

Technical Information

Proline Promag H 500

Electromagnetic flowmeter



The flowmeter for smallest flow rates, as remote version with up to 4 I/Os

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
- Remote version with up to 4 I/Os
- Backlit display with touch control and WLAN access
- Standard cable between sensor and transmitter

Your benefits

- Multivariable measurement for flow, temperature and conductivity
- 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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


Supplementary documentation 105
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Document information

Symbols used









Electrical symbols

Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current
	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.
	Equipotential connection 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
	Wireless Local Area Network (WLAN) Communication via a wireless, local network.
	Bluetooth Wireless data transmission between devices over a short distance.
	LED Light emitting diode is off.
	LED Light emitting diode is on.
	LED Light emitting diode is flashing.

Symbols for certain types of information

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

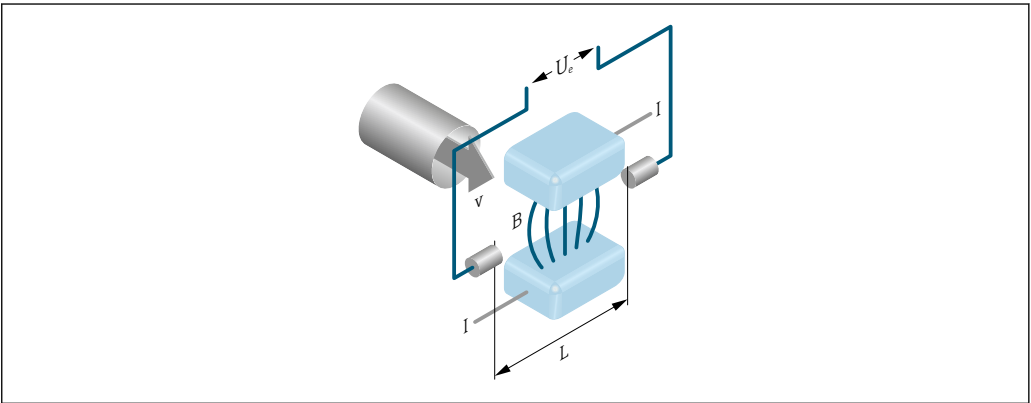
Symbols in graphics

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.



A0028962

- 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

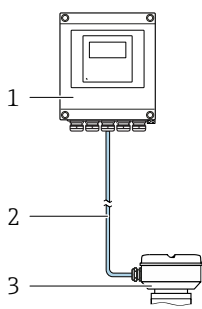
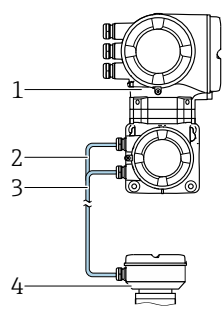
- Induced voltage $U_e = B \cdot L \cdot v$
- Volume flow $Q = A \cdot v$

Measuring system

The measuring system consists of a transmitter and a sensor. The transmitter and sensor are mounted in physically separate locations. They are interconnected by one or two connecting cable(s).

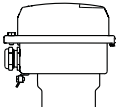

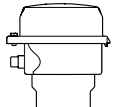

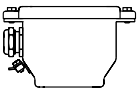

Transmitter

Two versions of the transmitter are available.

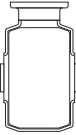
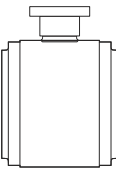
Proline 500 – digital	Proline 500
<p>For use in applications not required to meet special requirements due to ambient or operating conditions.</p>  <p>1 Transmitter 2 Connecting cable: cable, separate, standard 3 Sensor connection housing with integrated ISEM</p> <ul style="list-style-type: none"> Flexible and cost-effective separate installation. A standard cable can be used as the connecting cable. Electronics in the transmitter housing, ISEM (intelligent sensor electronics module) in the sensor connection housing Signal transmission: digital Order code for "Integrated ISEM electronics", option A "Sensor" 	<p>For use in applications required to meet special requirements due to ambient or operating conditions.</p>  <p>1 Transmitter with integrated ISEM 2 Coil current cable 3 Signal cable 4 Sensor connection housing</p> <p>Application examples for sensors without electronics:</p> <ul style="list-style-type: none"> Sensor in underground installations. Permanent immersion of sensor in water, IP68 ingress protection. Electronics and ISEM (intelligent sensor electronics module) in the transmitter housing Signal transmission: analog Order code for "Integrated ISEM electronics", option B "Transmitter"
Connecting cable (can be ordered in various lengths → 102)	
<ul style="list-style-type: none"> Length: max. 300 m (1 000 ft) A standard cable with a common shield (pair-stranded) Not sensitive to external EMC interference. 	<ul style="list-style-type: none"> Length: max. 200 m (656 ft), depending on the medium conductivity Two connecting cables: <ul style="list-style-type: none"> One cable for coil current with a common shield (1 pair) One cable for signal transmission with a common shield and individual shielded cores (2 pairs)
Ex zone	
<p>Use in: Ex Zone 2, Class 1, Division 2</p> <p>Mixed installation is possible:</p> <ul style="list-style-type: none"> Sensor: Ex Zone 1, Class I, Division 1 Transmitter: Ex Zone 1, Class I, Division 1; Ex Zone 2, Class I, Division 2 	<p>Use in: Ex Zone 1 and 2, Class 1, Division 2 and Class 1, Division 1</p>
Device versions and materials	
<ul style="list-style-type: none"> Transmitter housing <ul style="list-style-type: none"> Aluminum, coated: aluminum, AlSi10Mg, coated Material: polycarbonate Material of window in transmitter housing <ul style="list-style-type: none"> Aluminum, coated: glass Polycarbonate: plastic 	<ul style="list-style-type: none"> Transmitter housing <ul style="list-style-type: none"> Aluminum, coated: aluminum, AlSi10Mg, coated Window material: glass
Configuration	
<ul style="list-style-type: none"> External operation via 4-line, backlit, graphic local display with touch control and guided menus ("Make-it-run" wizards) for application-specific commissioning. Via service interface or WLAN interface: <ul style="list-style-type: none"> Operating tools (e.g. FieldCare, DeviceCare) Web server (access via Web browser, e.g. Microsoft Internet Explorer, Microsoft Edge) 	

Sensor connection housing

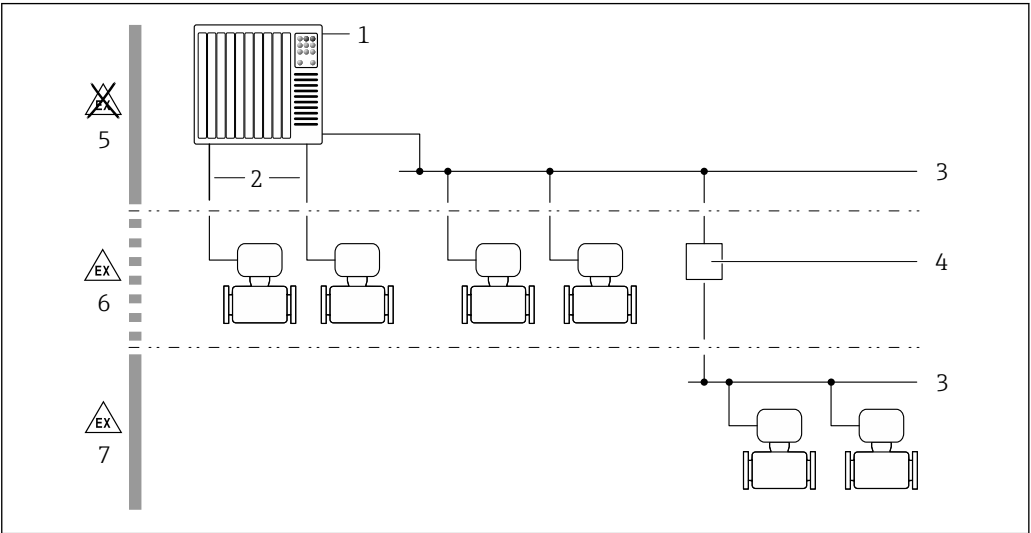
Different versions of the connection housing are available.


 A0029683	Order code for "Sensor connection housing", option B , "Stainless": Hygienic version, stainless steel 1.4301 (304)  This device version is only available in conjunction with the Proline 500 – digital transmitter.
	Order code for "Sensor connection housing", option C , "Ultra-compact hygienic, stainless": Hygienic version, stainless steel 1.4301 (304)  This device version is only available in conjunction with the Proline 500 – digital transmitter.
	Order code for "Sensor connection housing", option B , "Stainless, hygienic": Hygienic version, stainless steel 1.4301 (304)  This device version is only available in conjunction with the Proline 500 transmitter.

Sensor

Promag H  A0019897  A0019898	Nominal diameter range: DN 2 to 150 (1/12 to 6") Materials: <ul style="list-style-type: none">■ Sensor housing: stainless steel, 1.4301 (304)■ Measuring tubes: stainless steel, 1.4301 (304)■ Liner: PFA■ Electrodes: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum; platinum (only up to DN 25 (1"))■ Process connections: stainless steel, 1.4404 (F316L); PVDF; PVC adhesive sleeve■ Seals:<ul style="list-style-type: none">– DN 2 to 25 (1/12 to 1"): O-ring seal (EPDM, FKM, Kalrez), aseptic molded seal (EPDM, FKM, silicone)– DN 40 to 150 (1 1/2 to 6"): aseptic molded seal (EPDM, FKM, silicone)■ Grounding rings: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum
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Equipment architecture



 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
→ 105.

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
→ 105.

Input

Measured variable

Direct measured variables

- Volume flow (proportional to induced voltage)
- Temperature (DN 15 to 150 (½ to 6"))
- Electrical conductivity

Calculated measured variables

- Mass flow
- Corrected volume flow
- Corrected electrical conductivity

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 ($v \sim 0.3/10$ m/s)	Factory settings		
[mm]	[in]		Current output full scale value ¹⁾ ($v \sim 2.5$ m/s)	Pulse value ¹⁾ (~ 2 pulse/s)	Low flow cut off ($v \sim 0.04$ m/s)
		[dm ³ /min]	[dm ³ /min]	[dm ³]	[dm ³ /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 ³ /h	150 m ³ /h	0.03 m ³	2.5 m ³ /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 ¹⁾ (v ~ 2.5 m/s)	Pulse value ¹⁾ (~ 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 1250	300	2	4
5	125	60 to 1950	450	5	7
6	150	90 to 2650	600	5	12

1) HART only

 To calculate the measuring range, use the *Applicator* sizing tool →  104

Recommended measuring range"Flow limit" section →  55

Operable flow range	Over 1000 : 1
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Input signal**Input and output versions**→  12**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 →  104


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 →  11.

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

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

Status input

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

Output

Output and input variants

Depending on the option selected for output/input 1, different options are available for the other outputs and inputs. Only one option can be selected for each output/input 1 to 4. The table must be read vertically (↓).

Example: If the option **BA** (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 and 4.

Order code for "Output; input 1" (020) →	Possible options						
Current output 4 to 20 mA HART	BA						
Current output 4 to 20 mA HART Ex i	↓	CA					
FOUNDATION Fieldbus		↓	SA				
FOUNDATION Fieldbus Ex i			↓	TA			
PROFIBUS PA				↓	GA		
PROFIBUS PA Ex i					↓	HA	
Modbus RS485						↓	MA
Order code for "Output; input 2" (021) →	↓	↓	↓	↓	↓	↓	↓
Not assigned	A	A	A	A	A	A	A
Current output 0/4 to 20 mA	B		B		B		B
Current output 0/4 to 20 mA (Ex i)		C		C		C	
User configurable input/output ¹⁾	D		D		D		D
Pulse/frequency/switch output	E		E		E		E
Double pulse output ²⁾	F						F
Pulse/frequency/switch output (Ex i)		G		G		G	
Relay output	H		H		H		H
Current input 0/4 to 20 mA	I		I		I		I
Status input	J		J		J		J
Order code for "Output; input 3" (022), "Output; input 4" (023) ³⁾ →	↓	↓	↓	↓	↓	↓	↓
Not assigned	A	A	A	A	A	A	A
Current output 0/4 to 20 mA	B						B
Current output 0/4 to 20 mA (Ex i)		C					
User configurable input/output	D						D
Pulse/frequency/switch output	E						E
Double pulse output (slave) ^{2) 4)}	F						F
Pulse/frequency/switch output (Ex i)		G					
Relay output	H						H
Current input 0/4 to 20 mA	I						I
Status input	J						J

1) A specific input or output can be assigned to a user configurable input/output → 16.

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

3) The order code for "Output; input 4" (023) is only available for the Proline 500 – digital transmitter.

4) The double pulse output (F) option is not available for input/output 4.

Output signal**HART current output**

Current output	4 to 20 mA HART
Current span	Can be set to: 4 to 20 mA (active/passive)
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	250 to 700 Ω
Resolution	0.38 μ A
Damping	Adjustable: 0.07 to 999 s
Assignable measured variables	<ul style="list-style-type: none"> ■ Volume flow ■ Mass flow ■ Corrected volume flow ■ Flow velocity ■ Conductivity ■ Corrected conductivity ■ Temperature ■ Electronic temperature

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"> ■ 4 to 20 mA (active) ■ 0/4 to 20 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)

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

Pulse/frequency/switch output

Function	Can be set to pulse, frequency or switch output
Version	Open collector Can be set to: <ul style="list-style-type: none"> ■ Active ■ Passive
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Voltage drop	For 22.5 mA: \leq DC 2 V
Pulse output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Pulse width	Adjustable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Adjustable
Assignable measured variables	<ul style="list-style-type: none"> ■ Volume flow ■ Mass flow ■ Corrected volume flow
Frequency output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Output frequency	Adjustable: end value frequency 2 to 10 000 Hz ($f_{\max} = 12\,500$ Hz)
Damping	Adjustable: 0 to 999 s
Pulse/pause ratio	1:1
Assignable measured variables	<ul style="list-style-type: none"> ■ Volume flow ■ Mass flow ■ Corrected volume flow ■ Flow velocity ■ Conductivity ■ Corrected conductivity ■ Temperature ■ Electronic temperature
Switch output	
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Switching behavior	Binary, conductive or non-conductive

Switching delay	Adjustable: 0 to 100 s
Number of switching cycles	Unlimited
Assignable functions	<ul style="list-style-type: none"> ■ Off ■ On ■ Diagnostic behavior ■ Limit value: <ul style="list-style-type: none"> – Off – Volume flow – Mass flow – Corrected volume flow – Flow velocity – Conductivity – Corrected conductivity – Totalizer 1-3 – Temperature – Electronic temperature ■ Flow direction monitoring ■ Status <ul style="list-style-type: none"> – Empty pipe detection – Low flow cut off

Double pulse output

Function	Double pulse
Version	Open collector Can be set to: <ul style="list-style-type: none"> ■ Active ■ Passive
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Voltage drop	For 22.5 mA: ≤ DC 2 V
Output frequency	Adjustable: 0 to 1 000 Hz
Damping	Adjustable: 0 to 999 s
Pulse/pause ratio	1:1
Assignable measured variables	<ul style="list-style-type: none"> ■ Volume flow ■ Mass flow ■ Corrected volume flow ■ Flow velocity ■ Conductivity ■ Corrected conductivity ■ Temperature ■ Electronic temperature

Relay output

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

Maximum switching capacity (passive)	<ul style="list-style-type: none"> ■ DC 30 V, 0.1 A ■ AC 30 V, 0.5 A
Assignable functions	<ul style="list-style-type: none"> ■ Off ■ On ■ Diagnostic behavior ■ Limit value: <ul style="list-style-type: none"> – Off – Volume flow – Mass flow – Corrected volume flow – Flow velocity – Conductivity – Corrected conductivity – Totalizer 1-3 – Temperature – Electronic temperature ■ Flow direction monitoring ■ Status <ul style="list-style-type: none"> – Empty pipe detection – Low flow cut off

User configurable input/output

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

The following inputs and outputs are available for assignment:

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

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

Signal on alarm

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

HART current output

Device diagnostics	Device condition can be read out via HART Command 48
---------------------------	--

PROFIBUS PA

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

FOUNDATION Fieldbus

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

Modbus RS485

Failure mode	Choose from: <ul style="list-style-type: none"> ■ NaN value instead of current value ■ Last valid value
---------------------	---

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

Failure mode	Choose from: <ul style="list-style-type: none"> ■ 4 to 20 mA in accordance with NAMUR recommendation NE 43 ■ 4 to 20 mA in accordance with US ■ Min. value: 3.59 mA ■ Max. value: 22.5 mA ■ Freely definable value between: 3.59 to 22.5 mA ■ Actual value ■ Last valid value
---------------------	--

0 to 20 mA

Failure mode	Choose from: <ul style="list-style-type: none"> ■ Maximum alarm: 22 mA ■ Freely definable value between: 0 to 20.5 mA
---------------------	---

Pulse/frequency/switch output

Pulse output	
Failure mode	Choose from: <ul style="list-style-type: none"> ■ Actual value ■ No pulses
Frequency output	
Failure mode	Choose from: <ul style="list-style-type: none"> ■ Actual value ■ 0 Hz ■ Defined value (f_{\max} 2 to 12 500 Hz)
Switch output	
Failure mode	Choose from: <ul style="list-style-type: none"> ■ Current status ■ Open ■ Closed

Relay output

Failure mode	Choose from: <ul style="list-style-type: none"> ■ Current status ■ Open ■ Closed
---------------------	---

Local display

Plain text display	With information on cause and remedial measures
Backlight	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
--------------------	---

 Additional information on remote operation →  90

Web server

Plain text display	With information on cause and remedial measures
--------------------	---

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"> Supply voltage active Data transmission active Device alarm/error has occurred
--------------------	--

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	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$	
Option GA	PROFIBUS PA	$U_{nom} = 32\text{ V}$ $U_{max} = 250\text{ V}$	
Option MA	Modbus RS485	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$	
Option SA	FOUNDATION Fieldbus	$U_{nom} = 32\text{ V}$ $U_{max} = 250\text{ V}$	

Order code for "Output; input 2"; "Output; input 3"; "Output; input 4"	Output type	Safety-related values					
		Output; input 2		Output; input 3		Output; input 4 ¹⁾	
		24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
Option B	Current output 4 to 20 mA	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$					
Option D	User configurable input/output	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$					
Option E	Pulse/frequency/switch output	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$					
Option F	Double pulse output	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$					
Option H	Relay output	$U_{nom} = 30\text{ V}$ $I_{nom} = 100\text{ mA DC}/500\text{ mA AC}$ $U_{max} = 250\text{ V}$					
Option I	Current input 4 to 20 mA	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$					
Option J	Status input	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$					

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

Intrinsically safe values

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

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

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

Order code for "Output; input 2"; "Output; input 3"; "Output; input 4"	Output type	Intrinsically safe values					
		Output; input 2		Output; input 3		Output; input 4 ¹⁾	
		24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
Option C	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 G	Pulse/frequency/switch output Ex i	$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1.25 \text{ W}$ $L_i = 0$ $C_i = 0$					

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

Low flow cut off

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

Galvanic isolation

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

Protocol-specific data


HART

Manufacturer ID	0x11
Device type ID	0x3C
HART protocol revision	7
Device description files (DTM, DD)	Information and files under: www.endress.com
HART load	Min. 250 Ω

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

PROFIBUS PA

Manufacturer ID	0x11
Ident number	0x156C
Profile version	3.02
Device description files (GSD, DTM, DD)	<p>Information and files under:</p> <ul style="list-style-type: none"> ■ www.endress.com ■ www.profibus.org

Output values (from measuring device to automation system)	Heartbeat Technology Application Package Additional measured variables are available with the Heartbeat Technology application package: Analog input 1 to 4 <ul style="list-style-type: none"> ■ Volume flow ■ Mass flow ■ Corrected volume flow ■ Flow velocity ■ Conductivity ■ Corrected conductivity ■ Temperature ■ Electronic temperature ■ Current input Digital input 1 to 2 <ul style="list-style-type: none"> ■ Empty pipe detection ■ Low flow cut off ■ Status verification Totalizer 1 to 3 <ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow
Input values (from automation system to measuring device)	Analog output 1 to 2 (fixed assignment) <ul style="list-style-type: none"> ■ Analog output 1: external density ■ Analog output 2: external temperature Digital output 1 to 3 (fixed assignment) <ul style="list-style-type: none"> ■ Digital output 1: switch positive zero return on/off ■ Digital output 2: start verification ■ Digital output 3: relay output non-conductive/conductive Totalizer 1 to 3 <ul style="list-style-type: none"> ■ Totalize ■ Reset and hold ■ Preset and hold ■ Operating mode configuration: <ul style="list-style-type: none"> – Net flow total – Forward flow total – Reverse flow total – Last valid value
Supported functions	<ul style="list-style-type: none"> ■ Identification & Maintenance Simplest device identification on the part of the control system and nameplate ■ PROFIBUS upload/download Reading and writing parameters is up to ten times faster with PROFIBUS upload/download ■ Condensed status Simplest and self-explanatory diagnostic information by categorizing diagnostic messages that occur
Configuration of the device address	<ul style="list-style-type: none"> ■ DIP switches on the I/O electronics module ■ Local display ■ Via operating tools (e.g. FieldCare)
Compatibility with earlier model	<p>If the device is replaced, the Promag 500 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 500 GSD file.</p> <p>Earlier models:</p> <ul style="list-style-type: none"> ■ Promag 50 PROFIBUS PA <ul style="list-style-type: none"> – ID No.: 1525 (hex) – Extended GSD file: EH3x1525.gsd – Standard GSD file: EH3_1525.gsd ■ Promag 53 PROFIBUS PA <ul style="list-style-type: none"> – ID No.: 1527 (hex) – Extended GSD file: EH3x1527.gsd – Standard GSD file: EH3_1527.gsd <p> Description of the function scope of compatibility: Operating Instructions → 105.</p>

