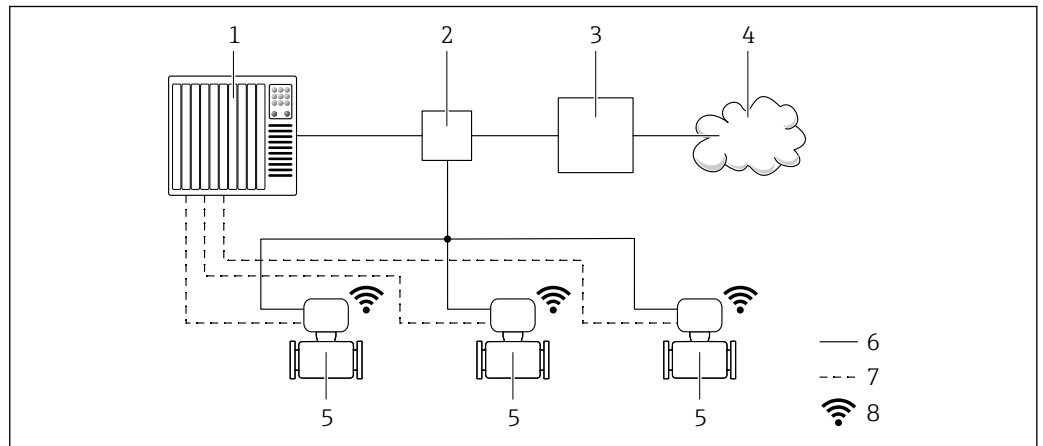
Function	WLAN: IEEE 802.11 b/g (2.4 GHz) <ul style="list-style-type: none"> <li>▪ Access point with DHCP server (default setting)</li> <li>▪ Network</li> </ul>
Encryption	WPA2-PSK AES-128 (in accordance with IEEE 802.11i)
Configurable WLAN channels	1 to 11
Degree of protection	IP67
Available antennas	<ul style="list-style-type: none"> <li>▪ Internal antenna</li> <li>▪ External antenna (optional) In the event of poor transmission/reception conditions at the place of installation. Available as an accessory →  115.</li> </ul> <p> Only one antenna active in each case!</p>
Max. range	50 m (164 ft)
Materials: External WLAN antenna	<ul style="list-style-type: none"> <li>▪ Antenna: ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel-plated brass</li> <li>▪ Adapter: Stainless steel and nickel-plated brass</li> <li>▪ Cable: Polyethylene</li> <li>▪ Connector: Nickel-plated brass</li> <li>▪ Angle bracket: Stainless steel</li> </ul>

### Network integration

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.


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.



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

- 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, illuminated, 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

Supported operating tools	Operating unit	Interface	Additional information
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
Device Xpert	Field Xpert SFX 100/350/370	HART and FOUNDATION Fieldbus fieldbus protocol	Operating Instructions BA01202S Device description files: Use update function of handheld terminal

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

The associated device description files are available at: [www.endress.com](http://www.endress.com) → Downloads


### Web server



Thanks to the integrated Web server, the device can be operated and configured via a Web browser and via a service interface (CDI-RJ45) or via a 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 also displayed and allows the user to monitor the status of the device. Furthermore the device data can be managed and the network parameters can be configured.

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 the measuring device:

- Upload the configuration from the measuring device (XML format, configuration backup)
- Save the configuration to the measuring device (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 verification log (PDF file, only available with the "Heartbeat Verification" application package)
- Flash firmware version for device firmware upgrade, for instance
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package →  113)

 Web server special documentation →  119

### 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:

	Device memory	T-DAT	S-DAT
<b>Available data</b>	<ul style="list-style-type: none"> <li>▪ Event logbook such as diagnostic events for example</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>▪ Peakhold indicator (min/max values)</li> <li>▪ Totalizer values</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sensor data: nominal diameter etc.</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 board in the connection compartment	Attachable to the user interface 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 the sensor is replaced: once the sensor has been replaced, new sensor data are transferred from the S-DAT in the measuring device and the 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 transfer

##### 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:

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

## Certificates and approvals



Currently available certificates and approvals can be called up via the product configurator.

**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.

**C-Tick symbol**

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.

