

# Technical Information

## Proline Promag H 300

Electromagnetic flowmeter



The flowmeter for smallest flow rates with a compact, easily accessible transmitter

### Application

- The measuring principle is virtually independent of pressure, density, temperature and viscosity
- For the smallest flow quantities and demanding hygienic applications

### Device properties

- Liner made of PFA
- Sensor housing made of stainless steel (3-A, EHEDG)
- Wetted materials CIP/SIP cleanable
- Compact dual-compartment housing with up to 3 I/Os
- Backlit display with touch control and WLAN access
- Remote display available

### Your benefits

- Flexible installation concept – numerous hygienic process connections
- Energy-saving flow measurement – no pressure loss due to cross-section constriction
- Maintenance-free – no moving parts
- 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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## Document information

### 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 ground connection</b> A terminal which must be connected to ground prior to establishing any other connections.
	<b>Equipotential connection</b> A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.




#### Communication symbols

Symbol	Meaning
	<b>Wireless Local Area Network (WLAN)</b> Communication via a wireless, local network.
	<b>Bluetooth</b> Wireless data transmission between devices over a short distance.
	<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

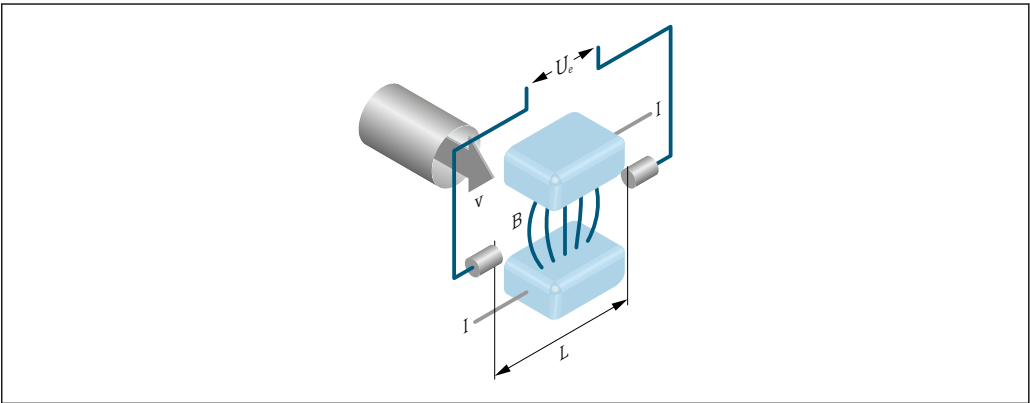
Symbols in graphics

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

Following *Faraday's law of magnetic induction*, a voltage is induced in a conductor moving through a magnetic field.



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- $U_e$  Induced voltage
- $B$  Magnetic induction (magnetic field)
- $L$  Electrode spacing
- $I$  Current
- $v$  Flow velocity

In the electromagnetic measuring principle, the flowing medium is the moving conductor. The voltage induced ( $U_e$ ) is proportional to the flow velocity ( $v$ ) and is supplied to the amplifier by means of two measuring electrodes. The flow volume ( $Q$ ) is calculated via the pipe cross-section ( $A$ ). The DC magnetic field is created through a switched direct current of alternating polarity.

Formulae for calculation

- Induced voltage  $U_e = B \cdot L \cdot v$
- Volume flow  $Q = A \cdot v$

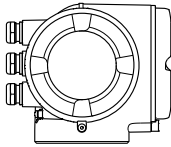
**Measuring system**

The device consists of a transmitter and a sensor.

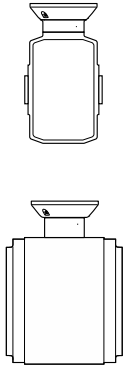
The device is available as a compact version:

The transmitter and sensor form a mechanical unit.

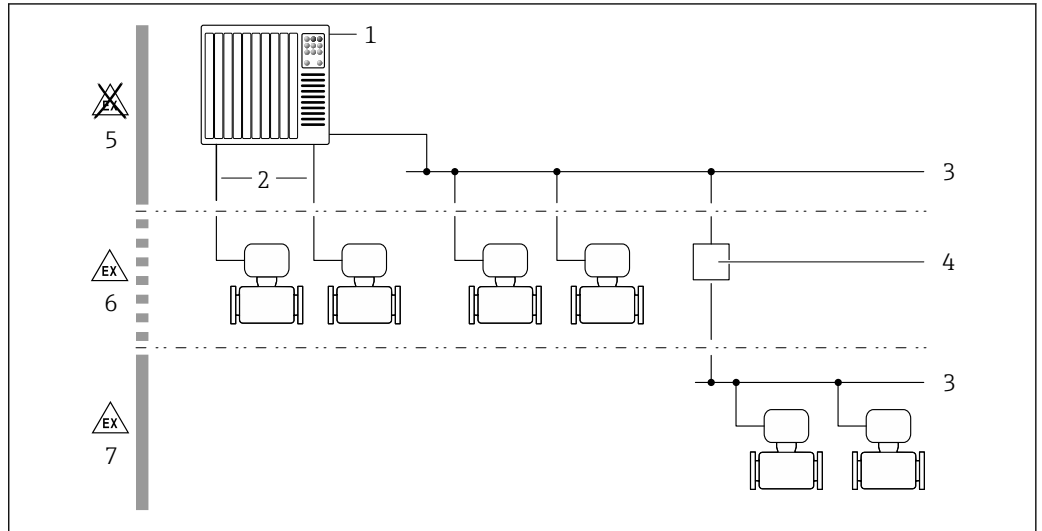
**Transmitter**

<p><b>Promag 300</b></p>  <p>A0026708</p>	<p>Device versions and materials:</p> <ul style="list-style-type: none"> <li>■ Transmitter housing Aluminum, coated: aluminum, AlSi10Mg, coated</li> <li>■ Material of window in transmitter housing: Aluminum, coated: glass</li> </ul> <p>Configuration:</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)</li> <li>– Web server (access via Web browser, e.g. Microsoft Internet Explorer, Microsoft Edge)</li> </ul> </li> </ul>
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**Sensor**

<p><b>Promag H</b></p>  <p>A0028964</p> <p>A0028965</p>	<p>Nominal diameter range: DN 2 to 150 (1/12 to 6")</p> <p>Materials:</p> <ul style="list-style-type: none"> <li>■ Sensor housing: stainless steel, 1.4301 (304)</li> <li>■ Measuring tubes: stainless steel, 1.4301 (304)</li> <li>■ Liner: PFA</li> <li>■ Electrodes: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum; platinum (only up to DN 25 (1"))</li> <li>■ Process connections: stainless steel, 1.4404 (F316L); PVDF; PVC adhesive sleeve</li> <li>■ Seals: <ul style="list-style-type: none"> <li>– DN 2 to 25 (1/12 to 1"): O-ring seal (EPDM, FKM, Kalrez), aseptic molded seal (EPDM, FKM, silicone)</li> <li>– DN 40 to 150 (1 1/2 to 6"): aseptic molded seal (EPDM, FKM, silicone)</li> </ul> </li> <li>■ Grounding rings: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum</li> </ul>
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## Equipment architecture



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1 Possibilities for integrating measuring devices into a system

- 1 Control system (e.g. PLC)
- 2 Connecting cable (0/4 to 20 mA HART etc.)
- 3 Fieldbus
- 4 Segment coupler
- 5 Non-hazardous area
- 6 Non-hazardous area and Zone 2/Div. 2
- 7 Hazardous area and Zone 1/Div. 1

## Safety

## IT security

We only provide a warranty 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 device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

## 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.

## 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). Is equivalent to hardware write protection in terms of functionality.
- 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.

## 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.

When the device is delivered, the device does not have an access code and is equivalent to 0000 (open).

*WLAN passphrase*

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 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.

*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 fieldbus*

When communicating via fieldbus, access to the device parameters can be restricted to "Read only" access. The option can be changed in the **Fieldbus writing access** parameter.

This does not affect cyclic measured value transmission to the higher-order system, which is always guaranteed.


 Additional information: "Description of Device Parameters" document pertaining to the device  
→  94.

*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.

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.

 Additional information: "Description of Device Parameters" document pertaining to the device  
→  94.

# Input

Measured variable	<p><b>Direct measured variables</b></p> <ul style="list-style-type: none"><li>■ Volume flow (proportional to induced voltage)</li><li>■ Temperature (DN 15 to 150 (½ to 6"))</li><li>■ Electrical conductivity</li></ul> <p><b>Calculated measured variables</b></p> <ul style="list-style-type: none"><li>■ Mass flow</li><li>■ Corrected volume flow</li><li>■ Corrected electrical conductivity</li></ul>
Measuring range	Typically v = 0.01 to 10 m/s (0.03 to 33 ft/s) with the specified accuracy



## Flow characteristic values in SI units

Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.3/10 m/s)	Factory settings		
			Current output full scale value <sup>1)</sup> (v ~ 2.5 m/s)	Pulse value <sup>1)</sup> (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm <sup>3</sup> /min]	[dm <sup>3</sup> /min]	[dm <sup>3</sup> ]	[dm <sup>3</sup> /min]
2	1/12	0.06 to 1.8	0.5	0.005	0.01
4	1/8	0.25 to 7	2	0.025	0.05
8	3/8	1 to 30	8	0.1	0.1
15	½	4 to 100	25	0.2	0.5
25	1	9 to 300	75	0.5	1
40	1 ½	25 to 700	200	1.5	3
50	2	35 to 1 100	300	2.5	5
65	–	60 to 2 000	500	5	8
80	3	90 to 3 000	750	5	12
100	4	145 to 4 700	1200	10	20
125	5	220 to 7 500	1850	15	30
150	6	20 to 600 m <sup>3</sup> /h	150 m <sup>3</sup> /h	0.03 m <sup>3</sup>	2.5 m <sup>3</sup> /h

1) HART only

## Flow characteristic values in US units

Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.3/10 m/s)	Factory settings		
			Current output full scale value <sup>1)</sup> (v ~ 2.5 m/s)	Pulse value <sup>1)</sup> (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
1/12	2	0.015 to 0.5	0.1	0.001	0.002
1/8	4	0.07 to 2	0.5	0.005	0.008
3/8	8	0.25 to 8	2	0.02	0.025
½	15	1 to 27	6	0.05	0.1
1	25	2.5 to 80	18	0.2	0.25
1 ½	40	7 to 190	50	0.5	0.75
2	50	10 to 300	75	0.5	1.25
3	80	24 to 800	200	2	2.5
4	100	40 to 1 250	300	2	4
5	125	60 to 1 950	450	5	7
6	150	90 to 2 650	600	5	12

1) HART only

To calculate the measuring range, use the *Applicator* sizing tool → 93

## Recommended measuring range

"Flow limit" section → 48

**Operable flow range** Over 1000 : 1

## Input signal

### Input and output versions

→  11

### External measured values

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

- Fluid temperature to increase the accuracy of the electrical conductivity (e.g. iTEMP)
- Reference density for calculating the corrected volume flow



Various pressure transmitters and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section →  93

It is recommended to read in external measured values to calculate the following measured variables:  
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 →  10.

### Digital communication

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

- FOUNDATION Fieldbus
- PROFIBUS PA
- Modbus RS485

### Current input 0/4 to 20 mA

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

### Status input

<b>Maximum input values</b>	<ul style="list-style-type: none"> <li>■ DC -3 to 30 V</li> <li>■ If status input is active (ON): <math>R_i &gt; 3 \text{ k}\Omega</math></li> </ul>
<b>Response time</b>	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 3. The table must be read vertically (↓).

Example: If the option **BA** (current output 4 to 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.

Order code for "Output; input 1" (020) →	Possible options						
Current output 4 to 20 mA HART	<b>BA</b>						
Current output 4 to 20 mA HART Ex i	↓	<b>CA</b>					
FOUNDATION Fieldbus		↓	<b>SA</b>				
FOUNDATION Fieldbus Ex i			↓	<b>TA</b>			
PROFIBUS PA				↓	<b>GA</b>		
PROFIBUS PA Ex i					↓	<b>HA</b>	
Modbus RS485						↓	<b>MA</b>
Order code for "Output; input 2" (021) →	↓	↓	↓	↓	↓	↓	↓
Not assigned	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>
Current output 0/4 to 20 mA	<b>B</b>		<b>B</b>		<b>B</b>		<b>B</b>
Current output 0/4 to 20 mA (Ex i)		<b>C</b>		<b>C</b>		<b>C</b>	
User configurable input/output <sup>1)</sup>	<b>D</b>		<b>D</b>		<b>D</b>		<b>D</b>
Pulse/frequency/switch output	<b>E</b>		<b>E</b>		<b>E</b>		<b>E</b>
Double pulse output <sup>2)</sup>	<b>F</b>						<b>F</b>
Pulse/frequency/switch output (Ex i)		<b>G</b>		<b>G</b>		<b>G</b>	
Relay output	<b>H</b>		<b>H</b>		<b>H</b>		<b>H</b>
Current input 0/4 to 20 mA	<b>I</b>		<b>I</b>		<b>I</b>		<b>I</b>
Status input	<b>J</b>		<b>J</b>		<b>J</b>		<b>J</b>
Order code for "Output; input 3" (022) →	↓	↓	↓	↓	↓	↓	↓
Not assigned	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>
Current output 0/4 to 20 mA	<b>B</b>						<b>B</b>
Current output 0/4 to 20 mA (Ex i)		<b>C</b>					
User configurable input/output	<b>D</b>						<b>D</b>
Pulse/frequency/switch output	<b>E</b>						<b>E</b>
Double pulse output (slave) <sup>2)</sup>	<b>F</b>						<b>F</b>
Pulse/frequency/switch output (Ex i)		<b>G</b>					
Relay output	<b>H</b>						<b>H</b>
Current input 0/4 to 20 mA	<b>I</b>						<b>I</b>
Status input	<b>J</b>						<b>J</b>

1) A specific input or output can be assigned to a user configurable input/output → 15.

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

## Output signal

## HART current output

Current output	4 to 20 mA HART
Current span	Can be set to: 4 to 20 mA (active/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	Adjustable: 0.07 to 999 s
Assignable measured variables	<ul style="list-style-type: none"> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Corrected volume flow</li> <li>■ Flow velocity</li> <li>■ Conductivity</li> <li>■ Corrected conductivity</li> <li>■ Temperature</li> <li>■ Electronic temperature</li> </ul>

## PROFIBUS PA

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

## FOUNDATION Fieldbus

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

## Modbus RS485

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

## Current output 0/4 to 20 mA

Current output	0/4 to 20 mA
Maximum output values	22.5 mA
Current span	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>
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)

<b>Load</b>	0 to 700 $\Omega$
<b>Resolution</b>	0.38 $\mu$ A
<b>Damping</b>	Adjustable: 0.07 to 999 s
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Corrected volume flow</li> <li>■ Flow velocity</li> <li>■ Conductivity</li> <li>■ Corrected conductivity</li> <li>■ Temperature</li> <li>■ Electronic temperature</li> </ul>

#### 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>
<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: $\leq$ 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>■ Volume flow</li> <li>■ Mass 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>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Corrected volume flow</li> <li>■ Flow velocity</li> <li>■ Conductivity</li> <li>■ Corrected conductivity</li> <li>■ Temperature</li> <li>■ Electronic temperature</li> </ul>
<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>– Off</li> <li>– Volume flow</li> <li>– Mass flow</li> <li>– Corrected volume flow</li> <li>– Flow velocity</li> <li>– Conductivity</li> <li>– Corrected conductivity</li> <li>– Totalizer 1-3</li> <li>– Temperature</li> <li>– Electronic temperature</li> </ul> </li> <li>■ Flow direction monitoring</li> <li>■ Status <ul style="list-style-type: none"> <li>– Empty pipe detection</li> <li>– Low flow cut off</li> </ul> </li> </ul>

#### 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>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Corrected volume flow</li> <li>■ Flow velocity</li> <li>■ Conductivity</li> <li>■ Corrected conductivity</li> <li>■ Temperature</li> <li>■ Electronic temperature</li> </ul>

#### 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>– Off</li> <li>– Volume flow</li> <li>– Mass flow</li> <li>– Corrected volume flow</li> <li>– Flow velocity</li> <li>– Conductivity</li> <li>– Corrected conductivity</li> <li>– Totalizer 1-3</li> <li>– Temperature</li> <li>– Electronic temperature</li> </ul> </li> <li>■ Flow direction monitoring</li> <li>■ Status <ul style="list-style-type: none"> <li>– Empty pipe detection</li> <li>– Low flow cut off</li> </ul> </li> </ul>

### User configurable input/output

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

The following inputs and outputs are available for assignment:

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

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

### Signal on alarm

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

#### HART current output

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

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

#### FOUNDATION Fieldbus

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

#### Modbus RS485

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

<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>■ 4 to 20 mA in accordance with NAMUR recommendation NE 43</li> <li>■ 4 to 20 mA in accordance with US</li> <li>■ Min. value: 3.59 mA</li> <li>■ Max. value: 22.5 mA</li> <li>■ 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>
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**Pulse/frequency/switch output**

Pulse output	
<b>Failure mode</b>	Choose from: <ul style="list-style-type: none"> <li>■ Actual value</li> <li>■ No pulses</li> </ul>
Frequency output	
<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>
Switch output	
<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
  - Modbus RS485
- Via service interface



Plain text display	With information on cause and remedial measures
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Additional information on remote operation → 82

#### Web server

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

Status information	<p>Status indicated by various light emitting diodes</p> <p>The following information is displayed depending on the device version:</p> <ul style="list-style-type: none"> <li>Supply voltage active</li> <li>Data transmission active</li> <li>Device alarm/error has occurred</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 <sub>nom</sub> = 30 V U <sub>max</sub> = 250 V	
Option GA	PROFIBUS PA	U <sub>nom</sub> = 32 V U <sub>max</sub> = 250 V	
Option MA	Modbus RS485	U <sub>nom</sub> = 30 V U <sub>max</sub> = 250 V	
Option SA	FOUNDATION Fieldbus	U <sub>nom</sub> = 32 V U <sub>max</sub> = 250 V	

Order code for "Output; input 2"; "Output; input 3"	Output type	Safety-related values			
		Output; input 2		Output; input 3	
		24 (+)	25 (-)	22 (+)	23 (-)
Option B	Current output 4 to 20 mA	U <sub>nom</sub> = 30 V U <sub>max</sub> = 250 V			
Option D	User configurable input/output	U <sub>nom</sub> = 30 V U <sub>max</sub> = 250 V			
Option E	Pulse/frequency/switch output	U <sub>nom</sub> = 30 V U <sub>max</sub> = 250 V			
Option F	Double pulse output	U <sub>nom</sub> = 30 V U <sub>max</sub> = 250 V			
Option H	Relay output	U <sub>nom</sub> = 30 V I <sub>nom</sub> = 100 mA DC/500 mA AC U <sub>max</sub> = 250 V			
Option I	Current input 4 to 20 mA	U <sub>nom</sub> = 30 V U <sub>max</sub> = 250 V			
Option J	Status input	U <sub>nom</sub> = 30 V U <sub>max</sub> = 250 V			

## Intrinsically safe values

Order code for "Output; input 1"	Output type	Intrinsically safe values "Output; input 1"	
		26 (+)	27 (-)
Option <b>CA</b>	Current output 4 to 20 mA HART Ex i	$U_i = 30\text{ V}$ $I_i = 100\text{ mA}$ $P_i = 1.25\text{ W}$ $L_i = 0$ $C_i = 0$	
Option <b>HA</b>	PROFIBUS PA Ex i	<b>Ex ia</b> <sup>1)</sup> $U_i = 30\text{ V}$ $I_i = 570\text{ mA}$ $P_i = 8.5\text{ W}$ $L_i = 10\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$	<b>Ex ic</b> <sup>2)</sup> $U_i = 32\text{ V}$ $I_i = 570\text{ mA}$ $P_i = 8.5\text{ W}$ $L_i = 10\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$
Option <b>TA</b>	FOUNDATION Fieldbus Ex i	<b>Ex ia</b> <sup>1)</sup> $U_i = 30\text{ V}$ $I_i = 570\text{ mA}$ $P_i = 8.5\text{ W}$ $L_i = 10\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$	<b>Ex ic</b> <sup>2)</sup> $U_i = 32\text{ V}$ $I_i = 570\text{ mA}$ $P_i = 8.5\text{ W}$ $L_i = 10\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$

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

2) Only available for the Zone 2, Class I, Division 2 version transmitter

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

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

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


**Protocol-specific data** **HART**

Manufacturer ID	0x11
Device type ID	0x3C
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 $\Omega$

<b>Dynamic variables</b>	<p>Read out the dynamic variables: HART command 3 The measured variables can be freely assigned to the dynamic variables.</p> <p><b>Measured variables for PV (primary dynamic variable)</b></p> <ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Corrected volume flow</li> <li>■ Flow velocity</li> <li>■ Corrected conductivity</li> <li>■ Temperature</li> <li>■ Electronic temperature</li> </ul> <p><b>Measured variables for SV, TV, QV (secondary, tertiary and quaternary dynamic variable)</b></p> <ul style="list-style-type: none"> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Corrected volume flow</li> <li>■ Flow velocity</li> <li>■ Corrected conductivity</li> <li>■ Temperature</li> <li>■ Electronic temperature</li> <li>■ Totalizer 1</li> <li>■ Totalizer 2</li> <li>■ Totalizer 3</li> </ul>
<b>Device variables</b>	<p>Read out the device variables: HART command 9 The device variables are permanently assigned.</p> <p>A maximum of 8 device variables can be transmitted:</p> <ul style="list-style-type: none"> <li>■ 0 = volume flow</li> <li>■ 1 = mass flow</li> <li>■ 2 = corrected volume flow</li> <li>■ 3 = flow velocity</li> <li>■ 4 = conductivity</li> <li>■ 5 = corrected conductivity</li> <li>■ 6 = temperature</li> <li>■ 7 = electronic temperature</li> <li>■ 8 = totalizer 1</li> <li>■ 9 = totalizer 2</li> <li>■ 10 = totalizer 3</li> </ul>

**PROFIBUS PA**

<b>Manufacturer ID</b>	0x11
<b>Ident number</b>	0x156C
<b>Profile version</b>	3.02
<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></li> <li>■ <a href="http://www.profibus.org">www.profibus.org</a></li> </ul>

<b>Output values</b> (from measuring device to automation system)	<b>Heartbeat Technology Application Package</b> Additional measured variables are available with the Heartbeat Technology application package:  <b>Analog input 1 to 4</b> <ul style="list-style-type: none"> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Corrected volume flow</li> <li>■ Flow velocity</li> <li>■ Conductivity</li> <li>■ Corrected conductivity</li> <li>■ Temperature</li> <li>■ Electronic temperature</li> <li>■ Current input</li> </ul> <b>Digital input 1 to 2</b> <ul style="list-style-type: none"> <li>■ Empty pipe detection</li> <li>■ Low flow cut off</li> <li>■ Status verification</li> </ul> <b>Totalizer 1 to 3</b> <ul style="list-style-type: none"> <li>■ Mass flow</li> <li>■ Volume flow</li> <li>■ Corrected volume flow</li> </ul>
<b>Input values</b> (from automation system to measuring device)	<b>Analog output 1 to 2 (fixed assignment)</b> <ul style="list-style-type: none"> <li>■ Analog output 1: external density</li> <li>■ Analog output 2: external temperature</li> </ul> <b>Digital output 1 to 3 (fixed assignment)</b> <ul style="list-style-type: none"> <li>■ Digital output 1: switch positive zero return on/off</li> <li>■ Digital output 2: start verification</li> <li>■ Digital output 3: relay output non-conductive/conductive</li> </ul> <b>Totalizer 1 to 3</b> <ul style="list-style-type: none"> <li>■ Totalize</li> <li>■ Reset and hold</li> <li>■ Preset and hold</li> <li>■ Operating mode configuration:             <ul style="list-style-type: none"> <li>– Net flow total</li> <li>– Forward flow total</li> <li>– Reverse flow total</li> <li>– Last valid value</li> </ul> </li> </ul>
<b>Supported functions</b>	<ul style="list-style-type: none"> <li>■ Identification &amp; Maintenance Simplest device identification on the part of the control system and nameplate</li> <li>■ PROFIBUS upload/download Reading and writing parameters is up to ten times faster with PROFIBUS upload/download</li> <li>■ Condensed status Simplest and self-explanatory diagnostic information by categorizing diagnostic messages that occur</li> </ul>
<b>Configuration of the device address</b>	<ul style="list-style-type: none"> <li>■ DIP switches on the I/O electronics module</li> <li>■ Local display</li> <li>■ Via operating tools (e.g. FieldCare)</li> </ul>
<b>Compatibility with earlier model</b>	<p>If the device is replaced, the Promag 300 measuring device supports the compatibility of the cyclic data with earlier models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promag 300 GSD file.</p> <p>Earlier models:</p> <ul style="list-style-type: none"> <li>■ Promag 50 PROFIBUS PA             <ul style="list-style-type: none"> <li>– ID No.: 1525 (hex)</li> <li>– Extended GSD file: EH3x1525.gsd</li> <li>– Standard GSD file: EH3_1525.gsd</li> </ul> </li> <li>■ Promag 53 PROFIBUS PA             <ul style="list-style-type: none"> <li>– ID No.: 1527 (hex)</li> <li>– Extended GSD file: EH3x1527.gsd</li> <li>– Standard GSD file: EH3_1527.gsd</li> </ul> </li> </ul> <p> Description of the function scope of compatibility: Operating Instructions → 94.</p>

## FOUNDATION Fieldbus


Manufacturer ID	0x452B48
Ident number	0x103C
Device revision	1
DD revision	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.fieldbus.org">www.fieldbus.org</a></li> </ul>
CFF revision	
Interoperability Test Kit (ITK)	Version 6.1.2
ITK Test Campaign Number	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>
Link Master capability (LAS)	Yes
Choice of "Link Master" and "Basic Device"	Yes Factory setting: Basic Device
Node address	Factory setting: 247 (0xF7)
Supported functions	The following methods are supported: <ul style="list-style-type: none"> <li>■ Restart</li> <li>■ ENP Restart</li> <li>■ Diagnostic</li> </ul>
<b>Virtual Communication Relationships (VCRs)</b>	
Number of VCRs	44
Number of link objects in VFD	50
Permanent entries	1
Client VCRs	0
Server VCRs	10
Source VCRs	43
Sink VCRs	0
Subscriber VCRs	43
Publisher VCRs	43
<b>Device Link Capabilities</b>	
Slot time	4
Min. delay between PDU	8
Max. response delay	20

## Transducer Blocks

Block	Contents	Output values
Setup Transducer Block (TRDSUP)	All parameters for standard commissioning.	No output values
Advanced Setup Transducer Block (TRDASUP)	All parameters for more accurate measurement configuration.	No output values
Display Transducer Block (TRDDISP)	Parameters for configuring the local display.	No output values
HistoROM Transducer Block (TRDHROM)	Parameters for using the HistoROM function.	No output values




Block	Contents	Output values
Diagnostic Transducer Block (TRDDIAG)	Diagnostics information.	Process variables (AI Channel) <ul style="list-style-type: none"> <li>■ Temperature (7)</li> <li>■ Volume flow (9)</li> <li>■ Mass flow (11)</li> <li>■ Corrected volume flow (13)</li> <li>■ Flow velocity (37)</li> <li>■ Electronic temperature (39)</li> <li>■ Conductivity (70)</li> <li>■ Corrected conductivity (71)</li> </ul>
Expert Configuration Transducer Block (TRDEXP)	Parameters that require the user to have in-depth knowledge of the operation of the device in order to configure the parameters appropriately.	No output values
Expert Information Transducer Block (TRDEXPIN)	Parameters that provide information about the state of the device.	No output values
Service Sensor Transducer Block (TRDSRVS)	Parameters that can only be accessed by Endress+Hauser Service.	No output values
Service Information Transducer Block (TRDSRVIF)	Parameters that provide Endress+Hauser Service with information about the state of the device.	No output values
Total Inventory Counter Transducer Block (TRDTIC)	Parameters for configuring all the totalizers and the inventory counter.	Process variables (AI Channel) <ul style="list-style-type: none"> <li>■ Totalizer 1 (16)</li> <li>■ Totalizer 2 (17)</li> <li>■ Totalizer 3 (18)</li> </ul>
Heartbeat Technology Transducer Block (TRDHBT)	Parameters for the configuration and comprehensive information about the results of the verification.	No output values
Heartbeat Results 1 Transducer Block (TRDHBTR1)	Information about the results of the verification.	No output values
Heartbeat Results 2 Transducer Block (TRDHBTR2)	Information about the results of the verification.	No output values
Heartbeat Results 3 Transducer Block (TRDHBTR3)	Information about the results of the verification.	No output values
Heartbeat Results 4 Transducer Block (TRDHBTR4)	Information about the results of the verification.	No output values

*Function blocks*

Block	Number blocks	Execution times	Process variables (Channel)
Resource Block (RB)	1	This Block (extended functionality) contains all the data that uniquely identify the device; it is the equivalent of an electronic nameplate for the device.	–
Analog Input Block (AI)	4	7 ms	Process variables (AI Channel) <ul style="list-style-type: none"> <li>■ Temperature (7)</li> <li>■ Volume flow (9)</li> <li>■ Mass flow (11)</li> <li>■ Corrected volume flow (13)</li> <li>■ Totalizer 1 (16)</li> <li>■ Totalizer 2 (17)</li> <li>■ Totalizer 3 (18)</li> <li>■ Flow velocity (37)</li> <li>■ Electronic temperature (39)</li> <li>■ Conductivity (70)</li> <li>■ Corrected conductivity (71)</li> </ul>
Discrete Input Block (DI)	2	5 ms	<ul style="list-style-type: none"> <li>■ Switch output state (101)</li> <li>■ Low flow cut off (103)</li> <li>■ Empty pipe detection (104)</li> <li>■ Status verification (105)</li> </ul>
PID Block (PID)	1	6 ms	–
Multiple Analog Output Block (MAO)	1	5 ms	Channel_0 (121) <ul style="list-style-type: none"> <li>■ Value 1: External compensation variable, temperature</li> <li>■ Value 2: External compensation variable, density</li> </ul> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"></div> <div>The compensation variables must be transmitted to the device in the SI basic units.</div> </div>
Multiple Digital Output Block (MDO)	1	5 ms	Channel_DO (122) <ul style="list-style-type: none"> <li>■ Value 1: Reset totalizer 1</li> <li>■ Value 2: Reset totalizer 2</li> <li>■ Value 3: Reset totalizer 3</li> <li>■ Value 4: Flow override</li> <li>■ Value 5: Start heartbeat verification</li> <li>■ Value 6: Status switch output</li> <li>■ Value 7: Not assigned</li> <li>■ Value 8: Not assigned</li> </ul>
Integrator Block (IT)	1	6 ms	–

**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>	<p>If the device is replaced, the Promag 300 measuring device supports the compatibility of the Modbus registers for process variables and diagnostic information with the earlier Promag 53 model. It is not necessary to change the engineering parameters in the automation system.</p> <p> Description of the function scope of compatibility: Operating Instructions →  94.</p>

## Power supply


### Terminal assignment

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


##### HART

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered →  11.							