FOUNDATION Fieldbus

Manufacturer ID	0x452B48
Ident number	0x103C
Device revision	1
DD revision	Information and files under:
CFF revision	<ul style="list-style-type: none"> ▪ www.endress.com ▪ www.fieldbus.org
Interoperability Test Kit (ITK)	Version 6.1.2
ITK Test Campaign Number	Information: <ul style="list-style-type: none"> ▪ www.endress.com ▪ www.fieldbus.org
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"> ▪ Restart ▪ ENP Restart ▪ Diagnostic
Virtual Communication Relationships (VCRs)	
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
Device Link Capabilities	
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"> ■ Temperature (7) ■ Volume flow (9) ■ Mass flow (11) ■ Corrected volume flow (13) ■ Flow velocity (37) ■ Electronic temperature (39) ■ Conductivity (70) ■ Corrected conductivity (71)
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"> ■ Totalizer 1 (16) ■ Totalizer 2 (17) ■ Totalizer 3 (18)
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"> ■ Temperature (7) ■ Volume flow (9) ■ Mass flow (11) ■ Corrected volume flow (13) ■ Totalizer 1 (16) ■ Totalizer 2 (17) ■ Totalizer 3 (18) ■ Flow velocity (37) ■ Electronic temperature (39) ■ Conductivity (70) ■ Corrected conductivity (71)
Discrete Input Block (DI)	2	5 ms	<ul style="list-style-type: none"> ■ Switch output state (101) ■ Low flow cut off (103) ■ Empty pipe detection (104) ■ Status verification (105)
PID Block (PID)	1	6 ms	–
Multiple Analog Output Block (MAO)	1	5 ms	Channel_0 (121) <ul style="list-style-type: none"> ■ Value 1: External compensation variable, temperature ■ Value 2: External compensation variable, density <div style="display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px; text-align: center;">i</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"> ■ Value 1: Reset totalizer 1 ■ Value 2: Reset totalizer 2 ■ Value 3: Reset totalizer 3 ■ Value 4: Flow override ■ Value 5: Start heartbeat verification ■ Value 6: Status switch output ■ Value 7: Not assigned ■ Value 8: Not assigned
Integrator Block (IT)	1	6 ms	–

Modbus RS485

Protocol	Modbus Applications Protocol Specification V1.1
Response times	<ul style="list-style-type: none"> ■ Direct data access: typically 25 to 50 ms ■ Auto-scan buffer (data range): typically 3 to 5 ms
Device type	Slave
Slave address range	1 to 247
Broadcast address range	0


Function codes	<ul style="list-style-type: none"> 03: Read holding register 04: Read input register 06: Write single registers 08: Diagnostics 16: Write multiple registers 23: Read/write multiple registers
Broadcast messages	Supported by the following function codes: <ul style="list-style-type: none"> 06: Write single registers 16: Write multiple registers 23: Read/write multiple registers
Supported baud rate	<ul style="list-style-type: none"> 1 200 BAUD 2 400 BAUD 4 800 BAUD 9 600 BAUD 19 200 BAUD 38 400 BAUD 57 600 BAUD 115 200 BAUD
Data transfer mode	<ul style="list-style-type: none"> ASCII RTU
Data access	Each device parameter can be accessed via Modbus RS485.  For Modbus register information
Compatibility with earlier model	<p>If the device is replaced, the Promag 500 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 →  105.</p>

Power supply


Terminal assignment

Transmitter: supply voltage, input/outputs


HART

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered →  12.									

FOUNDATION Fieldbus

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (A)	27 (B)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered →  12.									

PROFIBUS PA

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered →  12.									

Modbus RS485

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
The terminal assignment depends on the specific device version ordered → 12.									


Transmitter and sensor connection housing: connecting cable

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

Terminal assignment and connection of the connecting cable:

- Proline 500 – digital → 27
- Proline 500 → 29

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" → 26
- Option SA "FOUNDATION Fieldbus" → 26

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

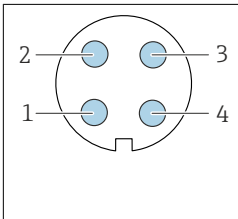
Order code for "Electrical connection"	Cable entry 2	Cable entry 3
L, N, P, U	Plug M12 × 1	–

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

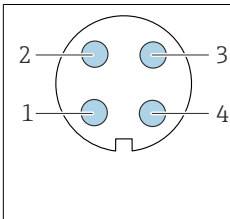
Order code for "Electrical connection"	Cable entry 2	Cable entry 3
M, 3, 4, 5	7/8" plug	–

Pin assignment, device plug

PROFIBUS PA

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

FOUNDATION Fieldbus

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

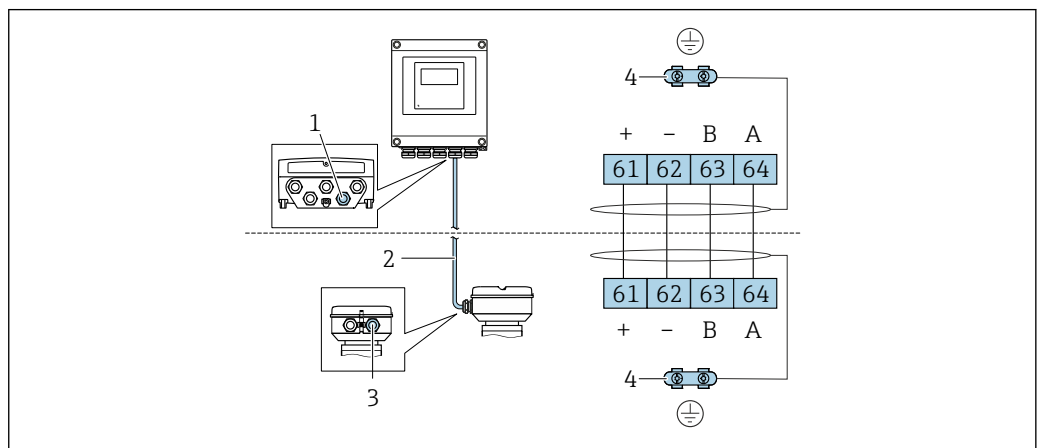
Supply voltage	Order code for "Power supply"	terminal voltage		Frequency range
	Option D	DC 24 V	±20%	–
	Option E	AC100 to 240 V	–15...+10%	50/60 Hz, ±4 Hz
	Option I	DC 24 V	±20%	–
		AC100 to 240 V	–15...+10%	50/60 Hz, ±4 Hz

Power consumption	Transmitter
	Max. 10 W (active power)

Current consumption	Transmitter <ul style="list-style-type: none">■ Max. 400 mA (24 V)■ Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)
---------------------	--

Power supply failure	<ul style="list-style-type: none"> ■ Totalizers stop at the last value measured. ■ Configuration is retained in the plug-in memory (HistoROM DAT). ■ Error messages (incl. total operated hours) are stored.
-----------------------------	---

Electrical connection	Connection of connecting cable: Proline 500 – digital
-----------------------	---



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

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

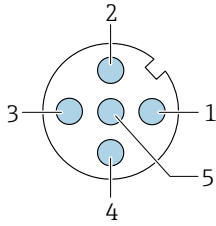
Sensor connection housing Order code for "Housing"	Connection on sensor connection housing via	Connection on transmitter housing via
Option B : stainless	Terminals	Terminals
Option C ultra-compact, hygienic, stainless	Device plug	Terminals

Pin assignment, device plug


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

Option **C** ultra-compact, hygienic, stainless

For connection to sensor connection housing.

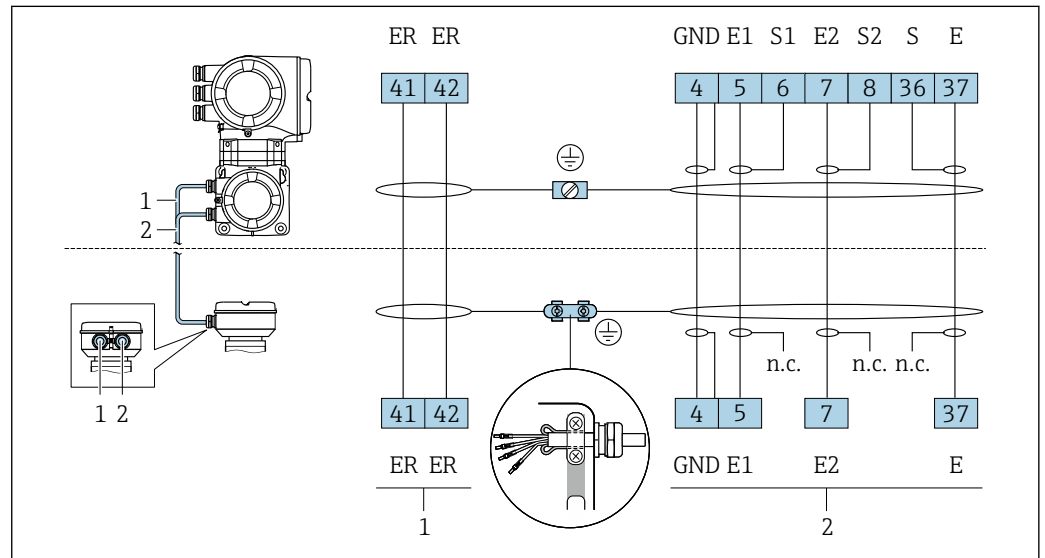
	Pin	Color ¹⁾	Assignment	
	1	Brown		Supply voltage
	2	White	A	ISEM communication
	3	Blue	B	
	4	Black		Supply voltage
	5	–		–
	Coding			Plug/socket
A				Plug

1) Cable colors of connecting cable

 A connecting cable with a device plug is optionally available.

Connection of the connecting cable: Proline 500

The connecting cable is connected via terminals.



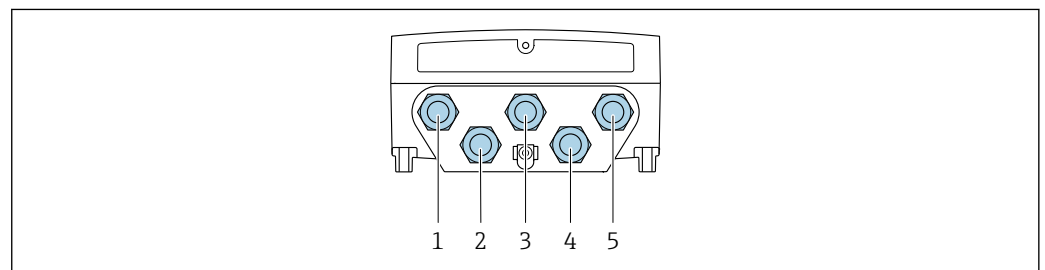
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- 1 Coil current cable
- 2 Signal cable

Connecting the transmitter

- Terminal assignment → 25
- Device plug pin assignment → 26

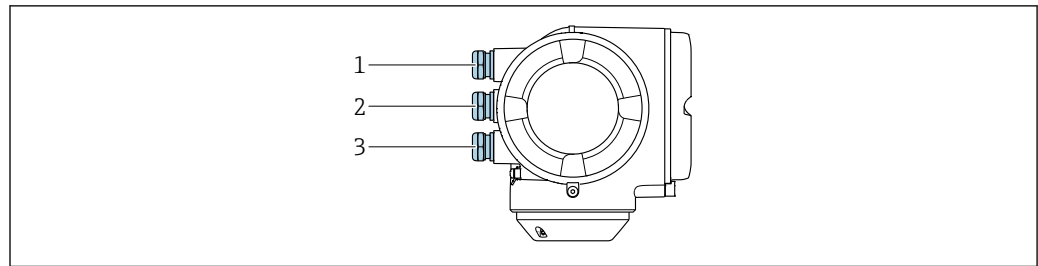
Connection of the Proline 500 – digital transmitter



A0028200

- 1 Cable entry for supply voltage
- 2 Cable entry for cable or connection of device plug for signal transmission
- 3 Cable entry for cable or connection of device plug for signal transmission
- 4 Cable entry for sensor - transmitter connecting cable
- 5 Cable entry for cable or connection of device plug for signal transmission, optional: connection of external WLAN antenna or service connector

Connection of the Proline 500 transmitter

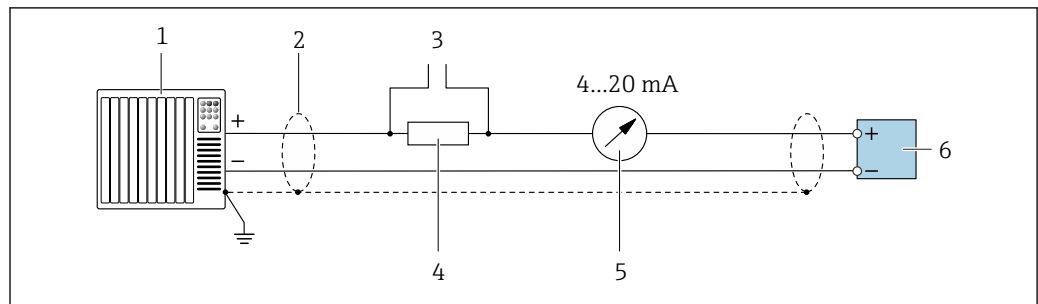


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- 1 Cable entry for supply voltage
- 2 Cable entry for input/output signal transmission
- 3 Cable entry for input/output signal transmission; optional: connection of external WLAN antenna or service connector

Connection examples

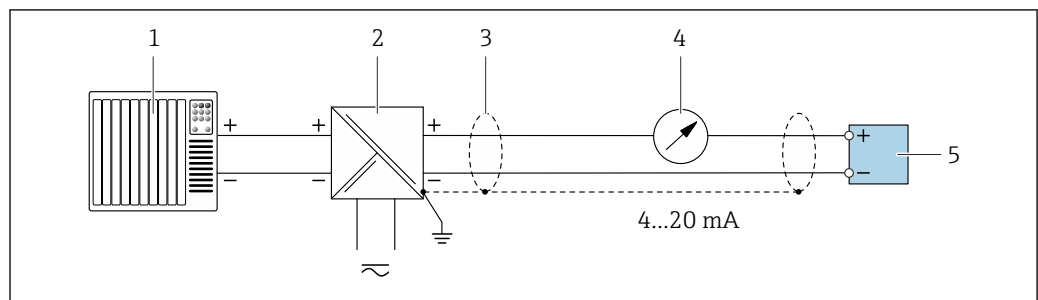
Current output 4 to 20 mA HART



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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 → 37
- 3 Connection for HART operating devices → 90
- 4 Resistor for HART communication ($\geq 250 \Omega$): observe maximum load → 13
- 5 Analog display unit: observe maximum load → 13
- 6 Transmitter

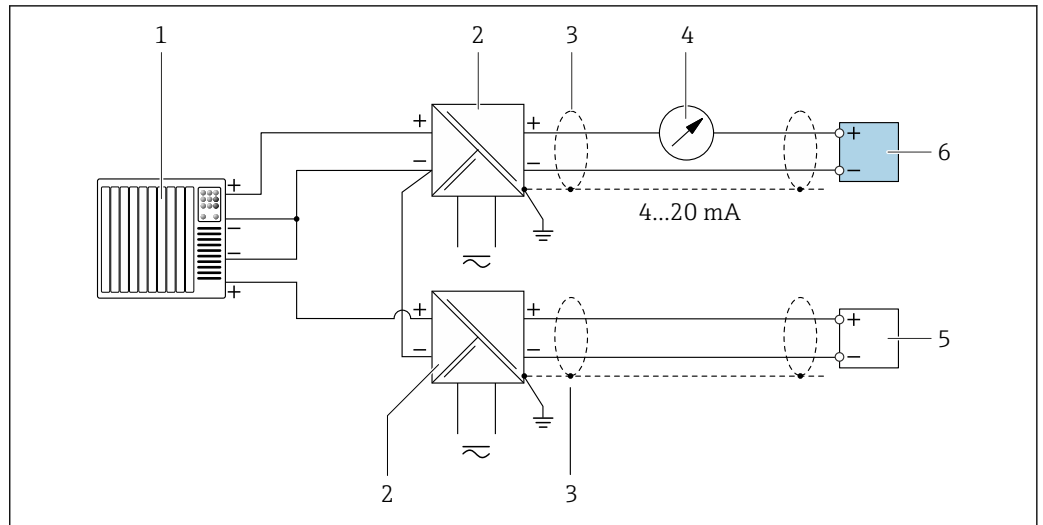


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3 Connection example for 4 to 20 mA HART current output (passive)

- 1 Automation system with current input (e.g. PLC)
- 2 Power supply
- 3 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 37
- 4 Analog display unit: observe maximum load → 13
- 5 Transmitter

HART input

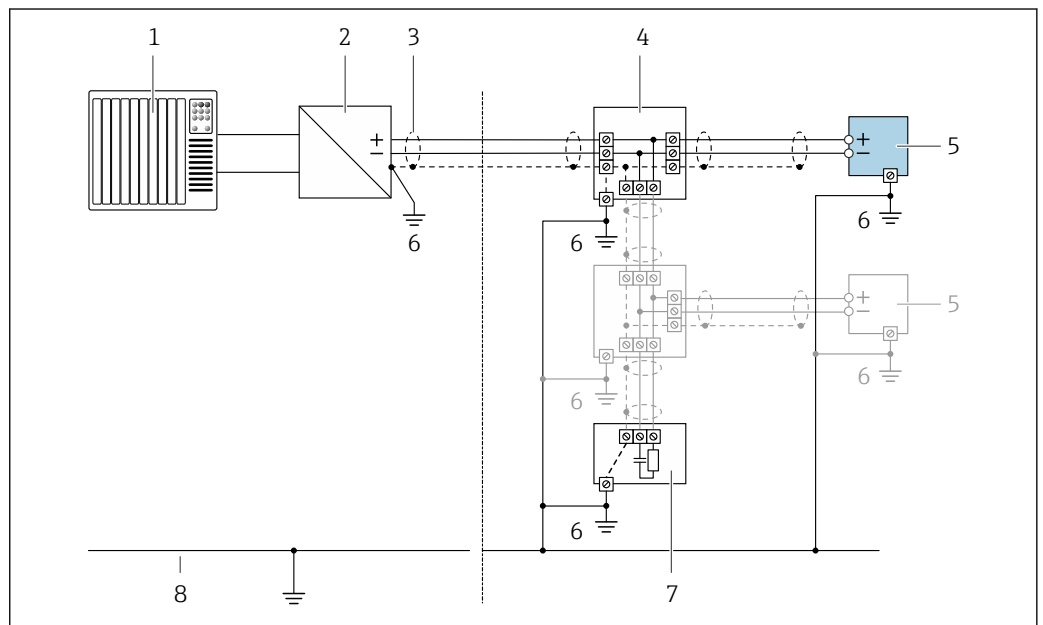


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4 Connection example for HART input with a common negative (passive)

- 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

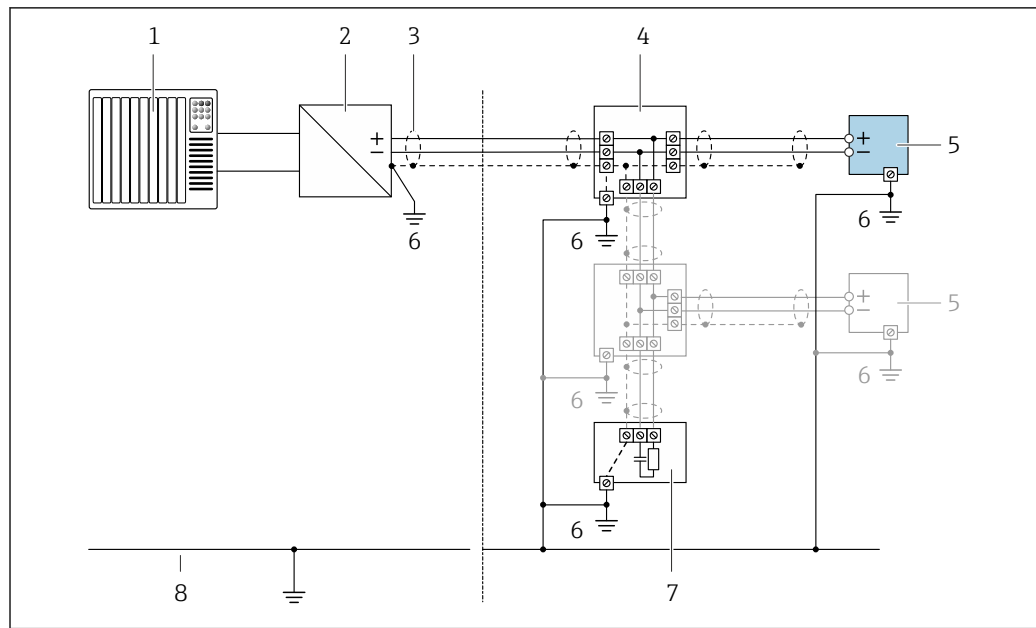


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5 Connection example for PROFIBUS-PA