The following devices have equipment protection level (EPL) Gb (Zone 1 in the measuring tube):

- Device versions with the order code for "Integrated ISEM electronics", option A and the order code for "Approval; transmitter; sensor", option BI, BJ, BM or BN.
- Device versions with the order code for "Integrated ISEM electronics", option B and the order code for "Approval; transmitter; sensor", option BA, BB, BC or BD.



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

**Proline 500 – digital**

*ATEX/IECEX*

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

*Ex ia*

Transmitter		Sensor	
Category	Type of protection	Category	Type of protection
II(1)G	[Ex ia] IIC	II1/2G	Ex ia IIC T6...T1 Gb Ex ia IIB T6...T1 Gb
II(1)G	[Ex ia] IIC	II2G	Ex ia IIC T6...T1 Gb Ex ia IIB T6...T1 Gb
II3(1)G	Ex ec [ia Ga] IIC T5...T4 Gc	II1/2G	Ex ia IIC T6...T1 Gb Ex ia IIB T6...T1 Gb
II3(1)G	Ex ec [ia Ga] IIC T5...T4 Gc	II2G	Ex ia IIC T6...T1 Gb Ex ia IIB T6...T1 Gb

*Ex tb*

Transmitter		Sensor	
Category	Type of protection	Category	Type of protection
II(1)D	[Ex ia] IIIC	II2D	Ex ia tb IIIC T** °C Db



*Non-Ex / Ex ec*

Transmitter		Sensor	
Category	Type of protection	Category	Type of protection
Non - Ex	Non-Ex	IIBG	Ex ec IIC T5...T1 Gc
IIBG	Ex ec IIC T5...T4 Gc	IIBG	Ex ec IIC T5...T1 Gc

*cCSA<sub>US</sub>*

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

*IS (Ex nA, Ex i)*

Transmitter	Sensor
Class I Division 2 Groups A - D	Class I, II, III Division 1 Groups A-G
Class I Division 2 Groups A - D	Class I, II, III Division 1 Groups C-G

*NI (Ex nA)*

Transmitter	Sensor
Class I Division 2 Groups A - D	

*Ex nA / Ex i*

Transmitter	Sensor
Class I, Zone 2 AEx/ Ex nA [ia Ga] IIC T5...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIC T6...T1 Gb Class I, Zone 1 AEx/ Ex ia IIB T6...T1 Gb
Class I, Zone 2 AEx/ Ex nA [ia Ga] IIC T5...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIC T6...T1 Gb Class I, Zone 1 AEx/ Ex ia IIB T6...T1 Gb

*Ex nA*

Transmitter	Sensor
Class I, Zone 2 AEx/ Ex nA IIC T5...T4 Gc	Class I, Zone 2 AEx/ Ex nA IIC T5...T1 Gc

*Ex tb*

Transmitter	Sensor
[AEx / Ex ia ] IIIC	Zone 2.1 AEx/ Ex ia tb IIIC T** °C Db

**Proline 500**

*ATEX/IECEX*

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

*Ex db eb*

Transmitter		Sensor	
Category	Type of protection	Category	Type of protection
IIBG	Ex db eb ia IIC T6...T4 Gb	IIBG	Ex ia IIC T6...T1 Gb
IIBG	Ex db eb ia IIB T6...T4 Gb	IIBG	Ex ia IIB T6...T1 Gb
IIBG	Ex db eb ia IIC T6...T4 Gb	IIBG	Ex ia IIC T6...T1 Gb
IIBG	Ex db eb ia IIB T6...T4 Gb	IIBG	Ex ia IIB T6...T1 Gb

*Ex db*

Transmitter		Sensor	
Category	Type of protection	Category	Type of protection
II2G	Ex db ia IIC T6...T4 Gb	II2G	Ex ia IIC T6...T1 Gb
II2G	Ex db ia IIB T6...T4 Gb	II2G	Ex ia IIB T6...T1 Gb
II2G	Ex db ia IIC T6...T4 Gb	II2G	Ex ia IIC T6...T1 Gb
II2G	Ex db ia IIB T6...T4 Gb	II2G	Ex ia IIB T6...T1 Gb

*Ex tb*

Category	Type of protection	
	Transmitter	Sensor
II2D	Ex tb IIIC T85°C Db	Ex ia tb IIIC T** °C Db

*Ex ec*

Category	Type of protection	
	Transmitter	Sensor
II3G	Ex ec IIC T5...T4 Gc	Ex ec IIC T5...T1 Gc