##### FOUNDATION Fieldbus

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (A)	27 (B)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered →  11.							


##### PROFIBUS PA

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered →  11.							




Modbus RS485

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)
The terminal assignment depends on the specific device version ordered → 11.							

 Terminal assignment of the remote display and operating module: → 26

Device plugs available

 Device plugs may not be used in hazardous areas!

Device plugs are only available for the following device versions:

Order code for "Input; output 1"

- Option GA "PROFIBUS PA" → 25
- Option SA "FOUNDATION Fieldbus" → 25

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

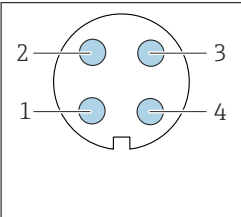
Order code for "Electrical connection"	Cable entry 2	Cable entry 3
L, N, P, U	Plug M12 × 1	–

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

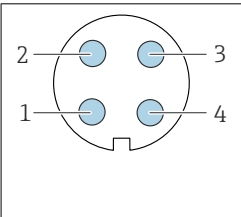
Order code for "Electrical connection"	Cable entry 2	Cable entry 3
M, 3, 4, 5	7/8" plug	–

Pin assignment, device plug

PROFIBUS PA

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

FOUNDATION Fieldbus

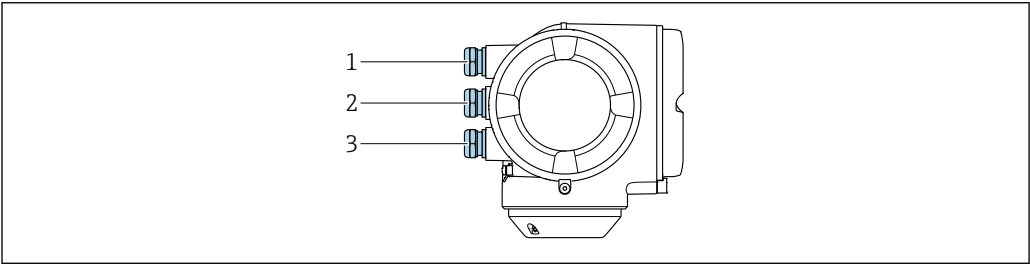
	Pin	Assignment		Coding	Plug/socket
	1	+	Signal +		
	2	-	Signal –		
	3		Grounding		
	4		Not assigned		

Supply voltage

Order code for "Power supply"	terminal voltage		Frequency range
Option D	DC 24 V	±20%	–
Option E	AC100 to 240 V	–15...+10%	50/60 Hz, ±4 Hz
Option I	DC 24 V	±20%	–
	AC100 to 240 V	–15...+10%	50/60 Hz, ±4 Hz

Power consumption	<b>Transmitter</b> Max. 10 W (active power)
Current consumption	<b>Transmitter</b> <ul style="list-style-type: none"><li>■ Max. 400 mA (24 V)</li><li>■ Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)</li></ul>
Power supply failure	<ul style="list-style-type: none"><li>■ Totalizers stop at the last value measured.</li><li>■ Configuration is retained in the plug-in memory (HistoROM DAT).</li><li>■ Error messages (incl. total operated hours) are stored.</li></ul>

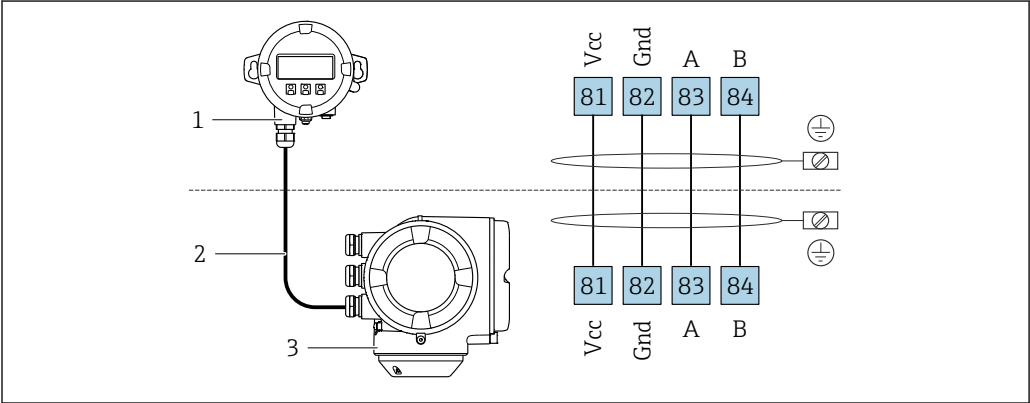
Electrical connection	<b>Connecting the transmitter</b> <ul style="list-style-type: none"><li>■ Terminal assignment→ 24</li><li>■ Device plugs available→ 25</li></ul>
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A0026781

- 1 Cable entry for supply voltage
- 2 Cable entry for input/output signal transmission
- 3 Cable entry for input/output signal transmission; Optional: connection of external WLAN antenna, connection of remote display and operating module DKX001 or service plug

Connection of remote display and operating module DKX001



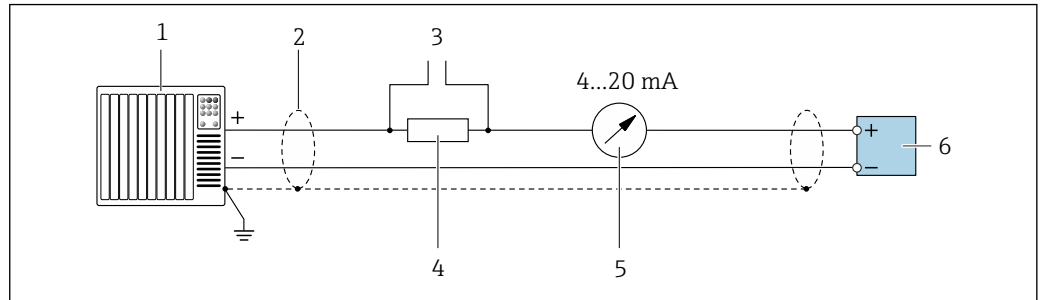
A0027518

- 1 Remote display and operating module DKX001
- 2 Connecting cable
- 3 Measuring device

**i** Remote display and operating module DKX001 → 91

## Connection examples

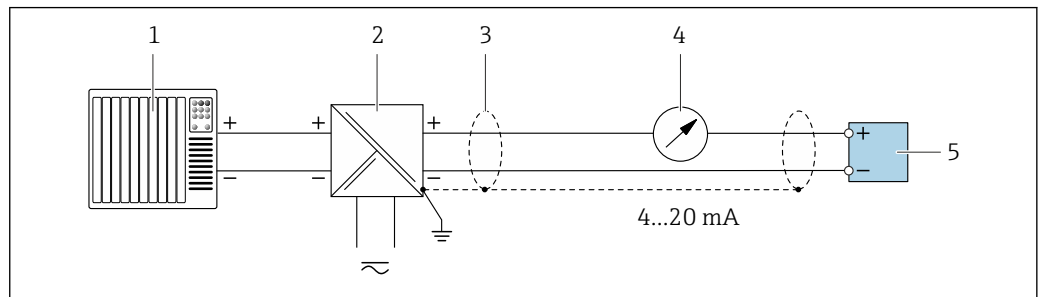
### Current output 4 to 20 mA HART



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 → 34
- 3 Connection for HART operating devices → 82
- 4 Resistor for HART communication ( $\geq 250 \Omega$ ): observe maximum load → 12
- 5 Analog display unit: observe maximum load → 12
- 6 Transmitter

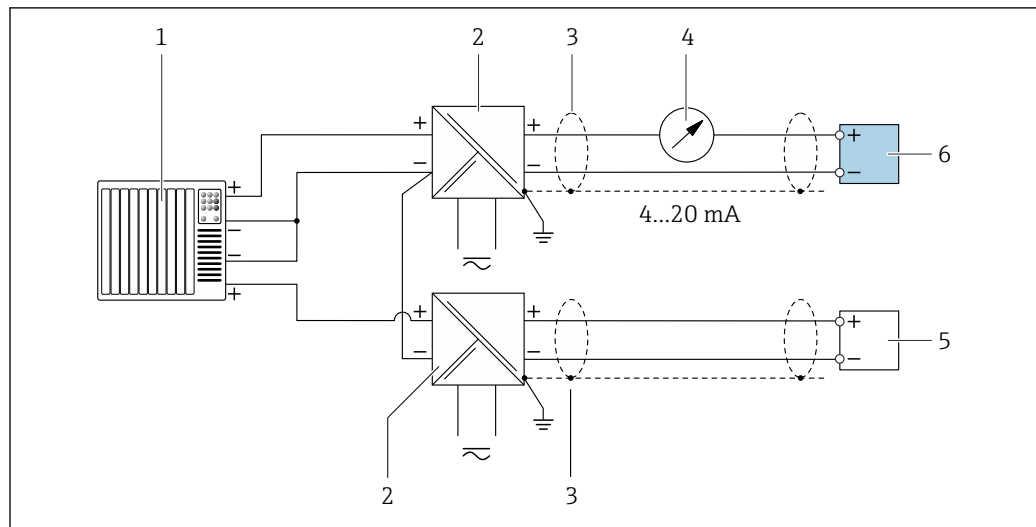


A0028762

**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 → 34
- 4 Analog display unit: observe maximum load → 12
- 5 Transmitter

## HART input

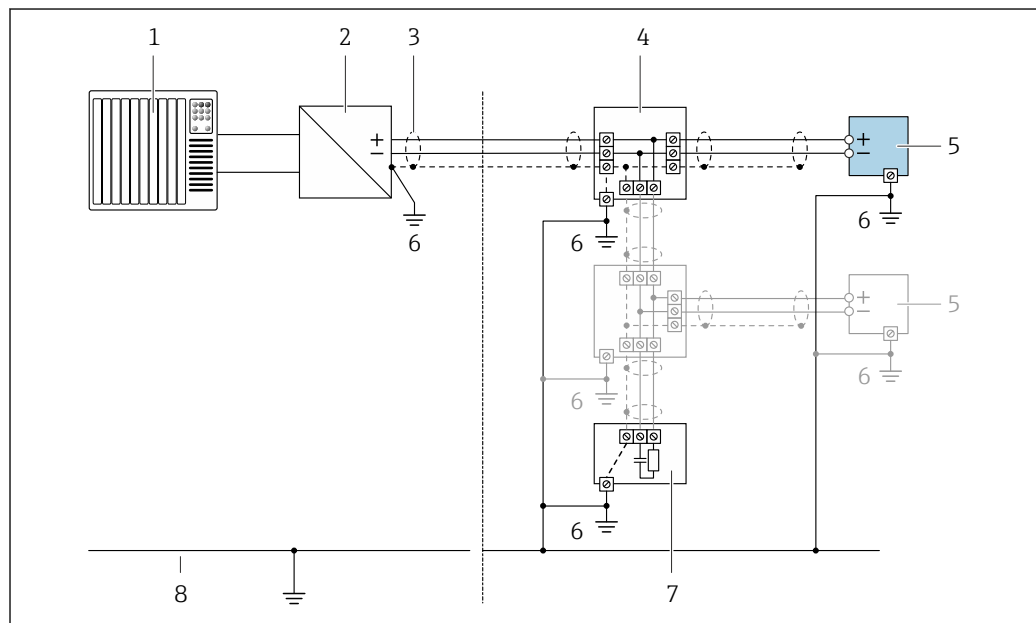


A0028763

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

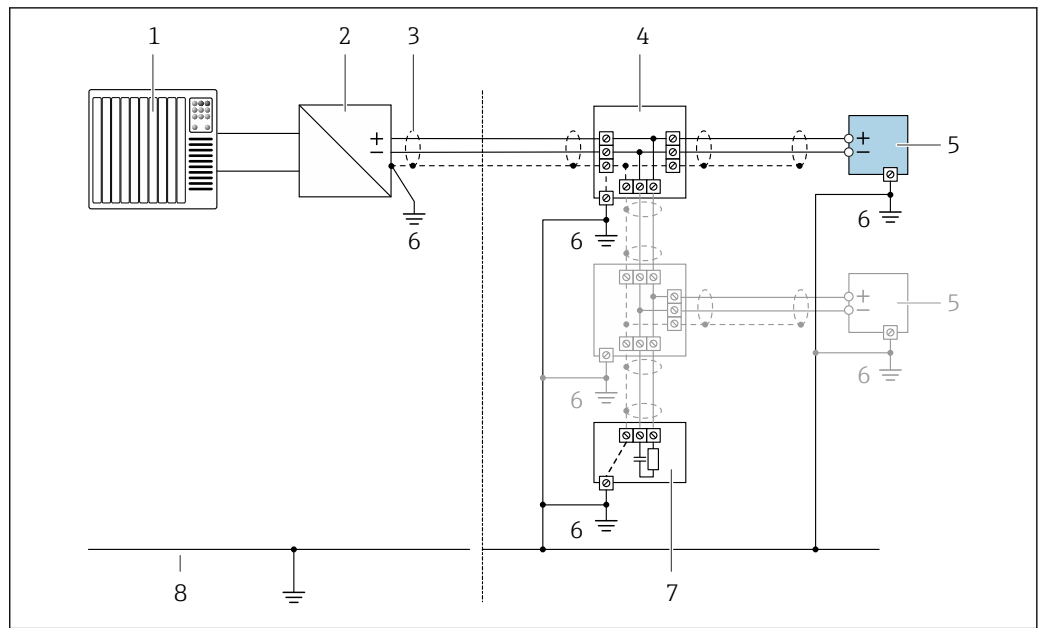


A0028768

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

## FOUNDATION Fieldbus

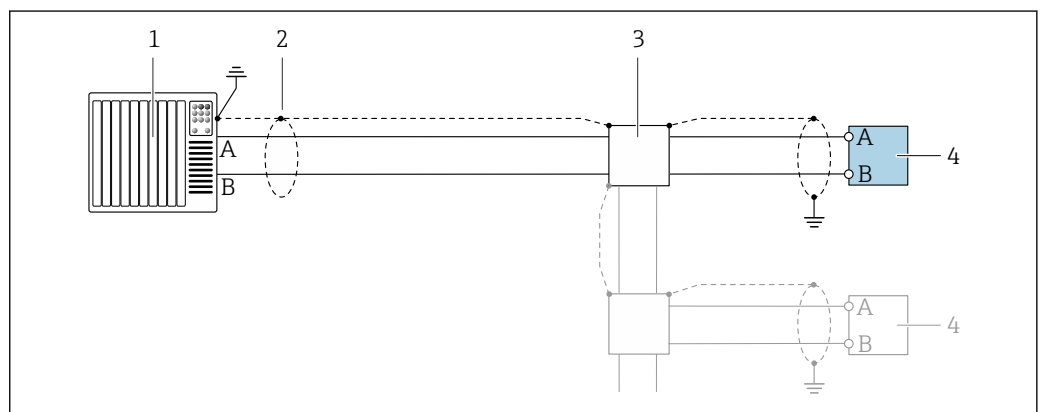


A0028768

6 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

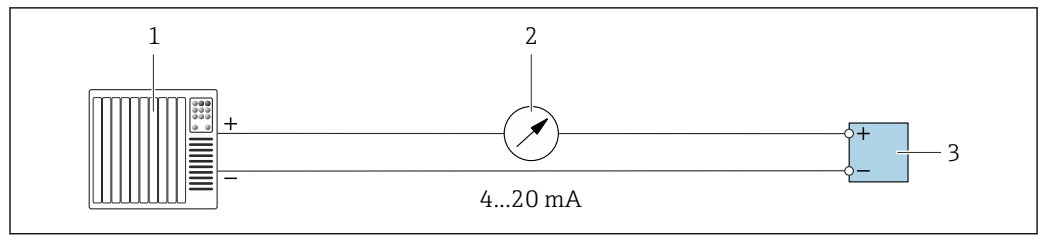


A0028765

7 Connection example for Modbus RS485, 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

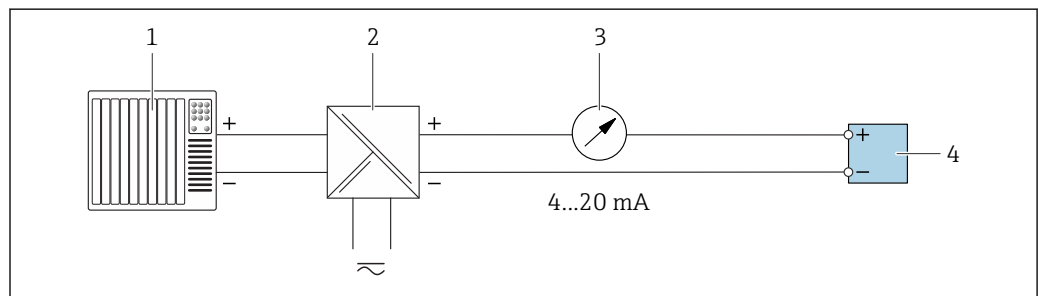
## Current output 4-20 mA



A0028758

8 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

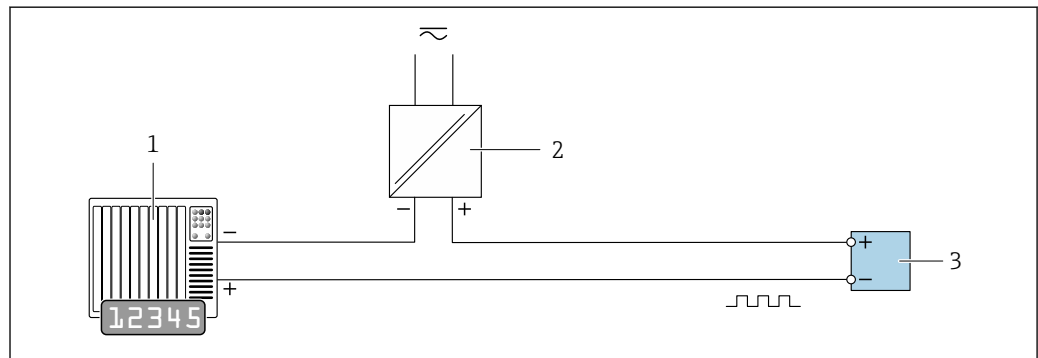


A0028759

9 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

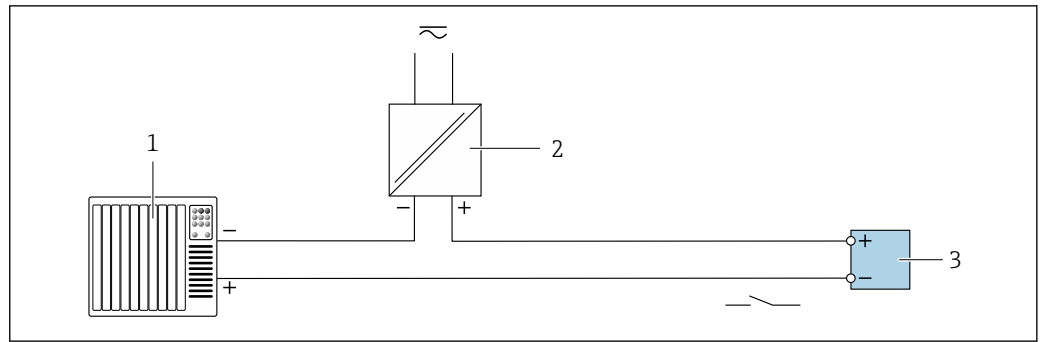


A0028761

10 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 → 13

### Switch output

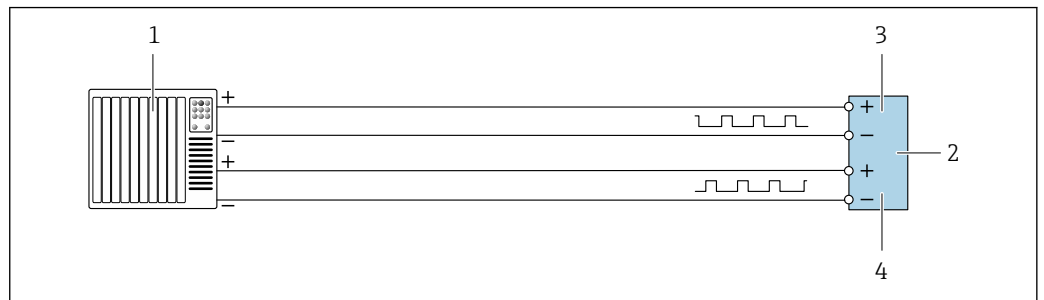


A0028760

11 Connection example for switch output (passive)

- 1 Automation system with switch input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values → 13

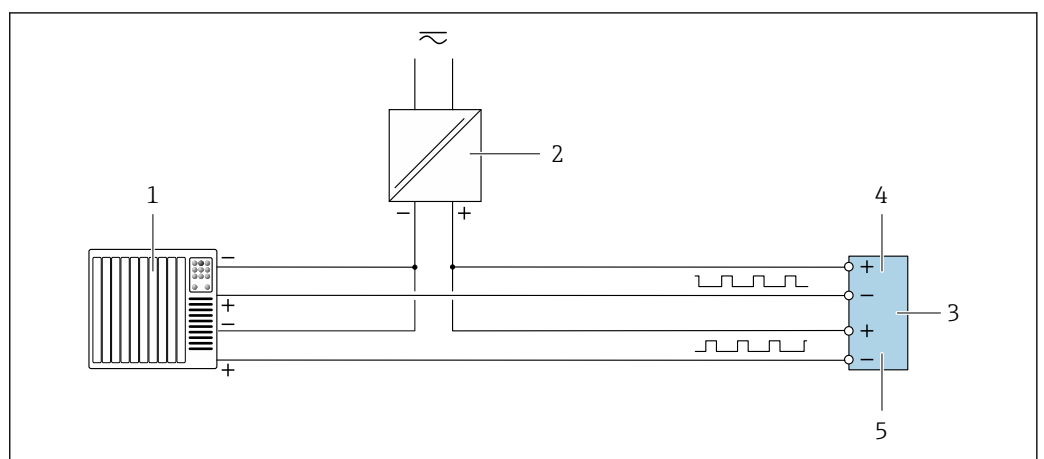
### Double pulse output



A0029280

12 Connection example for double pulse output (active)

- 1 Automation system with double pulse input (e.g. PLC)
- 2 Transmitter: Observe input values → 14
- 3 Double pulse output
- 4 Double pulse output (slave), phase-shifted

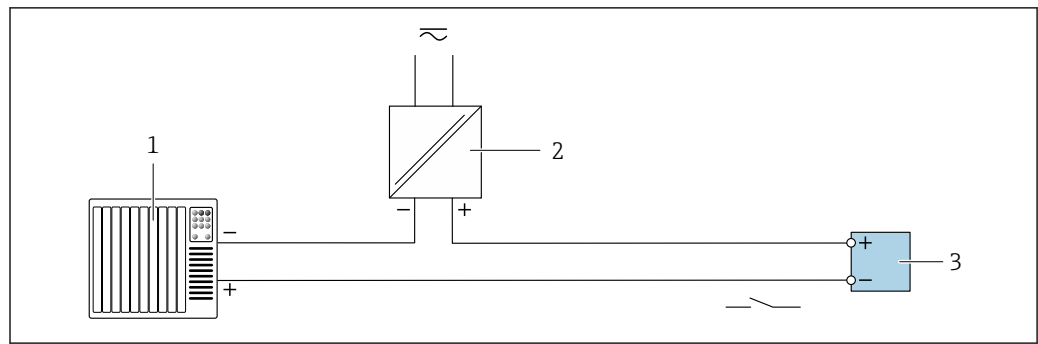


A0029279

13 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 → 14
- 4 Double pulse output
- 5 Double pulse output (slave), phase-shifted

## Relay output

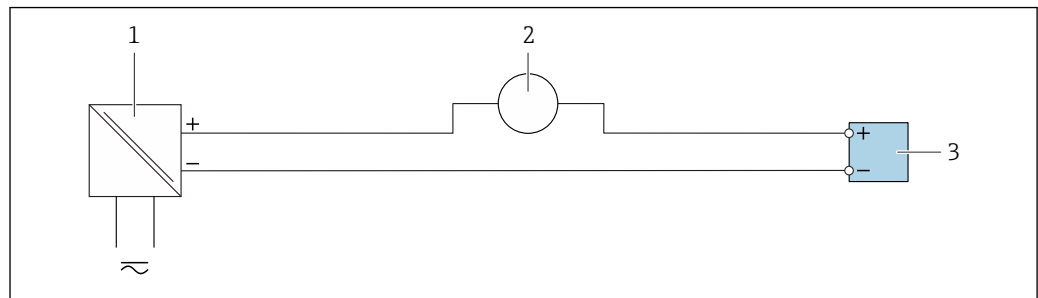


A0028760

14 Connection example for relay output (passive)

- 1 Automation system with relay input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values → 14

## Current input

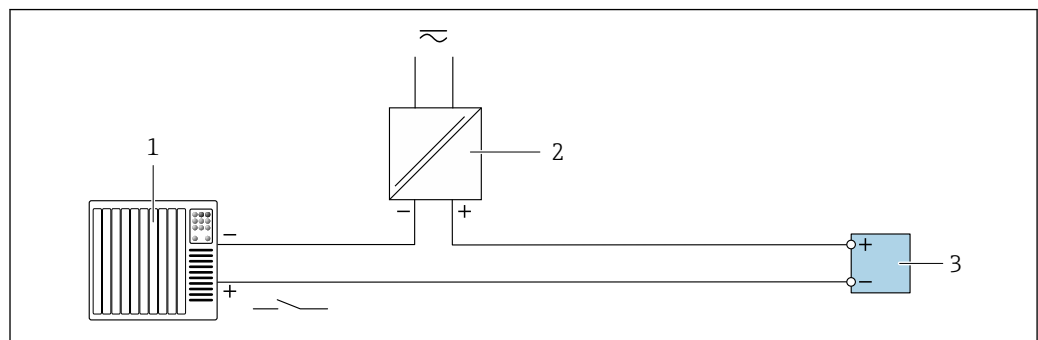


A0028915

15 Connection example for 4 to 20 mA current input

- 1 Power supply
- 2 External measuring device (for reading in pressure or temperature, for instance)
- 3 Transmitter: Observe input values

## Status input



A0028764

16 Connection example for status input

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

## Potential equalization

## Requirements

Please consider the following to ensure correct measurement:

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



### Connection example, standard scenario

#### *Metal process connections*

Potential equalization is generally via the metal process connections that are in contact with the medium and mounted directly on the sensor. Therefore there is generally no need for additional potential equalization measures.

### Connection example in special situations

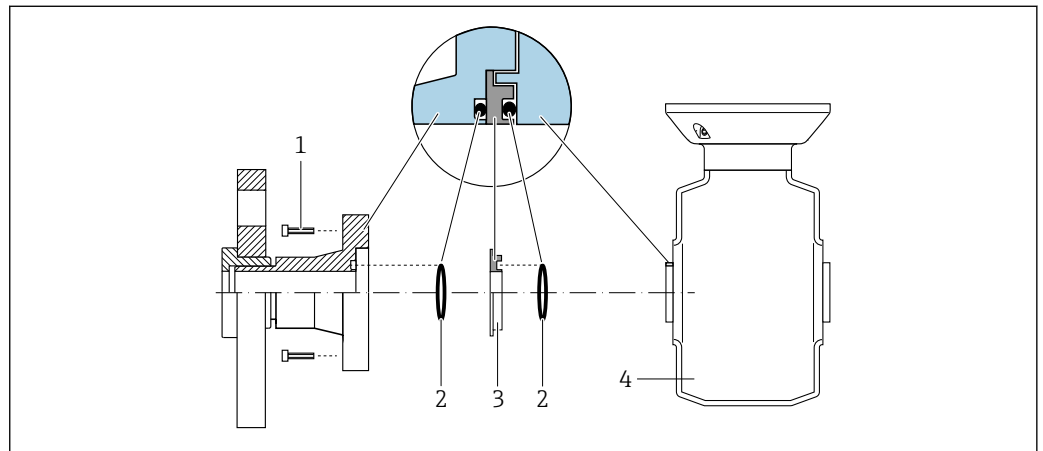
#### *Plastic process connections*

In the case of plastic process connections, additional grounding rings or process connections with an integrated grounding electrode must be used to ensure potential matching between the sensor and the fluid. If there is no potential matching, this can affect the measuring accuracy or cause the destruction of the sensor as a result of the electrochemical decomposition of the electrodes.