- 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

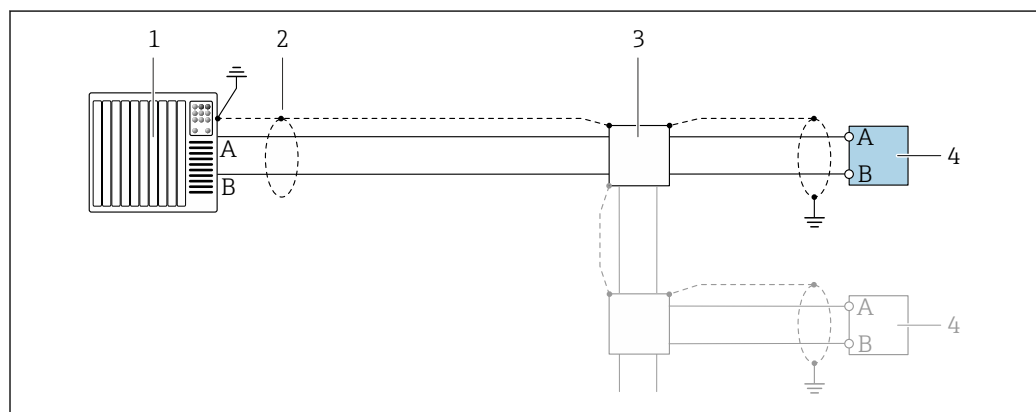


A0028768

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

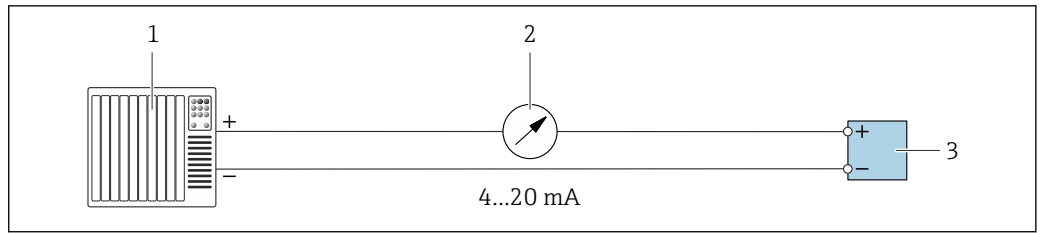


A0028765

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

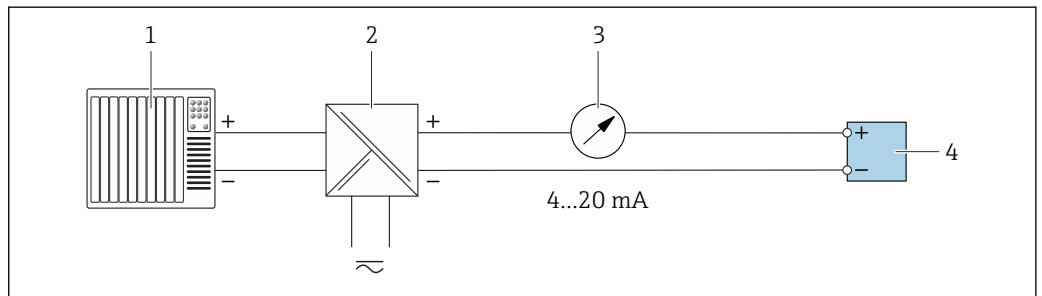
Current output 4-20 mA



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

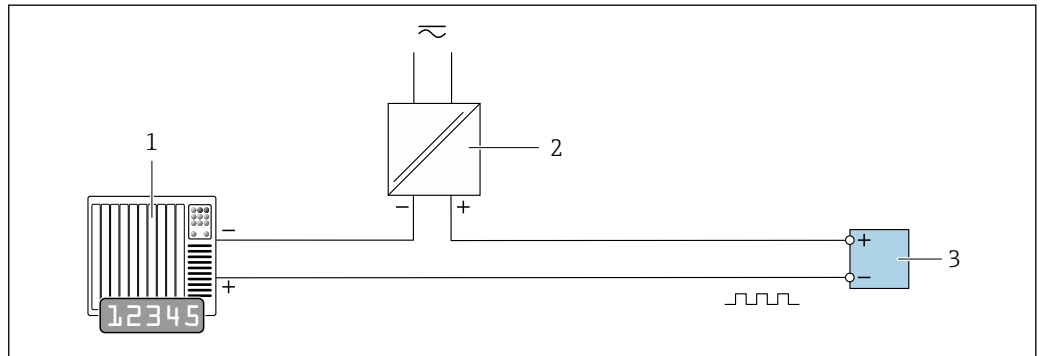


A0028759

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

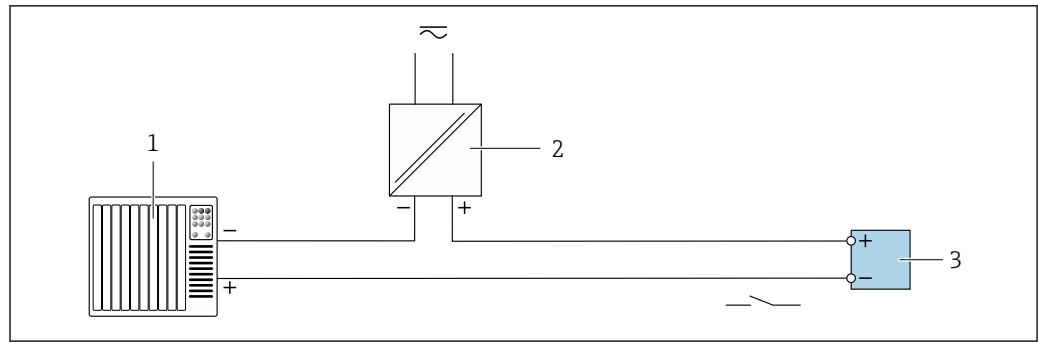


A0028761

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 → 14

Switch output

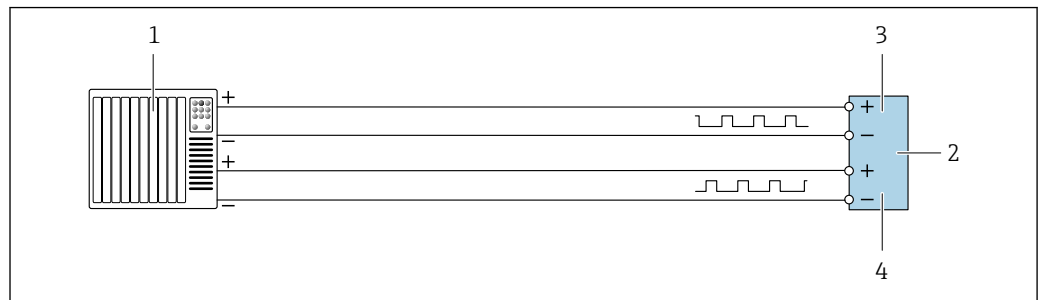


A0028760

11 Connection example for switch output (passive)

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

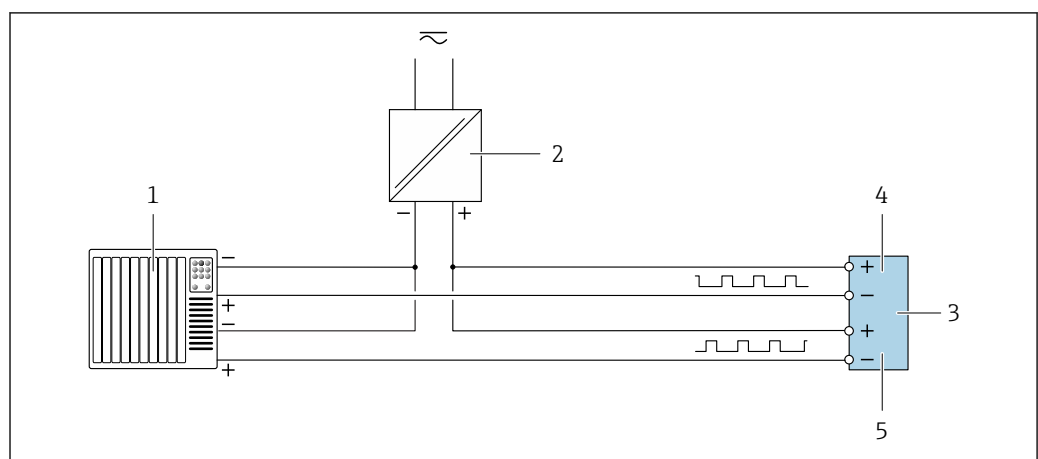
Double pulse output



A0029280

12 Connection example for double pulse output (active)

- 1 Automation system with double pulse input (e.g. PLC)
- 2 Transmitter: Observe input values → 15
- 3 Double pulse output
- 4 Double pulse output (slave), phase-shifted

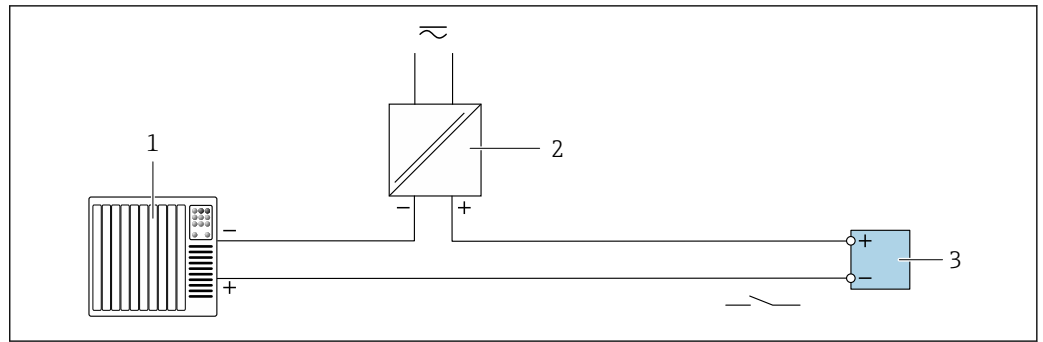


A0029279

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 → 15
- 4 Double pulse output
- 5 Double pulse output (slave), phase-shifted

Relay output

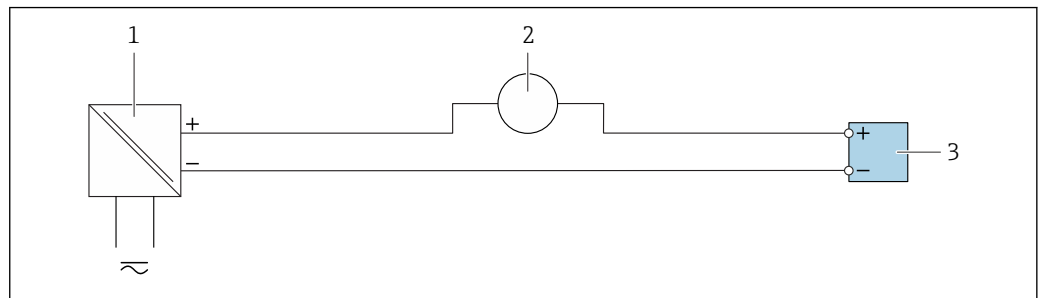


A0028760

14 Connection example for relay output (passive)

- 1 Automation system with relay input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values → 15

Current input

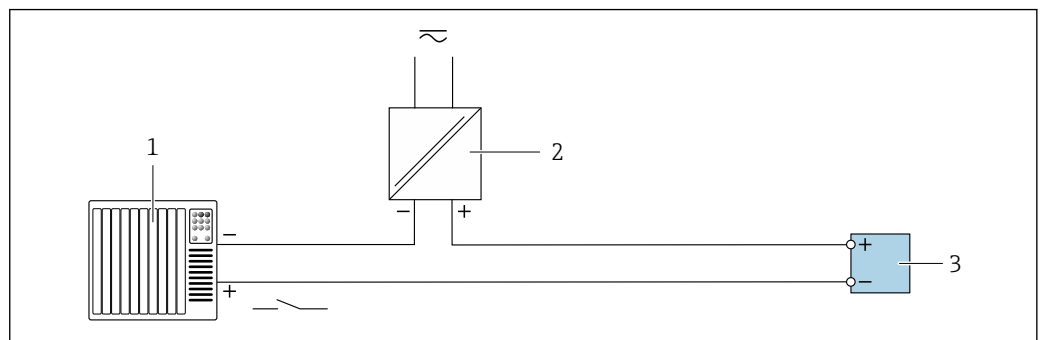


A0028915

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

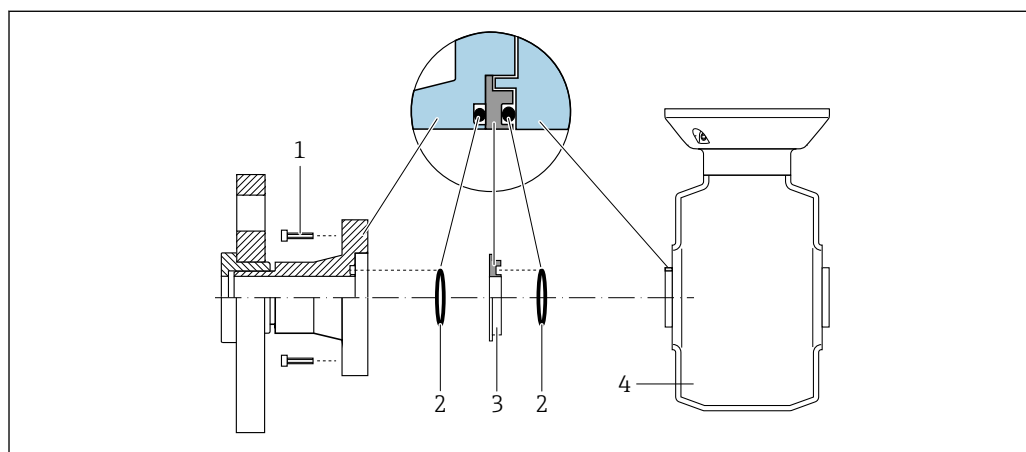
Plastic process connections

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.

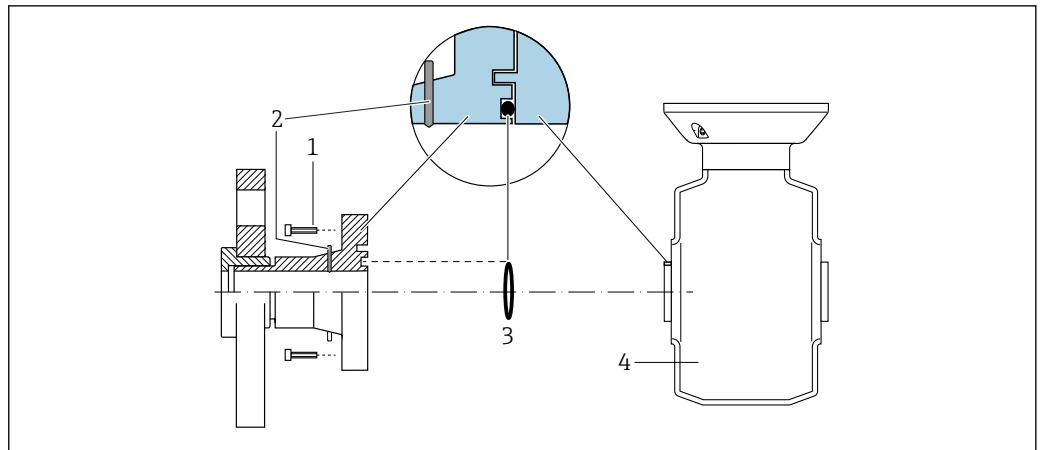
Potential equalization via additional grounding ring



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 mm² (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 → 26.
- Device plug for connecting cable: M12
A device plug is always used for the device version with the order code for "Sensor connection housing", option C "Ultra-compact, hygienic, stainless".

Cable specification

Permitted temperature range

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

Power supply cable

Standard installation cable is sufficient.

Protective ground cable

Cable: 2.1 mm² (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.

Cable type	A
Characteristic impedance	135 to 165 Ω at a measuring frequency of 3 to 20 MHz
Cable capacitance	< 30 pF/m
Wire cross-section	> 0.34 mm ² (22 AWG)
Cable type	Twisted pairs
Loop resistance	$\leq 110 \Omega/\text{km}$
Signal damping	Max. 9 dB over the entire length of the cable cross-section
Shield	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 sensor - transmitter: Proline 500 – digital*Standard cable*

A standard cable can be used as the connecting cable.

Standard cable	4 cores (2 pairs); twisted pair with common shield
Shielding	Tin-plated copper-braid, optical cover $\geq 85 \%$
Cable length	Maximum 300 m (1 000 ft), see the following table.

Cross-section	Cable lengths for use in	
	Non-hazardous area, Ex Zone 2, Class I, Division 2	Hazardous area, Ex Zone 1, Class I, Division 1
0.34 mm ² (AWG 22)	80 m (270 ft)	50 m (165 ft)
0.50 mm ² (AWG 20)	120 m (400 ft)	60 m (200 ft)
0.75 mm ² (AWG 18)	180 m (600 ft)	90 m (300 ft)
1.00 mm ² (AWG 17)	240 m (800 ft)	120 m (400 ft)
1.50 mm ² (AWG 15)	300 m (1 000 ft)	180 m (600 ft)
2.50 mm ² (AWG 13)	300 m (1 000 ft)	300 m (1 000 ft)

Optionally available connecting cable

Standard cable	2 × 2 × 0.34 mm ² (AWG 22) PVC cable with common shield (2 pairs, twisted pair)
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 %
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)
Available cable length	Fixed: 20 m (65 ft); variable: up to maximum 50 m (165 ft)

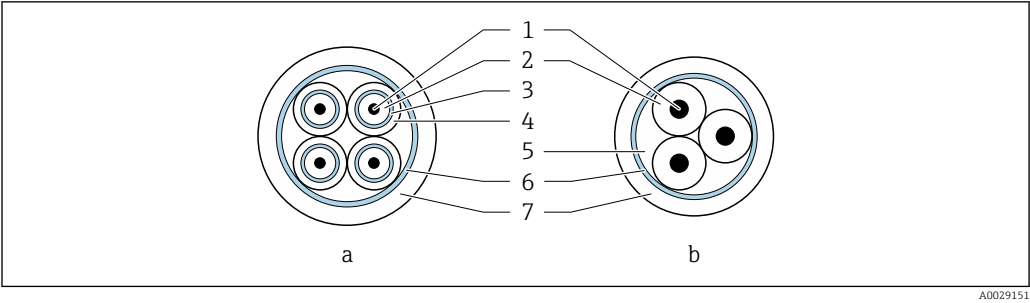
Connecting cable for sensor - Proline 500 transmitter

Signal cable

Standard cable	3 × 0.38 mm ² (20 AWG) with common, braided copper shield (∅ ~ 9.5 mm (0.37 in)) and individual shielded cores
Conductor resistance	≤ 50 Ω/km (0.015 Ω/ft)
Capacitance: core/shield	≤ 420 pF/m (128 pF/ft)
Cable length (max.)	Depends on the medium conductivity, max. 200 m (656 ft)
Cable lengths (available for order)	5 m (15 ft), 10 m (32 ft), 20 m (65 ft) or variable length up to max. 200 m (656 ft)
Operating temperature	-20 to +80 °C (-68 to +176 °F)

Coil current cable

Standard cable	3 × 0.75 mm ² (18 AWG) with common, braided copper shield (∅ ~ 9 mm (0.35 in)) and individual shielded cores
Conductor resistance	≤ 37 Ω/km (0.011 Ω/ft)
Capacitance: core/core, shield grounded	≤ 120 pF/m (37 pF/ft)
Cable length (max.)	Depends on the medium conductivity, max. 200 m (656 ft)
Cable lengths (available for order)	5 m (15 ft), 10 m (32 ft), 20 m (65 ft) or variable length up to max. 200 m (656 ft)
Operating temperature	-20 to +80 °C (-68 to +176 °F)
Test voltage for cable insulation	≤ AC 1433 V rms 50/60 Hz or ≥ DC 2026 V



A0029151

17 Cable cross-section


- a Electrode cable
- b Coil current cable
- 1 Core
- 2 Core insulation
- 3 Core shield
- 4 Core jacket
- 5 Core reinforcement
- 6 Cable shield
- 7 Outer jacket

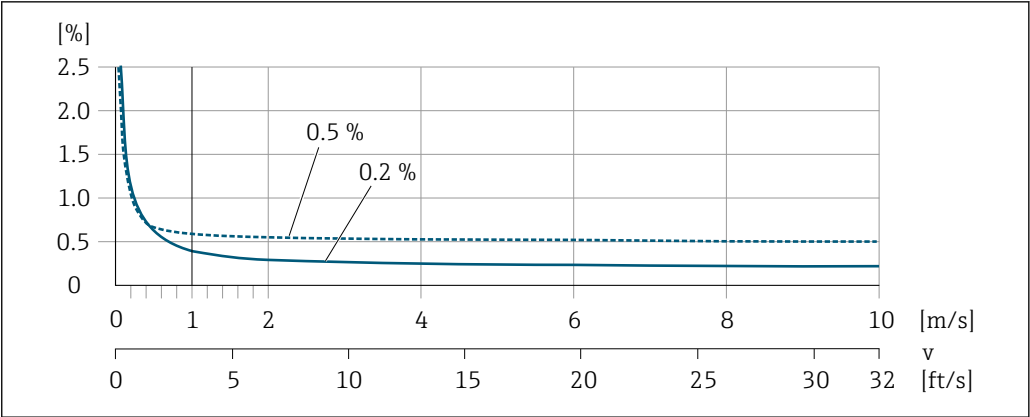
Operation in zones of severe electrical interference

The measuring system meets the general safety requirements → 100 and EMC specifications → 48.