*cCSA<sub>US</sub>*

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

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

Transmitter	Sensor
Class I, III, III Division 1 Groups A-G	
Class I, III, III Division 1 Groups C-G	

*NI (Ex nA)*

Transmitter	Sensor
Class I Division 2 Groups ABCD	

*Ex de*

Transmitter	Sensor
Class I, Zone 1 AEx/ Ex de ia IIC T6...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIC T6...T1 Gb
Class I, Zone 1 AEx/ Ex de ia IIB T6...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIB T6...T1 Gb
Class I, Zone 1 AEx/ Ex de ia IIC T6...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIC T6...T1 Gb
Class I, Zone 1 AEx/ Ex de ia IIB T6...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIB T6...T1 Gb

*Ex d*

Transmitter	Sensor
Class I, Zone 1 AEx/ Ex d ia IIC T6...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIC T6...T1 Gb
Class I, Zone 1 AEx/ Ex d ia IIB T6...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIB T6...T1 Gb
Class I, Zone 1 AEx/ Ex d ia IIC T6...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIC T6...T1 Gb
Class I, Zone 1 AEx/ Ex d ia IIB T6...T4 Gb	Class I, Zone 1 AEx/ Ex ia IIB T6...T1 Gb

*Ex nA*

Transmitter	Sensor
Class I, Zone 2 AEx/ Ex nA IIC T5...T4 Gc	Class I, Zone 2 AEx/ Ex nA IIC T5...T1 Gc

*Ex tb*

Transmitter	Sensor
Zone 21 AEx/ Ex tb IIIC T85°C Db	Zone 21 AEx/ Ex ia tb IIIC T** °C Db

**Sanitary compatibility**

- 3-A approval  
Only devices with the order code for "Additional approval", option LP "3A" have 3-A approval.
- 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)).
- FDA
- Food Contact Materials Regulation (EC) 1935/2004

**Pharmaceutical compatibility**



- FDA
- USP Class VI
- TSE/BSE Certificate of Suitability

**Functional safety**

The measuring device can be used for flow monitoring systems (min., max., range) up to SIL 2 (single-channel architecture; order code for "Additional approval", option LA) and SIL 3 (multichannel architecture with homogeneous redundancy) and is independently evaluated and certified by the TÜV in accordance with IEC 61508.

The following types of monitoring in safety equipment are possible:

- Mass flow
- Volume flow
- Density

 Functional Safety Manual with information on the SIL device →  119

**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 User Organization Organization). The measuring system meets all the requirements of the following specifications:

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

<b>EtherNet/IP certification</b>	<p>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:</p> <ul style="list-style-type: none"> <li>■ Certified in accordance with the ODVA Conformance Test</li> <li>■ EtherNet/IP Performance Test</li> <li>■ EtherNet/IP PlugFest compliance</li> <li>■ The device can also be operated with certified devices of other manufacturers (interoperability)</li> </ul>
<b>Certification PROFINET</b>	<p><b>PROFINET interface</b></p> <p>The measuring device is certified and registered by the PNO (PROFIBUS User Organization Organization). The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> <li>■ Certified according to: <ul style="list-style-type: none"> <li>- Test specification for PROFINET devices</li> <li>- PROFINET Security Level 2 – Netload Class</li> </ul> </li> <li>■ The device can also be operated with certified devices of other manufacturers (interoperability)</li> </ul>
<b>Pressure Equipment Directive</b>	<p>The devices can be ordered with or without a PED approval. If a device with a PED approval is required, this must be explicitly stated in the order. For devices with nominal diameters less than or equal to DN 25 (1"), this is neither possible nor necessary.</p> <ul style="list-style-type: none"> <li>■ With the identification PED/G1/x (x = category) on the sensor nameplate, Endress+Hauser confirms conformity with the "Essential Safety Requirements" specified in Appendix I of the Pressure Equipment Directive 2014/68/EU.</li> <li>■ Devices bearing this marking (PED) are suitable for the following types of medium: <ul style="list-style-type: none"> <li>- Media in Group 1 and 2 with a vapor pressure greater than, or smaller and equal to 0.5 bar (7.3 psi)</li> <li>- Unstable gases</li> </ul> </li> <li>■ Devices not bearing this marking (PED) are designed and manufactured according to good engineering practice. They meet the requirements of Article 4 paragraph 3 of the Pressure Equipment Directive 2014/68/EU. The range of application is indicated in tables 6 to 9 in Annex II of the Pressure Equipment Directive 2014/68/EU.</li> </ul>
<b>Radio approval</b>	<p>The measuring device has radio approval.</p> <p> For detailed information on the radio approval, see the Special Documentation →  119</p>
<b>Additional certification</b>	<p><b>CRN approval</b></p> <p>Some device versions have CRN approval. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device.</p> <p><b>Tests and certificates</b></p> <ul style="list-style-type: none"> <li>■ Pressure test, internal procedure, inspection certificate</li> <li>■ EN10204-3.1 material certificate, wetted parts and sensor housing</li> <li>■ PMI test (XRF), internal procedure, wetted parts, test report</li> <li>■ EN10204-2.1 confirmation of compliance with the order and EN10204-2.2 test report</li> </ul>
<b>Other standards and guidelines</b>	<ul style="list-style-type: none"> <li>■ EN 60529 Degrees of protection provided by enclosures (IP code)</li> <li>■ IEC/EN 60068-2-6 Environmental influences: Test procedure - Test Fc: vibrate (sinusoidal).</li> <li>■ IEC/EN 60068-2-31 Environmental influences: Test procedure - Test Ec: shocks due to rough handling, primarily for devices.</li> <li>■ EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements</li> <li>■ IEC/EN 61326 Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements).</li> <li>■ NAMUR NE 21 Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment</li> </ul>