Note the following when using grounding rings:

- Depending on the option ordered, plastic disks are used instead of grounding rings on some process connections. These plastic disks only act as "spacers" and do not have any potential matching function. Furthermore, they also perform a significant sealing function at the sensor/connection interface. Therefore, in the case of process connections without metal grounding rings, these plastic disks/seals should never be removed and should always be installed!
- Grounding rings can be ordered separately as an accessory from Endress+Hauser. When ordering make sure that the grounding rings are compatible with the material used for the electrodes, as otherwise there is the danger that the electrodes could be destroyed by electrochemical corrosion!
- Grounding rings, including seals, are mounted inside the process connections. Therefore the installation length is not affected.

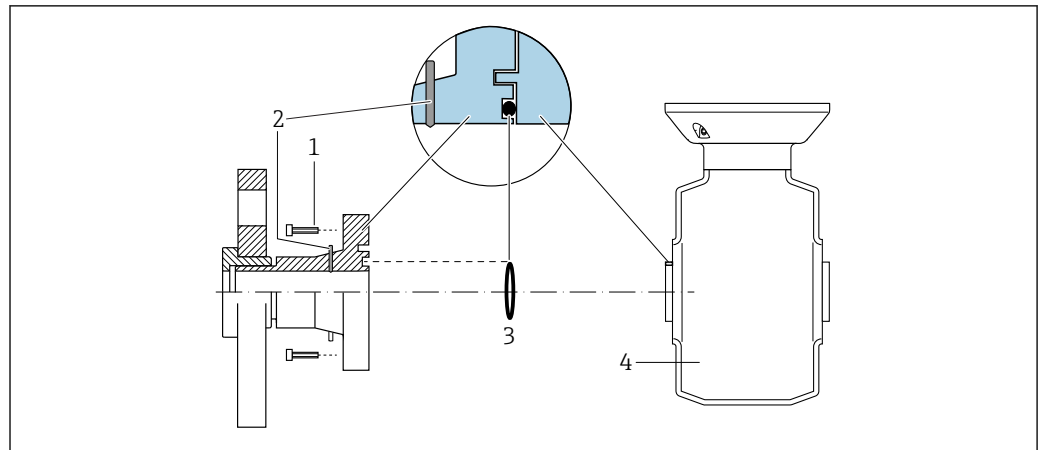
#### *Potential equalization via additional grounding ring*



A0028971

- 1 Hexagonal-headed bolts of process connection
- 2 O-ring seals
- 3 Plastic disk (spacer) or grounding ring
- 4 Sensor

*Potential equalization via grounding electrodes on process connection*



A0028972

- 1 Hexagonal-headed bolts of process connection
- 2 Integrated grounding electrodes
- 3 O-ring seal
- 4 Sensor

## Terminals

### Transmitter

Spring terminals for conductor cross-section 0.2 to 2.5 mm<sup>2</sup> (24 to 12 AWG)

## Cable entries

- Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT ½"
  - G ½"
  - M20
- Device plug for digital communication: M12  
Only available for certain device versions → 25.

## Cable specification

### Permitted temperature range

Minimum requirement: cable temperature range ≥ ambient temperature +20 K

### Power supply cable

Standard installation cable is sufficient.

### Protective ground cable

Cable: 2.1 mm<sup>2</sup> (14 AWG)

The grounding impedance must be less than 1 Ω.

### 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 PA 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)

*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 $\Omega$ 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>	$\leq 110 \Omega/\text{km}$
<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.

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

A standard cable can be used as the connecting cable.

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

Cross-section	Cable length for use in non-hazardous area, Ex Zone 2, Class I, Division 2 Ex Zone 1, Class I, Division 1
0.34 mm <sup>2</sup> (22 AWG)	80 m (270 ft)
0.50 mm <sup>2</sup> (20 AWG)	120 m (400 ft)
0.75 mm <sup>2</sup> (18 AWG)	180 m (600 ft)
1.00 mm <sup>2</sup> (17 AWG)	240 m (800 ft)
1.50 mm <sup>2</sup> (15 AWG)	300 m (1 000 ft)

*Optionally available connecting cable*

Standard cable	2 × 2 × 0.34 mm <sup>2</sup> (22 AWG) PVC cable with common shield (2 pairs, pair-stranded)
Flame resistance	According to DIN EN 60332-1-2
Oil-resistance	According to DIN EN 60811-2-1
Shielding	Tin-plated copper-braid, optical cover ≥ 85 %
Capacitance: core/shield	≤200 pF/m
L/R	≤24 μH/Ω
Available cable length	10 m (35 ft)
Operating temperature	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)

## Performance characteristics

### Reference operating conditions

- Error limits following DIN EN 29104, in future ISO 20456
- Water, typically +15 to +45 °C (+59 to +113 °F); 0.5 to 7 bar (73 to 101 psi)
- Data as indicated in the calibration protocol
- Accuracy based on accredited calibration rigs according to ISO 17025

### Maximum measured error

#### Error limits under reference operating conditions

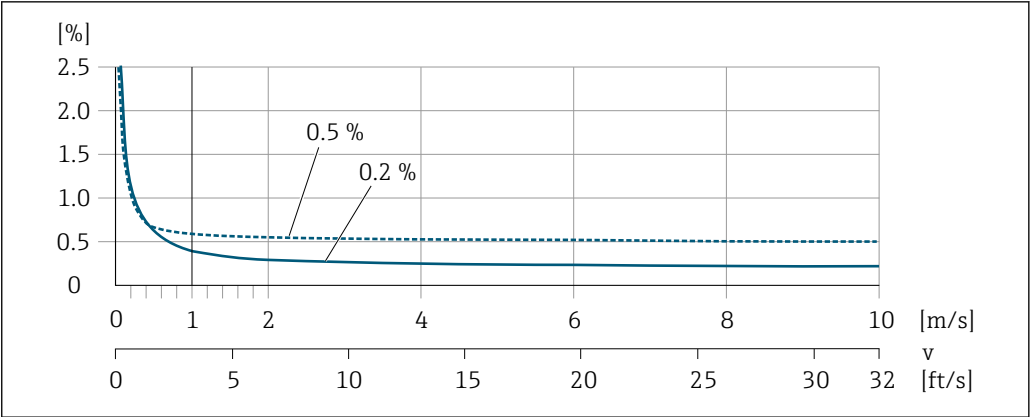
o.r. = of reading

#### Volume flow

- ±0.5 % o.r. ± 1 mm/s (0.04 in/s)
- Optional: ±0.2 % o.r. ± 2 mm/s (0.08 in/s)



Fluctuations in the supply voltage do not have any effect within the specified range.



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17 Maximum measured error in % o.r.

**Temperature**

$\pm 3^{\circ}\text{C}$  ( $\pm 5.4^{\circ}\text{F}$ )

**Electrical conductivity**

Max. measured error not specified.

**Accuracy of outputs**

The outputs have the following base accuracy specifications.

*Current output*

Accuracy	$\pm 5\ \mu\text{A}$
----------	----------------------

*Pulse/frequency output*

o.r. = of reading

Accuracy	Max. $\pm 50\ \text{ppm o.r.}$ (across the entire ambient temperature range)
----------	--

**Repeatability**

o.r. = of reading

**Volume flow**

Max.  $\pm 0.1\ \%$  o.r.  $\pm 0.5\ \text{mm/s}$  ( $0.02\ \text{in/s}$ )

**Temperature**

$\pm 0.5^{\circ}\text{C}$  ( $\pm 0.9^{\circ}\text{F}$ )

**Electrical conductivity**

- Max.  $\pm 5\ \%$  o.r.
- Max.  $\pm 1\ \%$  o.r. for DN 15 to 150 in conjunction with stainless steel process connections, 1.4404 (F316L)

**Temperature measurement response time**

$T_{90} < 15\ \text{s}$

**Influence of ambient temperature**

**Current output**

o.r. = of reading

Temperature coefficient	Typically $1\ \mu\text{A}/^{\circ}\text{C}$
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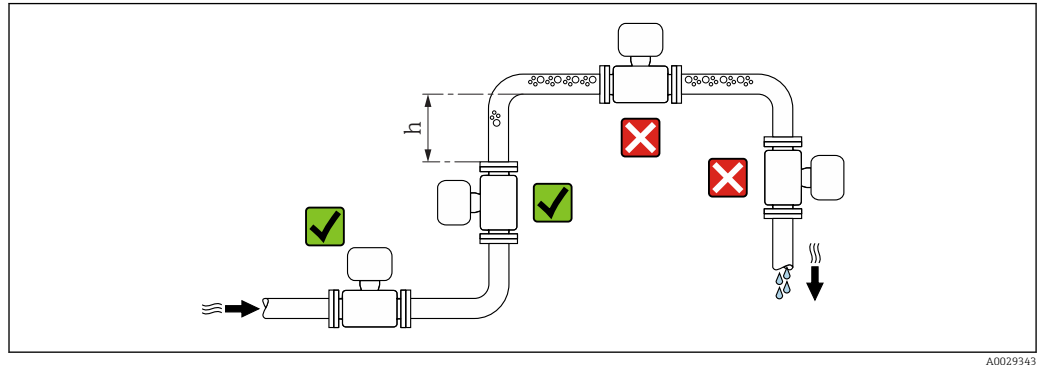
**Pulse/frequency output**

Temperature coefficient	No additional effect. Included in accuracy.
-------------------------	---

## Installation

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

### Mounting location



A0029343

Preferably install the sensor in an ascending pipe, and ensure a sufficient distance to the next pipe elbow:  $h \geq 2 \times \text{DN}$

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

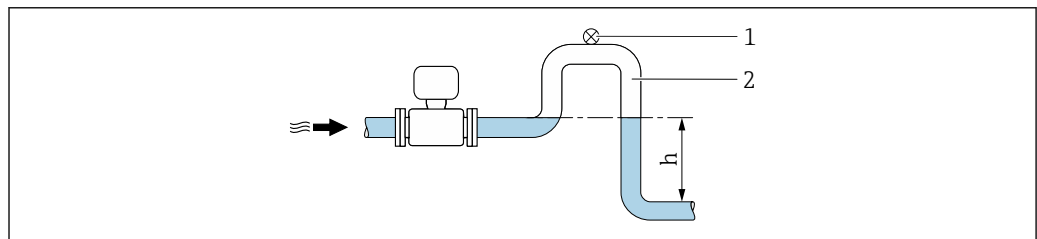
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

### Installation in down pipes

Install a siphon with a vent valve downstream of the sensor in down pipes whose length  $h \geq 5 \text{ m}$  (16.4 ft). This precaution is to avoid low pressure and the consequent risk of damage to the measuring tube. This measure also prevents the system losing prime.



For information on the liner's resistance to partial vacuum



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 18 Installation in a down pipe

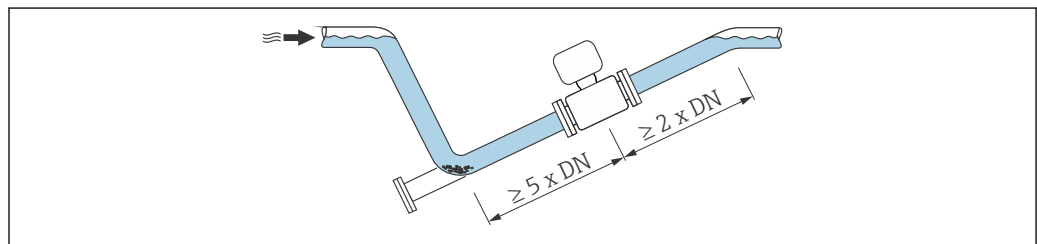
1 Vent valve

2 Pipe siphon

$h$  Length of down pipe

### Installation in partially filled pipes

A partially filled pipe with a gradient necessitates a drain-type configuration. The empty pipe detection (EPD) function offers additional protection by detecting empty or partially filled pipes.



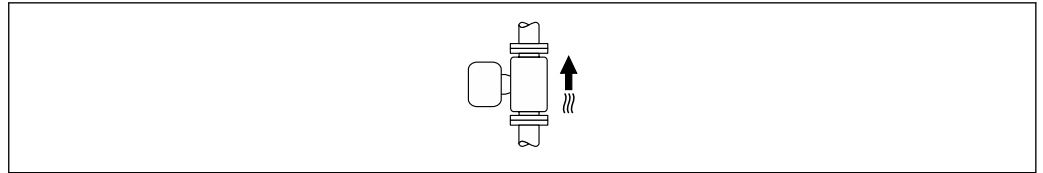
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**Orientation**

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).

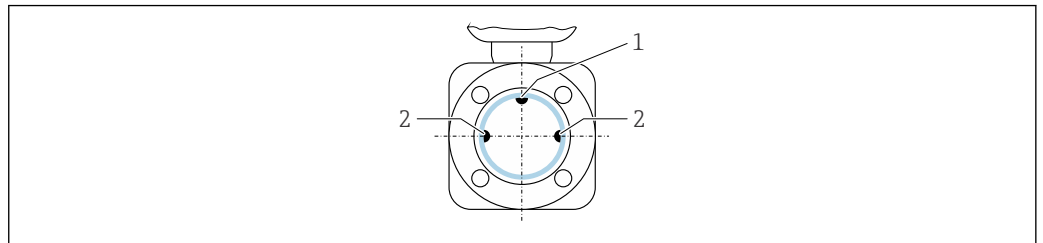
An optimum orientation position helps avoid gas and air accumulations and deposits in the measuring tube.

The measuring device also offers the empty pipe detection function to detect partially filled measuring pipes in the event of outgassing fluids or variable process pressures.

**Vertical**

A0015591

Optimum for self-emptying pipe systems and for use in conjunction with empty pipe detection.

**Horizontal**

A0028998

- 1 EPD electrode for empty pipe detection
- 2 Measuring electrodes for signal detection

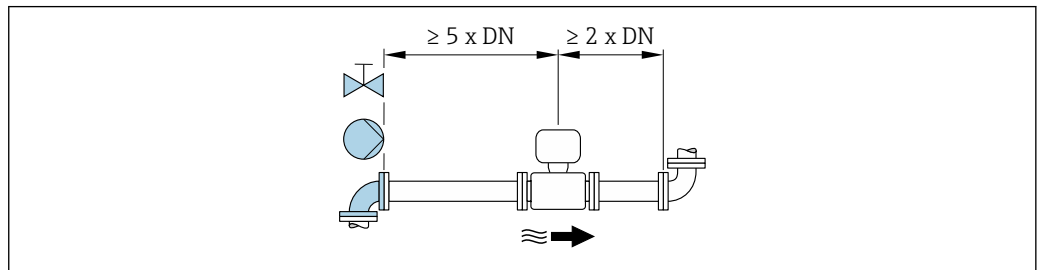


- Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.
- Empty pipe detection only works if the transmitter housing is pointing upwards as otherwise there is no guarantee that the empty pipe detection function will actually respond to a partially filled or empty measuring tube.

**Inlet and outlet runs**

If possible, install the sensor upstream from fittings such as valves, T-pieces or elbows.

Observe the following inlet and outlet runs to comply with accuracy specifications:



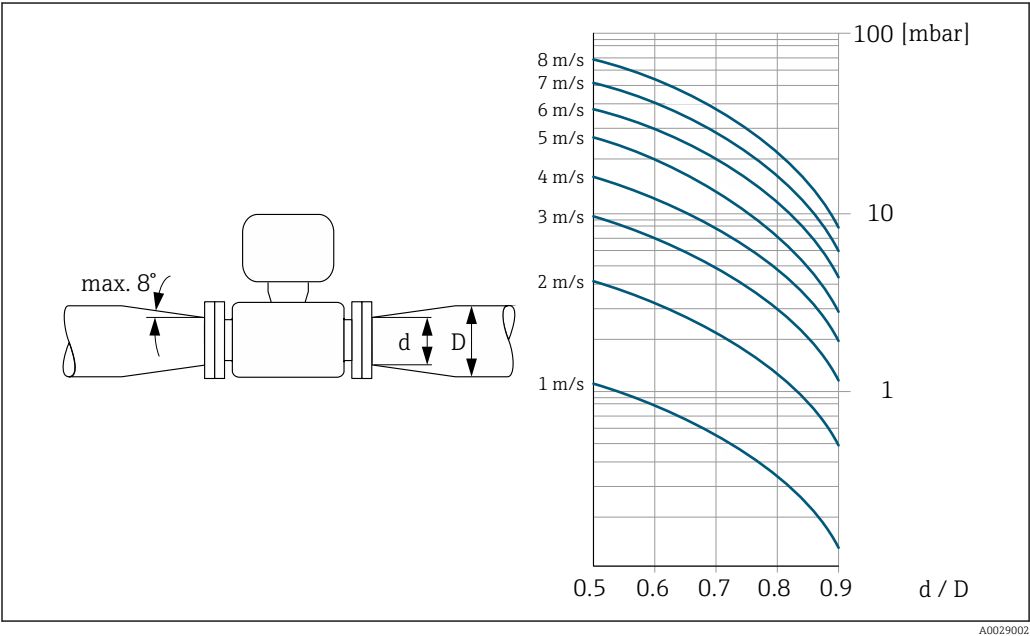
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**Adapters**

Suitable adapters to DIN EN 545 (double-flange reducers) can be used to install the sensor in larger-diameter pipes. The resultant increase in the rate of flow improves measuring accuracy with very slow-moving fluids.

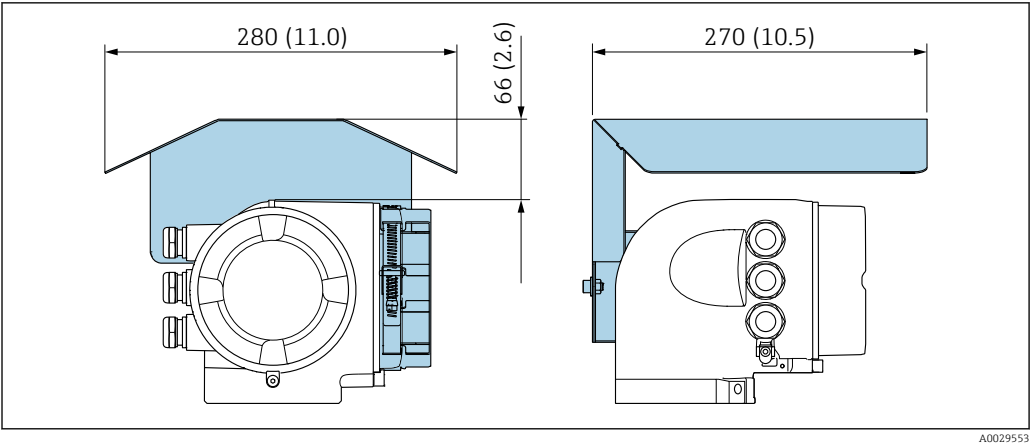
The nomogram shown here can be used to calculate the pressure loss caused by reducers and expanders:

- Calculate the ratio of the diameters  $d/D$ .
  - From the nomogram read off the pressure loss as a function of flow velocity (downstream from the reduction) and the  $d/D$  ratio.
- i** ■ The nomogram only applies to liquids with a viscosity similar to that of water.
- If the medium has a high viscosity, a larger measuring tube diameter can be considered in order to reduce pressure loss.



Special mounting instructions

Protective cover



Environment


Ambient temperature range	Transmitter	Standard: -40 to +60 °C (-40 to +140 °F)
	Local display	-20 to +60 °C (-4 to +140 °F), the readability of the display may be impaired at temperatures outside the temperature range.
	Sensor	-20 to +60 °C (-4 to +140 °F)
	Liner	Do not exceed or fall below the permitted temperature range of the liner .




If operating outdoors:

- Install the measuring device in a shady location.
- Avoid direct sunlight, particularly in warm climatic regions.
- Avoid direct exposure to weather conditions.

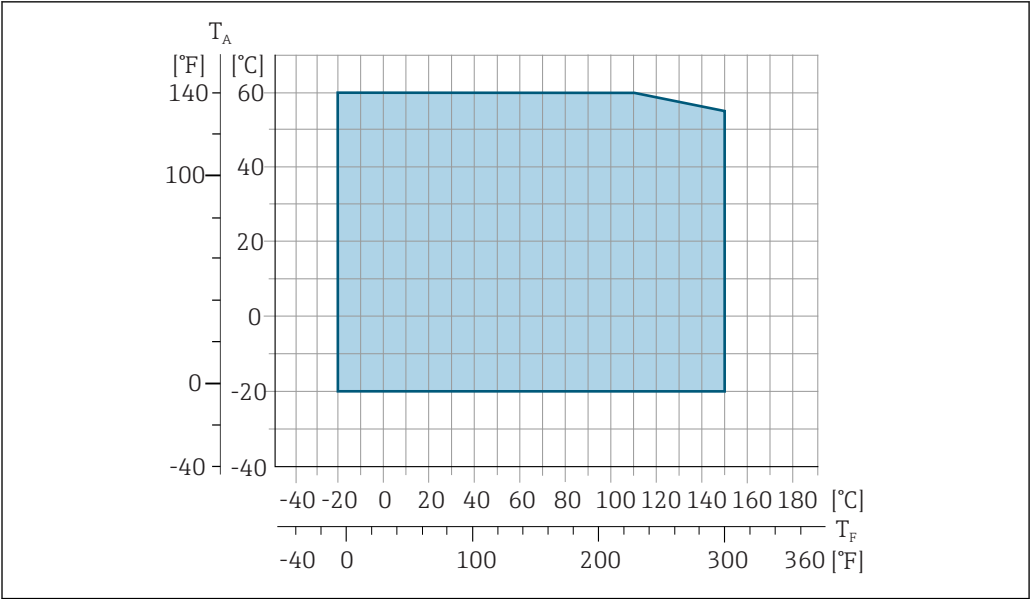


You can order a weather protection cover from Endress+Hauser : →  91

<b>Storage temperature</b>	<p>–50 to +80 °C (–58 to +176 °F)</p> <ul style="list-style-type: none"> <li>■ Protect the measuring device against direct sunlight during storage in order to avoid unacceptably high surface temperatures.</li> <li>■ Select a storage location where moisture cannot collect in the measuring device as fungus or bacteria infestation can damage the liner.</li> <li>■ If protection caps or protective covers are mounted these should never be removed before installing the measuring device.</li> </ul>
<b>Degree of protection</b>	<p><b>Transmitter and 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>: IP69K can also be ordered</li> <li>■ When housing is open: IP20, type 1 enclosure</li> <li>■ Display module: IP20, type 1 enclosure</li> </ul> <p><b>External WLAN antenna</b> IP67</p>
<b>Vibration resistance</b>	<ul style="list-style-type: none"> <li>■ Vibration, sinusoidal according to IEC 60068-2-6               <ul style="list-style-type: none"> <li>– 2 to 8.4 Hz, 3.5 mm peak</li> <li>– 8.4 to 2 000 Hz, 1 g peak</li> </ul> </li> <li>■ Vibration broad-band random, according to 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>	<p>Shock, half-sine according to IEC 60068-2-27 6 ms 30 g</p>
<b>Impact resistance</b>	<p>Rough handling shocks according to IEC 60068-2-31</p>
<b>Mechanical load</b>	<ul style="list-style-type: none"> <li>■ Protect the transmitter housing against mechanical effects, such as shock or impact.</li> <li>■ Never use the transmitter housing as a ladder or climbing aid.</li> </ul>
<b>Interior cleaning</b>	<ul style="list-style-type: none"> <li>■ Cleaning in place (CIP)</li> <li>■ Sterilization in place (SIP)</li> </ul>
<b>Electromagnetic compatibility (EMC)</b>	<p>As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)</p> <div>  <p>For details, refer to the Declaration of Conformity.</p> </div>

## Process

<b>Medium temperature range</b>	–20 to +150 °C (–4 to +302 °F)
---------------------------------	--------------------------------



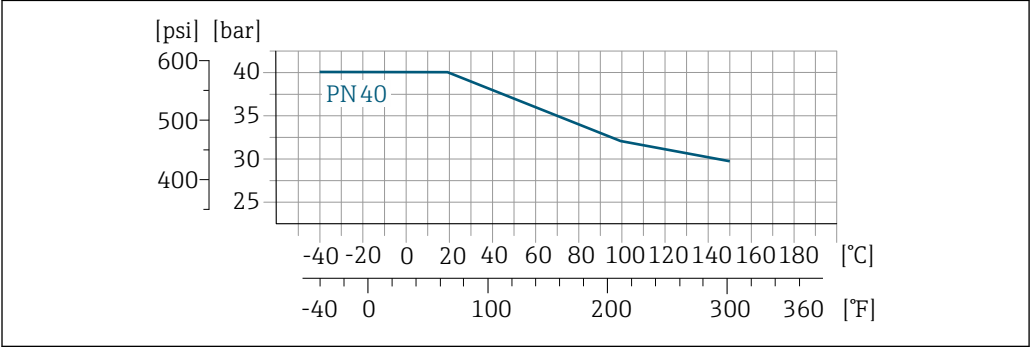
$T_A$  Ambient temperature range  
 $T_F$  Fluid temperature

**Conductivity**  $\geq 5 \mu\text{S/cm}$  for liquids in general. Stronger filter damping is required for very low conductivity values.

**Pressure-temperature ratings** The following graphics contain material load diagrams (reference curves) for different process connections in relation to the medium temperature.