Grounding is by means of the ground terminal provided for the purpose inside the connection housing. The stripped and twisted lengths of cable shield to the ground terminal must be as short as possible.

Performance characteristics

Reference operating conditions	<ul style="list-style-type: none">■ 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	<p>Error limits under reference operating conditions</p> <p>o.r. = of reading</p> <p>Volume flow</p> <ul style="list-style-type: none">■ $\pm 0.5\%$ o.r. ± 1 mm/s (0.04 in/s)■ Optional: $\pm 0.2\%$ o.r. ± 2 mm/s (0.08 in/s) <p> Fluctuations in the supply voltage do not have any effect within the specified range.</p>



A0028974

18 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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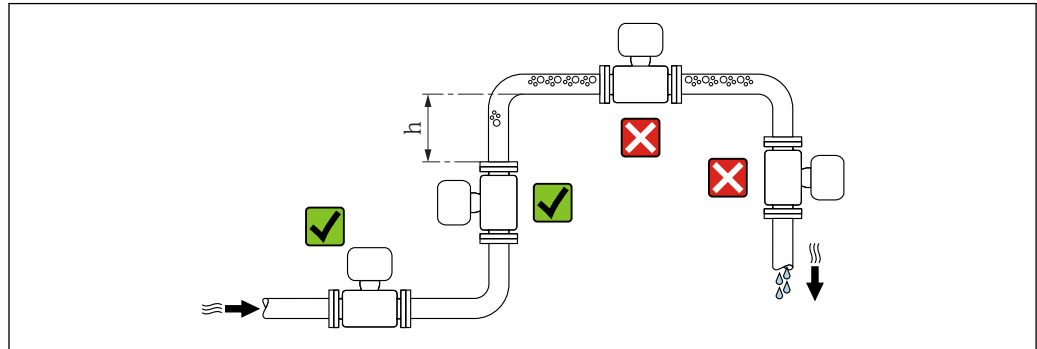
Pulse/frequency output

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:

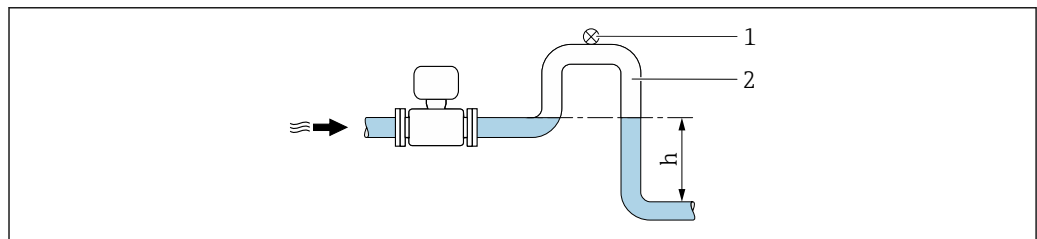
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

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



A0028981

19 Installation in a down pipe

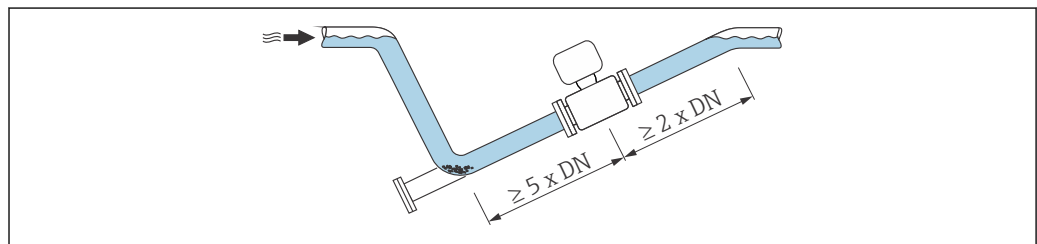
1 Vent valve

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.



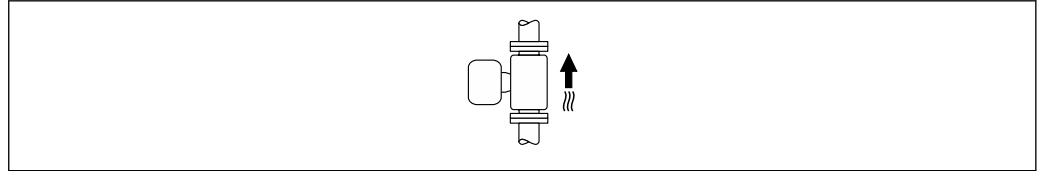
A0029257

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).

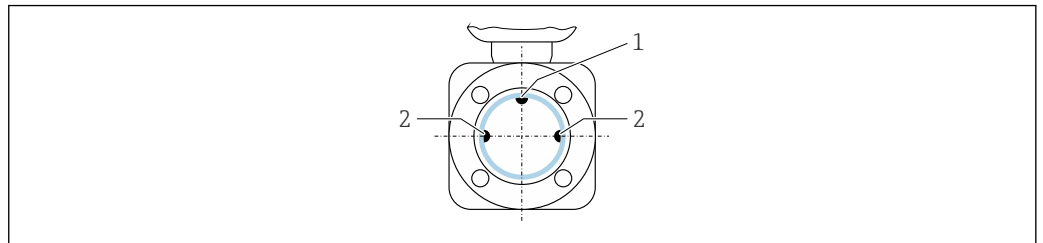
An optimum orientation position helps avoid gas and air accumulations and deposits in the measuring tube.

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

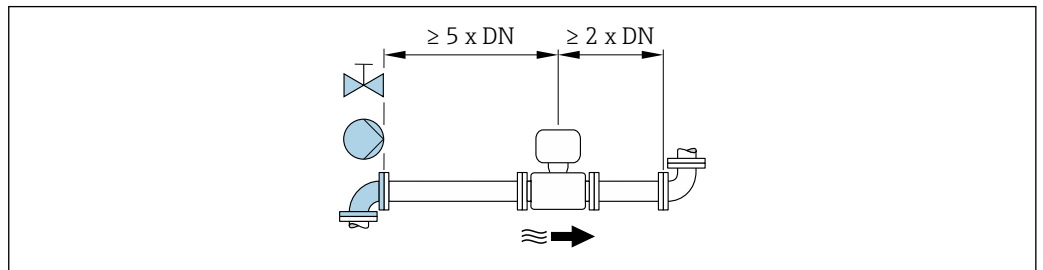


- Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.
- Empty pipe detection only works if the transmitter housing is pointing upwards as otherwise there is no guarantee that the empty pipe detection function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



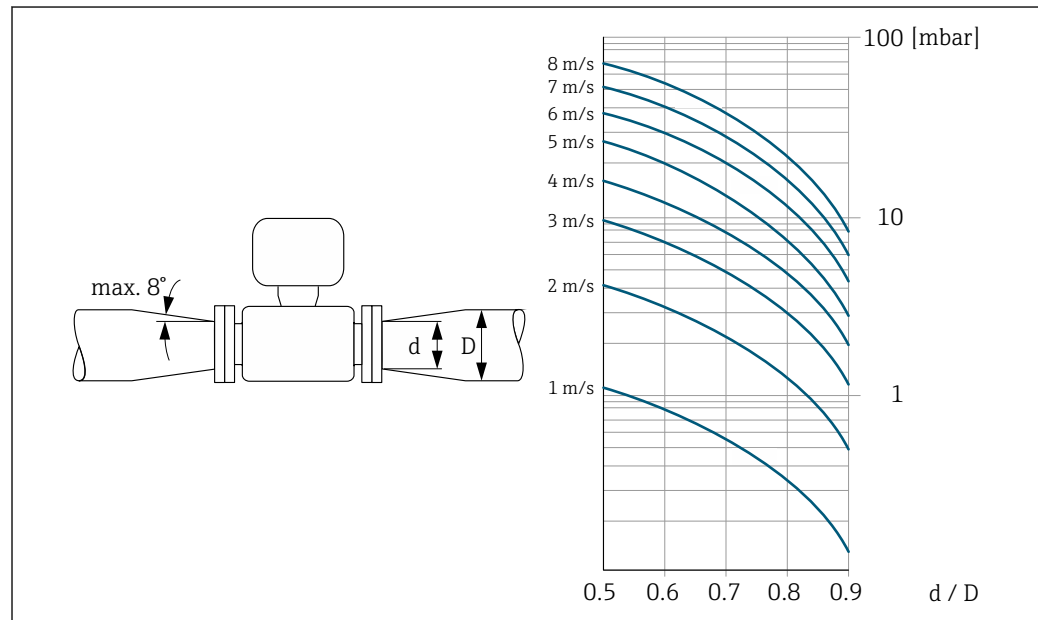
A0028997

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.



A0029002

Length of connecting cable

Proline 500 – digital transmitter

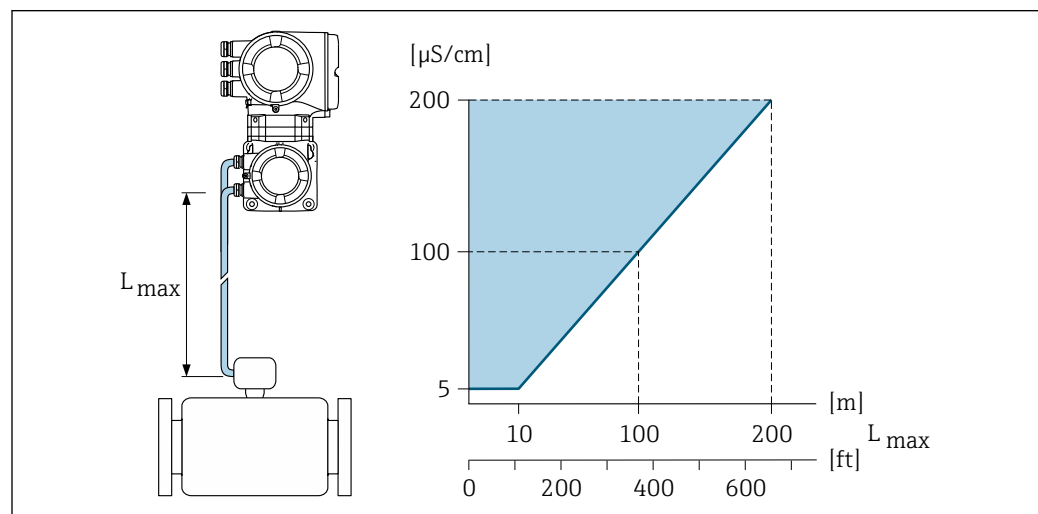
Lengths of connecting cable → 38

Proline 500 transmitter

Max. 200 m (650 ft)

To ensure correct measuring results, observe the maximum permitted length of the connecting cable L_{\max} . This length is determined by the conductivity of the fluid.

If measuring liquids in general: 5 $\mu\text{S/cm}$



A0029158

20 Permitted length of connecting cable

Colored area = permitted range

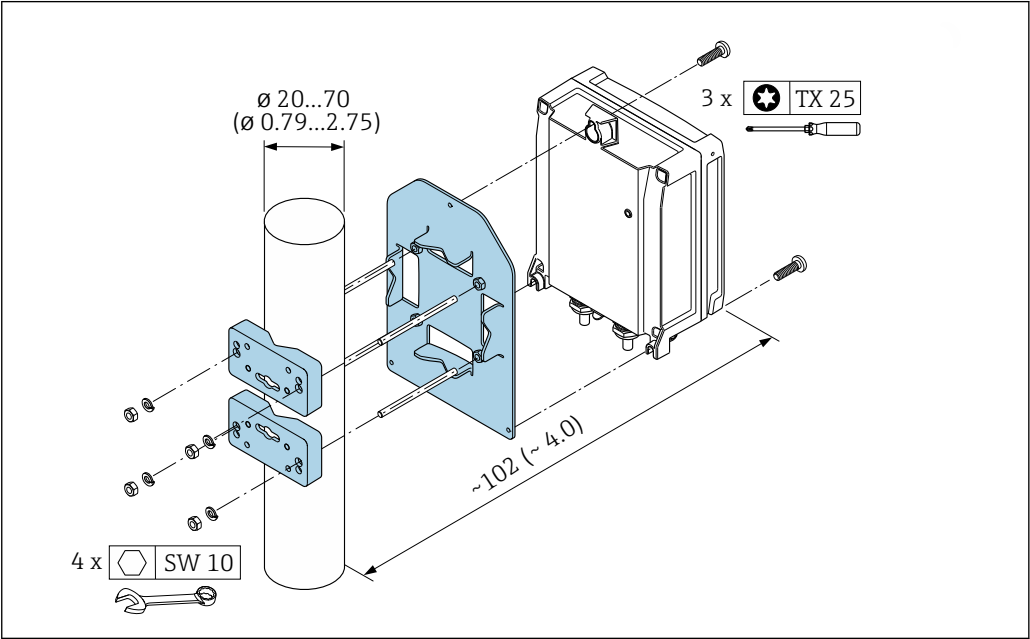
L_{\max} = length of connecting cable in [m] ([ft])

[$\mu\text{S/cm}$] = fluid conductivity

Mounting the transmitter housing

Proline 500 – digital transmitter

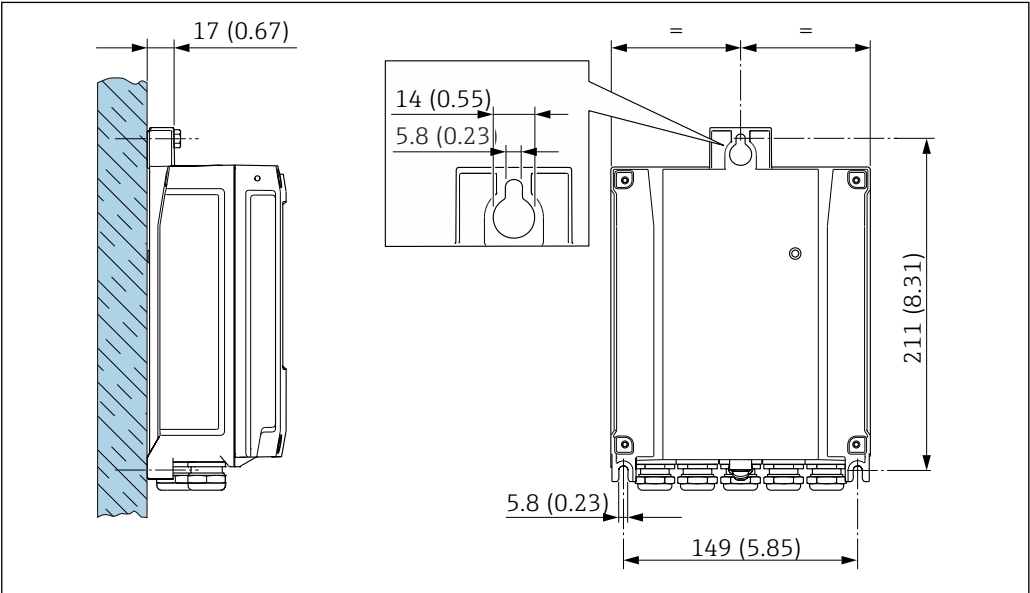
Post mounting



A0029051

21 Engineering unit mm (in)

Wall mounting

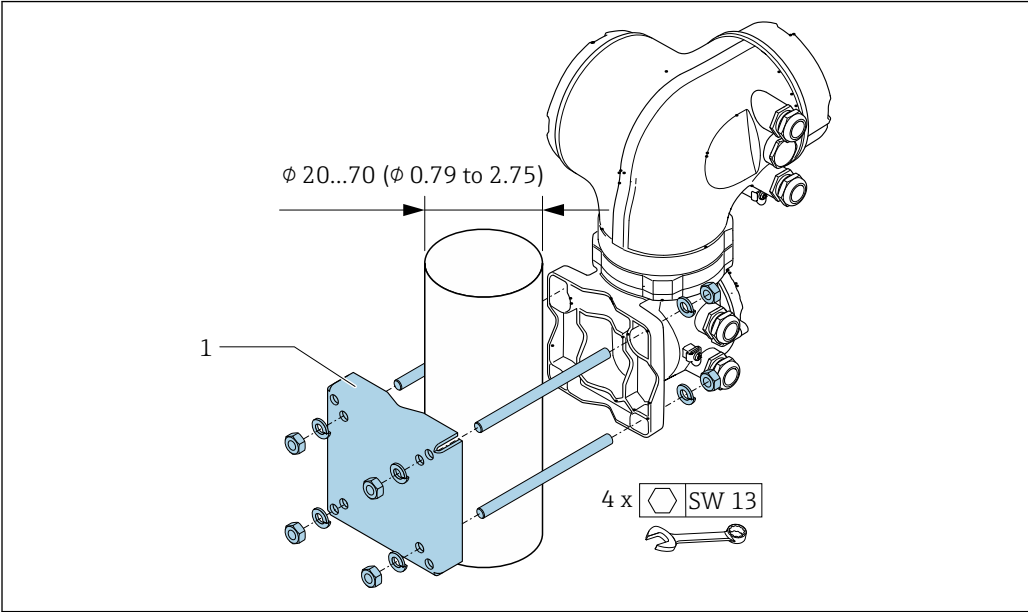


A0029054

22 Engineering unit mm (in)

Proline 500 transmitter

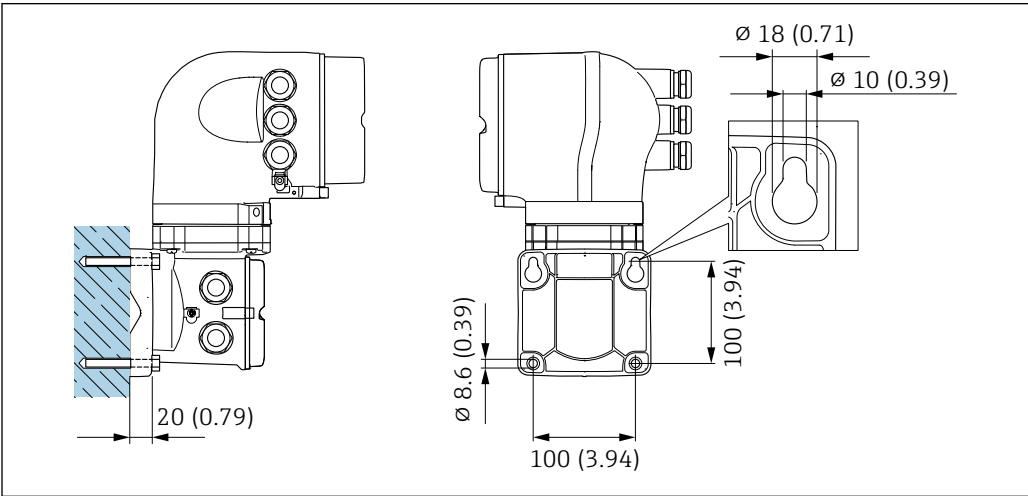
Post mounting



A0029057

23 Engineering unit mm (in)

Wall mounting

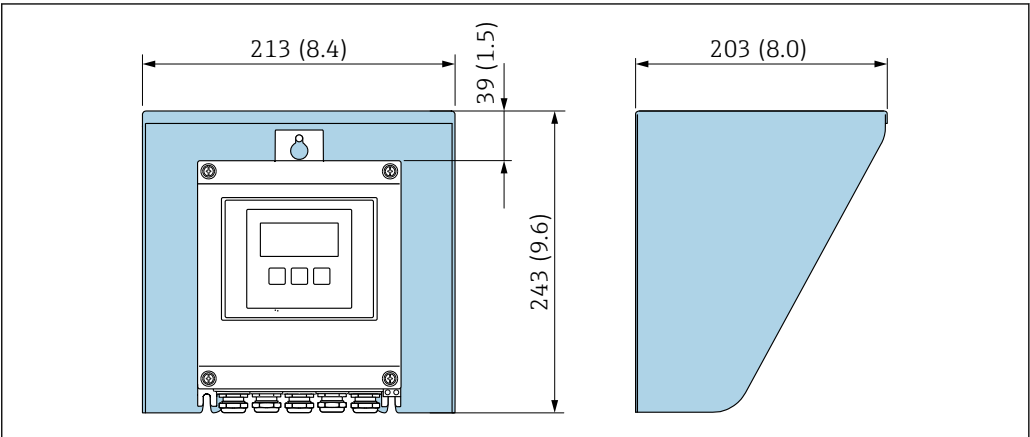


A0029068

24 Engineering unit mm (in)

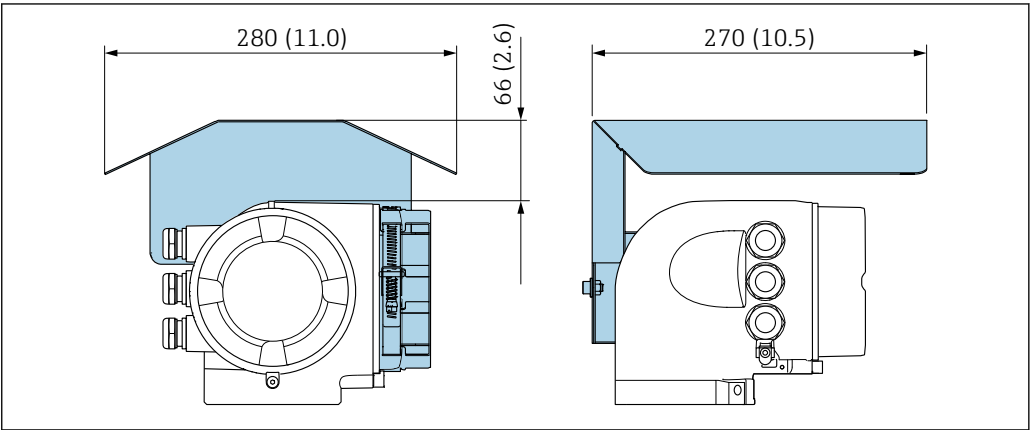
Special mounting instructions

Protective cover



A0029552

25 Weather protection cover for Proline 500 – digital



A0029553

26 Weather protection cover for Proline 500

Environment


Ambient temperature range	Transmitter	<ul style="list-style-type: none">Standard: -40 to +60 °C (-40 to +140 °F)Optional: -50 to +60 °C (-58 to +140 °F) (order code for "Test, certificate", option JN "Ambient temperature of transmitter -50 °C (-58 °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) Mount the transmitter separately from the sensor if both the ambient and fluid temperatures are high.
	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.