- 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

## Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: [www.endress.com](http://www.endress.com) -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: [www.addresses.endress.com](http://www.addresses.endress.com)



### 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 for the device → 119

### Diagnostics functions

Package	Description
Extended HistoROM	<p>Comprises extended functions concerning the event log and the activation of the measured value memory.</p> <p>Event log: Memory volume is extended from 20 message entries (standard version) to up to 100 entries.</p> <p>Data logging (line recorder):</p> <ul style="list-style-type: none"> <li>■ Memory capacity for up to 1000 measured values is activated.</li> <li>■ 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user.</li> <li>■ Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.</li> </ul>

## Heartbeat Technology

Package	Description
Heartbeat Verification +Monitoring	<p><b>Heartbeat Verification</b> Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment".</p> <ul style="list-style-type: none"> <li>■ Functional testing in the installed state without interrupting the process.</li> <li>■ Traceable verification results on request, including a report.</li> <li>■ Simple testing process via local operation or other operating interfaces.</li> <li>■ Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications.</li> <li>■ Extension of calibration intervals according to operator's risk assessment.</li> </ul> <p><b>Heartbeat Monitoring</b> 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:</p> <ul style="list-style-type: none"> <li>■ Draw conclusions - using these data and other information - about the impact process influences (such as corrosion, abrasion, buildup etc.) have on the measuring performance over time.</li> <li>■ Schedule servicing in time.</li> <li>■ Monitor the process or product quality, e.g. gas pockets.</li> </ul>

## Concentration

Package	Description
Concentration	<p><b>Calculation and outputting of fluid concentrations</b> The measured density is converted to the concentration of a substance of a binary mixture using the "Concentration" application package:</p> <ul style="list-style-type: none"> <li>■ Choice of predefined fluids (e.g. various sugar solutions, acids, alkalis, salts, ethanol etc.)</li> <li>■ Common or user-defined units (°Brix, °Plato, % mass, % volume, mol/l etc.) for standard applications.</li> <li>■ Concentration calculation from user-defined tables.</li> </ul>



## Viscosity

Package	Description
Viscosity measurement	<p><b>In-line and real-time viscosity measurement</b> Promass I with the "Viscosity" application package also measures the real-time viscosity of the fluid directly in the process, in addition to measuring the mass flow/volume flow/ temperature and density.</p> <p>The following viscosity measurements are performed on liquids:</p> <ul style="list-style-type: none"> <li>■ Dynamic viscosity</li> <li>■ Kinematic viscosity</li> <li>■ Temperature-compensated viscosity (kinematic and dynamic) in relation to the reference temperature</li> </ul> <p>Viscosity measurement can be used for Newtonian and non-Newtonian applications and supplies accurate measured data irrespective of the flow, even under difficult conditions.</p>

## Special density

Package	Description
Special density	<p>Many applications use density as a key measured value for monitoring quality or controlling processes. The device measures the density of the fluid as standard and makes this value available to the control system.</p> <p>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.</p>