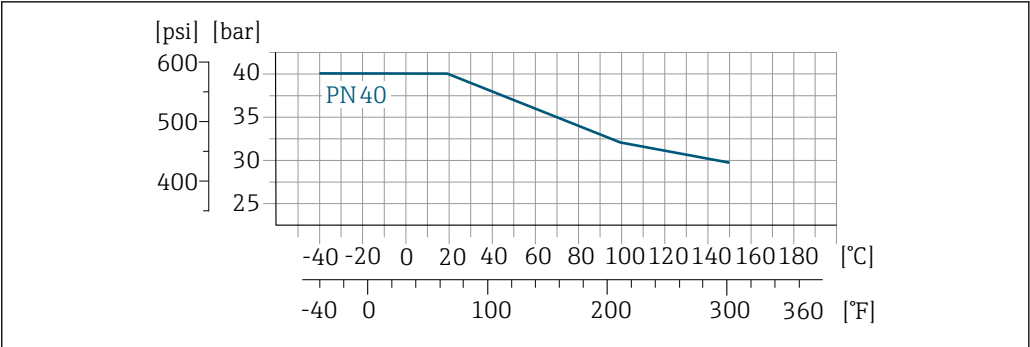
**Process connections with O-ring seal, DN 2 to 25 (1/12 to 1")**

Process connection: weld-in nipple according to DIN EN ISO 1127, ODT/SMS, ISO 2037; coupling according to ISO 228 / DIN 2999, NPT

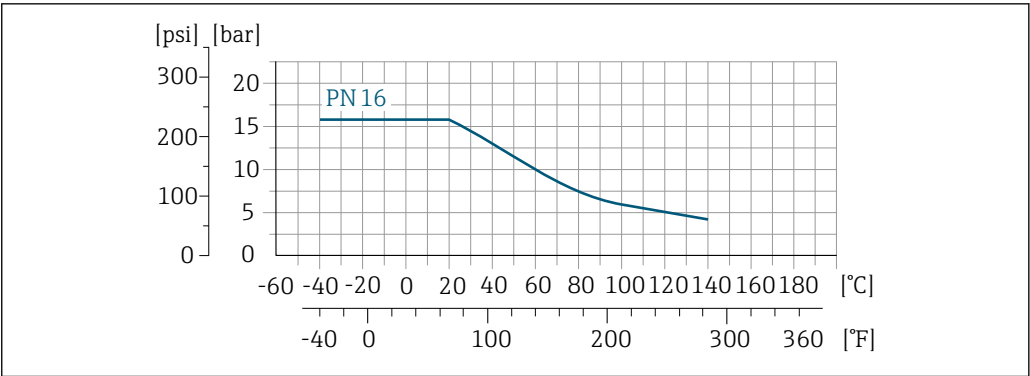


19 Process connection material: stainless steel, 1.4404 (F316L)

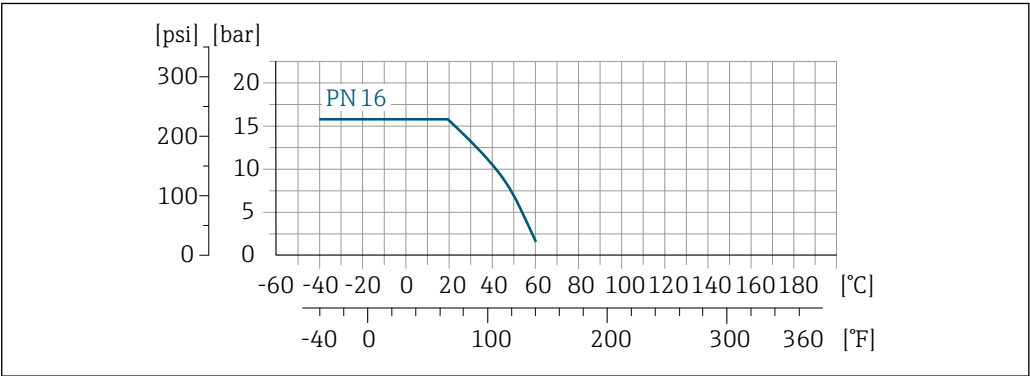
Process connection: flange according to EN 1092-1 (DIN 2501), adhesive sleeve



20 Process connection material: stainless steel, 1.4404 (F316L)

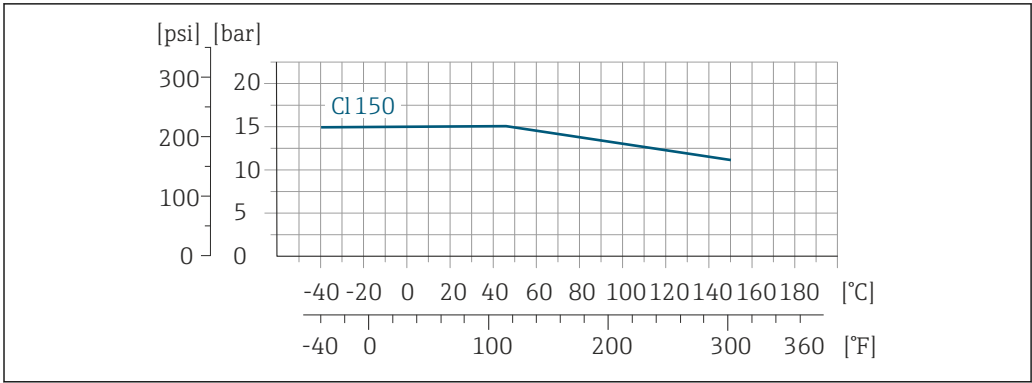


21 Process connection material: PVDF



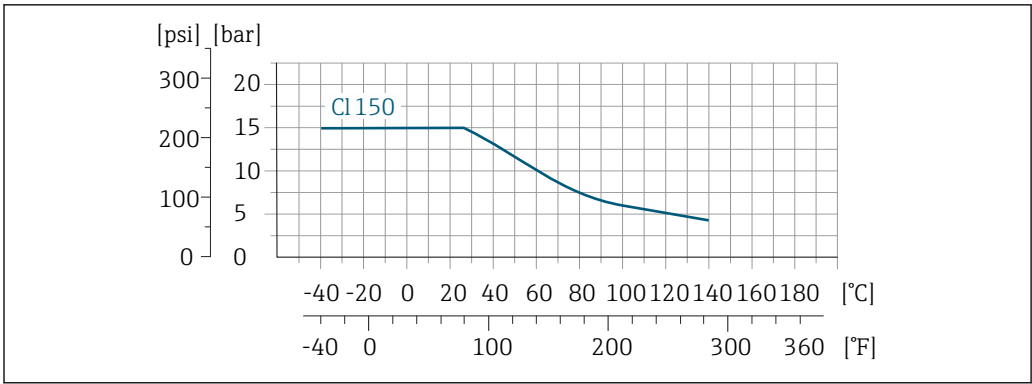
22 Process connection material: PVC-U

Process connection: flange according to ASME B16.5



A0028936-EN

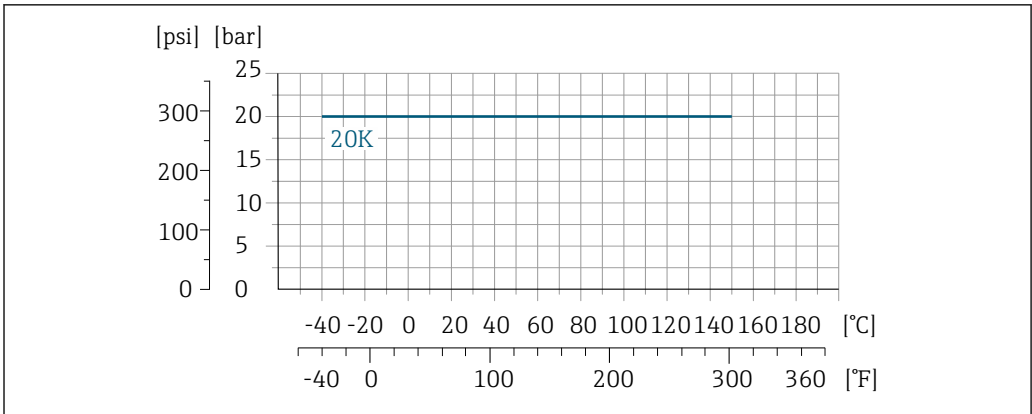
23 Process connection material: stainless steel, 1.4404 (F316L)



A0028937-EN

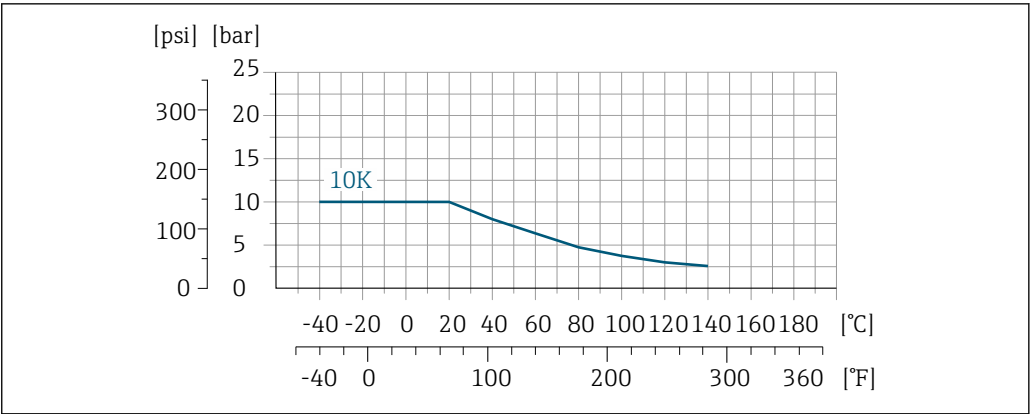
24 Process connection material: PVDF

Process connection: flange according to JIS B2220



A0028938-EN

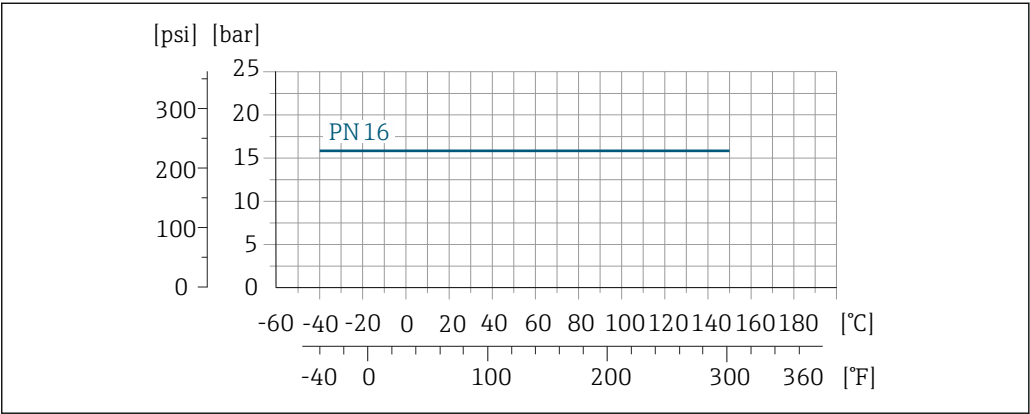
25 Process connection material: stainless steel, 1.4404 (F316L)



26 Process connection material: PVDF

**Process connections with aseptic molded seal, DN 2 to 25 (1/12 to 1")**

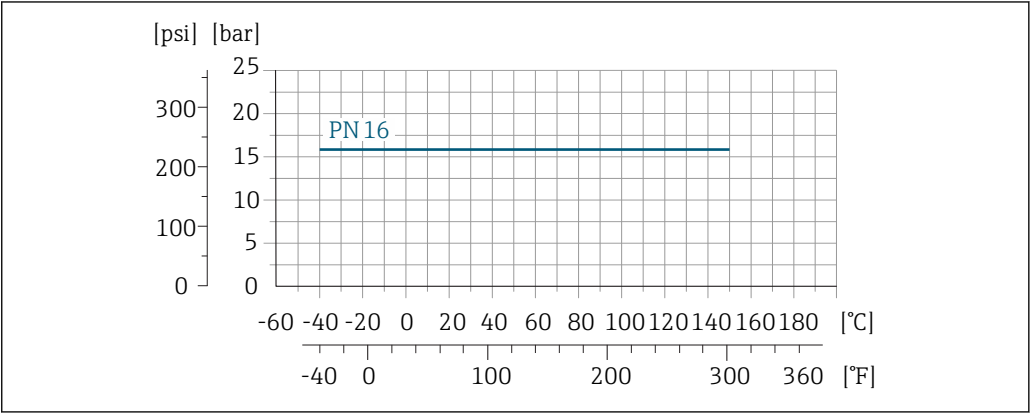
Process connection: weld-in nipple according to EN 10357 (DIN 11850), ASME BPE, ISO 2037; Clamp according to ISO 2852, DIN 32676, L14 AM7; coupling according to SC DIN 11851, DIN 11864-1, SMS 1145; flange according to DIN 11864-2



27 Process connection material: stainless steel, 1.4404 (F316L)

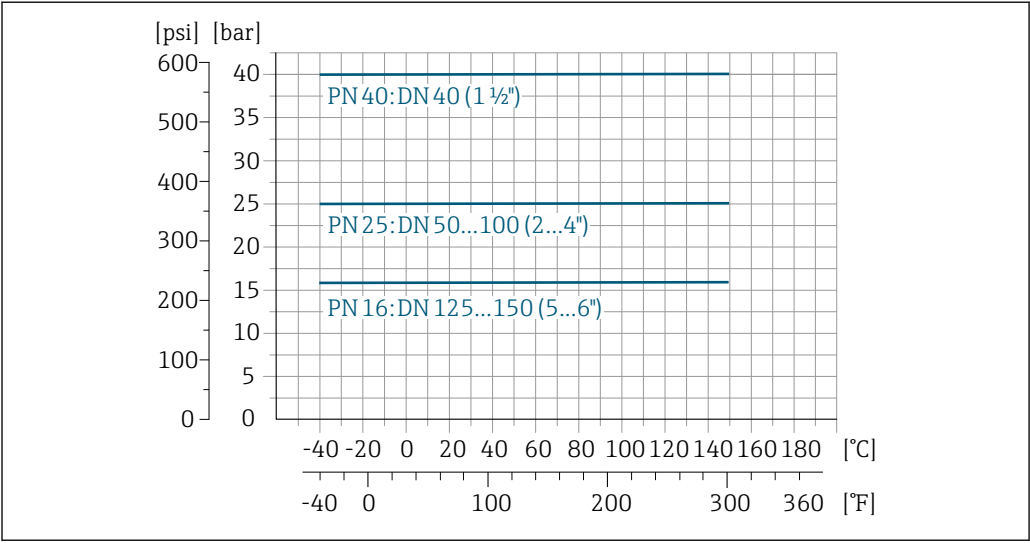
**Process connections with aseptic molded seal, DN 40 to 150 (1 1/2 to 6")**

Process connection: coupling according to SMS 1145



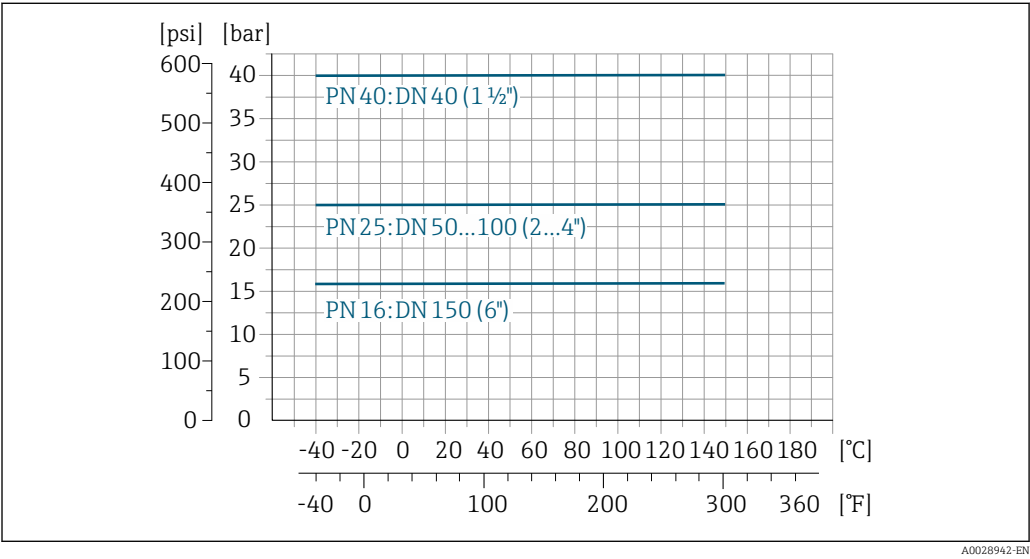
28 Process connection material: stainless steel, 1.4404 (F316L)

Process connection: weld-in nipple according to EN 10357 (DIN 11850); coupling according to SC DIN 11851

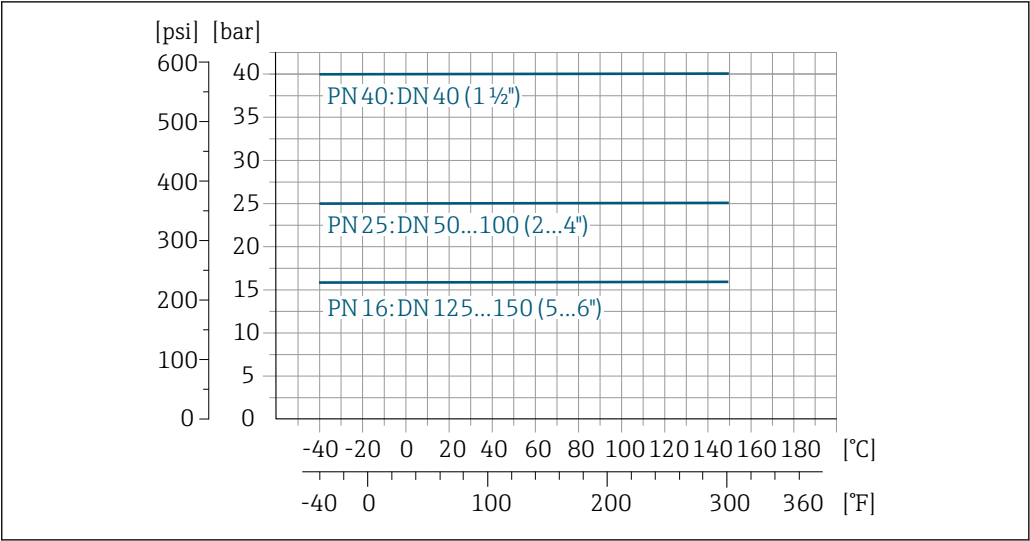


29 Process connection material: stainless steel, 1.4404 (F316L)

Process connection: weld-in nipple according to ASME BPE

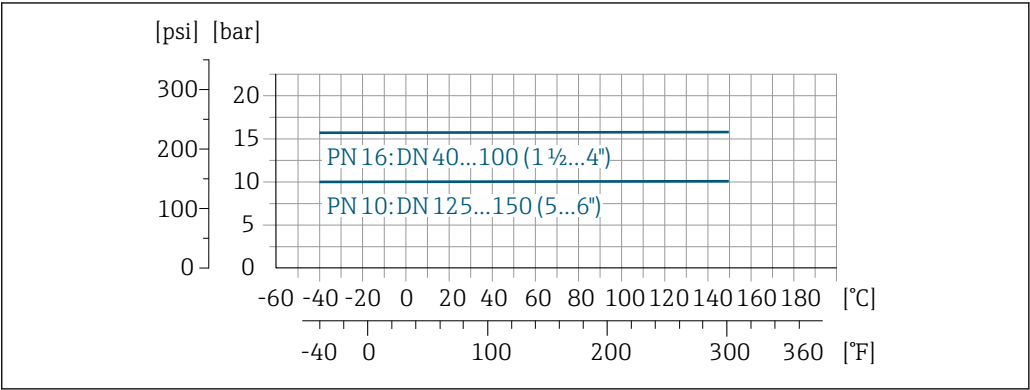


Process connection: weld-in nipple according to ISO 2037



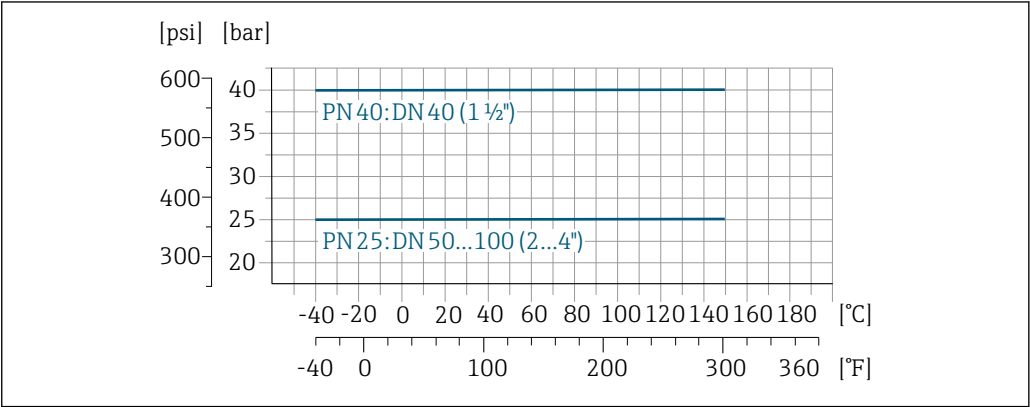
30 Process connection material: stainless steel, 1.4404 (F316L)

Process connection: Clamp according to ISO 2852, DIN 32676, L14 AM7



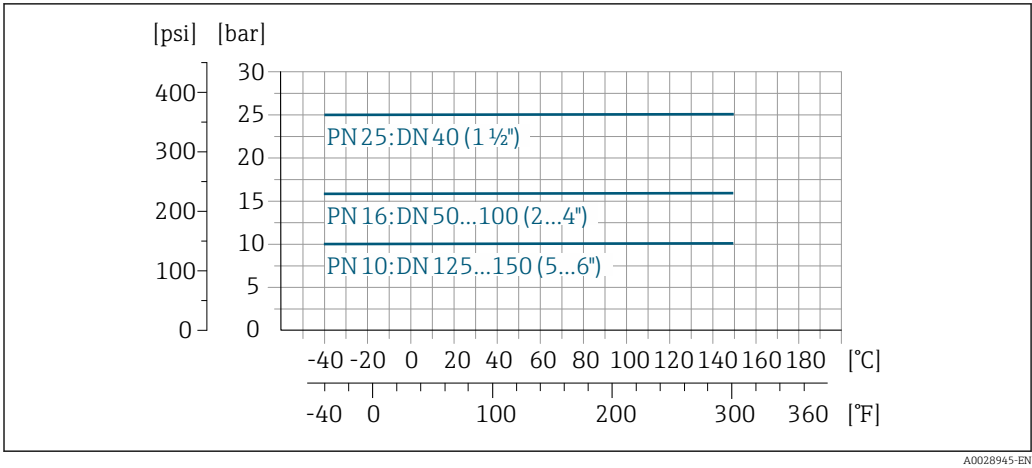
31 Process connection material: stainless steel, 1.4404 (F316L)

Process connection: coupling according to DIN 11864-1, ISO 2853



32 Process connection material: stainless steel, 1.4404 (F316L)

Process connection: flange according to DIN 11864-2



33 Process connection material: stainless steel, 1.4404 (F316L)

Pressure tightness

Liner: PFA

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:				
[mm]	[in]	+25 °C (+77 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)	+130 °C (+266 °F)	+150 °C (+302 °F)
2 to 150	1/12 to 6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Flow limit

The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum velocity of flow is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the fluid:

- $v < 2 \text{ m/s}$  (6.56 ft/s): for low conductivity values
- $v > 2 \text{ m/s}$  (6.56 ft/s): for fluids producing buildup (e.g. milk with a high fat content)

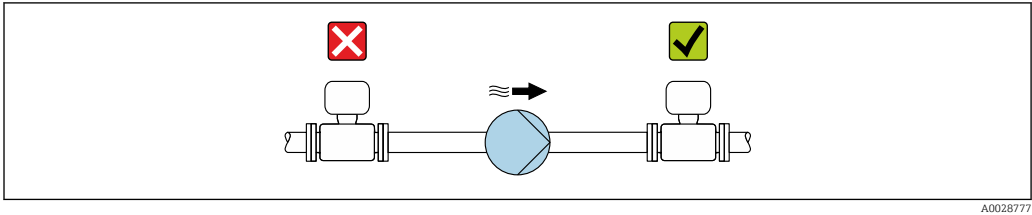
**i** A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter.

**i** For an overview of the full scale values for the measuring range, see the "Measuring range" section → 8

Pressure loss

- No pressure loss occurs as of nominal diameter DN 8 (3/8") if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545 → 39

System pressure



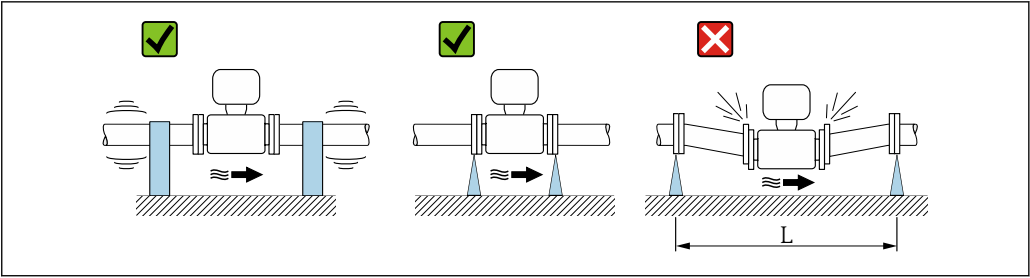
Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.

- i** Furthermore, install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.
- i**
- For information on the liner's resistance to partial vacuum
  - For information on the shock resistance of the measuring system
  - For information on the vibration resistance of the measuring system

Vibrations

- In the event of very strong vibrations, the pipe and sensor must be supported and fixed.
- i**
- For information on the shock resistance of the measuring system
  - For information on the vibration resistance of the measuring system



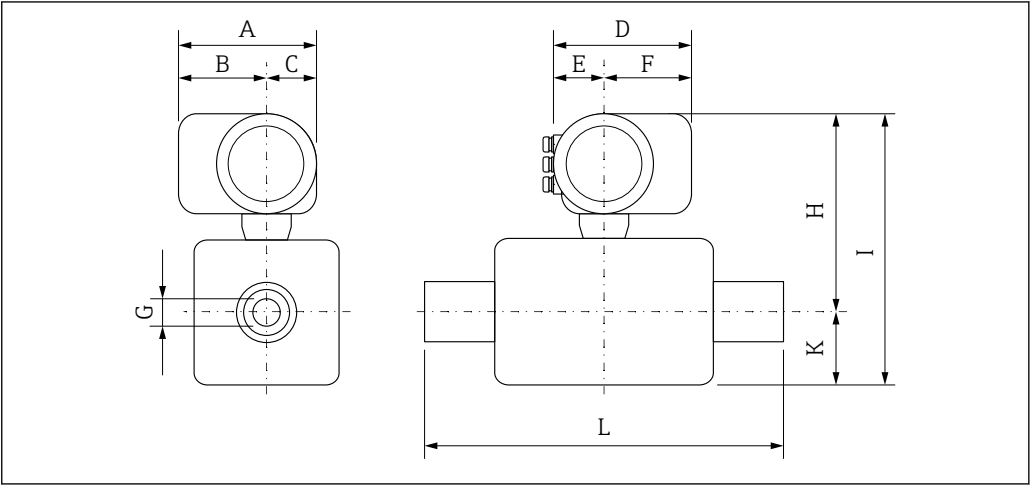


34 Measures to avoid device vibrations ( $L > 10\text{ m}$  (33 ft))

## Mechanical construction

Dimensions in SI units

Compact version



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

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D <sup>2)</sup>	E <sup>2)</sup>	F	G	H	I	K	L <sup>3)</sup>
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
2	200	141	59	169	68	101	2.25	242	297	55	86
4	200	141	59	169	68	101	4.5	242	297	55	86
8	200	141	59	169	68	101	9	242	297	55	86
15	200	141	59	169	68	101	16	242	297	55	86
25	200	141	59	169	68	101	26	242	297	55	86
40	200	141	59	169	68	101	34.8	243	296	53	140
50	200	141	59	169	68	101	47.5	249	309	60	140
65	200	141	59	169	68	101	60.2	257	324	67	140
80	200	141	59	169	68	101	72.9	263	337	74	140
100	200	141	59	169	68	101	97.4	276	363	87	140
125	200	141	59	169	68	101	120.0	292	395	103	200
150	200	141	59	169	68	101	146.9	306	423	117	200

- 1) For version without local display: values - 30 mm
- 2) Depending on the cable gland used: values up to + 30 mm
- 3) Total length (L) depends on the process connections.

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

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D <sup>2)</sup>	E <sup>2)</sup>	F	G	H	I	K	L <sup>3)</sup>
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
2	217	159	58	188	85	103	2.25	272	327	55	86
4	217	159	58	188	85	103	4.5	272	327	55	86
8	217	159	58	188	85	103	9	272	327	55	86
15	217	159	58	188	85	103	16	272	327	55	86
25	217	159	58	188	85	103	26	272	327	55	86
40	217	159	58	188	85	103	34.8	273	326	53	140
50	217	159	58	188	85	103	47.5	279	339	60	140
65	217	159	58	188	85	103	60.2	287	354	67	140
80	217	159	58	188	85	103	72.9	293	367	74	140
100	217	159	58	188	85	103	97.4	306	393	87	140
125	217	159	58	188	85	103	120.0	322	425	103	200
150	217	159	58	188	85	103	146.9	336	453	117	200

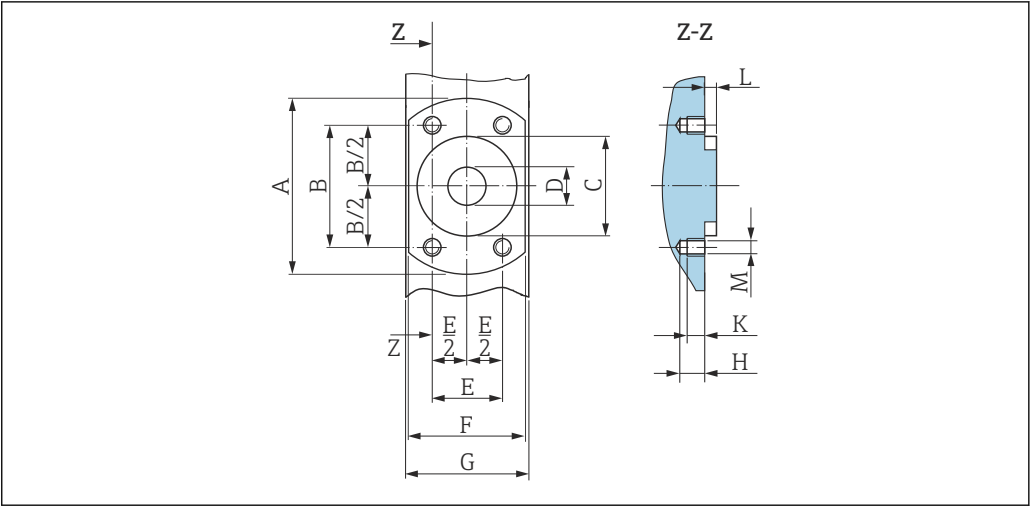
- 1) For version without local display: values - 30 mm  
 2) Depending on the cable gland used: values up to + 30 mm  
 3) Total length (L) depends on the process connections.