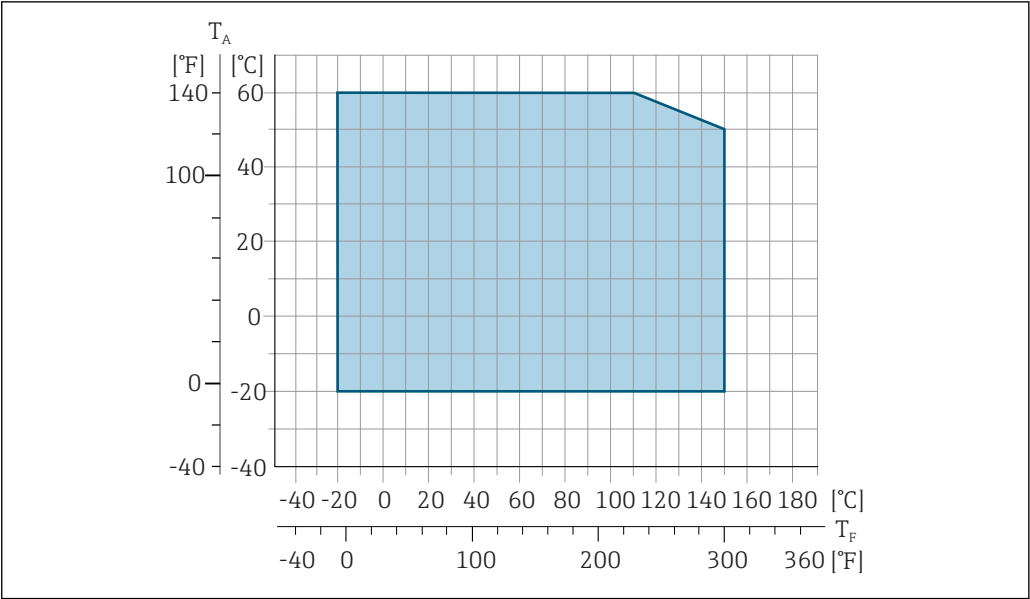
Storage temperature -50 to +80 °C (-58 to +176 °F)

- Protect the measuring device against direct sunlight during storage in order to avoid unacceptably high surface temperatures.
- Select a storage location where moisture cannot collect in the measuring device as fungus or bacteria infestation can damage the liner.
- If protection caps or protective covers are mounted these should never be removed before installing the measuring device.

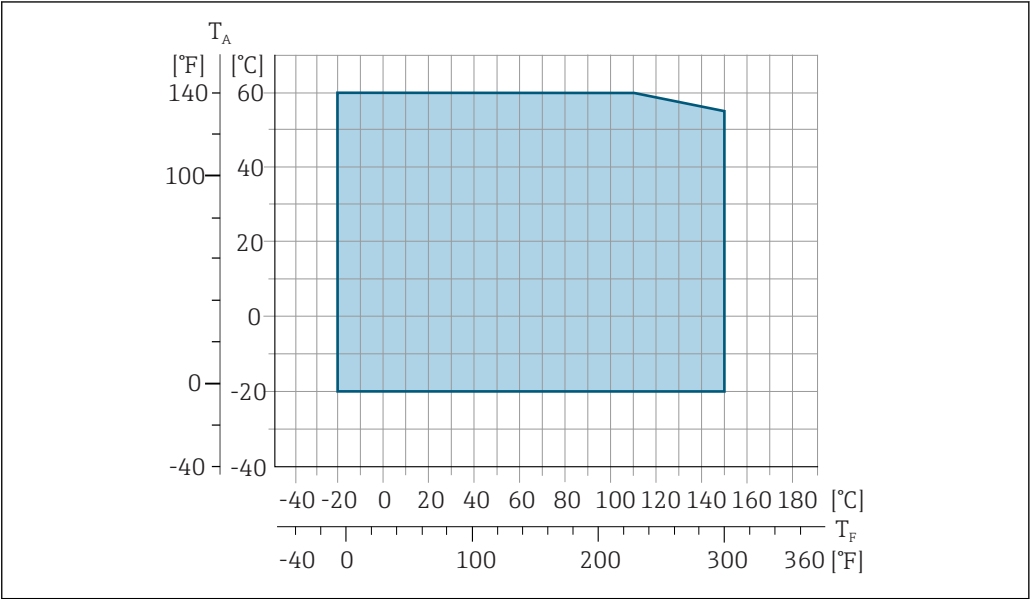
Degree of protection	Transmitter <ul style="list-style-type: none"> ■ As standard: IP66/67, type 4X enclosure ■ With the order code for "Sensor options", option CM: IP69K can also be ordered ■ When housing is open: IP20, type 1 enclosure ■ Display module: IP20, type 1 enclosure Sensor As standard: IP66/67, type 4X enclosure External WLAN antenna IP67
Vibration resistance	<ul style="list-style-type: none"> ■ Vibration, sinusoidal according to IEC 60068-2-6 <ul style="list-style-type: none"> – 2 to 8.4 Hz, 3.5 mm peak – 8.4 to 2 000 Hz, 1 g peak ■ Vibration broad-band random, according to IEC 60068-2-64 <ul style="list-style-type: none"> – 10 to 200 Hz, 0.003 g²/Hz – 200 to 2 000 Hz, 0.001 g²/Hz – Total: 1.54 g rms
Shock resistance	Shock, half-sine according to IEC 60068-2-27 6 ms 30 g
Impact resistance	Rough handling shocks according to IEC 60068-2-31
Mechanical load	<ul style="list-style-type: none"> ■ Protect the transmitter housing against mechanical effects, such as shock or impact. ■ Never use the transmitter housing as a ladder or climbing aid.
Interior cleaning	<ul style="list-style-type: none"> ■ Cleaning in place (CIP) ■ Sterilization in place (SIP)
Electromagnetic compatibility (EMC)	As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)  For details, refer to the Declaration of Conformity.

Process

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




27 Promag 500 – digital
 T_A Ambient temperature range
 T_F Fluid temperature



28 Promag 500
 T_A Ambient temperature range
 T_F Fluid temperature

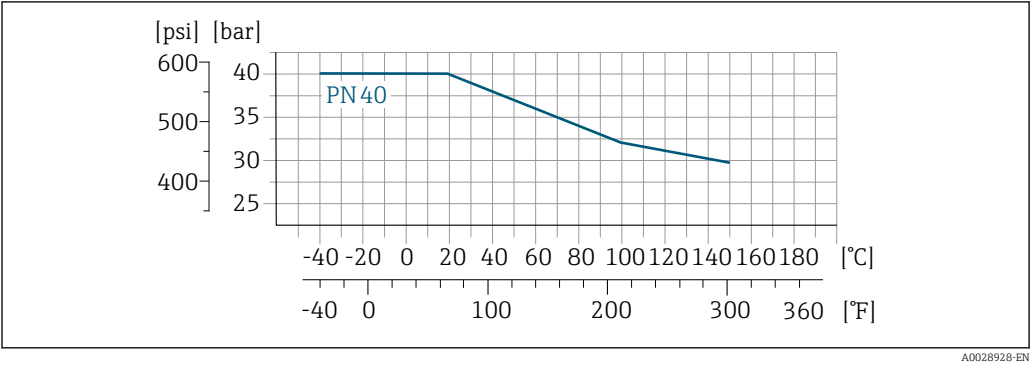
Conductivity $\geq 5 \mu\text{S/cm}$ for liquids in general. Stronger filter damping is required for very low conductivity values.

 Proline 500
The necessary minimum conductivity also depends on the cable length → 44.

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

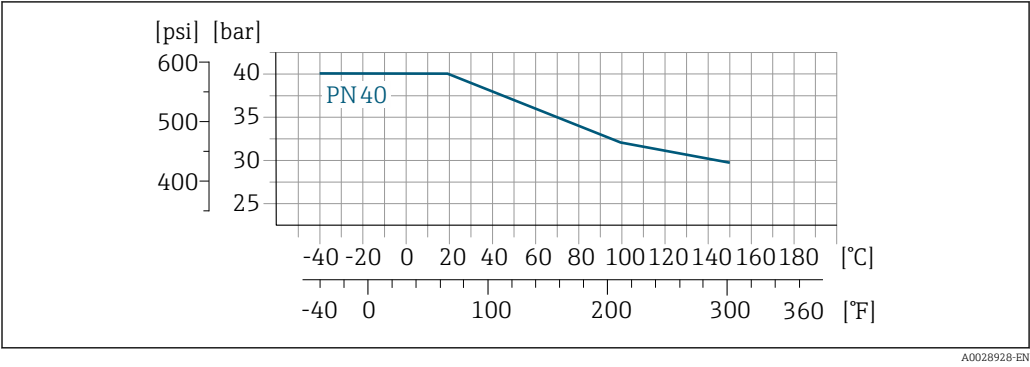
Process connections with O-ring seal, DN 2 to 25 (1/12 to 1")

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

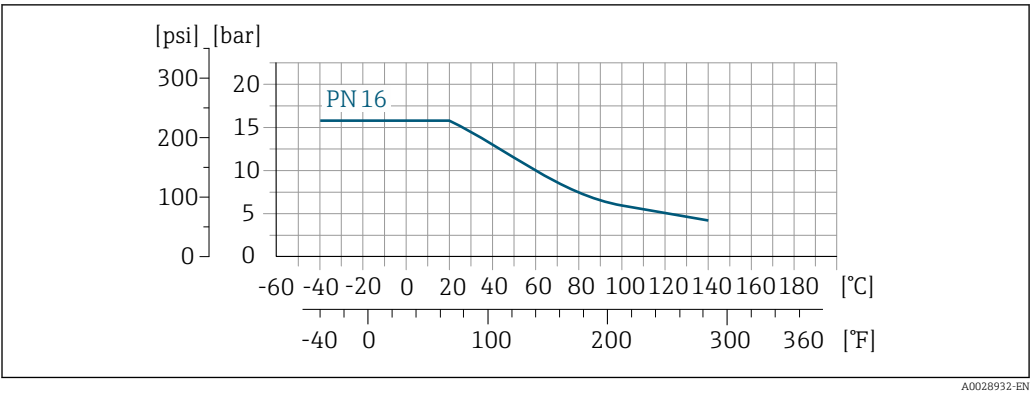


29 Process connection material: stainless steel, 1.4404 (F316L)

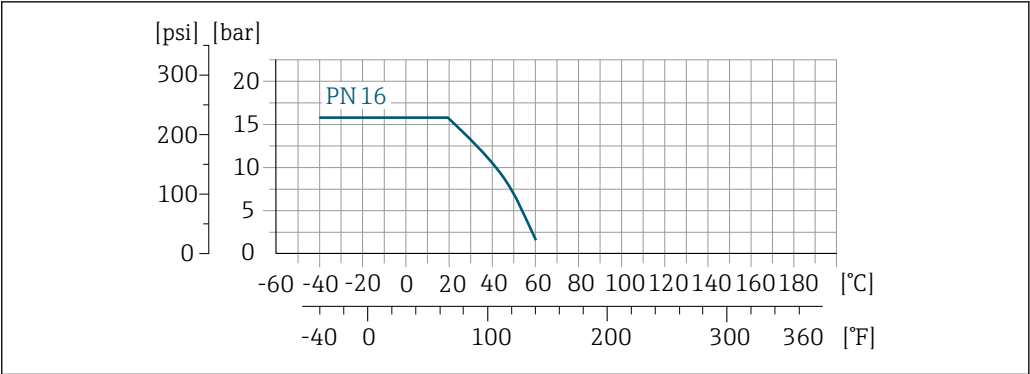
Process connection: flange according to EN 1092-1 (DIN 2501), adhesive sleeve



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

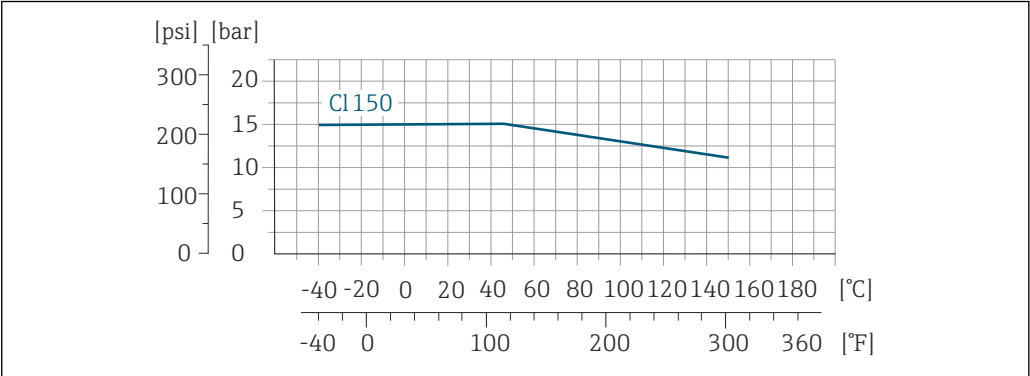


31 Process connection material: PVDF

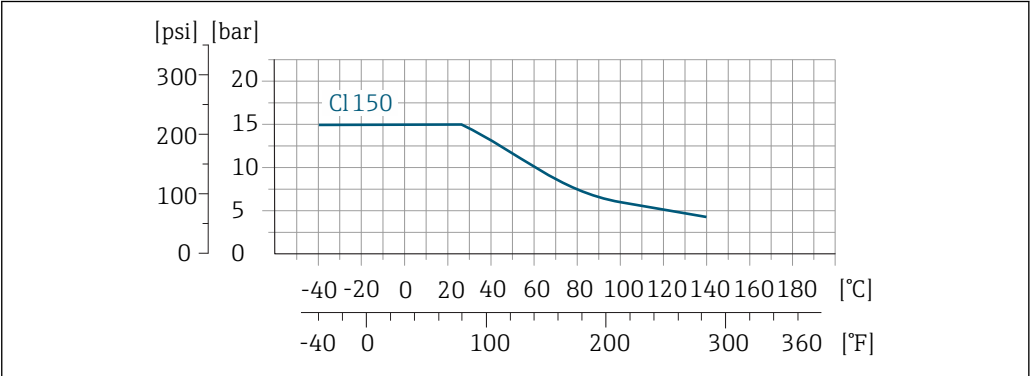


32 Process connection material: PVC-U

Process connection: flange according to ASME B16.5

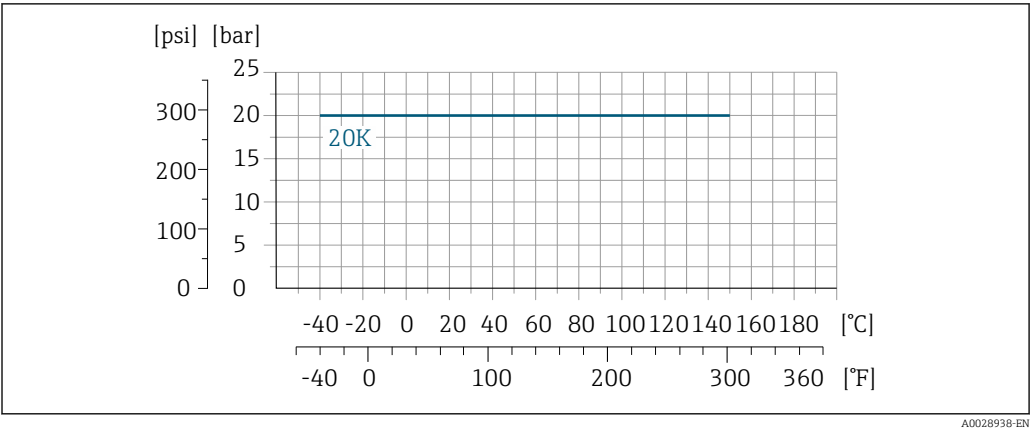


33 Process connection material: stainless steel, 1.4404 (F316L)

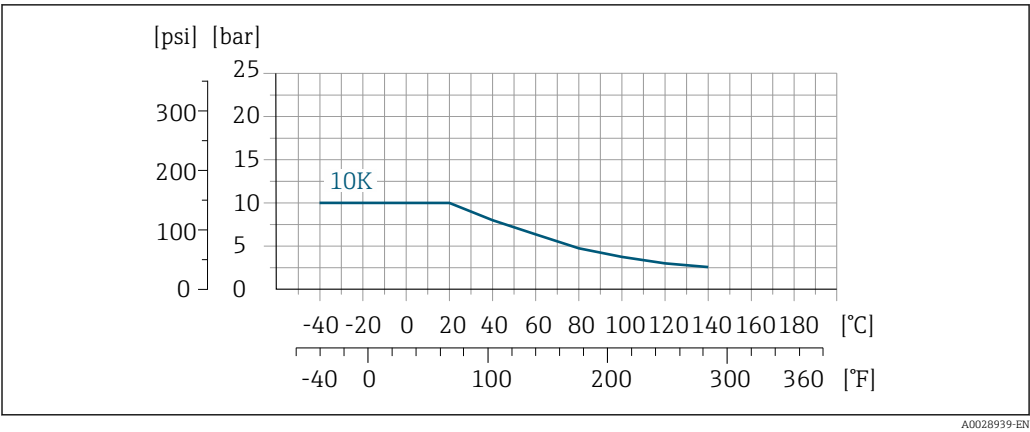


34 Process connection material: PVDF

Process connection: flange according to JIS B2220



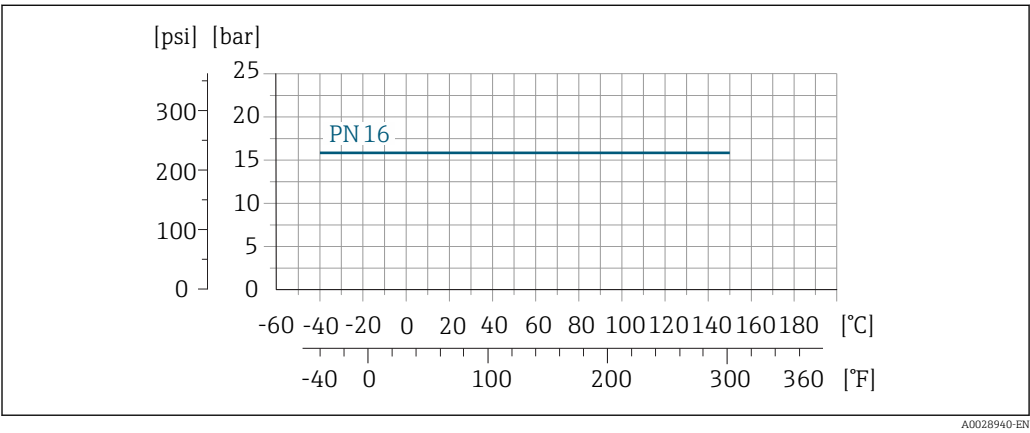
35 Process connection material: stainless steel, 1.4404 (F316L)



36 Process connection material: PVDF

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

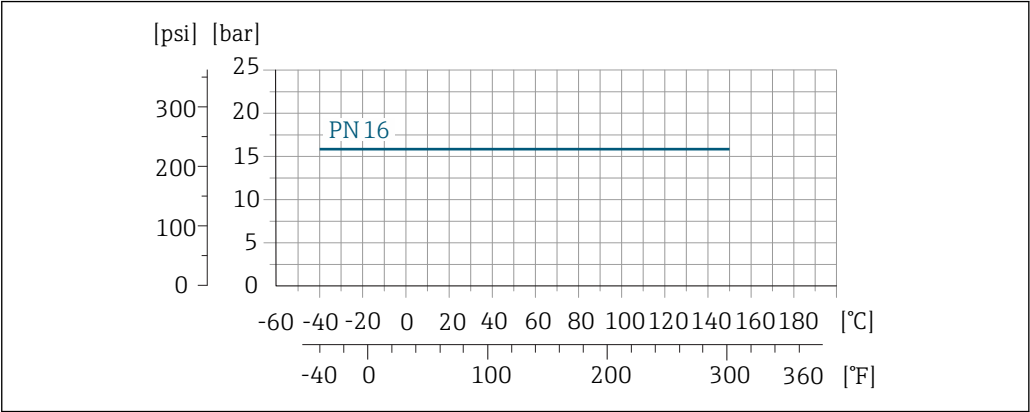
Process connection: weld-in nipple according to EN 10357 (DIN 11850), ASME BPE, ISO 2037; Clamp according to ISO 2852, DIN 32676, L14 AM7; coupling according to SC DIN 11851, DIN 11864-1, SMS 1145; flange according to DIN 11864-2