## OPC-UA server













Package	Description
OPC-UA-Server	<p>The application package provides the user with an integrated OPC-UA server for comprehensive instrument services for IoT and SCADA applications.</p> <p> Special Documentation for the "OPC-UA-Server" application package →  119.</p>



## 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
Transmitter <ul style="list-style-type: none"> <li>▪ Proline 500 – digital</li> <li>▪ Proline 500</li> </ul>	Transmitter for replacement or storage. Use the order code to define the following specifications: <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> ▪ Proline 500 – digital transmitter: Order code: 8X5BXX-XXXXXXXXXA</p> <p>▪ Proline 500 transmitter: Order code: 8X5BXX-XXXXXXXXXB</p> <p> Proline 500 transmitter for replacement: It is essential to specify the serial number of the current transmitter when ordering. Based on the serial number, the device-specific data (e.g., calibration factors) of the replacement device can be used for the new transmitter.</p> <p> ▪ Proline 500 – digital transmitter: Installation Instructions EA01151</p> <p>▪ Proline 500 transmitter: Installation Instructions EA01152</p>
External WLAN antenna	External WLAN antenna with 1.5 m (59.1 in) connecting cable and two angle brackets. Order code for "Enclosed accessories", option P8 "Wireless antenna wide area". <p> ▪ The external WLAN antenna is not suitable for use in hygienic applications.</p> <p>▪ Further information on the WLAN interface →  103.</p> <p> Order number: 71351317</p> <p> Installation Instructions EA01238D</p>
Pipe mounting set	Pipe mounting set for transmitter. <p> ▪ Proline 500 – digital transmitter Order number: 71346427</p> <p>▪ Proline 500 transmitter Order number: 71346428</p>
Protective cover Transmitter <ul style="list-style-type: none"> <li>▪ Proline 500 – digital</li> <li>▪ Proline 500</li> </ul>	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. <p> ▪ Proline 500 – digital transmitter Order number: 71343504</p> <p>▪ Proline 500 transmitter Order number: 71343505</p> <p> Installation Instructions EA01160</p>
Display guard Proline 500 – digital	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. <p> Order number: 71228792</p> <p> For details, see Installation Instructions EA01093</p>

Connecting cable Proline 500 – digital Sensor – Transmitter	<p>The connecting cable can be ordered directly with the measuring device (order code for "Cable, sensor connection) or as an accessory (order number DK8012).</p> <p>The following cable lengths are available: order code for "Cable, sensor connection"</p> <ul style="list-style-type: none"> <li>▪ Option B: 20 m (65 ft)</li> <li>▪ Option E: User configurable up to max. 50 m</li> <li>▪ Option F: User configurable up to max. 165 ft</li> </ul> <p> Maximum possible cable length for a Proline 500 – digital connecting cable: 300 m (1 000 ft)</p>
Connecting cable Proline 500 Sensor – Transmitter	<p>The connecting cable can be ordered directly with the measuring device (order code for "Cable, sensor connection) or as an accessory (order number DK8012).</p> <p>The following cable lengths are available: order code for "Cable, sensor connection"</p> <ul style="list-style-type: none"> <li>▪ Option 1: 5 m (16 ft)</li> <li>▪ Option 2: 10 m (32 ft)</li> <li>▪ Option 3: 20 m (65 ft)</li> </ul> <p> Possible cable length for a Proline 500 connecting cable: max. 20 m (65 ft)</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> <ul style="list-style-type: none"> <li>▪ If ordered together with the measuring device: order code for "Enclosed accessories" <ul style="list-style-type: none"> <li>– Option RB "heating jacket, G 1/2" internal thread"</li> <li>– Option RC "heating jacket, G 3/4" internal thread"</li> <li>– Option RD "Heating jacket, NPT 1/2" internal thread"</li> <li>– Option RE "Heating jacket, NPT 3/4" internal thread"</li> </ul> </li> <li>▪ If ordered subsequently: Use the order code with the product root DK8003.</li> </ul> <p> Special Documentation SD02158D</p>