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

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D <sup>2)</sup>	E <sup>2)</sup>	F	G	H	I	K	L <sup>3)</sup>
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
2	196	135	61	176	73	103	2.25	241	296	55	86
4	196	135	61	176	73	103	4.5	241	296	55	86
8	196	135	61	176	73	103	9	241	296	55	86
15	196	135	61	176	73	103	16	241	296	55	86
25	196	135	61	176	73	103	26	241	296	55	86
40	196	135	61	176	73	103	34.8	241	296	53	140
50	196	135	61	176	73	103	47.5	253	308	60	140
65	196	135	61	176	73	103	60.2	260	327	67	140
80	196	135	61	176	73	103	72.9	262	336	74	140
100	196	135	61	176	73	103	97.4	275	362	87	140
125	196	135	61	176	73	103	120.0	291	394	103	200
150	196	135	61	176	73	103	146.9	305	422	117	200

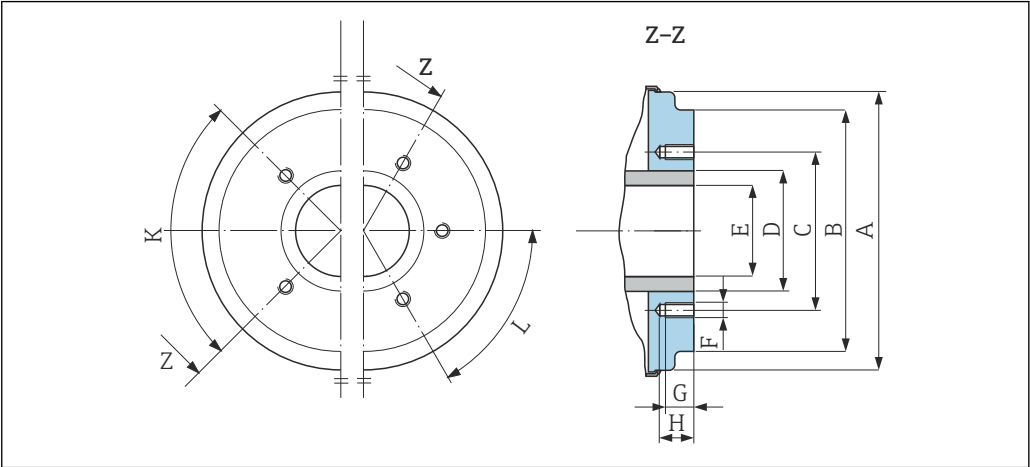
- 1) For version without local display: values - 30 mm  
 2) Depending on the cable gland used: values up to + 30 mm  
 3) Total length (L) depends on the process connections.

Sensor flange connection



35 Front view without process connections

DN	A	B	C	D	E	F	G	H	K	L	M
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
2	62	41.6	34	9	24	42	43	8.5	6	4	M6
4	62	41.6	34	9	24	42	43	8.5	6	4	M6
8	62	41.6	34	9	24	42	43	8.5	6	4	M6
15	62	41.6	34	16	24	42	43	8.5	6	4	M6
25	72	50.2	44	26	29	55	56	8.5	6	4	M6



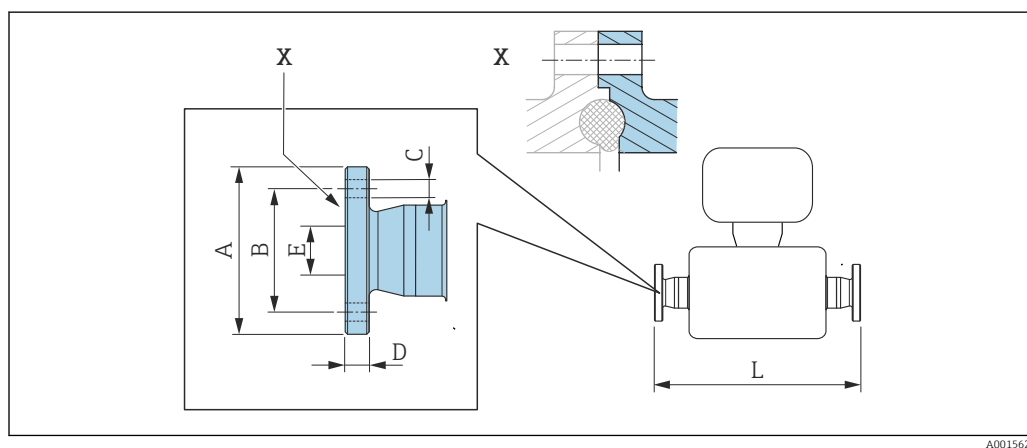
36 Front view without process connections

DN	A	B	C	D	E	F	G	H	K	L
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	90° ±0.5° Tapped holes	60° ±0.5°
40	99.7	85.8	71.0	48.3	34.8	M8	12	17	4	–
50	112.7	98.8	83.5	60.3	47.5	M8	12	17	4	–
65	127.7	114.8	100.0	76.1	60.2	M8	12	17	–	6
80	140.7	133.5	114.0	88.9	72.9	M8	12	17	–	6

DN	A	B	C	D	E	F	G	H	K 90° ±0.5°	L 60° ±0.5°
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Tapped holes	
100	166.7	159.5	141.0	114.3	97.4	M8	12	17	–	6
125	198.7	191.5	171.0	139.7	120.0	M10	15	20	–	6
150	226.7	219.5	200.0	168.3	146.9	M10	15	20	–	6

## Flanges

*Flanges with aseptic molded seal*



A0015627

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

### Flange DIN 11864-2 Form A, for pipe according to DIN 11866 series A, flat flange 1.4404 (316L)

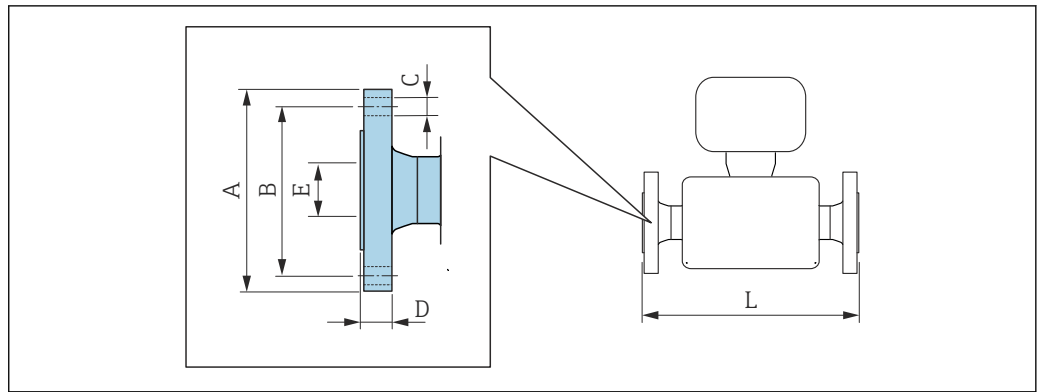
Order code for "Process connection", option DES

DN [mm]	Suitable for pipe EN 10357 (DIN 11850) [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8	13 × 1.5 (DN 10)	54	37	4 × Ø9	10	10	183
15	19 × 1.5 (DN 15)	59	42	4 × Ø9	10	16	183
25	29 × 1.5 (DN 25)	70	53	4 × Ø9	10	26	183
40	42 × 1.5	82	65	4 × Ø9	10	65	246
50	54 × 1.5	94	77	4 × Ø9	10	77	246
65	70 × 2	113	95	4 × Ø9	10	95	246
80	85 × 2	133	112	4 × Ø9	10	112	270
100	104 × 2	159	137	4 × Ø9	10	137	278
125	129 × 2	190	161	4 × Ø9	10	161	362
150	154 × 2	220	188	4 × Ø9	10	188	362

Surface roughness:  $R_a \leq 0.8 \mu\text{m}$ , optional  $\leq 0.38 \mu\text{m}$

Please note the internal diameters of the measuring tube and process connection (E) when cleaning with pigs.

## Flanges with O-ring seal



A0015621

**Flange according to EN 1092-1 (DIN 2501), Form B: PN 40**  
**1.4404 (316L)**

Order code for "Process connection", option D5S

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8 <sup>1)</sup>	95	65	4 × Ø14	16	17.3	198.4
15	95	65	4 × Ø14	16	17.3	198.4
25	115	85	4 × Ø14	18	28.5	198.4

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 

1) DN 2 to 8 with DN 15 flanges as standard

**Flange according to ASME B16.5: Class 150**  
**1.4404 (316L)**

Order code for "Process connection", option A1S

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8 <sup>1)</sup>	90	60.3	4 × Ø15.7	11.2	15.7	218
15	90	60.3	4 × Ø15.7	11.2	15.7	218
25	110	79.4	4 × Ø15.7	14.2	26.7	230

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 

1) DN 2 to 8 with DN 15 flanges as standard

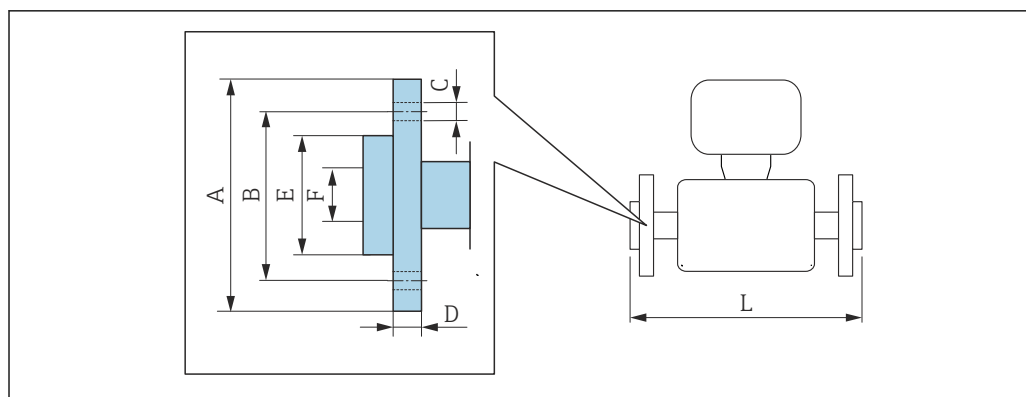
**Flange according to JIS B2220: 20K**  
**1.4404 (316L)**

Order code for "Process connection", option N4S

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8 <sup>1)</sup>	95	70	4 × Ø15	14	15	220
15	95	70	4 × Ø15	14	15	220
25	125	90	4 × Ø19	16	25	220

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 

1) DN 2 to 8 with DN 15 flanges as standard



A002221

**Lap joint flange according to EN 1092-1 (DIN 2501): PN 16****PVDF**Order code for "Process connection", option **D3P**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 <sup>1)</sup>	95	65	4 x Ø14	14.5	45	17.3	200
15	95	65	4 x Ø14	14.5	45	17.3	200
25	115	85	4 x Ø14	16.5	68	28.5	200

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 

The required grounding rings can be ordered as accessories (order code: DK5HR-\*\*\*\*).

- 1) DN 2 to 8 with DN 15 flanges as standard

**Lap joint flange with grounding electrode according to EN 1092-1 (DIN 2501): PN 16****PVDF**Order code for "Process connection", option **D4P**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 <sup>1)</sup>	95	65	4 x Ø14	14.5	45	17.3	200
15	95	65	4 x Ø14	14.5	45	17.3	200
25	115	85	4 x Ø14	16.5	68	28.5	200

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 

Grounding rings are not necessary.

- 1) DN 2 to 8 with DN 15 flanges as standard

**Lap joint flange according to ASME B16.5: Class 150****PVDF**Order code for "Process connection", option **A1P**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 <sup>1)</sup>	90	60.3	4 x Ø 15.7	15	35.1	15.7	200
15	90	60.3	4 x Ø 15.7	15	35.1	15.7	200
25	110	79.4	4 x Ø 15.7	16	50.8	26.7	200

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 

The required grounding rings can be ordered as accessories (order code: DK5HR-\*\*\*\*).

- 1) DN 2 to 8 with DN 15 flanges as standard

**Lap joint flange with grounding electrode according to ASME B16.5: Class 150**  
**PVDF**
*Order code for "Process connection", option A4P*

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 <sup>1)</sup>	90	60.3	4 × Ø 15.7	15	35.1	15.7	200
15	90	60.3	4 × Ø 15.7	15	35.1	15.7	200
25	110	79.4	4 × Ø 15.7	16	50.8	26.7	200

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$   
 Grounding rings are not necessary.

- 1) DN 2 to 8 with DN 15 flanges as standard

**Lap joint flange according to JIS B2220: 10K**  
**PVDF**
*Order code for "Process connection", option N3P*

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 <sup>1)</sup>	95	70	4 × Ø 15.7	15	35.1	15	200
15	95	70	4 × Ø 15.7	15	35.1	15	200
25	125	90	4 × Ø 15.7	16	50.8	19	200

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$   
 The required grounding rings can be ordered as accessories (order code: DK5HR-\*\*\*\*).

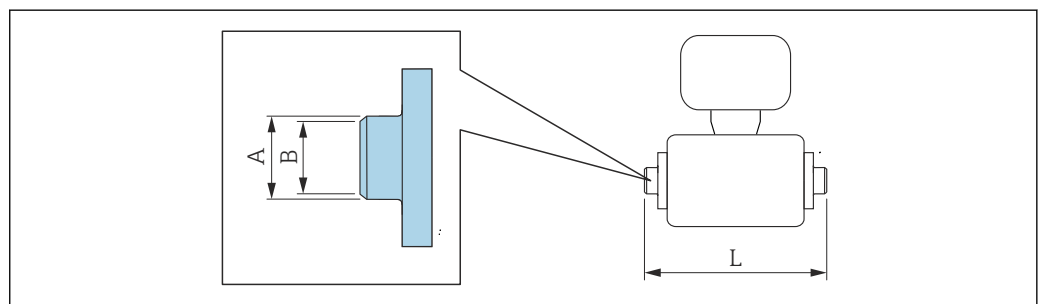
- 1) DN 2 to 8 with DN 15 flanges as standard

**Lap joint flange with grounding electrode according to JIS B2220: 10K**  
**PVDF**
*Order code for "Process connection", option N4P*

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 <sup>1)</sup>	95	70	4 × Ø 15.7	15	35.1	15	200
15	95	70	4 × Ø 15.7	15	35.1	15	200
25	125	90	4 × Ø 15.7	16	50.8	19	200

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$   
 Grounding rings are not necessary.

- 1) DN 2 to 8 with DN 15 flanges as standard

**Welding nipple**
*Welding nipple with aseptic molded seal*


A0027510

**Welding nipple according to EN 10357 (DIN 11850)**  
**1.4404 (316L)**
*Order code for "Process connection", option DAS*

DN [mm]	Suitable for pipe EN 10357 (DIN 11850) [mm]	A [mm]	B [mm]	L [mm]
2 to 8	13 × 1.5	13	10	132.6
15	19 × 1.5	19	16	132.6
25	29 × 1.5	29	26	132.6
40	41 × 1.5	41	38	220
50	53 × 1.5	53	50	220
65	70 × 2	70	66	220
80	85 × 2	85	81	280
100	104 × 2	104	100	280
125	129 × 2	129	125	300
150	154 × 2	154	150	300

 Surface roughness:  $R_a \leq 0.8 \mu\text{m}$ , optional  $\leq 0.38 \mu\text{m}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Welding nipple according to ISO 2037**
**1.4404 (316L)**
*Order code for "Process connection", option IAS*

DN [mm]	Suitable for pipe ISO 2037 [mm]	A [mm]	B [mm]	L [mm]
2 to 8	12.7 × 1.65	12.7	9	118.2
15	19.1 × 1.65	19.1	16	118.2
25	25.4 × 1.65	25.4	22.6	118.2
40	38 × 1.2	38	35.6	220
50	51 × 1.2	51	48.6	220
65	63.5 × 1.6	63.5	60.3	220
80	76.1 × 1.6	76.1	72.9	220
100	101.6 × 2	101.6	97.6	220
125	139.7 × 2	139.7	135.7	380
150	168.3 × 2.6	168.3	163.1	380

 Surface roughness:  $R_a \leq 0.8 \mu\text{m}$ , optional  $\leq 0.38 \mu\text{m}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Welding nipple according to ASME BPE**
**1.4404 (316L)**
*Order code for "Process connection", option AAS*

DN [mm]	Suitable for pipe ASME BPE [mm]	A [mm]	B [mm]	L [mm]
2 to 8	12.7 × 1.65	12.7	9	118.2
15	19.1 × 1.65	19.1	16	118.2
25	25.4 × 1.65	25.4	22.6	118.2
40	38.1 × 1.65	38.1	34.8	220
50	50.8 × 1.65	50.8	47.5	220
65	63.5 × 1.65	63.5	60.2	220

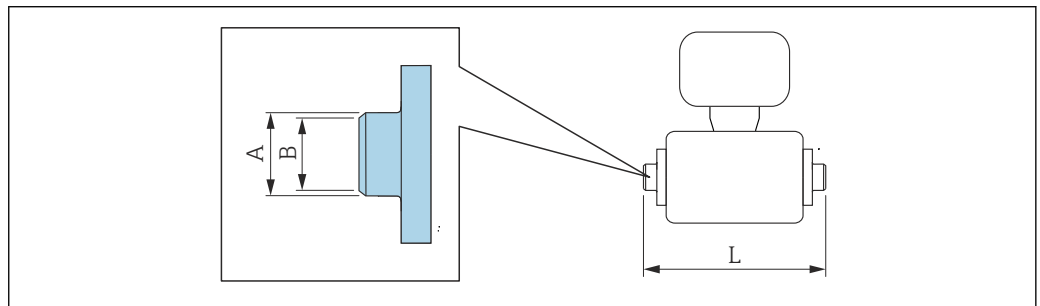


**Welding nipple according to ASME BPE  
1.4404 (316L)**
*Order code for "Process connection", option AAS*

DN [mm]	Suitable for pipe ASME BPE [mm]	A [mm]	B [mm]	L [mm]
80	76.2 × 1.65	76.2	72.9	220
100	101.6 × 1.65	101.6	97.4	220
150	152.4 × 2.77	149.9	149.9	300

 Surface roughness:  $R_a \leq 0.8 \mu\text{m}$ , optional  $\leq 0.38 \mu\text{m}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Welding nipple with O-ring seal**


A0027510

**Welding nipple according to ODT/SMS  
1.4404 (316L)**
*Order code for "Process connection", option A2S*

DN [mm]	Suitable for pipe ODT/SMS [mm]	A [mm]	B [mm]	L [mm]
2 to 8	13.5 × 2.30	13.5	9	126.6
15	21.3 × 2.65	21.3	16	126.6
25	33.7 × 3.25	33.7	27.2	126.6

 Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 
**Welding nipple according to DIN EN ISO 1127  
1.4404 (316L)**
*Order code for "Process connection", option D1S*

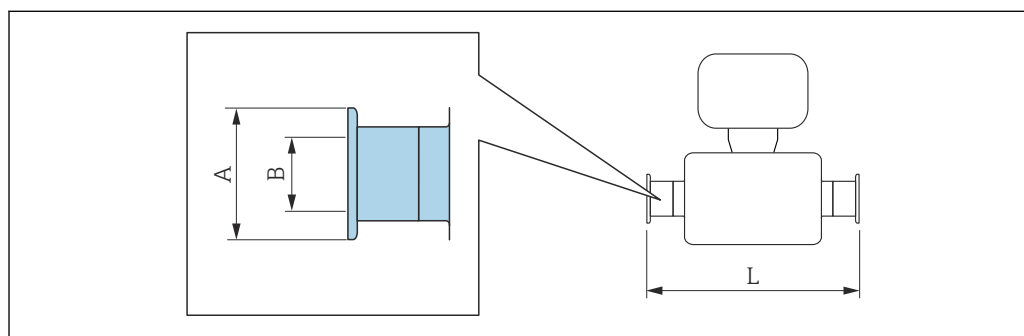
DN [mm]	Suitable for pipe DIN EN ISO 1127 [mm]	A [mm]	B [mm]	L [mm]
2 to 8	13.5 × 1.6	13.5	10.3	126.6
15	21.3 × 1.6	21.3	18.1	126.6
25	33.7 × 2.0	33.7	29.7	126.6

 Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 
**Welding nipple according to ISO 2037  
1.4404 (316L)**
*Order code for "Process connection", option IIS*

DN [mm]	Suitable for pipe ISO 2037 [mm]	A [mm]	B [mm]	L [mm]
2 to 8	13.5 × 2.3	13.5	9	126.6
15	21.3 × 2.65	21.3	16	126.6

**Welding nipple according to ISO 2037  
1.4404 (316L)**
*Order code for "Process connection", option I1S*

DN [mm]	Suitable for pipe ISO 2037 [mm]	A [mm]	B [mm]	L [mm]
25	33.7 × 3.25	33.7	27.2	126.6

 Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 
**Clamp connections**
*Clamp connections with aseptic molded seal*


A0015625

**Clamp according to DIN 32676  
1.4404 (316L)**
*Order code for "Process connection", option DBS*

DN [mm]	Suitable for pipe EN 10357 (DIN 11850) [mm]	A [mm]	B [mm]	L [mm]
2 to 8	14 × 2 (DN 10)	34	10	168
15	20 × 2 (DN 15)	34	16	168
25	30 × 2 (DN 25)	50.5	26	175
40	41 × 1.5	50.5	38	220
50	53 × 1.5	64	50	220
65	70 × 2	91	66	220
80	85 × 2	106	81	220
100	104 × 2	119	100	220
125	129 × 2	155	125	300
150	154 × 2	183	150	300

 Surface roughness:  $R_a \leq 0.8 \mu\text{m}$ , optional  $\leq 0.38 \mu\text{m}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Tri-Clamp for L14 AM7  
1.4404 (316L)**
*Order code for "Process connection", option FAS*

DN [mm]	Suitable for pipe as per ASME BPE [mm]	A [mm]	B [mm]	L [mm]
2 to 8	12.7 × 1.65	25	9.4	143
15	19.1 × 1.65	25	15.8	143
25	25.4 × 1.65	50.4	22.1	143
40	38.1 × 1.65	50.4	34.8	220

**Tri-Clamp for L14 AM7  
1.4404 (316L)***Order code for "Process connection", option FAS*

DN [mm]	Suitable for pipe as per ASME BPE [mm]	A [mm]	B [mm]	L [mm]
50	50.8 × 1.65	63.9	47.5	220
65	63.5 × 1.65	77.4	60.2	220
80	76.2 × 1.65	90.9	72.9	220
100	101.6 × 2.11	118.9	97.4	220
150	152.4 × 2.77	166.9	146.9	300

Surface roughness:  $R_a \leq 0.8 \mu\text{m}$ , optional  $\leq 0.38 \mu\text{m}$ 

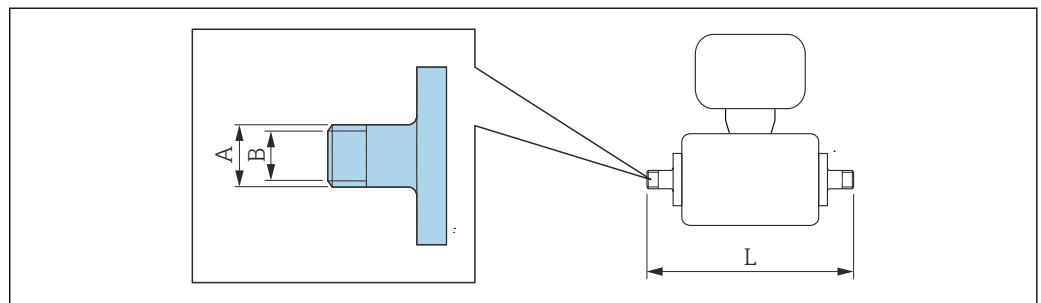
Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Clamp according to ISO 2852, Fig. 2  
1.4404 (316L)***Order code for "Process connection", option IBS*

DN [mm]	Suitable for pipe ISO 2037 [mm]	A [mm]	B [mm]	L [mm]
2 to 8	24.5 × 1.65	50.5	22.6	174.6
15	24.5 × 1.65	50.5	22.6	174.6
25	24.5 × 1.65	50.5	22.6	174.6
40	38 × 1.6	50.5	35.6	220
50	51 × 1.6	64	48.6	220
65	63.5 × 1.6	77.5	60.3	220
80	76.1 × 1.6	91	72.9	220
100	101.6 × 2	119	97.6	220
125	139.7 × 2	155	135.7	300
150	168.3 × 2.6	183	163.1	300

Surface roughness:  $R_a \leq 0.8 \mu\text{m}$ , optional  $\leq 0.38 \mu\text{m}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Cable glands***Threaded adapter with aseptic molded seal*

A0027509

Coupling SC DIN 11851, threaded adapter 1.4404 (316L) Order code for "Process connection", option DCS				
DN [mm]	Suitable for pipe EN 10357 (DIN 11850) [mm]	A [mm/in]	B [mm]	L [mm]
2 to 8	12 × 1 (DN 10)	Rd 28 × 1/8	10	174
15	18 × 1.5 (ODT 3/4")	Rd 34 × 1/8	16	174
25	28 × 1 or 28 × 1.5	Rd 52 × 1/6	26	190
40	42 × 1.5	Rd 65 × 1/6	38	260
50	54 × 1.5	Rd 78 × 1/6	50	260
65	70 × 2	Rd 95 × 1/6	66	270
80	85 × 2	Rd 110 × 1/4	81	280
100	104 × 2	Rd 130 × 1/4	100	290
125	129 × 2	Rd 160 × 1/4	125	380
150	154 × 2	Rd 160 × 1/4	150	390
Surface roughness: $R_a \leq 0.8 \mu\text{m}$ , optional $\leq 0.38 \mu\text{m}$ Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.				

Coupling DIN 11864-1, aseptic threaded hygienic connection, Form A 1.4404 (316L) Order code for "Process connection", option DDS				
DN [mm]	Suitable for pipe EN 10357 (DIN 11850) [mm]	A [mm/in]	B [mm]	L [mm]
2 to 8	Pipe 13 × 1.5 (DN 10)	Rd 28 × 1/8	10	170
15	Pipe 19 × 1.5	Rd 34 × 1/8	16	170
25	Pipe 29 × 1.5	Rd 52 × 1/6	26	184
40	42 × 1.5	Rd 65 × 1/6	38	256
50	54 × 1.5	Rd 78 × 1/6	50	256
65	70 × 2	Rd 95 × 1/6	66	266
80	85 × 2	Rd 110 × 1/4	81	276
100	104 × 2	Rd 130 × 1/4	100	286
Surface roughness: $R_a \leq 0.8 \mu\text{m}$ , optional $\leq 0.38 \mu\text{m}$ Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.				

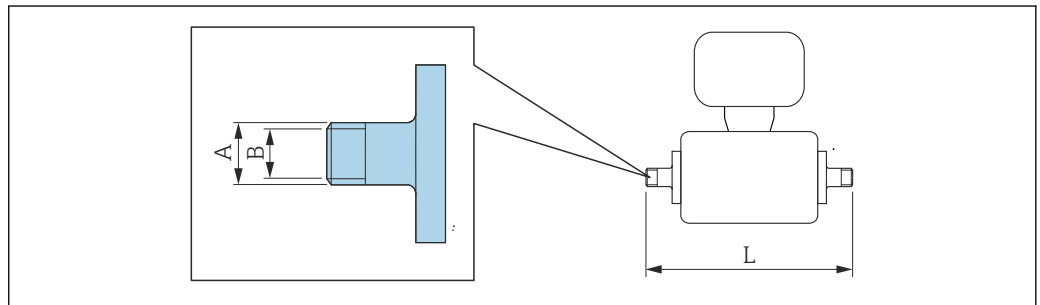
Coupling ISO 2853, threaded adapter 1.4404 (316L) Order code for "Process connection", option ICS					
DN [mm]	Suitable for pipe ISO 2037 [mm]	DN Clamp ISO 2853 [mm]	A [mm/in]	B [mm]	L [mm]
40	38 × 1.6	38	Tr 50.5 × 3.175	35.6	256
50	51 × 1.6	51	Tr 64 × 3.175	48.6	256
65	63.5 × 1.6	63.5	Tr 77.5 × 3.175	60.3	266
80	76.1 × 1.6	76.1	Tr 91 × 3.175	72.9	276
100	101.6 × 2	101.6	Tr 118 × 3.175	97.6	286
Surface roughness: $R_a \leq 0.8 \mu\text{m}$ , optional $\leq 0.38 \mu\text{m}$ Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.					