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

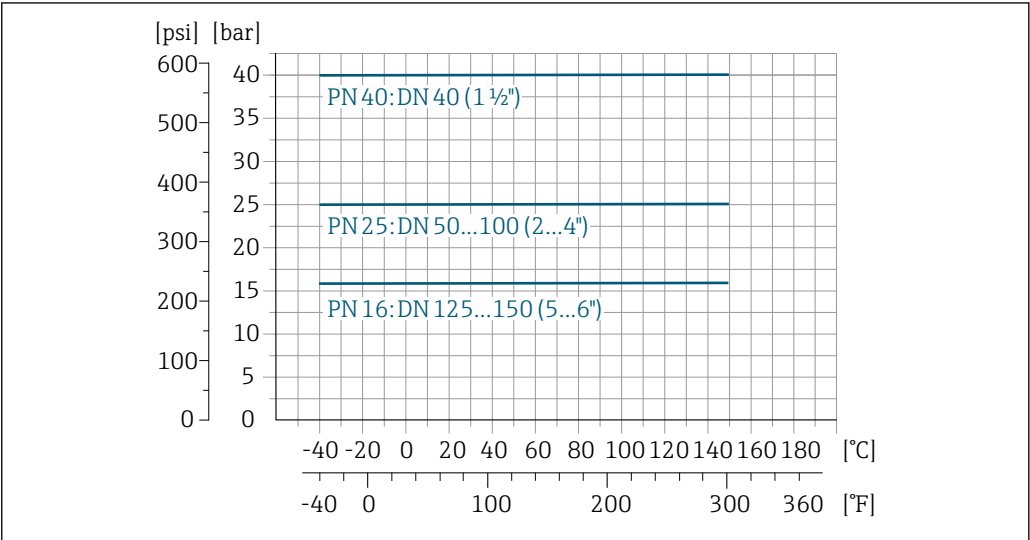
Process connections with aseptic molded seal, DN 40 to 150 (1 ½ to 6")

Process connection: coupling according to SMS 1145



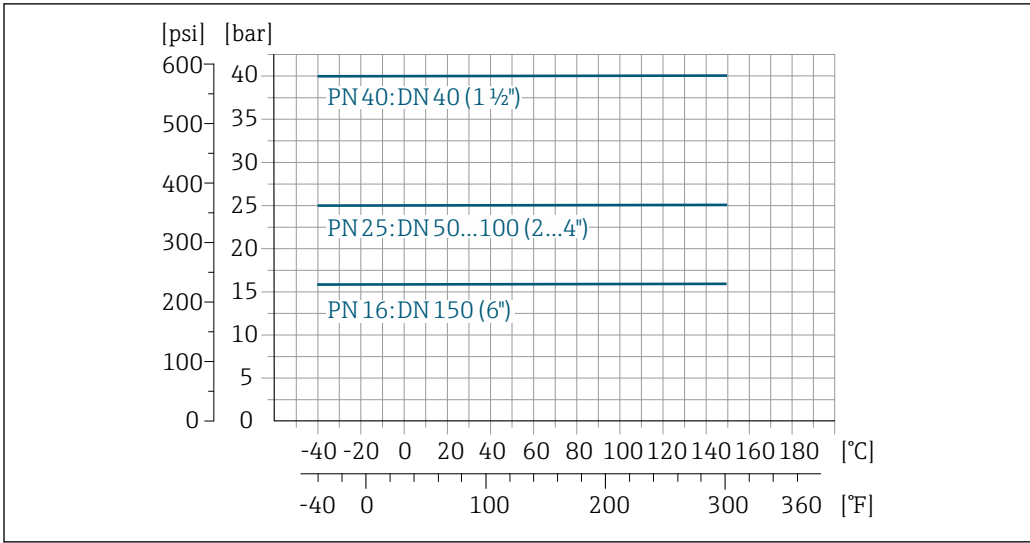
38 Process connection material: stainless steel, 1.4404 (F316L)

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



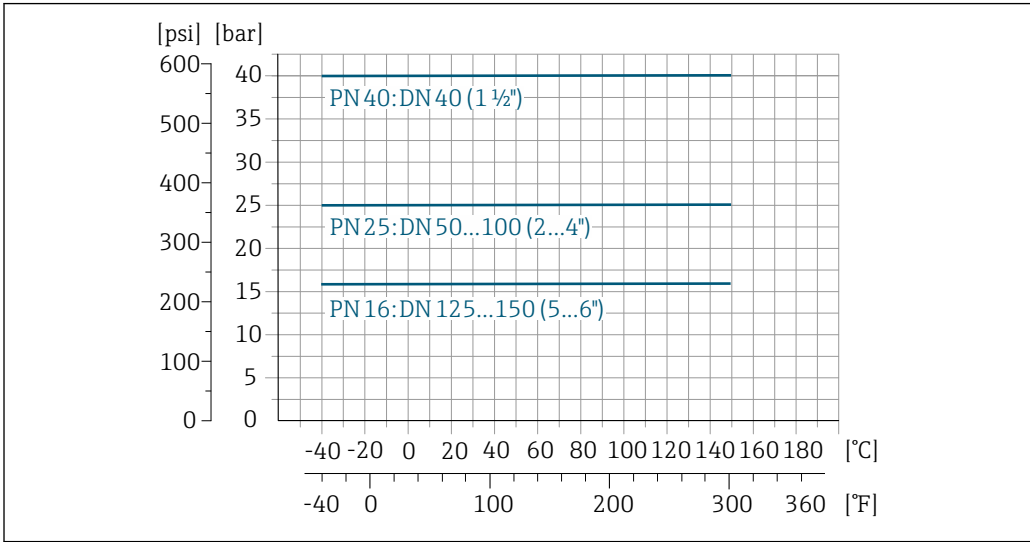
39 Process connection material: stainless steel, 1.4404 (F316L)

Process connection: weld-in nipple according to ASME BPE



A0028942-EN

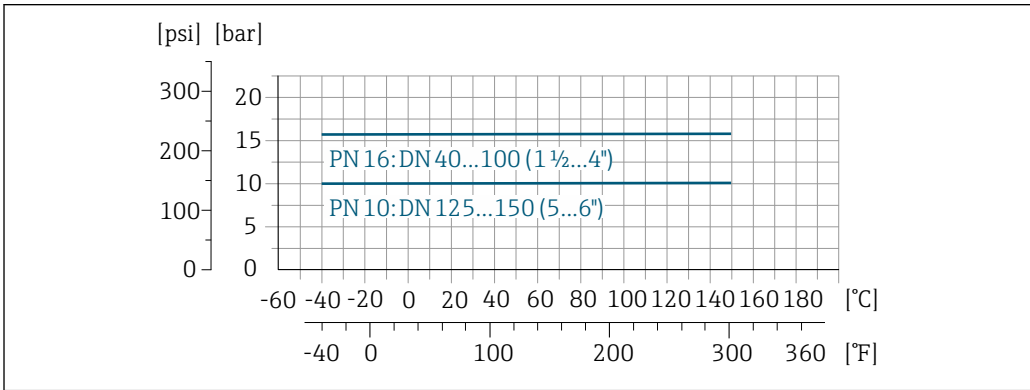
Process connection: weld-in nipple according to ISO 2037



A0028941-EN

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

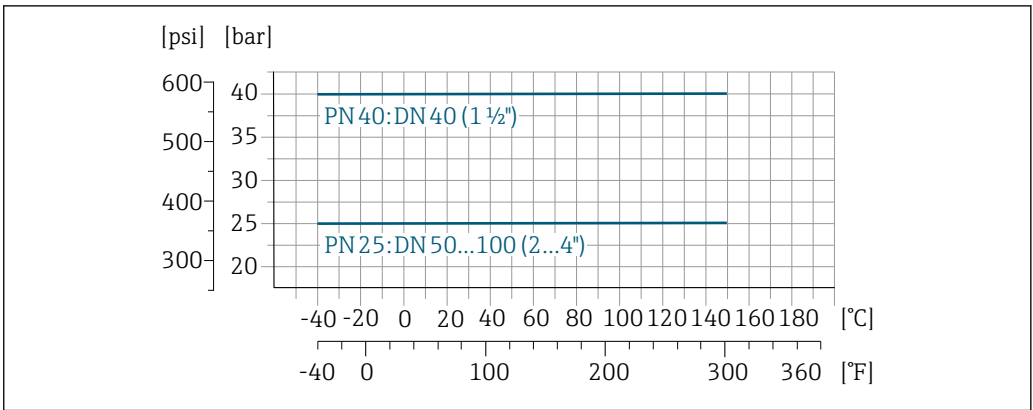
Process connection: Clamp according to ISO 2852, DIN 32676, L14 AM7



A0028943-EN

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

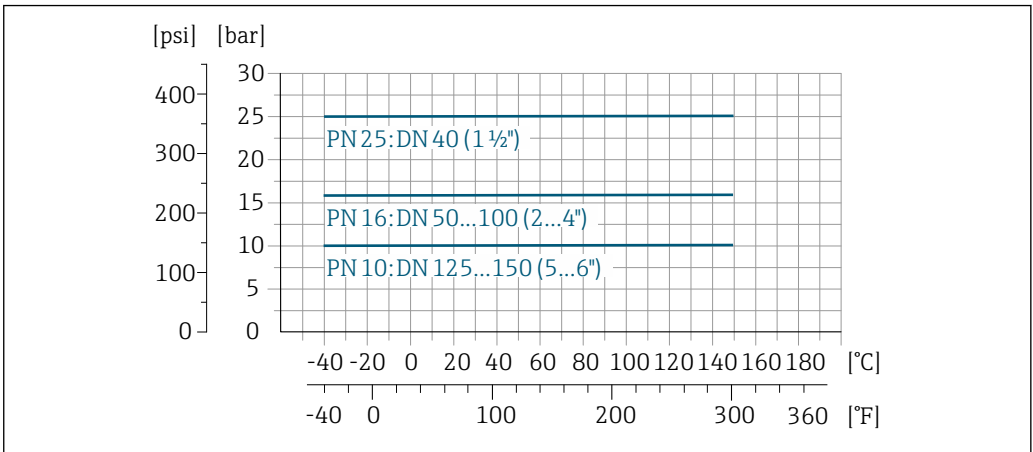
Process connection: coupling according to DIN 11864-1, ISO 2853



A0028944-EN

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

Process connection: flange according to DIN 11864-2



A0028945-EN

43 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)

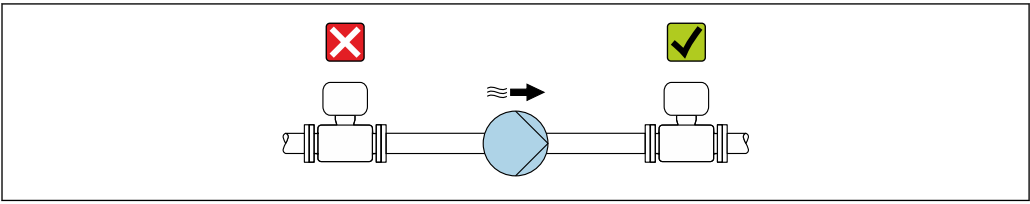
Flow limit

- 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 → 9

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 → 43

System pressure




A0028777

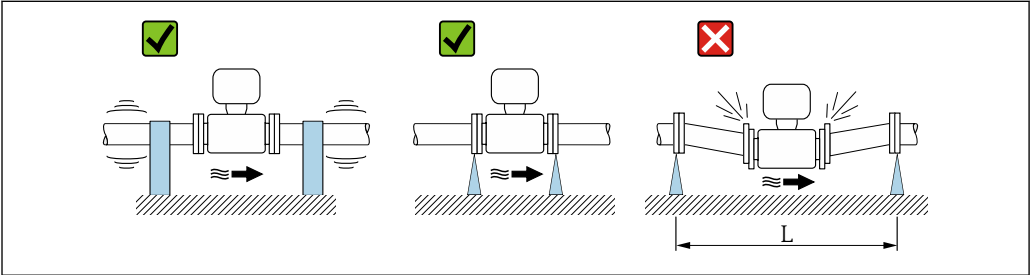
Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.

-  Furthermore, install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.
- 
 - 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.

- 
 - For information on the shock resistance of the measuring system
 - For information on the vibration resistance of the measuring system



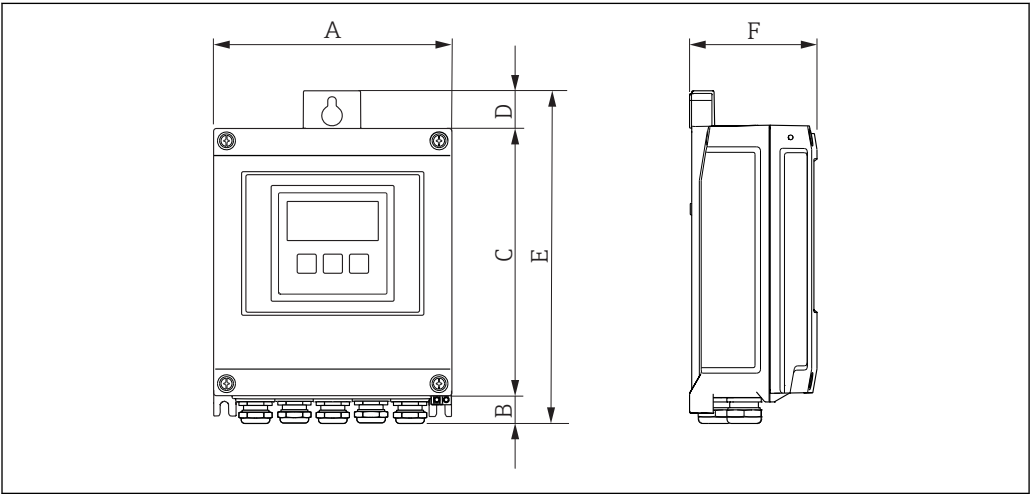
A0029004

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

Mechanical construction

Dimensions in SI units

Housing of Proline 500 – digital transmitter, non-Ex, Zone 2 and Div. 2



A0020522

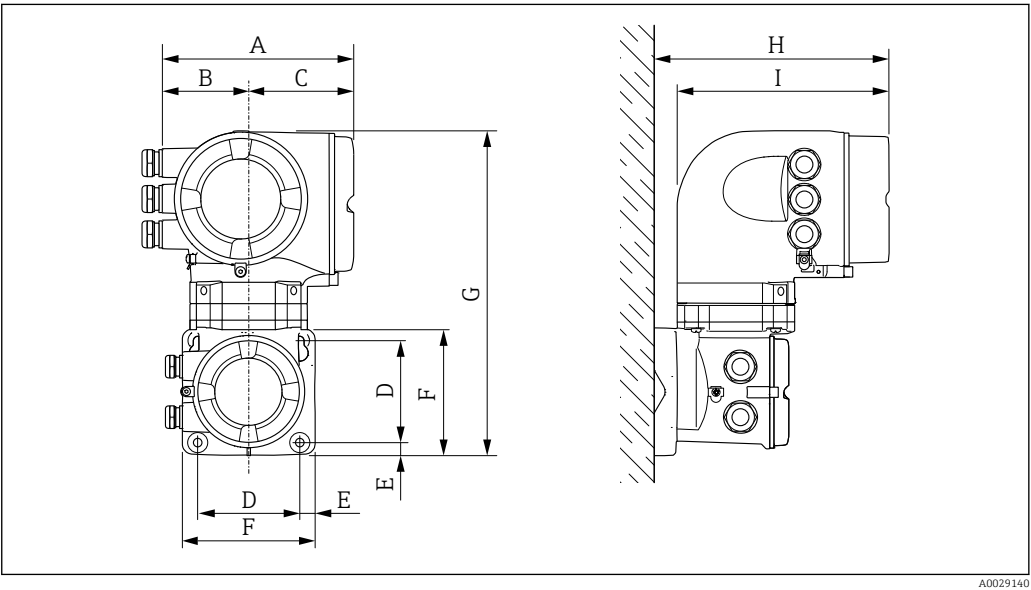
Order code for "Transmitter housing", option A "Aluminum, coated" and order code for "Integrated ISEM electronics", option A "Digital, sensor"

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
167	21	187	24	232	80

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

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
177	22	197	17	234	90

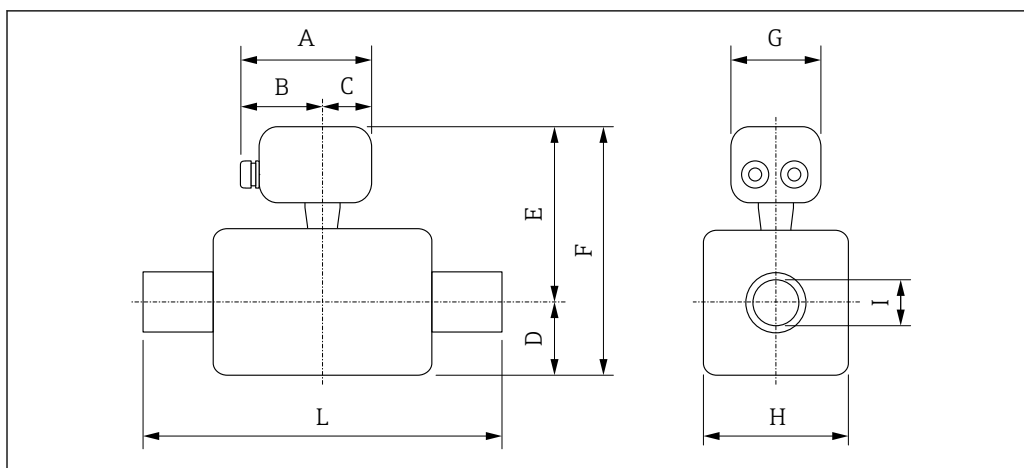
Housing of Proline 500 transmitter, Zone 1/2 and Div. 1/2



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

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]
188	85	103	100	15	130	318	239	217

Sensor connection housing



A0029685

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

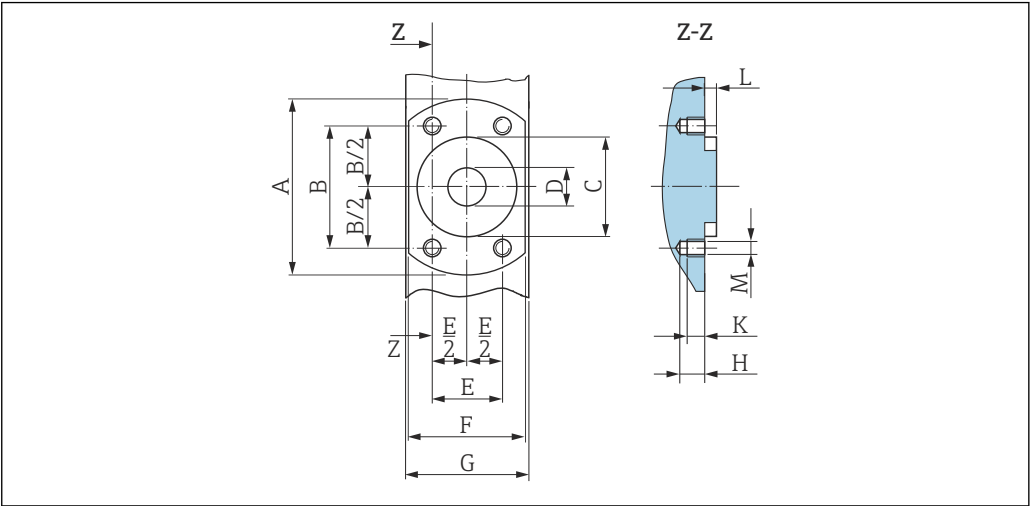
DN [mm]	L [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]
2	200	136.8	78	58.8	84	207	291	136	120	2.25
4	200	136.8	78	58.8	84	207	291	136	120	4.5
8	200	136.8	78	58.8	84	207	291	136	120	9
15	200	136.8	78	58.8	84	207	291	136	120	16
25	200	136.8	78	58.8	84	207	291	136	120	26
40	200	136.8	78	58.8	84	207	291	136	120	34.8
50	200	136.8	78	58.8	84	207	291	136	120	47.5
65	200	136.8	78	58.8	109	232	341	136	180	60.2
80	200	136.8	78	58.8	109	232	341	136	180	72.9
100	250	136.8	78	58.8	109	232	341	136	180	97.4
125	250	136.8	78	58.8	150	272	422	136	260	120.0
150	300	136.8	78	58.8	150	272	422	136	260	146.9

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

DN [mm]	L [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]
2	200	123.6	67.7	55.9	84	207	291	136	120	2.25
4	200	123.6	67.7	55.9	84	207	291	136	120	4.5
8	200	123.6	67.7	55.9	84	207	291	136	120	9
15	200	123.6	67.7	55.9	84	207	291	136	120	16
25	200	123.6	67.7	55.9	84	207	291	136	120	26
40	200	123.6	67.7	55.9	84	207	291	136	120	34.8
50	200	123.6	67.7	55.9	84	207	291	136	120	47.5
65	200	123.6	67.7	55.9	109	232	341	136	180	60.2
80	200	123.6	67.7	55.9	109	232	341	136	180	72.9
100	250	123.6	67.7	55.9	109	232	341	136	180	97.4