### Communication-specific accessories

Accessories	Description
Commubox FXA195 HART	<p>For intrinsically safe HART communication with FieldCare via the USB interface.</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 FXA320	<p>Gateway for the remote monitoring of connected 4-20 mA measuring devices via a Web browser.</p> <p> <ul style="list-style-type: none"> <li>Technical Information TI00025S</li> <li>Operating Instructions BA00053S</li> </ul> </p>
Fieldgate FXA520	<p>Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser.</p> <p> <ul style="list-style-type: none"> <li>Technical Information TI00025S</li> <li>Operating Instructions BA00051S</li> </ul> </p>
Field Xpert SFX350	<p>Field Xpert SFX350 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices and can be used in non-hazardous areas.</p> <p> Operating Instructions BA01202S</p>







Field Xpert SFX370	<p>Field Xpert SFX370 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices and can be used in the non-hazardous area and in the hazardous area.</p> <p> Operating Instructions BA01202S</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 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>

**Service-specific accessories**


Accessories	Description
Applicator	<p>Software for selecting and sizing Endress+Hauser measuring devices:</p> <ul style="list-style-type: none"> <li>▪ Choice of measuring devices 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 accuracy.</li> <li>▪ Graphic illustration 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:</p> <ul style="list-style-type: none"> <li>▪ Via the Internet: <a href="https://portal.endress.com/webapp/applicator">https://portal.endress.com/webapp/applicator</a></li> <li>▪ As a downloadable DVD for local PC installation.</li> </ul>
W@M	<p>W@M Life Cycle Management</p> <p>Improved productivity with information at your fingertips. Data relevant to a plant and its components is generated from the first stages of planning and during the asset's complete life cycle.</p> <p>W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access for your staff to current, in-depth data shortens your plant's engineering time, speeds up procurement processes and increases plant uptime.</p> <p>Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, visit <a href="http://www.endress.com/lifecyclemanagement">www.endress.com/lifecyclemanagement</a></p>
FieldCare	<p>FDT-based plant asset management tool from Endress+Hauser.</p> <p>It can configure all smart 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>

Accessories	Description
Cerabar S	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.  <ul style="list-style-type: none"> <li>▪ Technical Information TI00383P</li> <li>▪ Operating Instructions BA00271P</li> </ul>
iTEMP	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.  "Fields of Activity" document FA00006T

## Supplementary documentation

-  For an overview of the scope of the associated Technical Documentation, refer to the following:
- *W@M Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): Enter the serial number from nameplate
  - *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR code) on the nameplate

### Standard documentation      Brief Operating Instructions

*Brief Operating Instructions for the sensor*

Measuring device	Documentation code
Proline Promass I	KA01284D

*Brief Operating Instructions for transmitter*

Measuring device	Documentation code						
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET
Proline 500 – digital	KA01315D	KA01233D	KA01392D	KA01390D	KA01319D	KA01346D	KA01351D
Proline 500	KA01314D	KA01291D	KA01391D	KA01389D	KA01318D	KA01347D	KA01350D

### Operating Instructions

Measuring device	Documentation code						
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET
Promass I 500	BA01531D	BA01564D	BA01553D	BA01875D	BA01542D	BA01752D	BA01763D

### Description of Device Parameters

Measuring device	Documentation code						
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET
Promass 500	GP01060D	GP01096D	GP01061D	GP01137D	GP01062D	GP01120D	GP01121D

**Device-dependent additional documentation**

**Safety instructions**

Safety instructions for electrical equipment for hazardous areas.

Contents	Documentation code
	Measuring device
ATEX/IECEX Ex i	XA01473D
ATEX/IECEX Ex ec	XA01474D
cCSAus IS	XA01475D
cCSAus Ex i	XA01509D
cCSAus Ex nA	XA01510D
INMETRO Ex i	XA01476D
INMETRO Ex ec	XA01477D
NEPSI Ex i	XA01478D
NEPSI Ex nA	XA01479D

**Special Documentation**

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Functional Safety Manual	SD01729D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
OPC-UA Server <sup>1)</sup>	SD02040D

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

Contents	Documentation code						
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	PROFINET	EtherNet/IP
Web server	SD01666D	SD01669D	SD01668D	SD02232D	SD01667D	SD01971D	SD01970D
Heartbeat Technology	SD01643D	SD01608D	SD01705D	SD02203D	SD01704D	SD01989D	SD01983D
Concentration measurement	SD01645D	SD01709D	SD01711D	SD02213D	SD01710D	SD02007D	SD02006D
Viscosity measurement	SD01647D	SD01723D	SD01725D	SD02211D	SD01724D	SD01995D	SD01994

**Installation Instructions**

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

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