**Coupling SMS 1145, threaded adapter  
1.4404 (316L)**
*Order code for "Process connection", option SAS*

DN [mm]	Suitable for pipe ODT [mm]	DN SMS 1145 [mm]	A [mm/in]	B [mm]	L [mm]
25	1	25	Rd40 × 1/6	22.6	147.6
40	38.1 × 1.65	38	Rd 60 × 1/6"	34.8	256
50	50.8 × 1.65	51	Rd 70 × 1/6"	47.5	256
65	63.5 × 1.65	63.5	Rd 85 × 1/6"	60.2	266
80	76.2 × 1.65	76	Rd 98 × 1/6"	72.6	276
100	101.6 × 1.65	101.6	Rd 132 × 1/6"	97.4	286

 Surface roughness:  $R_a \leq 0.8 \mu\text{m}$ , optional  $\leq 0.38 \mu\text{m}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Threaded adapter with O-ring seal**


A0027509

**External thread according to ISO 228/DIN 2999**
**1.4404 (316L)**
*Order code for "Process connection", option I2S*

DN [mm]	A [mm/in]	B [mm]	L [mm]
2 to 8	R 10.1 × 3/8	10	166
15	R 13.2 × 1/2	16	166
25	R 16.5 × 1	25	170

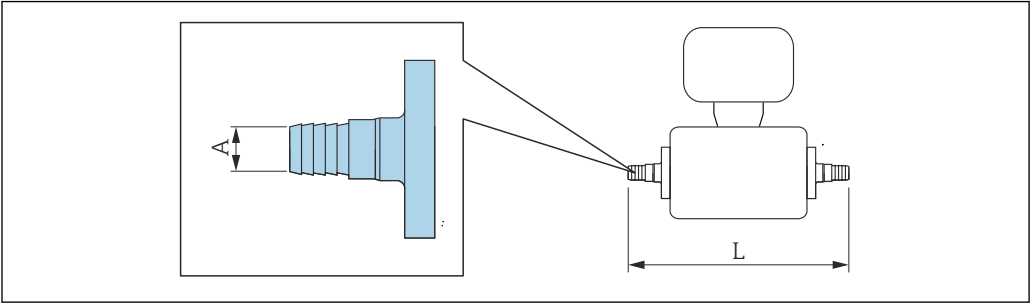
 Surface roughness:  $R_a \leq 1.6 \mu\text{m}$ 
**Internal thread according to ISO 228/DIN 2999**
**1.4404 (316L)**
*Order code for "Process connection", option I3S*

DN [mm]	A [mm/in]	B [mm]	L [mm]
2 to 8	Rp 13 × 3/8	9	176
15	Rp 14 × 1/2	16	176
25	Rp 17 × 1	27.2	188

 Surface roughness:  $R_a \leq 1.6 \mu\text{m}$

Hose adapter

Hose adapter with O-ring seal

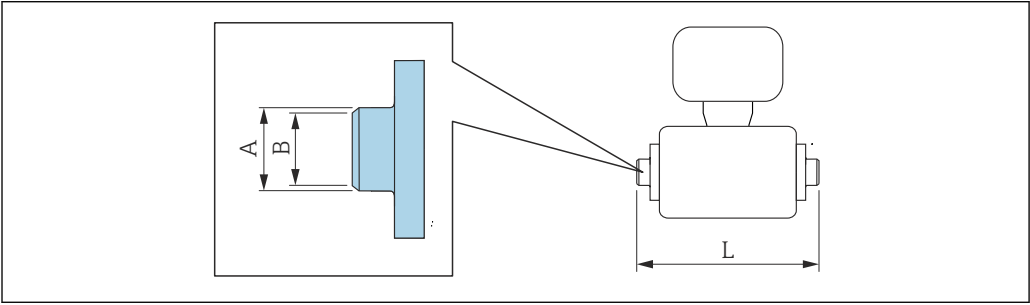


A0027511

<b>Hose adapter</b> <b>1.4404 (316L)</b> Order code for "Process connection", options <b>O1S, O2S, O3S</b>			
DN [mm]	Suitable for internal diameter [mm]	A [mm]	L [mm]
2 to 8	13	10	184
15	16	12.6	184
25	19	16	184
Surface roughness: $R_a \leq 1.6 \mu\text{m}$			

Adhesive sleeves

Adhesive sleeves with O-ring seal

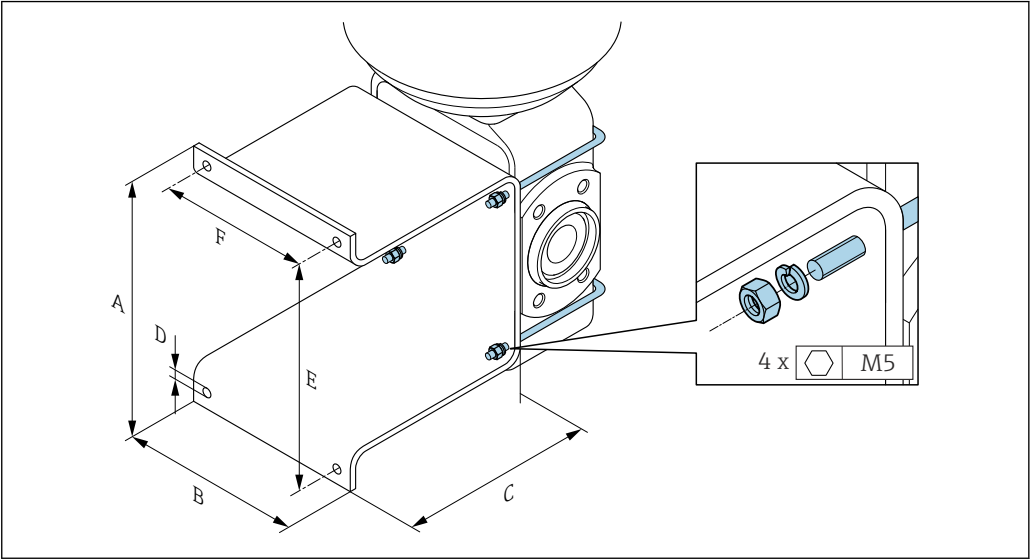


A0027510

<b>Adhesive sleeve</b> <b>PVC</b> Order code for "Process connection", options <b>O1V, O2V</b>				
DN [mm]	Suitable for pipe [mm] / [in]	A [mm]	B [mm]	L [mm]
2 to 8	20 × 2 (DIN 8062)	27	20.2	163
15	½	27.3	21.5	163
25	20 × 2 (DIN 8062)	27	20.2	142
Surface roughness: $R_a \leq 1.6 \mu\text{m}$ The required grounding rings can be ordered as accessories (order code: DK5HR-****).				

Mountings sets

Wall mounting kit

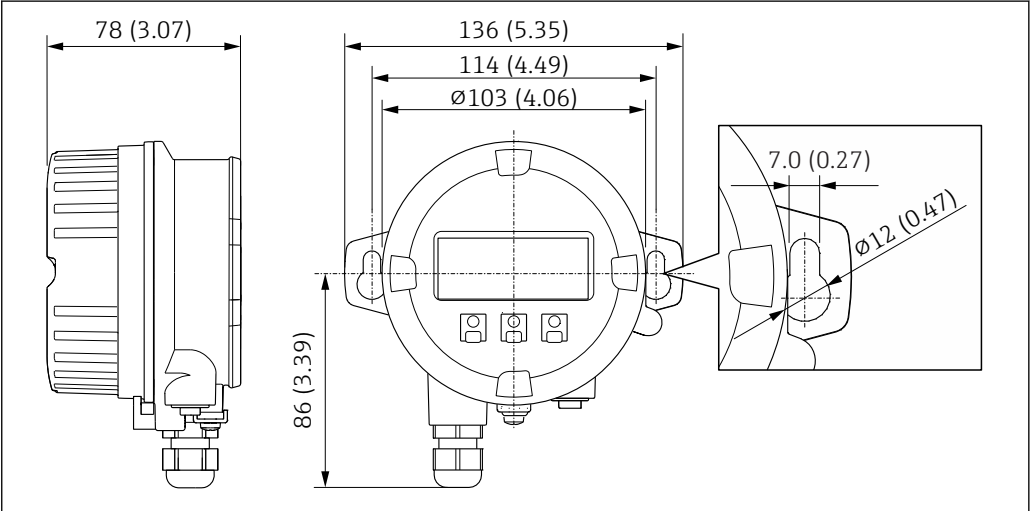


A000537

A [mm]	B [mm]	C [mm]	Ø D [mm]	E [mm]	F [mm]
125	88	120	7	110	140

Accessories

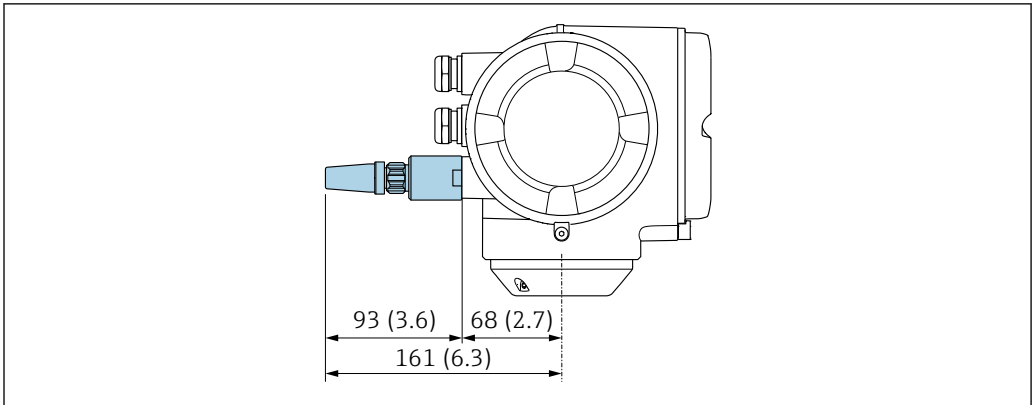
Remote display and operating module DKX001



A0028921

38 Engineering unit mm (in)

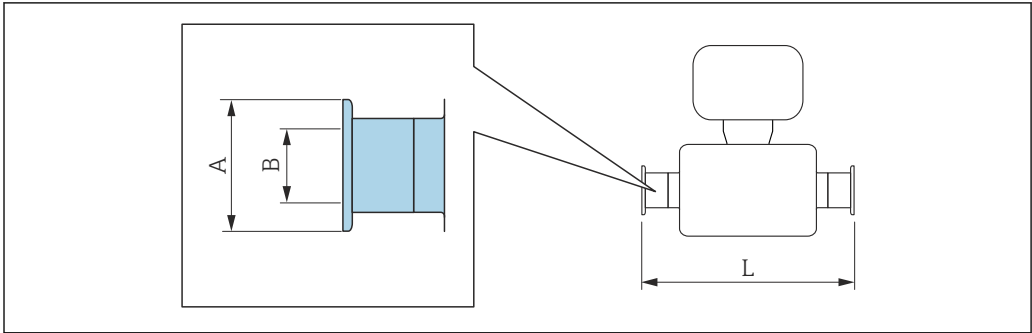
External WLAN antenna



A0028923

39 Engineering unit mm (in)

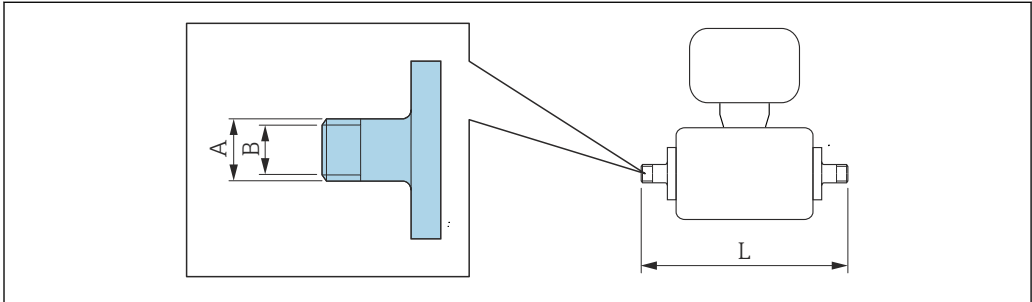
Clamp connections with aseptic molded seal available for order



A0015625

<b>Tri-Clamp for L14 AM17</b> <b>1.4404 (316L)</b> <b>Order code: DKH**-HF**</b>				
DN [mm]	Suitable for pipe in accordance with ASME BPE (reduction) [mm]	A [mm]	B [mm]	L [mm]
15	Pipe ODT 1	50.4	22.1	143
Surface roughness: $R_a \leq 0.8 \mu\text{m}$ , optional $\leq 0.38 \mu\text{m}$ Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.				

Threaded glands with O-ring seal available for order



A0027509



**External thread****1.4404 (316L)****Order code: DKH\*\*-GD\*\***

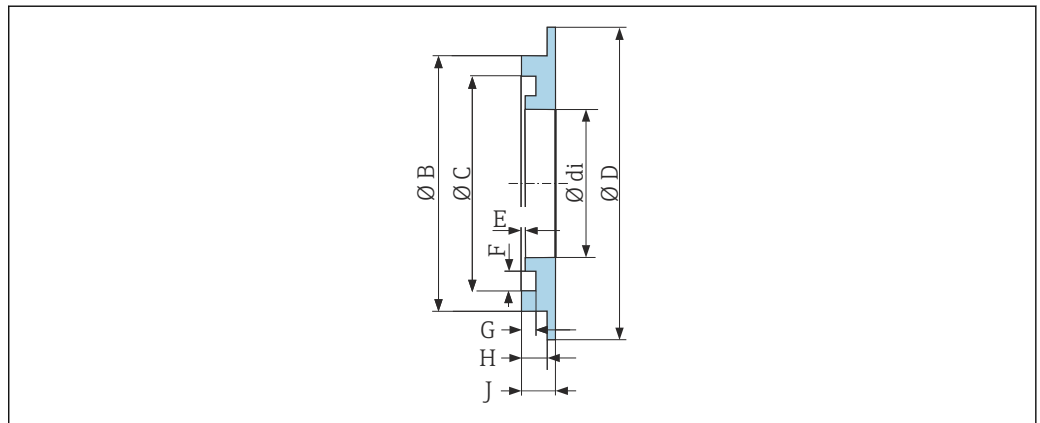
DN [mm]	Suitable for NPT internal thread [in]	A [mm/in]	B [mm]	L [mm]
2 to 8	NPT 3/8	R 15.5 × 3/8	10	186
15	NPT 1/2	R 20 × 1/2	16	186
25	NPT 1	R 25 × 1	25	196

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$

**Internal thread****1.4404 (316L)****Order code: DKH\*\*-GC\*\***

DN [mm]	Suitable for NPT external thread [in]	A [mm/in]	B [mm]	L [mm]
2 to 8	NPT 3/8	R 13 × 3/8	8.9	176
15	NPT 1/2	R 14 × 1/2	16	176
25	NPT 1	R 17 × 1	27.2	188

Surface roughness:  $R_a \leq 1.6 \mu\text{m}$

*Grounding rings*

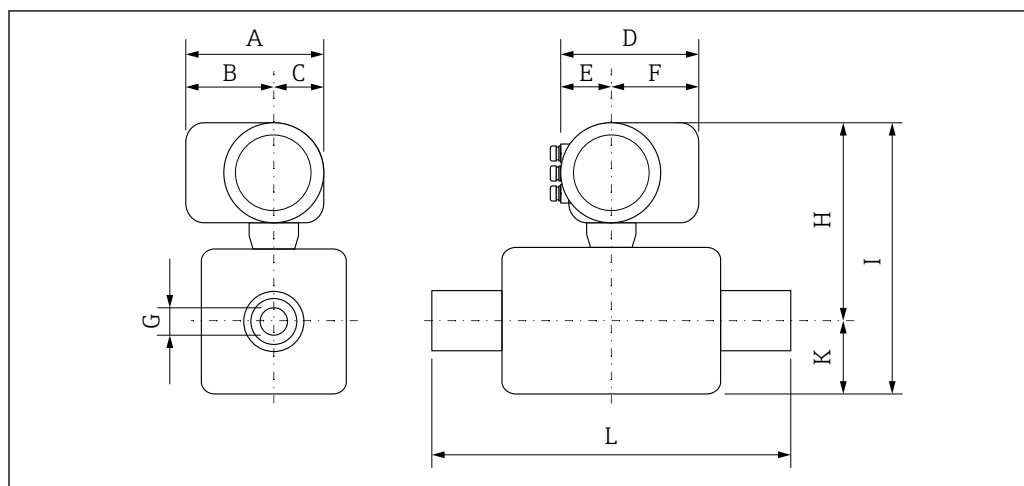
A0017673

**For lap joint flange made of PVDF and PVC adhesive sleeve****1.4435 (316L), Alloy C22, tantalum****Order code: DK5HR-\*\*\*\***

DN [mm]	di [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	J [mm]
2 to 8	9	22	17.6	33.9	0.5	3.5	1.9	3.4	4.5
15	16	29	24.6	33.9	0.5	3.5	1.9	3.4	4.5
25	26	39	34.6	43.9	0.5	3.5	1.9	3.4	4.5

## Dimensions in US units

## Compact version



A0029789

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

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D <sup>2)</sup>	E <sup>2)</sup>	F	G	H	I	K	L <sup>3)</sup>
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1/12	7.87	5.55	2.32	6.65	2.68	3.98	0.09	9.53	11.7	2.17	3.39
1/8	7.87	5.55	2.32	6.65	2.68	3.98	0.18	9.53	11.7	2.17	3.39
3/8	7.87	5.55	2.32	6.65	2.68	3.98	0.35	9.53	11.7	2.17	3.39
½	7.87	5.55	2.32	6.65	2.68	3.98	0.63	9.53	11.7	2.17	3.39
1	7.87	5.55	2.32	6.65	2.68	3.98	1.02	9.53	11.7	2.17	3.39
1 ½	7.87	5.55	2.32	6.65	2.68	3.98	1.37	9.57	11.7	2.09	5.51
2	7.87	5.55	2.32	6.65	2.68	3.98	1.87	9.8	12.2	2.36	5.51
3	7.87	5.55	2.32	6.65	2.68	3.98	2.87	10.35	13.3	2.91	5.51
4	7.87	5.55	2.32	6.65	2.68	3.98	3.83	10.87	14.3	3.43	5.51
5	7.87	5.55	2.32	6.65	2.68	3.98	4.72	11.5	15.6	4.06	7.87
6	7.87	5.55	2.32	6.65	2.68	3.98	5.78	12.05	16.7	4.61	7.87

- 1) For version without local display: values - 1.18 in  
 2) Depending on the cable gland used: values up to + 1.18 in  
 3) Total length (L) depends on the process connections.

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

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D <sup>2)</sup>	E <sup>2)</sup>	F	G	H	I	K	L <sup>3)</sup>
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1/12	8.54	6.26	2.28	7.4	3.35	4.06	0.09	10.7	12.9	2.17	3.39
1/8	8.54	6.26	2.28	7.4	3.35	4.06	0.18	10.7	12.9	2.17	3.39
3/8	8.54	6.26	2.28	7.4	3.35	4.06	0.35	10.7	12.9	2.17	3.39
½	8.54	6.26	2.28	7.4	3.35	4.06	0.63	10.7	12.9	2.17	3.39
1	8.54	6.26	2.28	7.4	3.35	4.06	1.02	10.7	12.9	2.17	3.39
1 ½	8.54	6.26	2.28	7.4	3.35	4.06	1.37	10.8	12.9	2.09	5.51
2	8.54	6.26	2.28	7.4	3.35	4.06	1.87	11.0	13.4	2.36	5.51
3	8.54	6.26	2.28	7.4	3.35	4.06	2.87	11.5	14.4	2.91	5.51
4	8.54	6.26	2.28	7.4	3.35	4.06	3.83	12.1	15.5	3.43	5.51

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D <sup>2)</sup>	E <sup>2)</sup>	F	G	H	I	K	L <sup>3)</sup>
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
5	8.54	6.26	2.28	7.4	3.35	4.06	4.72	12.7	16.8	4.06	7.87
6	8.54	6.26	2.28	7.4	3.35	4.06	5.78	13.2	17.8	4.61	7.87

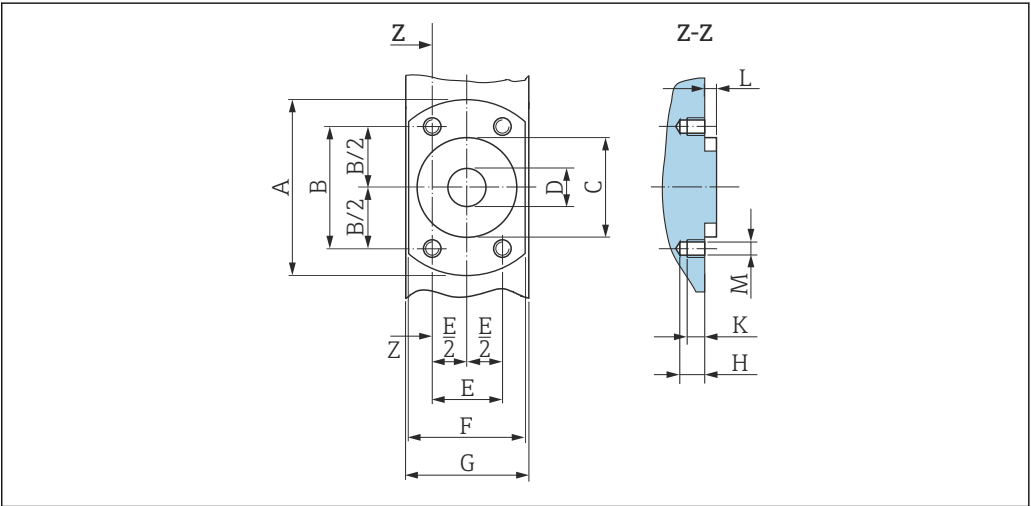
- 1) For version without local display: values - 1.18 in  
2) Depending on the cable gland used: values up to + 1.18 in  
3) Total length (L) depends on the process connections.

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

DN	A <sup>1)</sup>	B <sup>1)</sup>	C	D <sup>2)</sup>	E <sup>2)</sup>	F	G	H	I	K	L <sup>3)</sup>
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1/12	7.72	5.31	2.4	6.93	2.87	4.06	0.09	9.49	11.7	2.17	3.39
1/8	7.72	5.31	2.4	6.93	2.87	4.06	0.18	9.49	11.7	2.17	3.39
3/8	7.72	5.31	2.4	6.93	2.87	4.06	0.35	9.49	11.7	2.17	3.39
½	7.72	5.31	2.4	6.93	2.87	4.06	0.63	9.49	11.7	2.17	3.39
1	7.72	5.31	2.4	6.93	2.87	4.06	1.02	9.49	11.7	2.17	3.39
1 ½	7.72	5.31	2.4	6.93	2.87	4.06	1.37	9.49	11.7	2.09	5.51
2	7.72	5.31	2.4	6.93	2.87	4.06	1.87	9.96	12.1	2.36	5.51
3	7.72	5.31	2.4	6.93	2.87	4.06	2.87	10.3	13.2	2.91	5.51
4	7.72	5.31	2.4	6.93	2.87	4.06	3.83	10.8	14.3	3.43	5.51
5	7.72	5.31	2.4	6.93	2.87	4.06	4.72	11.5	15.5	4.06	7.87
6	7.72	5.31	2.4	6.93	2.87	4.06	5.78	12.0	16.6	4.61	7.87

- 1) For version without local display: values - 1.18 in  
2) Depending on the cable gland used: values up to + 1.18 in  
3) Total length (L) depends on the process connections.

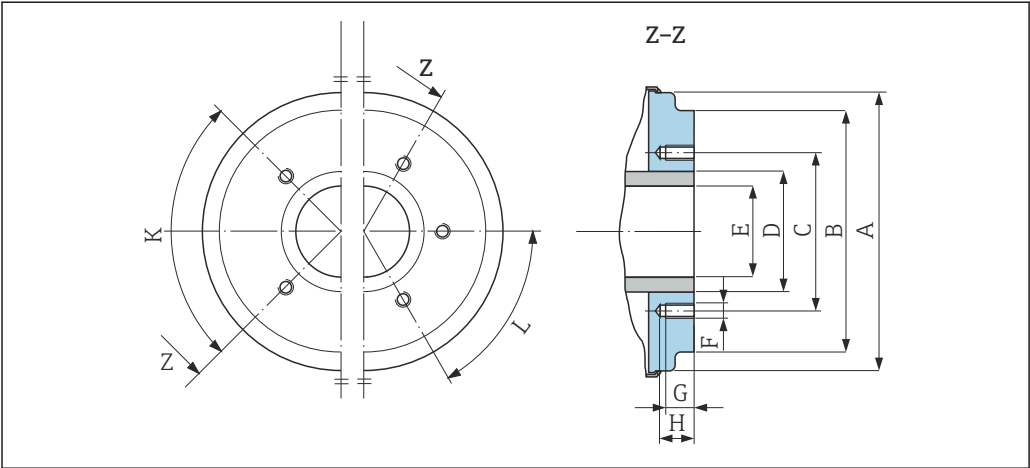
Sensor flange connection



A0017657

40 Front view without process connections

DN	A	B	C	D	E	F	G	H	K	L	M
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[mm]
1/12	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
1/8	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
3/8	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
½	2.44	1.64	1.34	0.63	0.94	1.65	1.69	0.33	0.24	0.16	M6
1	2.83	1.98	1.73	0.89	1.14	2.17	2.20	0.33	0.24	0.16	M6

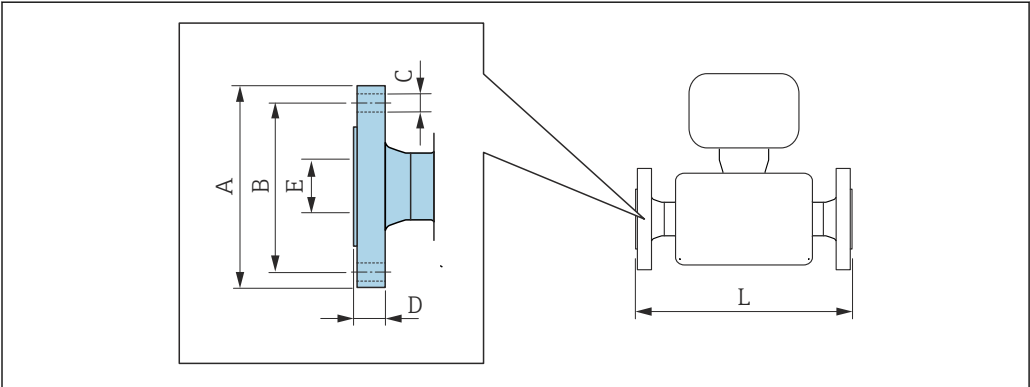


41 Front view without process connections

DN	A	B	C	D	E	F	G	H	K	L
[in]	[in]	[in]	[in]	[in]	[in]	[mm]	[in]	[in]	90° ±0.5° Tapped holes	60° ±0.5°
1 ½	3.93	3.38	2.80	1.90	1.37	M8	0.47	0.67	4	–
2	4.44	3.89	3.29	2.37	1.87	M8	0.47	0.67	4	–
3	5.54	5.26	4.49	3.50	2.87	M8	0.47	0.67	–	6
4	6.56	6.28	5.55	4.50	3.83	M8	0.47	0.67	–	6
5	7.82	7.54	6.73	5.50	4.72	M10	0.59	0.79	–	6
6	8.93	8.64	7.87	6.63	5.78	M10	0.59	0.79	–	6

Flanges

Flanges with O-ring seal

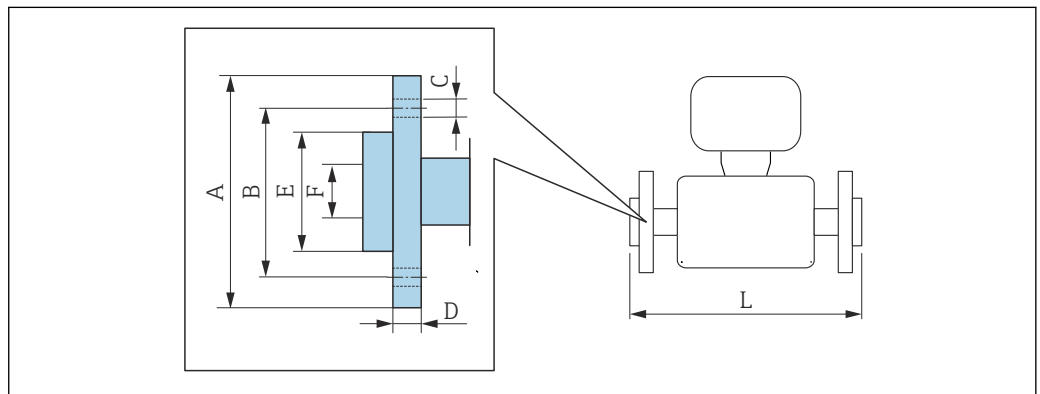


**Flange according to ASME B16.5: Class 150  
1.4404 (316L)**
*Order code for "Process connection", option A1S*

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$ <sup>1)</sup>	3.50	2.38	4 × Ø 0.62	0.44	0.62	8.59
$\frac{1}{2}$	3.50	2.38	4 × Ø 0.62	0.44	0.63	8.59
1	4.25	3.12	4 × Ø 0.62	0.56	1.05	9.05

 Surface roughness:  $R_a \leq 63 \mu\text{in}$ 

- 1) DN  $\frac{1}{12}$  to  $\frac{3}{8}$  with DN  $\frac{1}{2}$ " flanges as standard



A002221

**Lap joint flange according to ASME B16.5: Class 150  
PVDF**
*Order code for "Process connection", option A1P*

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$ <sup>1)</sup>	3.74	2.36	4 × Ø 0.62	0.59	1.38	0.63	7.87
$\frac{1}{2}$	3.74	2.36	4 × Ø 0.62	0.59	1.38	0.63	7.87

 Surface roughness:  $R_a \leq 63 \mu\text{in}$ 

The required grounding rings can be ordered as accessories (order code: DK5HR-\*\*\*\*).

- 1) DN  $\frac{1}{12}$  to  $\frac{3}{8}$  with DN  $\frac{1}{2}$ " flanges as standard

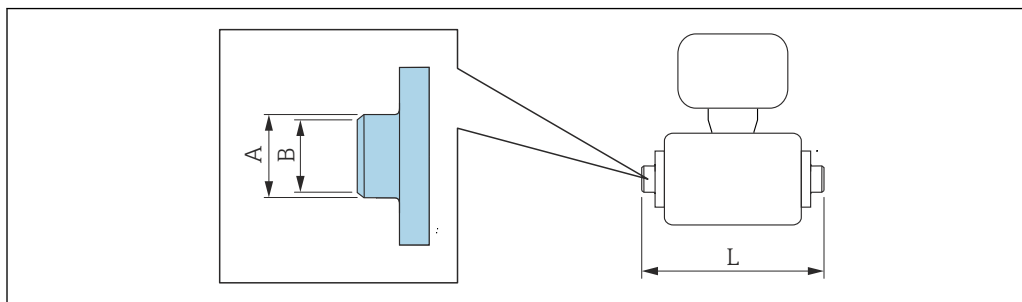
**Lap joint flange according to ASME B16.5: Class 150  
PVDF**
*Order code for "Process connection", option A4P*

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$ <sup>1)</sup>	3.74	2.36	4 × Ø 0.62	0.59	1.38	0.63	7.87
$\frac{1}{2}$	3.74	2.36	4 × Ø 0.62	0.59	1.38	0.63	7.87

 Surface roughness:  $R_a \leq 63 \mu\text{in}$ 

Grounding rings are not necessary.