DN	L	A	B	C	D	E	F	G	H	I
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
125	250	123.6	67.7	55.9	150	272	422	136	260	120.0
150	300	123.6	67.7	55.9	150	272	422	136	260	146.9

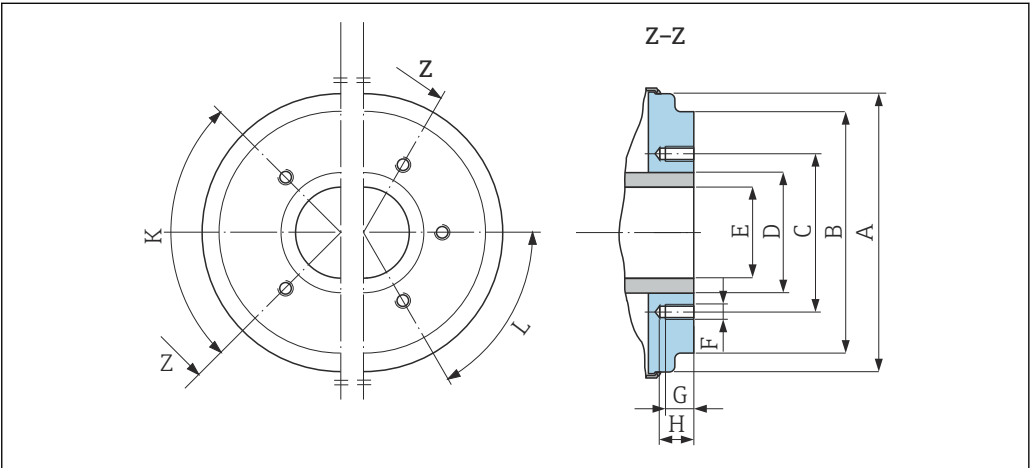
Sensor flange connection



A0017657

45 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



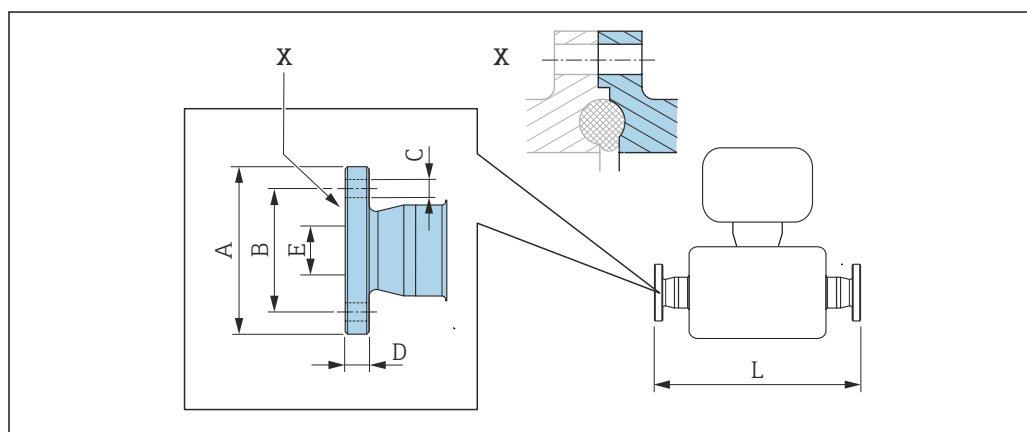
A0005528

46 Front view without process connections

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	
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
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

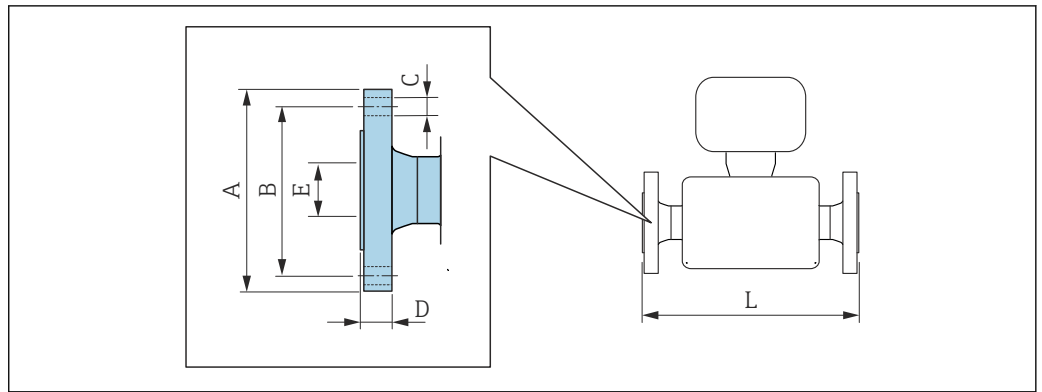
47 Detail X: Asymmetrical process connection; the part shown in gray is provided by the supplier.

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 ¹⁾	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 ¹⁾	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

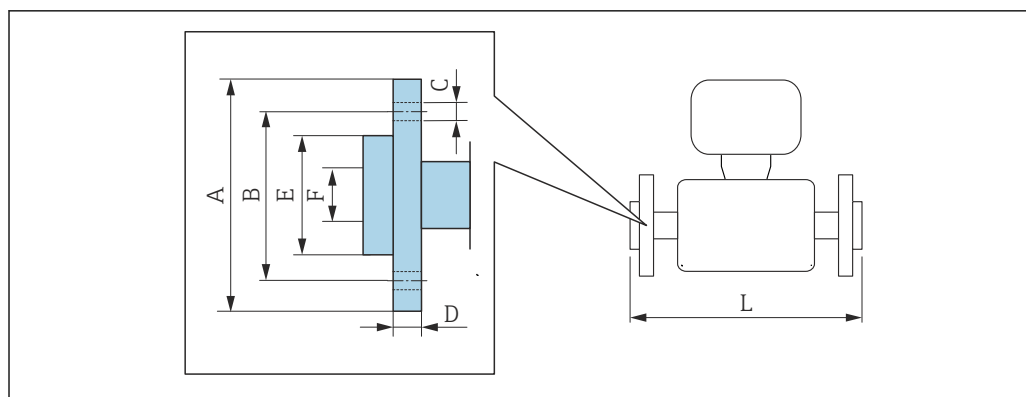
Flange according to JIS B2220: 20K
1.4404 (316L)

Order code for "Process connection", option N4S

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8 ¹⁾	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 ¹⁾	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 ¹⁾	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 ¹⁾	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 ¹⁾	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 ¹⁾	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-****).

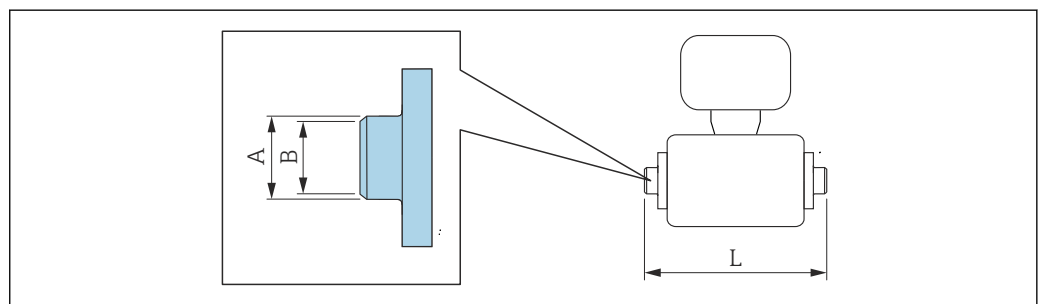
- 1) DN 2 to 8 with DN 15 flanges as standard

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 ¹⁾	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

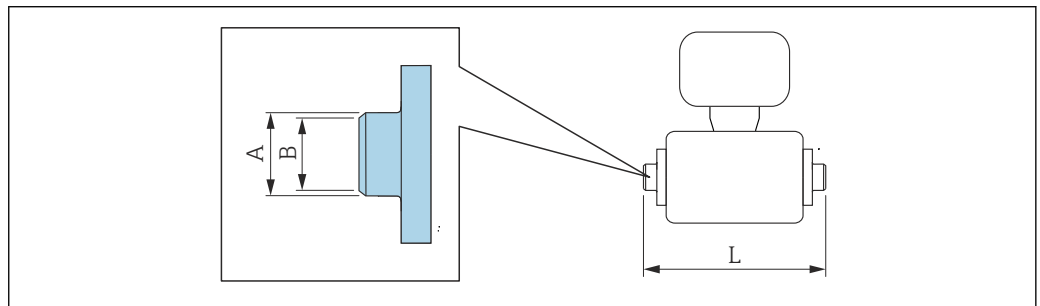
DN [mm]	Suitable for pipe ASME BPE [mm]	A [mm]	B [mm]	L [mm]
2 to 8	12.7 × 1.65	12.7	9	118.2
15	19.1 × 1.65	19.1	16	118.2
25	25.4 × 1.65	25.4	22.6	118.2
40	38.1 × 1.65	38.1	34.8	220
50	50.8 × 1.65	50.8	47.5	220
65	63.5 × 1.65	63.5	60.2	220

**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

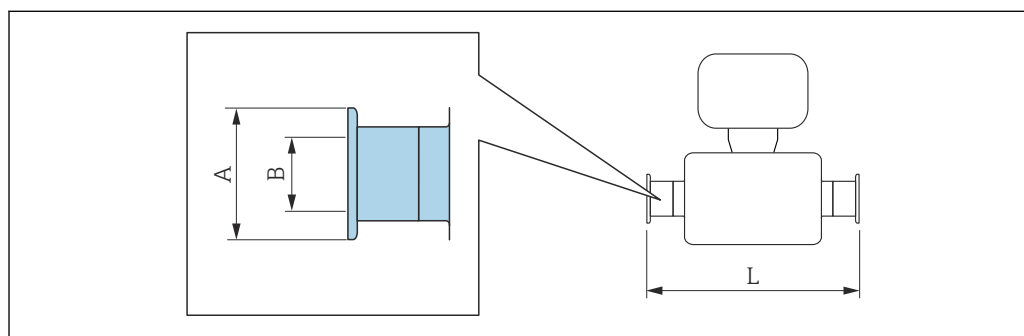
DN [mm]	Suitable for pipe DIN EN ISO 1127 [mm]	A [mm]	B [mm]	L [mm]
2 to 8	13.5 × 1.6	13.5	10.3	126.6
15	21.3 × 1.6	21.3	18.1	126.6
25	33.7 × 2.0	33.7	29.7	126.6

 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 $\leq 0.38 \mu\text{m}$

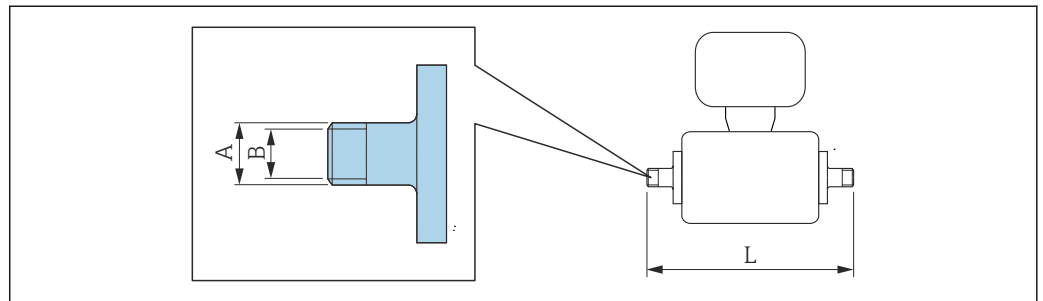
Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

**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.				

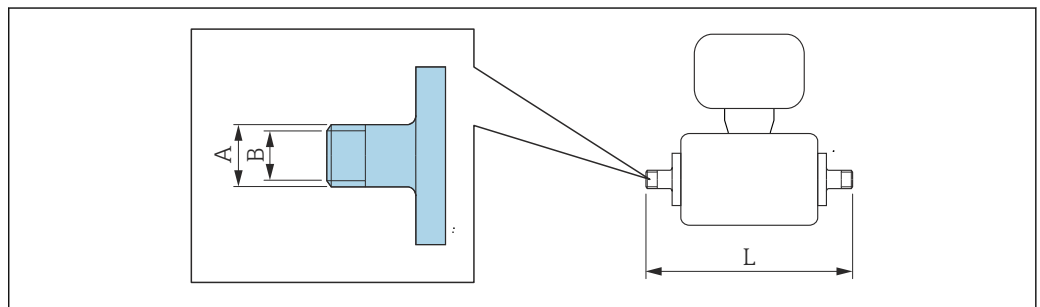
Coupling ISO 2853, threaded adapter 1.4404 (316L) Order code for "Process connection", option ICS					
DN [mm]	Suitable for pipe ISO 2037 [mm]	DN Clamp ISO 2853 [mm]	A [mm/in]	B [mm]	L [mm]
40	38 × 1.6	38	Tr 50.5 × 3.175	35.6	256
50	51 × 1.6	51	Tr 64 × 3.175	48.6	256
65	63.5 × 1.6	63.5	Tr 77.5 × 3.175	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

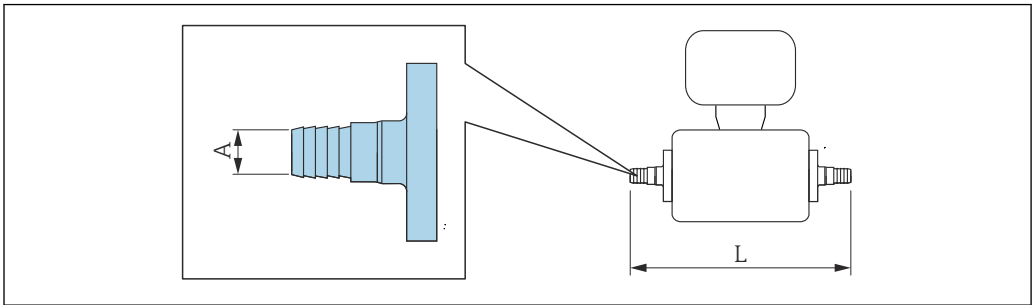
 Surface roughness: $R_a \leq 1.6 \mu\text{m}$
Internal thread according to ISO 228/DIN 2999
1.4404 (316L)
Order code for "Process connection", option I3S

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

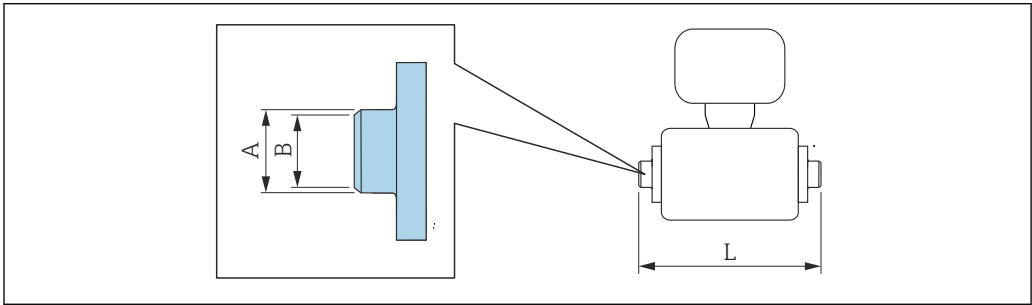


A0027511

Hose adapter 1.4404 (316L) Order code for "Process connection", options O1S, O2S, O3S			
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 ≤ 1.6 µm			

Adhesive sleeves

Adhesive sleeves with O-ring seal

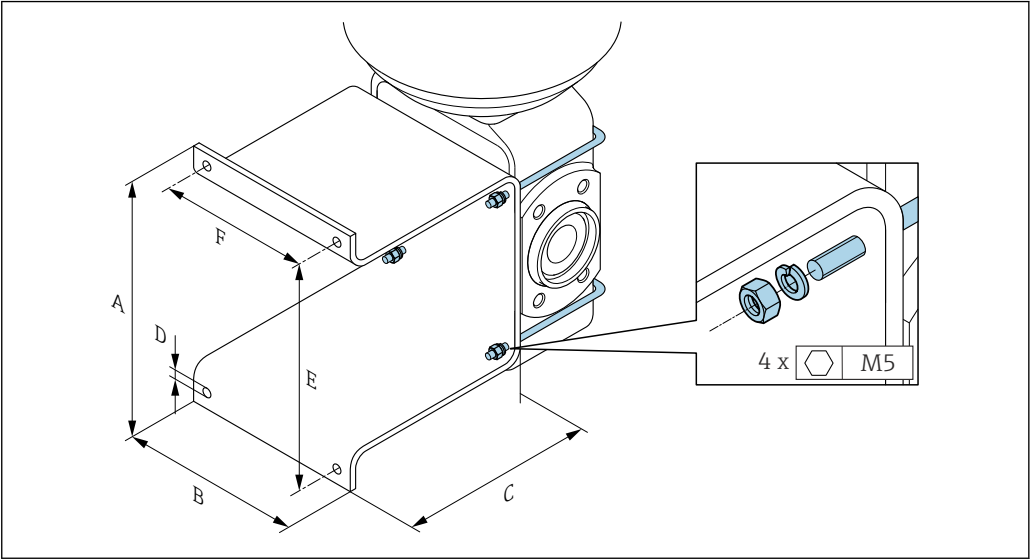


A0027510

Adhesive sleeve PVC Order code for "Process connection", options O1V, O2V				
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 ≤ 1.6 µm The required grounding rings can be ordered as accessories (order code: DK5HR-****).				

Mountings sets

Wall mounting kit

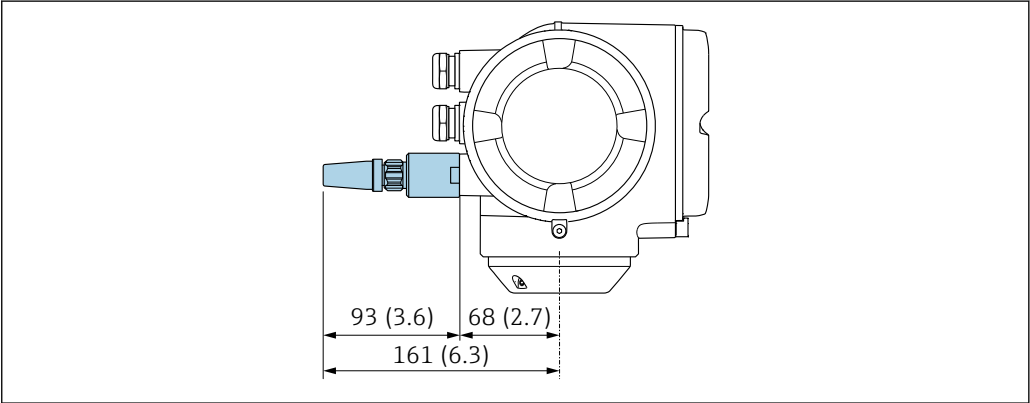


A0005537

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

Accessories

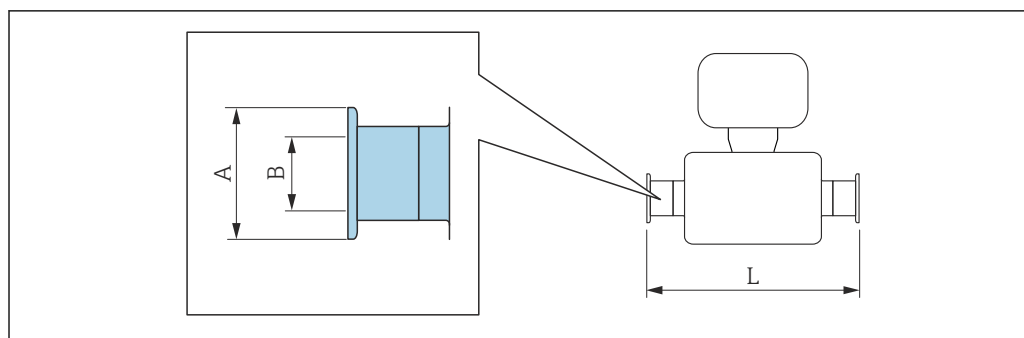
External WLAN antenna



A0028923

48 Engineering unit mm (in)

Clamp connections with aseptic molded seal available for order



A0015625

Tri-Clamp for L14 AM17

1.4404 (316L)

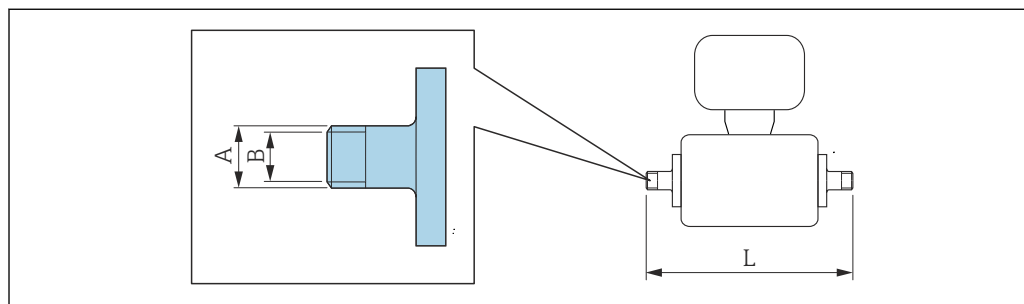
Order code: DKH**-HF**

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

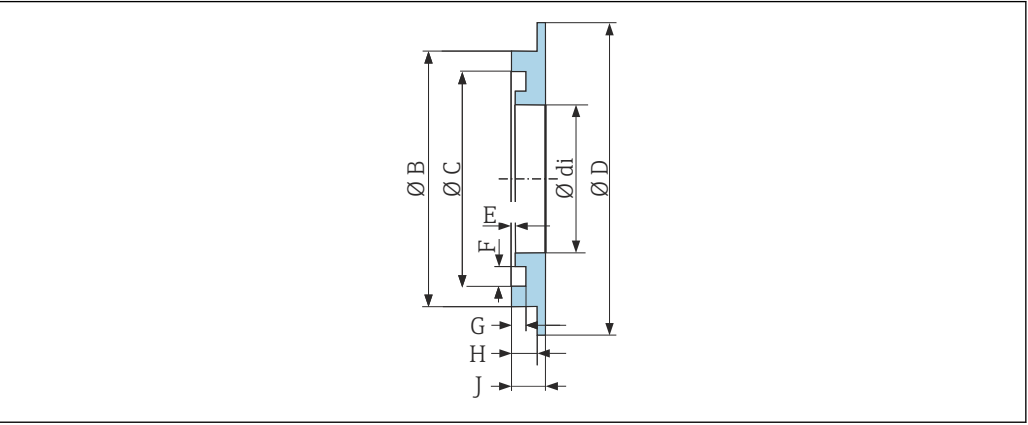
1.4404 (316L)