- 1) DN  $\frac{1}{12}$  to  $\frac{3}{8}$  with DN  $\frac{1}{2}$ " flanges as standard

**Welding nipple***Welding nipple with aseptic molded seal*

A0027510

**Welding nipple according to ISO 2037****1.4404 (316L)***Order code for "Process connection", option IAS*

DN [in]	Suitable for pipe ISO 2037 [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	$0.50 \times 0.06$	0.50	0.35	4.65
$\frac{1}{2}$	$0.75 \times 0.06$	0.75	0.63	4.65
1	$1.00 \times 0.06$	1.00	0.89	4.65
1 $\frac{1}{2}$	$1.50 \times 0.05$	1.50	1.40	8.66
2	$2.00 \times 0.05$	2.01	1.91	8.66
3	$3.00 \times 0.06$	3.00	2.87	8.66
4	$2.50 \times 0.08$	4.00	3.84	8.66
5	$4.00 \times 0.08$	5.50	5.34	15.0
6	$6.63 \times 0.10$	6.63	6.42	15.0

Surface roughness:  $R_a \leq 31.5 \mu\text{in}$ , optional  $\leq 15 \mu\text{in}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

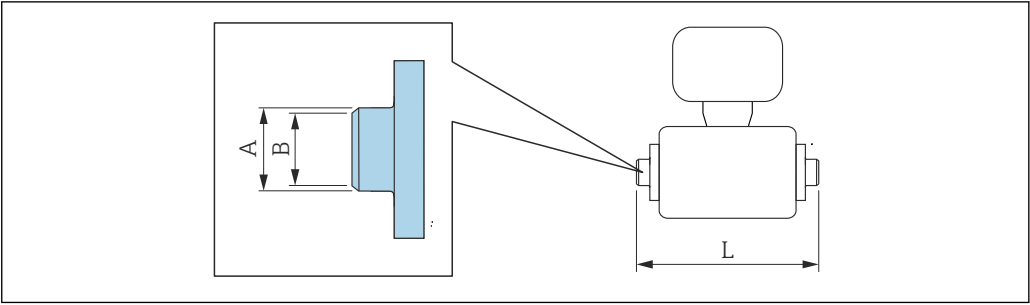
**Welding nipple according to ASME BPE****1.4404 (316L)***Order code for "Process connection", option AAS*

DN [in]	Suitable for pipe ASME BPE [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	$0.50 \times 0.06$	0.50	0.35	4.65
$\frac{1}{2}$	$0.75 \times 0.06$	0.75	0.63	4.65
1	$1.00 \times 0.06$	1.00	0.89	4.65
1 $\frac{1}{2}$	$1.50 \times 0.06$	1.50	1.37	8.66
2	$2.00 \times 0.06$	2.00	1.87	8.66
3	$3.00 \times 0.06$	3.00	2.87	8.66
4	$4.00 \times 0.08$	4.00	3.83	8.66
6	$6.00 \times 0.11$	6.00	5.90	11.8

Surface roughness:  $R_a \leq 31.5 \mu\text{in}$ , optional  $\leq 15 \mu\text{in}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

Welding nipple with O-ring seal



A0027510

Welding nipple according to ODT/SMS

1.4404 (316L)

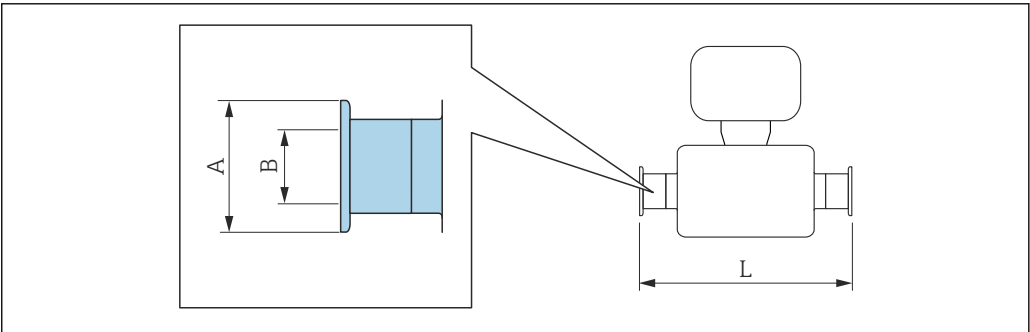
Order code for "Process connection", option A2S

DN [in]	Suitable for pipe ODT/SMS [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	$0.53 \times 0.09$	0.53	0.35	4.99
$\frac{1}{2}$	$0.84 \times 0.10$	0.84	0.63	4.99

Surface roughness:  $R_a \leq 63 \mu\text{m}$

Clamp connections

Clamp connections with aseptic molded seal



A0015625

Tri-Clamp for L14 AM7

1.4404 (316L)

Order code for "Process connection", option FAS

DN [in]	Suitable for pipe as per ASME BPE [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	$\frac{1}{2}$	1	0.37	5.63
$\frac{1}{2}$	$\frac{3}{4}$	2.5	0.62	5.63
1	1	2	0.87	5.63
$1 \frac{1}{2}$	$1.50 \times 0.06$	1.98	1.37	8.66
2	$2.00 \times 0.06$	2.52	1.87	8.66
3	$3.00 \times 0.06$	3.58	2.87	8.66
4	$4.00 \times 0.08$	4.68	3.83	8.66
6	$6.00 \times 0.11$	6.57	5.90	11.8

Surface roughness:  $R_a \leq 31.5 \mu\text{m}$ , optional  $\leq 15 \mu\text{m}$

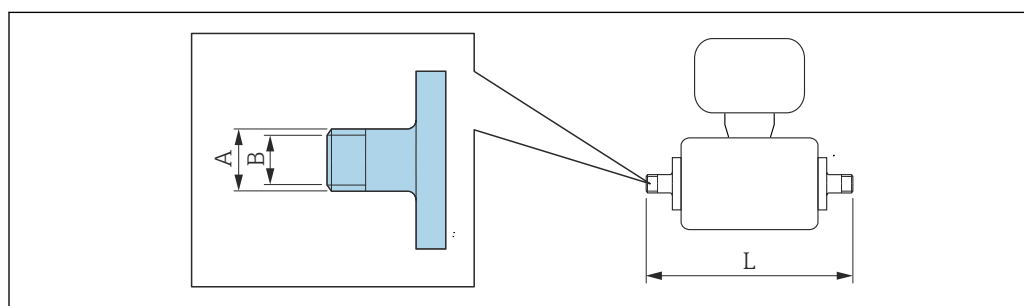
Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Clamp according to ISO 2852, Fig. 2**  
**1.4404 (316L)**
*Order code for "Process connection", option IBS*

DN [in]	Suitable for pipe ISO 2037 [in]	DN Clamp ISO 2852 [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	$0.96 \times 0.06$	1	2.00	0.89	6.87
$\frac{1}{2}$	$0.96 \times 0.06$	1	2.00	0.89	6.87
1	$0.96 \times 0.06$	1	2.00	0.89	6.87
1 $\frac{1}{2}$	$1.50 \times 0.06$	1.50	1.99	1.40	8.66
2	$2.00 \times 0.06$	2.01	2.52	1.91	8.66
3	$3.00 \times 0.06$	3.00	3.58	2.87	8.66
4	$2.50 \times 0.08$	4.00	4.69	3.84	8.66
5	$4.00 \times 0.08$	5.50	6.10	5.34	11.8
6	$6.63 \times 0.10$	6.63	7.20	6.42	11.8

 Surface roughness:  $R_a \leq 31.5 \mu\text{in}$ , optional  $\leq 15 \mu\text{in}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**Cable glands**
*Threaded adapter with aseptic molded seal*


A0027509

**Coupling SC DIN 11851, threaded adapter**  
**1.4404 (316L)**
*Order code for "Process connection", option DCS*

DN [in]	Suitable for pipe EN 10357 (DIN 11850) [in]	A [in]	B [in]	L [in]
$\frac{1}{2}$	Pipe ODT $\frac{3}{4}$	Rd0.05 $\times$ 0.13	0.63	6.85
1 $\frac{1}{2}$	$1.65 \times 0.06$	Rd 2.56 $\times$ 1/6	1.5	10.2
2	$2.13 \times 0.06$	Rd 3.07 $\times$ 1/6	1.97	10.2
3	$3.35 \times 0.08$	Rd 4.33 $\times$ 1/4	3.19	11.0
4	$4.09 \times 0.08$	Rd 5.12 $\times$ 1/4	3.94	11.4
5	$5.08 \times 0.08$	Rd 6.30 $\times$ 1/4	4.92	15.0
6	$6.06 \times 0.08$	Rd 6.30 $\times$ 1/4	5.91	15.4

 Surface roughness:  $R_a \leq 31.5 \mu\text{in}$ , optional  $\leq 15 \mu\text{in}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.



**Coupling ISO 2853, threaded adapter  
1.4404 (316L)**

Order code for "Process connection", option ICS

DN [in]	Suitable for pipe EN 10357 (DIN 11850) [in]	DN Clamp ISO 2853 [in]	A [in]	B [in]	L [in]
1 ½	1.50 × 0.06	1.50	Tr 2.00 × 0.13	1.40	10.8
2	2.00 × 0.06	2.01	Tr 2.52 × 0.13	1.91	10.8
3	3.00 × 0.06	3.00	Tr 3.58 × 0.13	2.87	10.9
4	2.50 × 0.08	4.00	Tr 4.65 × 0.13	3.84	11.3

Surface roughness:  $R_a \leq 31.5 \mu\text{in}$ , optional  $\leq 15 \mu\text{in}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

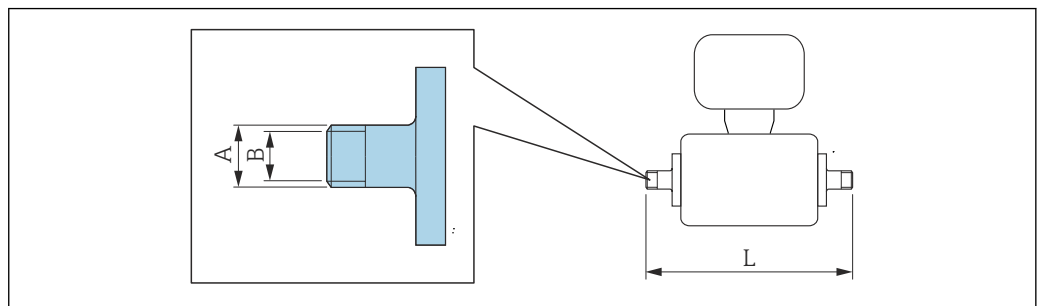
**Coupling SMS 1145, threaded adapter  
1.4404 (316L)**

Order code for "Process connection", option SAS

DN [in]	Suitable for pipe ODT [in]	DN SMS 1145 [in]	A [in]	B [in]	L [in]
1	1	1	Rd1.57 × 0.17	0.89	5.81
1 ½	1.50 × 0.06	1.50	Rd 2.36 × 1/6	1.37	10.1
2	2.00 × 0.06	2.00	Rd 2.76 × 1/6	1.87	10.1
3	3.00 × 0.06	3.00	Rd 3.86 × 1/6	2.86	10.9
4	4.00 × 0.08	4.00	Rd 5.20 × 1/6	3.83	11.3

Surface roughness:  $R_a \leq 31.5 \mu\text{in}$ , optional  $\leq 15 \mu\text{in}$ 

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

*Threaded adapter with O-ring seal*

A0027509

**External thread according to ISO 228/DIN 2999  
1.4404 (316L)**

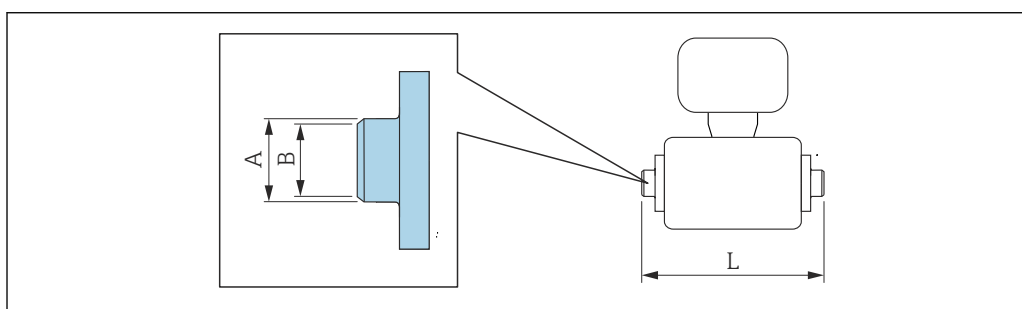
Order code for "Process connection", option I2S

DN [in]	Suitable for internal thread ISO 228 / DIN 2999 [in]	A [in]	B [in]	L [in]
1/12 to 3/8	R 3/8	Rd 0.40 × 3/8	0.39	6.53
1/2	R 1/2	Rd 0.52 × 1/2	0.63	6.53
1	R 1	Rd 0.66 × 1	0.98	6.69

Surface roughness:  $R_a \leq 63 \mu\text{in}$

**Internal thread according to ISO 228/DIN 2999  
1.4404 (316L)**
*Order code for "Process connection", option I3S*

DN [in]	Suitable for external thread ISO 228 / DIN 2999 [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	Rp $\frac{3}{8}$	Rd $0.51 \times \frac{3}{8}$	0.35	6.93
$\frac{1}{2}$	Rp $\frac{1}{2}$	Rd $0.55 \times \frac{1}{2}$	0.63	6.93
1	Rp 1	Rd $0.67 \times 1$	1.07	7.41

 Surface roughness:  $R_a \leq 63 \mu\text{in}$ 
**Adhesive sleeves**
*Adhesive sleeves with O-ring seal*


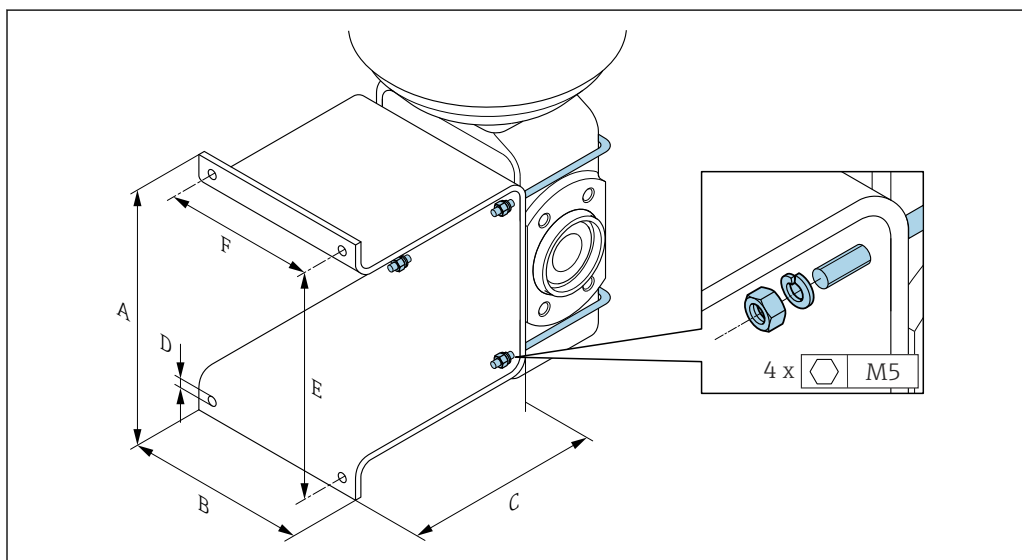
A0027510

**Adhesive sleeve  
PVC**
*Order code for "Process connection", options O1V, O2V*

DN [in]	Suitable for pipe [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	$\frac{1}{2}$	1.07	0.85	6.43

 Surface roughness:  $R_a \leq 63 \mu\text{in}$ 

The required grounding rings can be ordered as accessories (order code: DK5HR-\*\*\*\*).

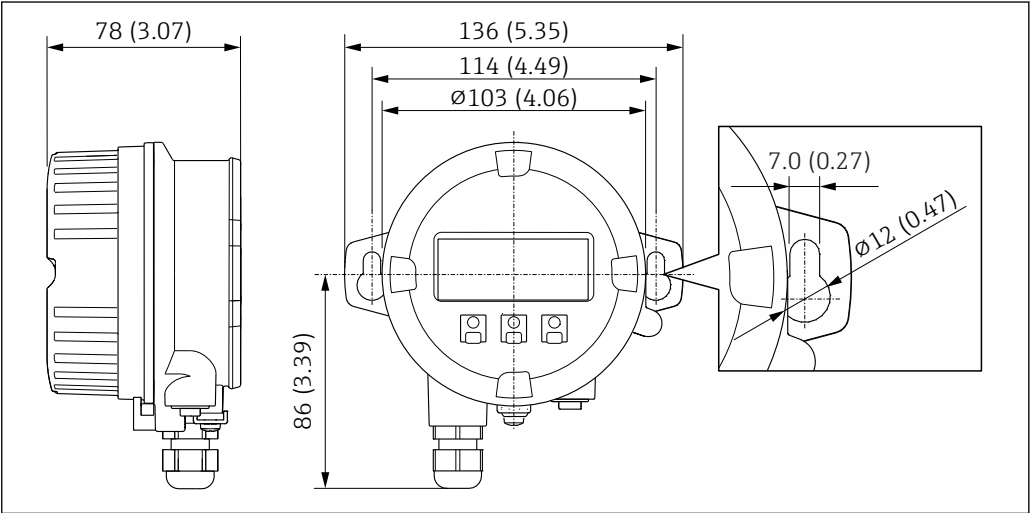
**Mountings sets**
*Wall mounting kit*


A0005537

A	B	C	Ø D	E	F
[in]	[in]	[in]	[in]	[in]	[in]
4.92	3.46	4.72	0.28	4.33	5.51

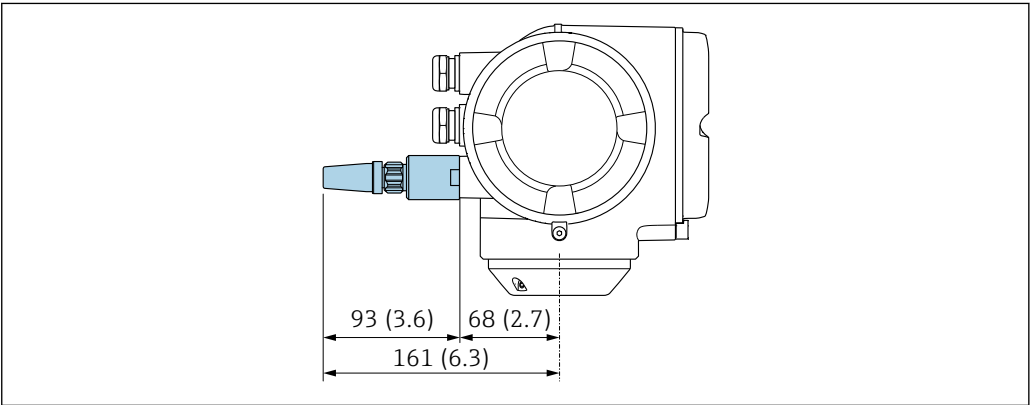
Accessories

Remote display and operating module DKX001



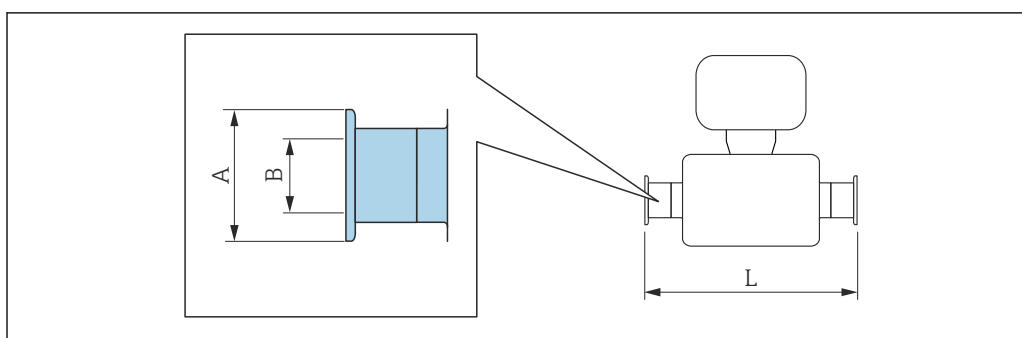
42 Engineering unit mm (in)

External WLAN antenna



43 Engineering unit mm (in)

Clamp connections with aseptic molded seal available for order



A0015625

44 Hygienic clamp adapter connection suitable for pipes with connection according to ASME BPE (reduction)

#### Tri-Clamp for L14 AM17

1.4404 (316L)

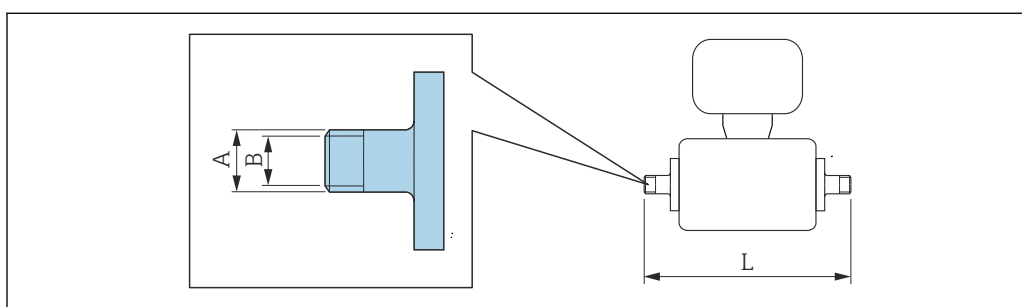
Order code: DKH\*\*-HF\*\*

DN [in]	Suitable for pipe in accordance with ASME BPE (reduction) [in]	A [in]	B [in]	L [in]
1/2	Pipe ODT 1	2	0.87	5.63

Surface roughness:  $R_a \leq 31.5 \mu\text{in}$ , optional  $\leq 15 \mu\text{in}$

Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

Threaded glands with O-ring seal available for order



A0027509

#### External thread

1.4404 (316L)

Order code: DKH\*\*-GD\*\*

DN [in]	Suitable for NPT internal thread [in]	A [in]	B [in]	L [in]
1/12 to 3/8	NPT 3/8	R 0.61 × 3/8	0.39	7.39
1/2	NPT 1/2	R 0.79 × 1/2	0.63	7.39
1	NPT 1	R 1 × 1	1	7.73

Surface roughness:  $R_a \leq 63 \mu\text{in}$

#### Internal thread

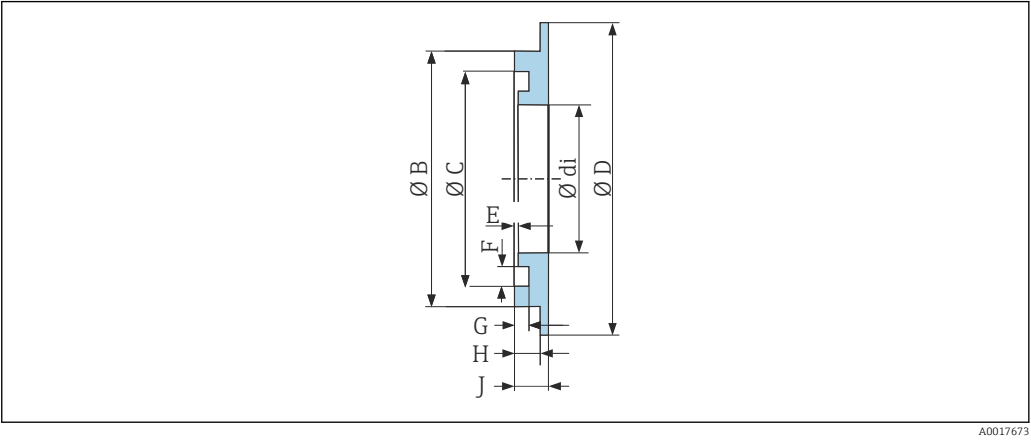
1.4404 (316L)

Order code: DKH\*\*-GC\*\*

DN [in]	Suitable for NPT external thread [in]	A [in]	B [in]	L [in]
1/12 to 3/8	NPT 3/8	R 0.51 × 3/8	0.35	6.93
1/2	NPT 1/2	R 0.55 × 1/2	0.63	6.93

Internal thread 1.4404 (316L) Order code: DKH**-GC**				
DN [in]	Suitable for NPT external thread [in]	A [in]	B [in]	L [in]
1	NPT 1	R 0.67 × 1	1.07	7.41
Surface roughness: R <sub>a</sub> ≤ 63 µin				

Grounding rings



A0017673

For lap joint flange made of PVDF and PVC adhesive sleeve 1.4435 (316L), Alloy C22, tantalum Order code: DK5HR-****									
DN [in]	di [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	J [in]
1/12 to 3/8	0.35	0.87	0.69	1.33	0.02	0.14	0.07	0.13	0.18
1/2	0.63	1.14	0.97	1.33	0.02	0.14	0.07	0.13	0.18
1	0.89	1.44	1.23	1.73	0.02	0.14	0.07	0.13	0.18

Weight

- Including the transmitter
  - Weight specifications apply to standard pressure ratings and without packaging material.
- Transmitter version for the hazardous area: +2 kg (+4.4 lbs)

Nominal diameter		Weight	
[mm]	[in]	[kg]	[lbs]
2	1/12	4.7	10.4
4	1/8	4.7	10.4
8	3/8	4.7	10.4
15	1/2	4.6	10.1
25	1	5.5	12.1
40	1 1/2	6.8	15.0
50	2	7.3	16.1
65	–	8.1	17.9
80	3	8.7	19.2
100	4	10.0	22.1

Nominal diameter		Weight	
[mm]	[in]	[kg]	[lbs]
125	5	15.4	34.0
150	6	17.8	39.3

Measuring tube specification

Nominal diameter		Pressure rating <sup>1)</sup>	Process connection internal diameter	
[mm]	[in]	EN (DIN)	PFA	
		[bar]	[mm]	[in]
2	1/12	PN 16/40	2.25	0.09
4	1/8	PN 16/40	4.5	0.18
8	3/8	PN 16/40	9.0	0.35
15	½	PN 16/40	16.0	0.63
–	1	PN 16/40	22.6	0.89
25	–	PN 16/40	26.0	1.02

1) Depending on process connection and seals used

Materials

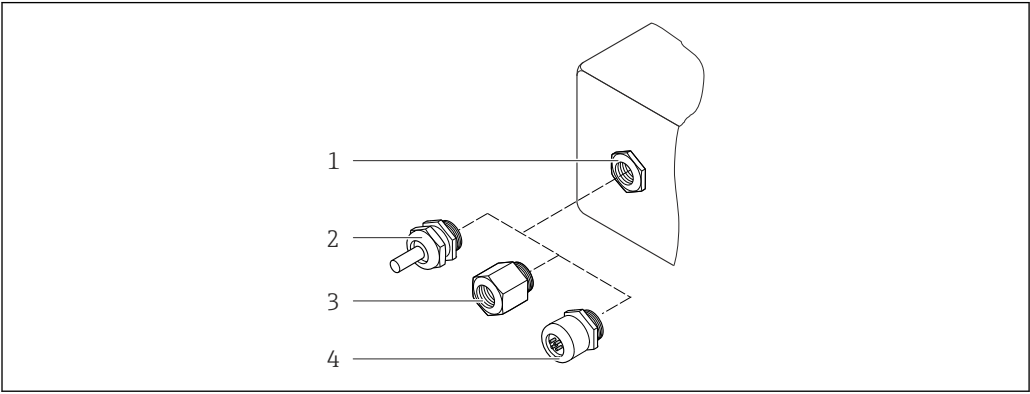
Transmitter housing

Order code for "Housing":  
Option A "Aluminum, coated": aluminum, AlSi10Mg, coated

Window material

Order code for "Housing":  
Option A "Aluminum, coated": glass

Cable entries/cable glands



45 Possible cable entries/cable glands

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

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

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

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

Cable entry/cable gland	Material
Adapter for cable entry with internal thread NPT ½"	
Device plug coupling	Plug M12 × 1 <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>

**Device plug**

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

**Sensor housing**

Stainless steel 1.4301 (304)

**Measuring tubes**

Stainless steel 1.4301 (304)

*Liner*

PFA (USP Class VI, FDA 21 CFR 177.1550, 3A)

**Process connections**

- Stainless steel, 1.4404 (F316L)
- PVDF
- PVC adhesive sleeve

**Electrodes**

Standard: 1.4435 (316L)

**Seals**

- O-ring seal, DN 2 to 25 (1/12 to 1"): EPDM, FKM, Kalrez
- Aseptic molded seal, DN 2 to 150 (1/12 to 6"): EPDM <sup>1)</sup>, FKM, silicone <sup>1)</sup>

**Accessories***Protective cover*

Stainless steel, 1.4404 (316L)

*External WLAN antenna*

- WLAN antenna:  
ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel-plated brass
- Adapter:  
Stainless steel and copper

*Grounding rings*

- Standard: 1.4435 (316L)
- Optional: Alloy C22, tantalum

*Wall mounting kit*



Stainless steel 1.4301 (304)

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1) USP Class VI, FDA 21 CFR 177.2600, 3A

*Spacer*

1.4435 (F316L)

<b>Fitted electrodes</b>	<ul style="list-style-type: none"> <li>■ 2 measuring electrodes for signal detection</li> <li>■ 1 empty pipe detection electrode for empty pipe detection/temperature measurement (only DN 15 to 150 (½ to 6"))</li> </ul>
<b>Process connections</b>	<p>With O-ring seal</p> <ul style="list-style-type: none"> <li>■ Welding nipple (DIN EN ISO 1127, ODT/SMS, ISO 2037)</li> <li>■ Flange (EN (DIN), ASME, JIS)</li> <li>■ Flange from PVDF (EN (DIN), ASME, JIS)</li> <li>■ External thread</li> <li>■ Internal thread</li> <li>■ Hose connection</li> <li>■ PVC adhesive sleeve</li> </ul> <p>With aseptic molded seal:</p> <ul style="list-style-type: none"> <li>■ Coupling (DIN 11851, DIN 11864-1, ISO 2853, SMS 1145)</li> <li>■ Flange DIN 11864-2</li> </ul> <p> For information on the different materials used in the process connections →  79</p>
<b>Surface roughness</b>	<p>Stainless steel electrodes, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum:  <math>\leq 0.3</math> to <math>0.5\ \mu\text{m}</math> (11.8 to <math>19.7\ \mu\text{in}</math>)          (All data relate to parts in contact with fluid)</p> <p>Liner with PFA:  <math>\leq 0.4\ \mu\text{m}</math> (<math>15.7\ \mu\text{in}</math>)          (All data relate to parts in contact with fluid)</p> <p>Stainless steel process connections:</p> <ul style="list-style-type: none"> <li>■ With O-ring seal: <math>\leq 1.6\ \mu\text{m}</math> (<math>63\ \mu\text{in}</math>)</li> <li>■ With aseptic seal: <math>\leq 0.8\ \mu\text{m}</math> (<math>31.5\ \mu\text{in}</math>)</li> <li>Optional: <math>\leq 0.38\ \mu\text{m}</math> (<math>15\ \mu\text{in}</math>)</li> </ul> <p>(All data relate to parts in contact with fluid)</p>

## Operability

<b>Operating concept</b>	<p><b>Operator-oriented menu structure for user-specific tasks</b></p> <ul style="list-style-type: none"> <li>■ Commissioning</li> <li>■ Operation</li> <li>■ Diagnostics</li> <li>■ Expert level</li> </ul> <p><b>Fast and safe commissioning</b></p> <ul style="list-style-type: none"> <li>■ Guided menus ("Make-it-run" wizards) for applications</li> <li>■ Menu guidance with brief explanations of the individual parameter functions</li> <li>■ Device access via Web server</li> <li>■ Optional: WLAN access to device via mobile handheld terminal</li> </ul> <p><b>Reliable operation</b></p> <ul style="list-style-type: none"> <li>■ Operation in local language →  81</li> <li>■ Uniform operating philosophy applied to device and operating tools</li> <li>■ If replacing electronic modules, transfer the device configuration via the integrated memory (integrated HistoROM) which contains the process and measuring device data and the event logbook. No need to reconfigure.</li> </ul> <p><b>Efficient diagnostics increase measurement availability</b></p> <ul style="list-style-type: none"> <li>■ Troubleshooting measures can be called up via the device and in the operating tools</li> <li>■ Diverse simulation options, logbook for events that occur and optional line recorder functions</li> </ul>
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## Languages

Can be operated in the following languages:

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

## Local operation

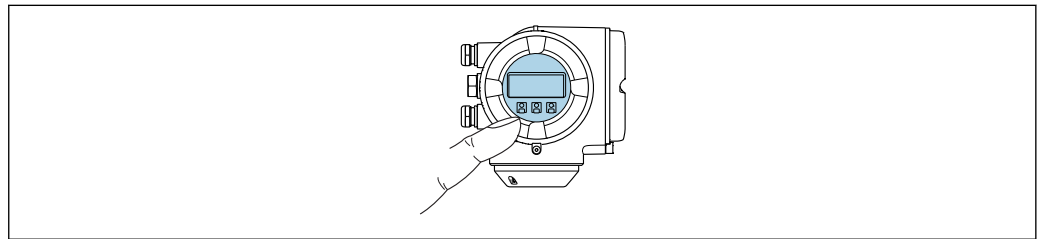
### Via display module

Two display modules are available:

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



Information about WLAN interface → 85



A0026785

46 Operation with touch control

### Display elements

- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- 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:  $\oplus$ ,  $\square$ ,  $\boxminus$
- Operating elements also accessible in various hazardous areas

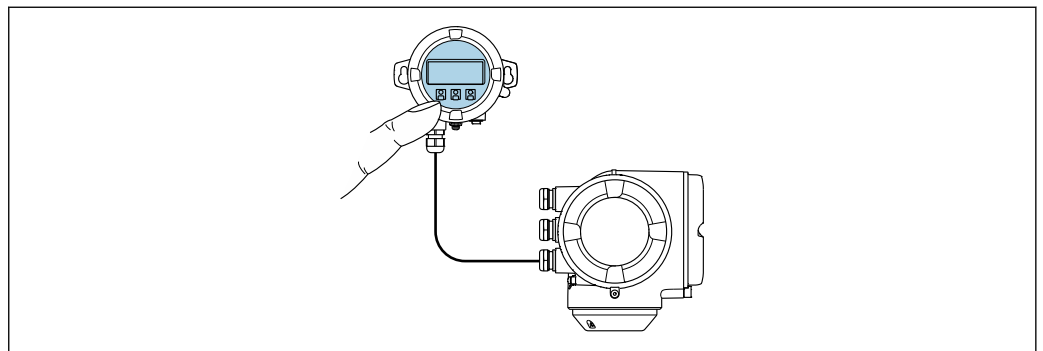
### Via remote display and operating module DKX001

The remote display and operating module DKX001 is available as an optional extra:

Order code for "Display; operation", option **O** "Separate backlit, 4-line display; 10 m (30 ft) Cable; touch control"



Another device version, e.g. other housing material, other cable length etc., can be ordered via the separate product structure DKX001. The measuring device is ordered with:  
Order code for "Display; operation", option **M** "None, prepared for remote display"




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47 Operation via remote display and operating module DKX001

Display and operating elements

The display and operating elements correspond to those of the display module → 81.

-  The measuring device is always supplied with a dummy cover when the remote display and operating module DKX001 is used. Display or operation at the transmitter is not possible in this case.
- The remote display and operating module DKX001 can also be ordered separately and subsequently as an accessory without a measuring device → 91.
- If ordered subsequently: The remote display and operating module DKX001 cannot be connected at the same time as the existing display or operation unit. Only one display or operation unit may be connected to the transmitter at any one time.

Material

The housing material of the display and operating module DKX001 corresponds to the selected material of the transmitter housing.

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

Cable entry

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

Connecting cable

→ 35

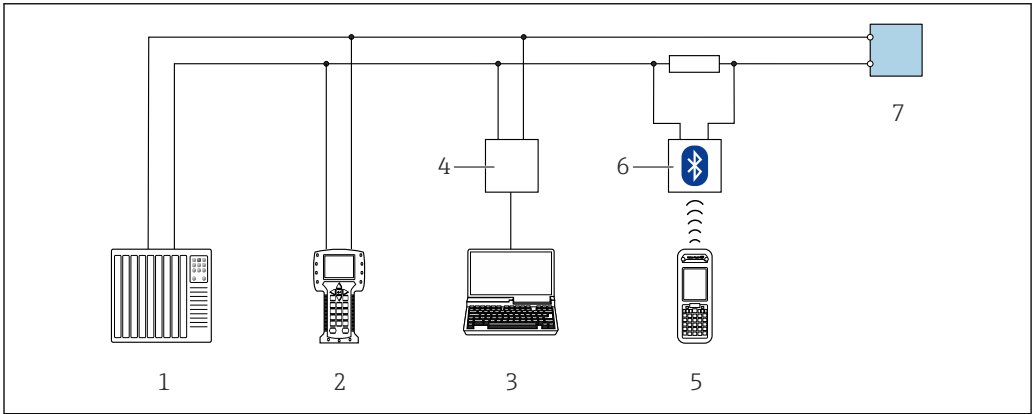
Dimensions


→ 63

Remote operation

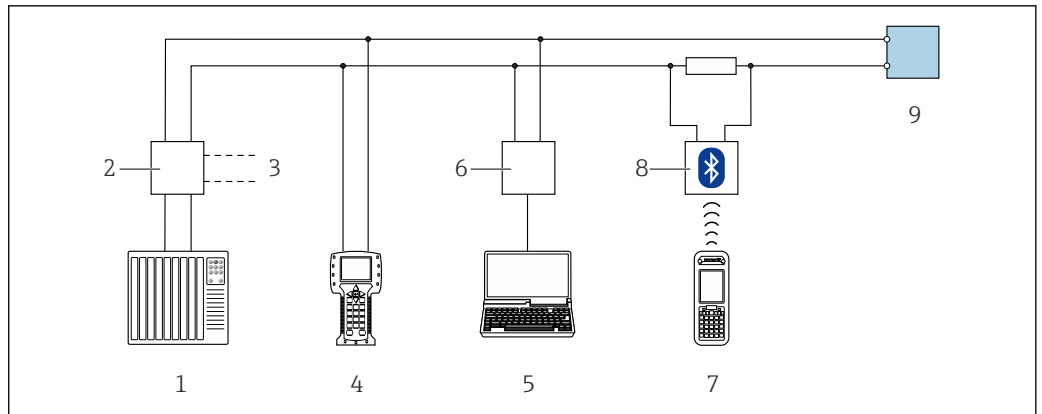
Via HART protocol

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



 48 Options for remote operation via HART protocol (active)

- Control system (e.g. PLC)
- Field Communicator 475
- Computer with Web browser (e.g. Internet Explorer) for accessing the integrated device Web server or computer with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
- Commubox FXA195 (USB)
- Field Xpert SFX350 or SFX370
- VIATOR Bluetooth modem with connecting cable
- Transmitter



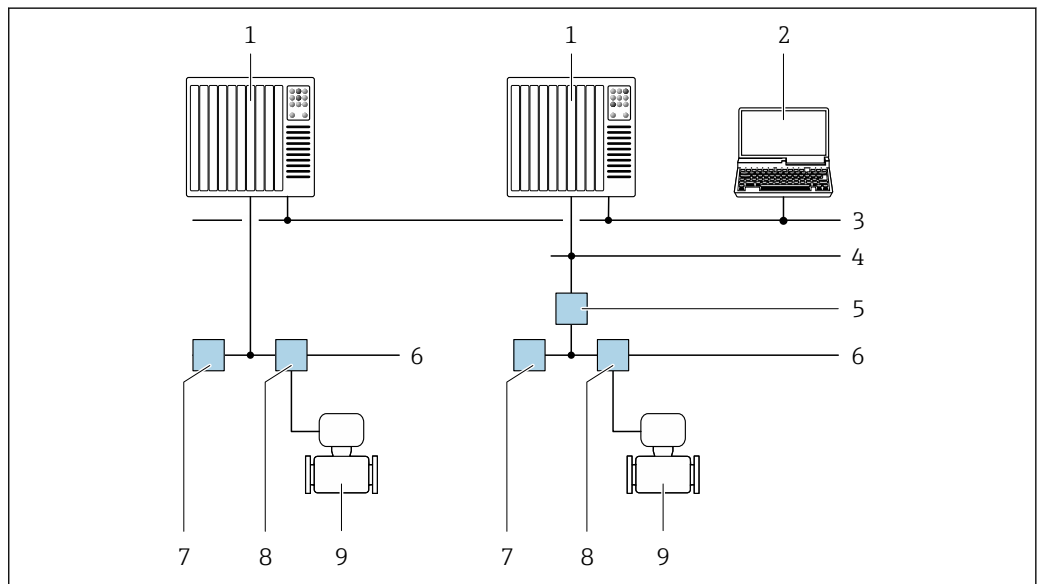
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49 Options for remote operation via HART protocol (passive)

- 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 accessing the integrated device Web server or computer with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
- 6 Commubox FXA195 (USB)
- 7 Field Xpert SFX350 or SFX370
- 8 VIATOR Bluetooth modem with connecting cable
- 9 Transmitter

### Via FOUNDATION Fieldbus network

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



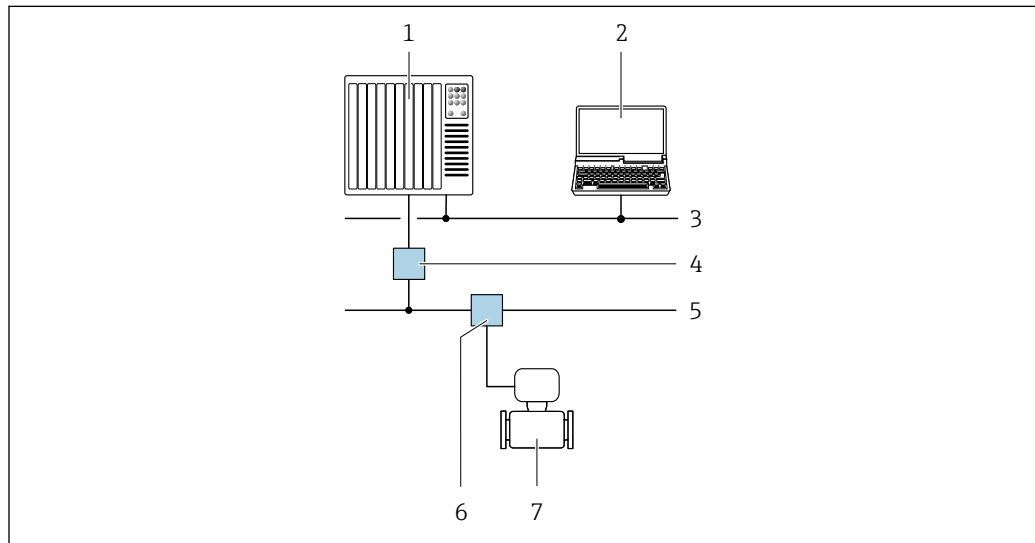
A0028837

50 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 PA network

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



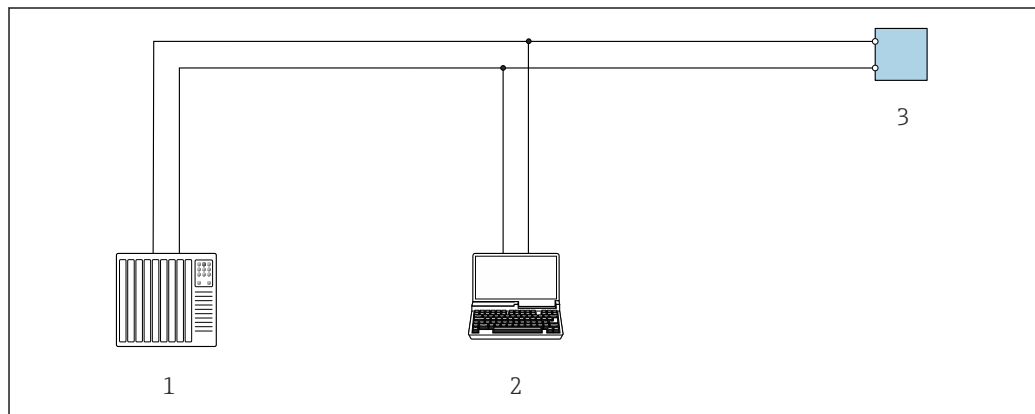
A0028838

51 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.



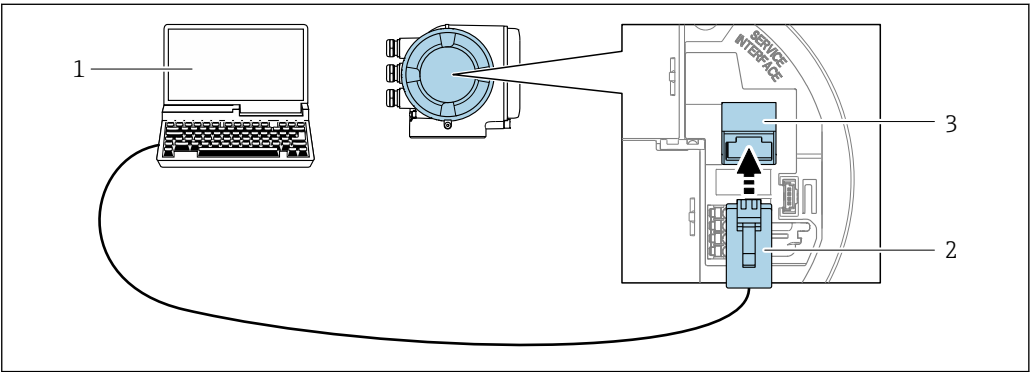
A0029437

52 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

Service interface

Via service interface (CDI-RJ45)



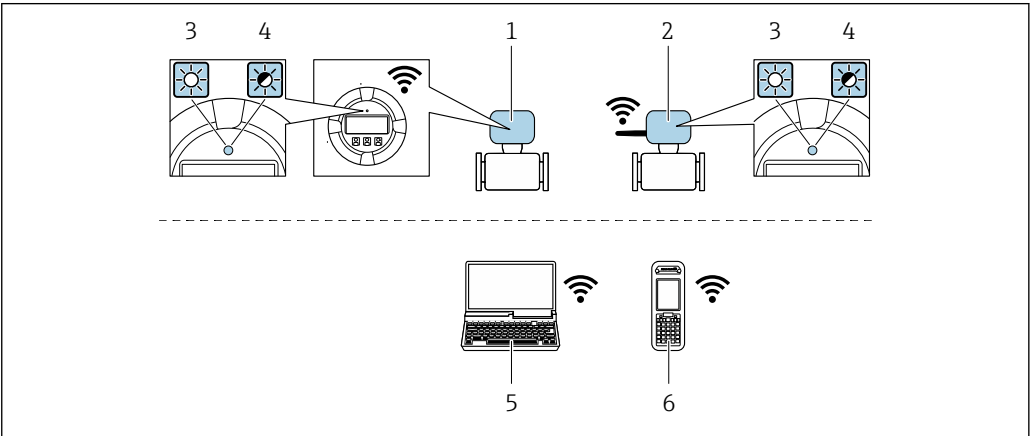
A0027563

53 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, backlit, graphic display; touch control + WLAN"






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- 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)

Wireless LAN	IEEE 802.11 b/g (2.4 GHz) WLAN
Encryption	WPA2 PSK/TKIP AES-128
Configurable channels	1 to 11
Function	Access point with DHCP
Range with integrated antenna	Max. 10 m (32 ft)
Range with external antenna	Max. 50 m (164 ft)

**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> </ul>	Special Documentation for the device →  95
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>	→  93
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>	→  93
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:

- 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 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 measuring device data can be managed and the network parameters can be configured. The WLAN connection requires a device that acts as an access point to enable communication via a computer or mobile handheld terminal.


*Supported functions*

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

- Uploading 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, create documentation of 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

**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 history, such as diagnostic events</li> <li>■ Parameter data record backup</li> <li>■ Device firmware package</li> <li>■ Driver for system integration e.g.:               <ul style="list-style-type: none"> <li>– DD for HART</li> <li>– GSD for PROFIBUS PA</li> <li>– DD for FOUNDATION Fieldbus</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Measured value memory ("Extended HistoROM" order option)</li> <li>■ Current parameter data record (used by firmware at run time)</li> <li>■ Maximum indicators (min/max values)</li> <li>■ Totalizer values</li> </ul>	<ul style="list-style-type: none"> <li>■ Sensor data: diameter etc.</li> <li>■ Serial number</li> <li>■ User-specific access code (to use the "Maintenance" user role)</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	Can be plugged into 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

##### Manual

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

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

#### 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)

#### 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
- Use the recorded measured value data in the integrated device simulation function in the **Diagnostics** submenu.

**Service logbook****Manual**

- Create up to 20 user-specific events with a date and customized text in a separate logbook for documentation of the measuring point
- Use for calibration or service operations, for example, or for maintenance or revision work that has been performed

## Certificates and approvals

<b>CE mark</b>	<p>The measuring system is in conformity with the statutory requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.</p> <p>Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.</p>
<b>C-Tick symbol</b>	The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".
<b>Ex approval</b>	<p>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.</p>



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

**ATEX, IECEx**

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

*Ex db eb*

Category	Type of protection
II2G	Ex db eb ia IIC T6...T1 Gb

*Ex tb*

Category	Type of protection
II2D	Ex tb IIIC Txxx Db

*Ex ec*

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

**cCSAus**

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

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

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

**NI (Ex nA)**

Class I Division 2 Groups A - D

**Ex de**

Class I, Zone 1 AEx/ Ex de ia IIC T6...T1 Gb




**Ex nA**

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

**Ex tb**

Zone 21 AEx/ Ex tb IIIC T\*\* °C Db



<b>Sanitary compatibility</b>	<ul style="list-style-type: none"> <li>■ 3A approval and EHEDG-certified</li> <li>■ Seals → FDA-compliant (apart from Kalrez seals)</li> </ul>
<b>Functional safety</b>	<p>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 <b>LA</b>) and SIL 3 (multichannel architecture with homogeneous redundancy) and is independently evaluated and certified by the TÜV in accordance with IEC 61508.</p> <p>The following types of monitoring in safety equipment are possible: Volume flow</p> <p> Functional Safety Manual with information on the SIL device →  94</p>
<b>HART certification</b>	<p><b>HART interface</b></p> <p>The measuring device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> <li>■ Certified according to HART 7</li> <li>■ The device can also be operated with certified devices of other manufacturers (interoperability)</li> </ul>
<b>FOUNDATION Fieldbus certification</b>	<p><b>FOUNDATION Fieldbus interface</b></p> <p>The measuring device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> <li>■ Certified in accordance with FOUNDATION Fieldbus H1</li> <li>■ Interoperability Test Kit (ITK), revision version 6.1.2 (certificate available on request)</li> <li>■ Physical Layer Conformance Test</li> <li>■ The device can also be operated with certified devices of other manufacturers (interoperability)</li> </ul>
<b>Certification PROFIBUS</b>	<p><b>PROFIBUS interface</b></p> <p>The measuring device is certified and registered by the PROFIBUS User Organization (PNO). The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> <li>■ Certified in accordance with PROFIBUS PA Profile 3.02</li> <li>■ The device can also be operated with certified devices of other manufacturers (interoperability)</li> </ul>
<b>Modbus RS485 certification</b>	<p>The measuring device meets all the requirements of the MODBUS/TCP conformity test and has the "MODBUS/TCP Conformance Test Policy, Version 2.0". The measuring device has successfully passed all the test procedures carried out.</p>
<b>Radio approval</b>	<p>Europe: RED 2014/53/EU</p> <p>United States of America: CFR Title 47, FCC Part 15.247</p> <p>Canada: RSS-247 Issue 1</p> <p>Japan: Article 2 clause 1 item 19</p> <p> Additional country-specific approvals on request.</p>
<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>■ 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> <li>■ NAMUR NE 32 Data retention in the event of a power failure in field and control instruments with microprocessors</li> </ul>

- 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 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
- ETSI EN 300 328  
Guidelines for 2.4 GHz radio components.
- EN 301489  
Electromagnetic compatibility and radio spectrum matters (ERM).

## Ordering information

Detailed ordering information is available from 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).

### 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 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> <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>





**Cleaning**




Package	Description
Electrode cleaning circuit (ECC)	The electrode cleaning circuit (ECC) function has been developed to have a solution for applications where magnetite ( $\text{Fe}_3\text{O}_4$ ) deposits frequently occur (e.g. hot water). Since magnetite is highly conductive this build up leads to measuring errors and ultimately to the loss of signal. The application package is designed to AVOID build up of highly conductive matter and thin layers (typical of magnetite).

## 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
Promag 300 transmitter	<p>Transmitter for replacement or storage. Use the order code to define the following specifications:</p> <ul style="list-style-type: none"> <li>▪ Approvals</li> <li>▪ Output</li> <li>▪ Input</li> <li>▪ Display / operation</li> <li>▪ Housing</li> <li>▪ Software</li> </ul> <p> For details, see Installation Instructions EA01150</p>
Remote display and operating module DKX001	<p>The remote display and operating module DKX001 is available as an optional extra: Order code for "Display; operation", option <b>O</b> "Separate backlit, 4-line display; 10 m (30 ft) Cable; touch control"</p> <p>The remote display and operating module DKX001 can also be ordered separately and subsequently as an accessory without a measuring device .</p> <p> Further information on display and operating module DKX001 →  81.</p> <p> For details, see Special Documentation SD01763D</p>

WLAN antenna Wide range	External WLAN antenna for a range of up to 50 m (165 ft).  Further information on the WLAN interface →  85.
Protective cover	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight.  For details, see Installation Instructions EA01160



**For the sensor**

Accessories	Description
Adapter set	Adapter connections for installing Promag H instead of a Promag 30/33 A or Promag 30/33 H (DN 25) device. Consists of: <ul style="list-style-type: none"> <li>■ 2 process connections</li> <li>■ Screws</li> <li>■ Seals</li> </ul>
Seal set	For the regular replacement of seals for the sensor.
Spacer	If replacing a DN 80/100 sensor in an existing installation, a spacer is needed if the new sensor is shorter.
Welding jig	Welding nipple as process connection: welding jig for installation in pipe.
Grounding rings	Are used to ground the fluid in lined measuring tubes to ensure proper measurement.  For details, see Installation Instructions EA00070D
Mounting kit	Consists of: <ul style="list-style-type: none"> <li>■ 2 process connections</li> <li>■ Screws</li> <li>■ Seals</li> </ul>
Wall mounting kit	Wall mounting kit for measuring device (only DN 2 to 25 (1/12 to 1"))


**Communication-specific accessories**

Accessories	Description
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare via the USB interface.  For details, see "Technical Information" TI00404F
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values.  For details, see "Technical Information" TI00429F and Operating Instructions BA00371F
Fieldgate FXA320	Gateway for the remote monitoring of connected 4 to 20 mA measuring devices via a Web browser.  For details, see "Technical Information" TI00025S and Operating Instructions BA00053S
Fieldgate FXA520	Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser.  For details, see "Technical Information" TI00025S and Operating Instructions BA00051S
Field Xpert SFX350	Field Xpert SFX350 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices in the <b>non-Ex area</b> .  For details, see Operating Instructions BA01202S
Field Xpert SFX370	Field Xpert SFX370 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices in the <b>non-Ex area</b> and the <b>Ex area</b> .  For details, see Operating Instructions BA01202S

## 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://wapps.endress.com/applicator">https://wapps.endress.com/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> For details, see Operating Instructions BA00027S and BA00059S</p>
DeviceCare	<p>Tool for connecting and configuring Endress+Hauser field devices.</p> <p> For details, see Innovation brochure IN01047S</p>

## System components

Accessories	Description
Memograph M graphic display recorder	<p>The Memograph M graphic display recorder provides information on all 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> For details, see "Technical Information" TI00133R and Operating Instructions BA00247R</p>

## Supplementary documentation



For an overview of the scope of the associated Technical Documentation, refer to the following:

- The *W@M Device Viewer*: Enter the serial number from the nameplate ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer))
- The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

## Standard documentation

## Brief Operating Instructions

Part 1 of 2: Sensor

Measuring device	Documentation code
Proline Promag	KA01216D

*Part 2 of 2: Transmitter*

Measuring device	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Proline 300	KA01226D	KA01229D	KA01227D	KA01228D

**Operating Instructions**

Measuring device	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Promag H 300	BA01392D	BA01477D	BA01396D	BA01394D

**Description of device parameters**

Measuring device	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Promag 300	GP01051D	GP01098D	GP01052D	GP01053D

**Supplementary device-dependent documentation****Safety Instructions**

Contents	Documentation code
ATEX/IECEX Ex d/Ex de	XA01414D
ATEX/IECEX Ex ec	XA01514D
cCSAus XP	XA01515D
cCSAus Ex d/ Ex de	XA01516D
cCSAus Ex nA	XA01517D
INMETRO Ex d/Ex de	XA01518D
INMETRO Ex ec	XA01519D
NEPSI Ex d/Ex de	XA01520D
NEPSI Ex nA	XA01521D

*Remote display and operating module DKX001*

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

### Special Documentation

Contents	Documentation code			
Information on the Pressure Equipment Directive	SD01614D			
Functional Safety Manual	SD01740D			
Remote display and operating module DKX001	SD01763D			
Contents	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Heartbeat Technology	SD01640D	SD01742D	SD01744D	SD01743D
Contents	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Web server	SD01654D	SD01657D	SD01656D	SD01655D

### Installation Instructions

Contents	Documentation code
Installation Instructions for spare part sets	Specified for each individual accessory

## Registered trademarks

#### HART®

Registered trademark of the FieldComm Group, Austin, Texas, USA

#### PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

#### FOUNDATION™ Fieldbus

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

#### Modbus®

Registered trademark of SCHNEIDER AUTOMATION, INC.

#### Applicator®, FieldCare®, DeviceCare®, Field Xpert™, HistoROM®, Heartbeat Technology™

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