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

Internal thread 1.4404 (316L) Order code: DKH**-GC**				
DN [mm]	Suitable for NPT external thread [in]	A [mm/in]	B [mm]	L [mm]
25	NPT 1	R 17 × 1	27.2	188
Surface roughness: R _a ≤ 1.6 µm				

Grounding rings

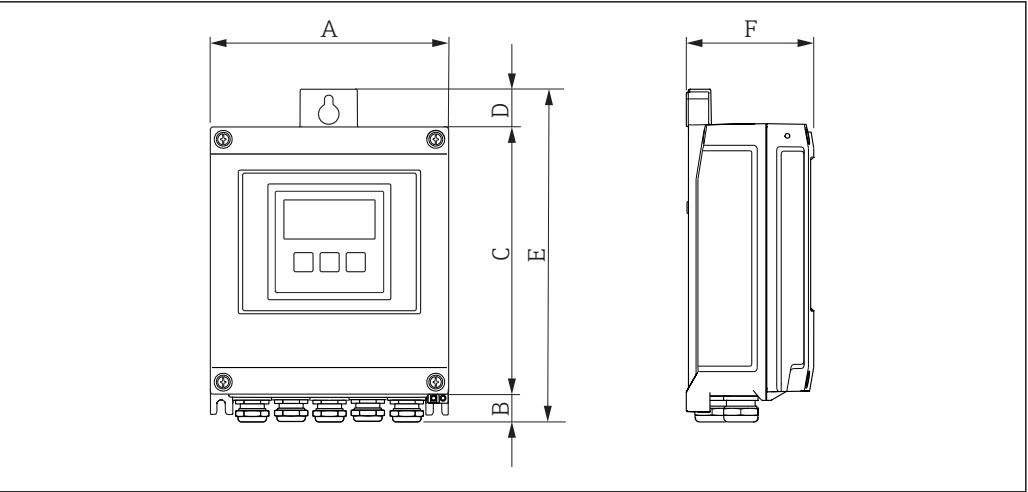


A0017673

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

Housing of Proline 500 – digital transmitter, non-Ex, Zone 2 and Div. 2



A0020522

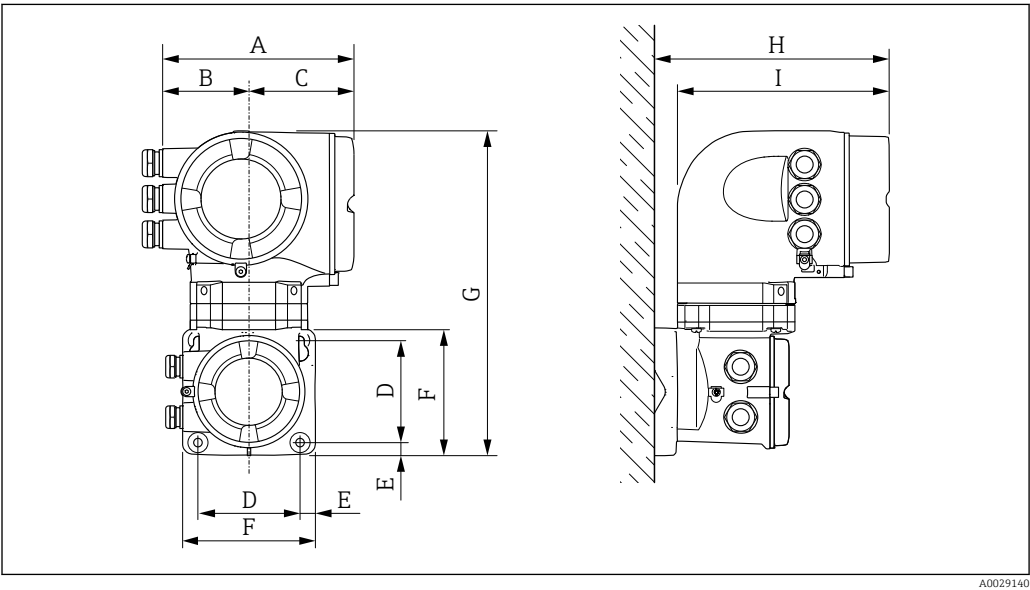
Order code for "Transmitter housing", option A "Aluminum, coated" and order code for "Integrated ISEM electronics", option A "Digital, sensor"

A [in]	B [in]	C [in]	D [in]	E [in]	F [in]
6.57	0.83	7.36	0.94	9.13	3.15

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

A [in]	B [in]	C [in]	D [in]	E [in]	F [in]
6.97	0.87	7.76	0.67	9.21	3.54

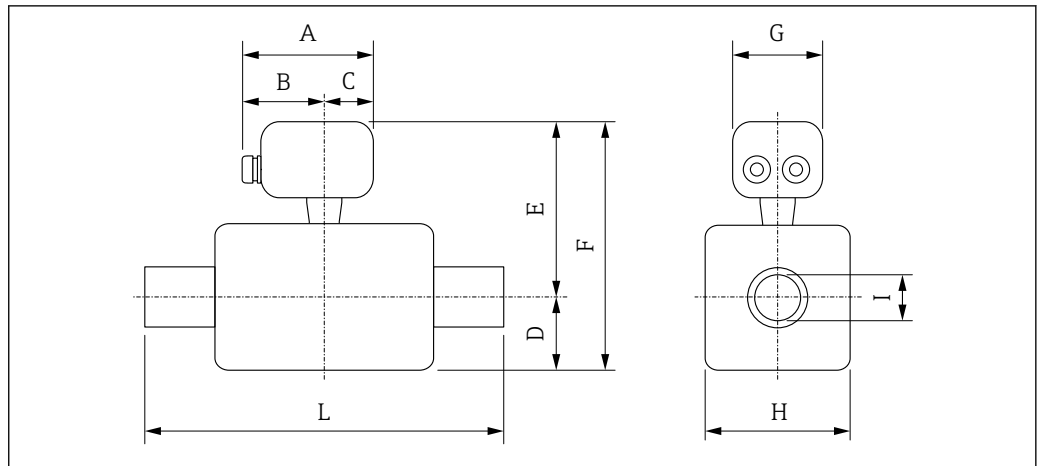
Housing of Proline 500 transmitter, Zone 1/2 and Div. 1/2



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

A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	I [in]
7.40	3.35	4.06	3.94	0.60	5.12	12.5	9.41	8.54

Sensor connection housing



A0029685

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

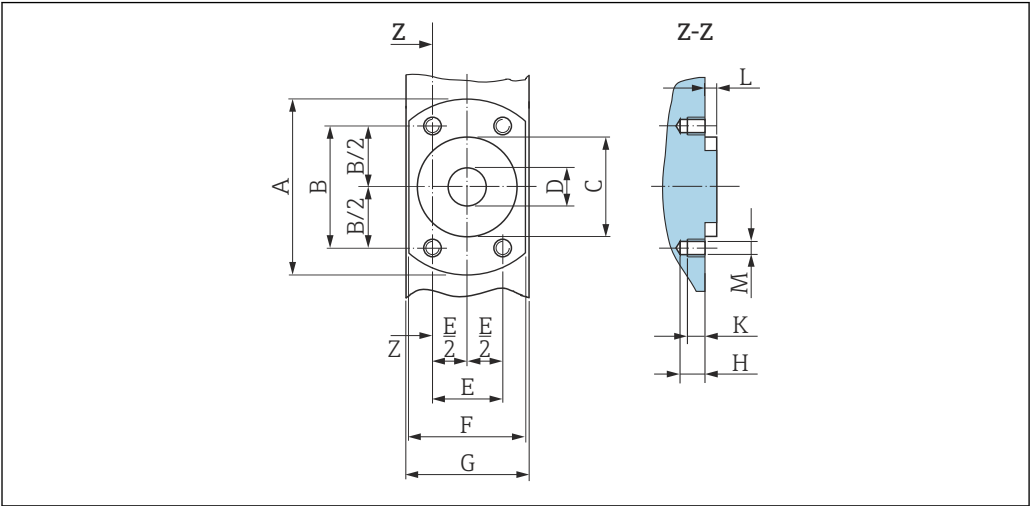
DN [in]	L [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	I [in]
1/12	7.87	5.39	3.07	2.31	3.31	8.15	11.5	5.35	4.72	0.09
1/8	7.87	5.39	3.07	2.31	3.31	8.15	11.5	5.35	4.72	0.18
3/8	7.87	5.39	3.07	2.31	3.31	8.15	11.5	5.35	4.72	0.35
1/2	7.87	5.39	3.07	2.31	3.31	8.15	11.5	5.35	4.72	0.63
1	7.87	5.39	3.07	2.31	3.31	8.15	11.5	5.35	4.72	1.02
1 ½	7.87	5.39	3.07	2.31	3.31	8.15	11.5	5.35	4.72	1.37
2	7.87	5.39	3.07	2.31	3.31	8.15	11.5	5.35	4.72	1.87
2 ½	7.87	5.39	3.07	2.31	3.31	8.15	11.5	5.35	4.72	2.37
3	7.87	5.39	3.07	2.31	4.29	9.13	13.4	5.35	7.09	2.87
4	9.84	5.39	3.07	2.31	4.29	9.13	13.4	5.35	7.09	3.83
5	9.84	5.39	3.07	2.31	4.29	9.13	13.4	5.35	7.09	4.72
6	11.8	5.39	3.07	2.31	5.91	10.7	16.6	5.35	10.2	5.78

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

DN [in]	L [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	I [in]
1/12	7.87	4.87	2.67	2.20	3.31	8.15	11.5	5.35	4.72	0.09
1/8	7.87	4.87	2.67	2.20	3.31	8.15	11.5	5.35	4.72	0.18
3/8	7.87	4.87	2.67	2.20	3.31	8.15	11.5	5.35	4.72	0.35
1/2	7.87	4.87	2.67	2.20	3.31	8.15	11.5	5.35	4.72	0.63
1	7.87	4.87	2.67	2.20	3.31	8.15	11.5	5.35	4.72	1.02
1 ½	7.87	4.87	2.67	2.20	3.31	8.15	11.5	5.35	4.72	1.37
2	7.87	4.87	2.67	2.20	3.31	8.15	11.5	5.35	4.72	1.87
2 ½	7.87	4.87	2.67	2.20	3.31	8.15	11.5	5.35	4.72	2.37
3	7.87	4.87	2.67	2.20	4.29	9.13	13.4	5.35	7.09	2.87
4	9.84	4.87	2.67	2.20	4.29	9.13	13.4	5.35	7.09	3.83

DN	L	A	B	C	D	E	F	G	H	I
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
5	9.84	4.87	2.67	2.20	4.29	9.13	13.4	5.35	7.09	4.72
6	11.8	4.87	2.67	2.20	5.91	10.7	16.6	5.35	10.2	5.78

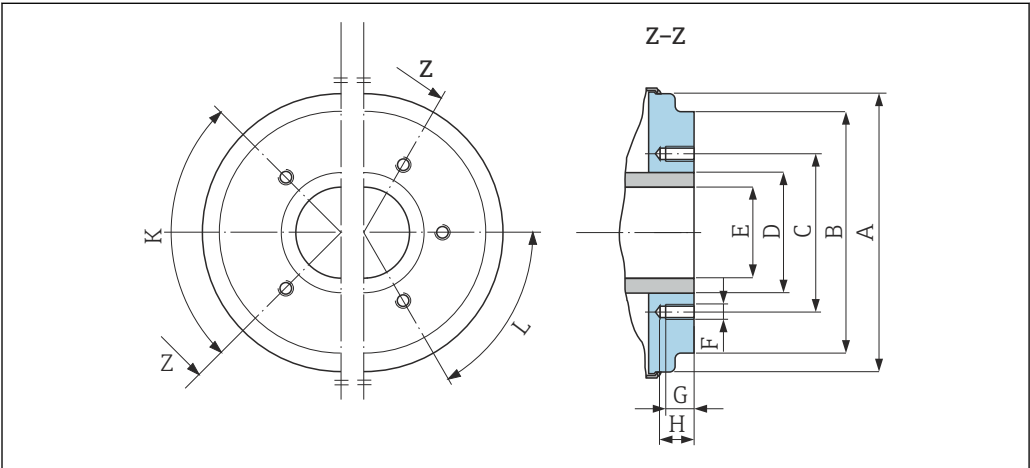
Sensor flange connection



A0017657

49 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



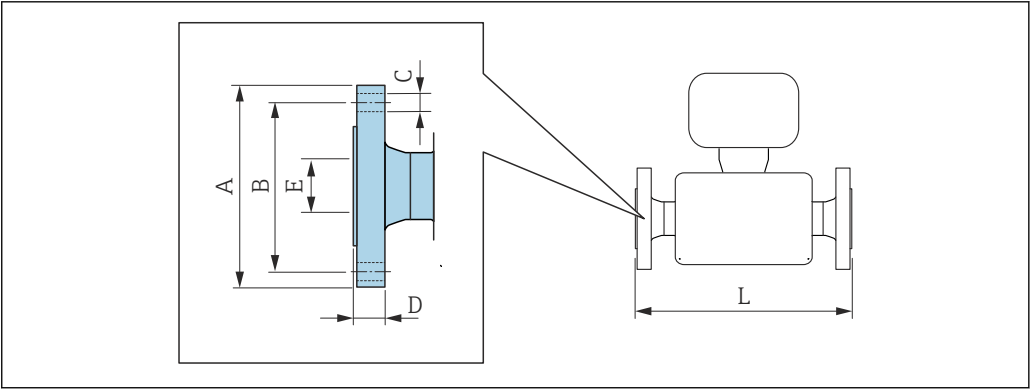
A0005528

50 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

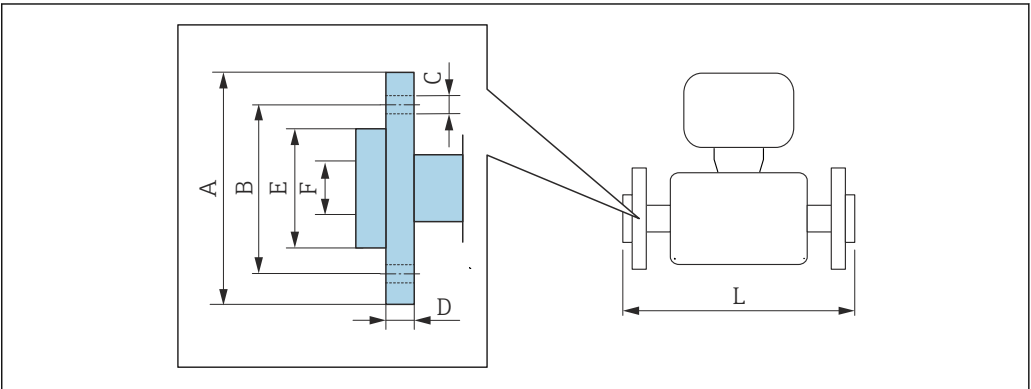
Flanges with O-ring seal



A0015621

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]
1/12 to 3/8 1)	3.50	2.38	4 × Ø 0.62	0.44	0.62	8.59
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 ≤ 63 µin						

1) DN 1/12 to 3/8 with DN 1/2" flanges as standard



A0022221

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 $\frac{3}{8}$ ¹⁾	3.74	2.36	$4 \times \varnothing 0.62$	0.59	1.38	0.63	7.87
$\frac{1}{2}$	3.74	2.36	$4 \times \varnothing 0.62$	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

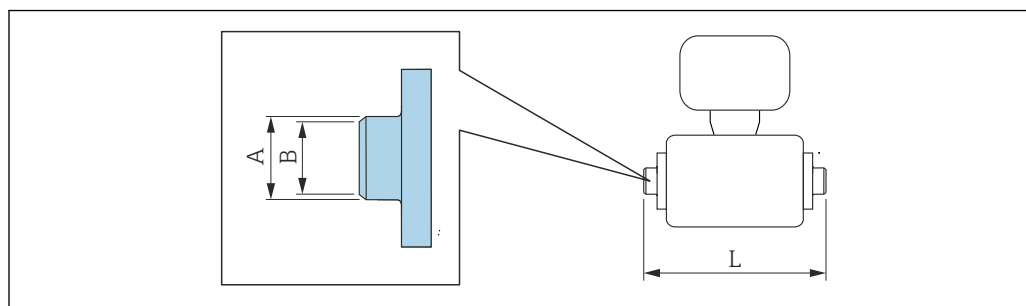
Lap joint flange according to ASME B16.5: Class 150
PVDF
Order code for "Process connection", option A4P

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$ ¹⁾	3.74	2.36	$4 \times \varnothing 0.62$	0.59	1.38	0.63	7.87
$\frac{1}{2}$	3.74	2.36	$4 \times \varnothing 0.62$	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 $\frac{3}{8}$	0.50×0.06	0.50	0.35	4.65
$\frac{1}{2}$	0.75×0.06	0.75	0.63	4.65
1	1.00×0.06	1.00	0.89	4.65
$1 \frac{1}{2}$	1.50×0.05	1.50	1.40	8.66
2	2.00×0.05	2.01	1.91	8.66
3	3.00×0.06	3.00	2.87	8.66
4	2.50×0.08	4.00	3.84	8.66
5	4.00×0.08	5.50	5.34	15.0

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]
6	6.63 × 0.10	6.63	6.42	15.0

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

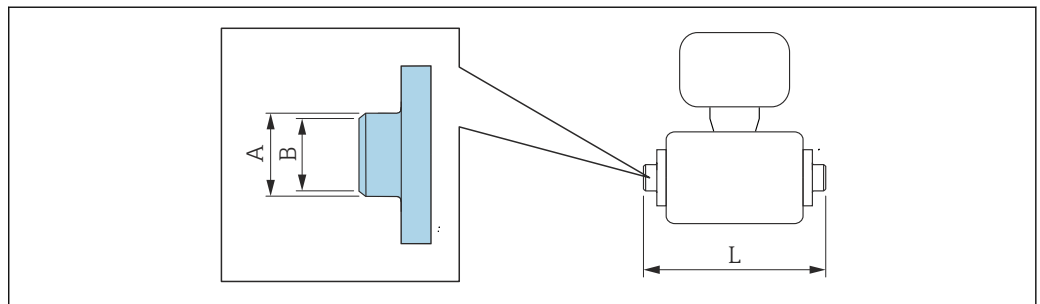
Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

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 × 0.06	0.50	0.35	4.65
$\frac{1}{2}$	0.75 × 0.06	0.75	0.63	4.65
1	1.00 × 0.06	1.00	0.89	4.65
1 $\frac{1}{2}$	1.50 × 0.06	1.50	1.37	8.66
2	2.00 × 0.06	2.00	1.87	8.66
3	3.00 × 0.06	3.00	2.87	8.66
4	4.00 × 0.08	4.00	3.83	8.66
6	6.00 × 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

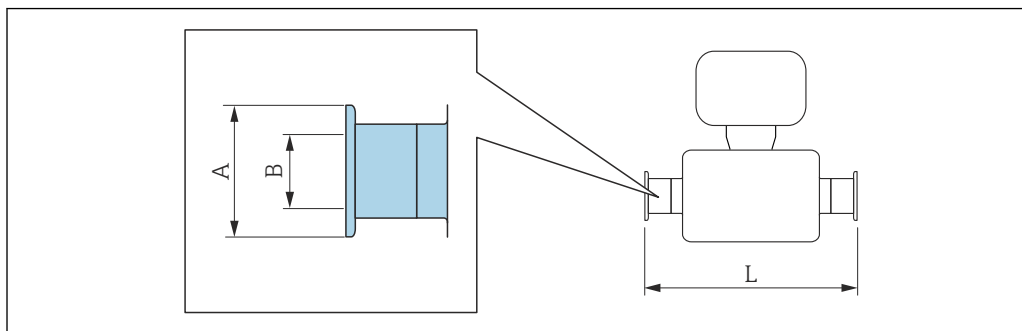
Welding nipple according to ODT/SMS
1.4404 (316L)
Order code for "Process connection", option A2S

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

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

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 × 0.06	1.98	1.37	8.66
2	2.00 × 0.06	2.52	1.87	8.66
3	3.00 × 0.06	3.58	2.87	8.66
4	4.00 × 0.08	4.68	3.83	8.66
6	6.00 × 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

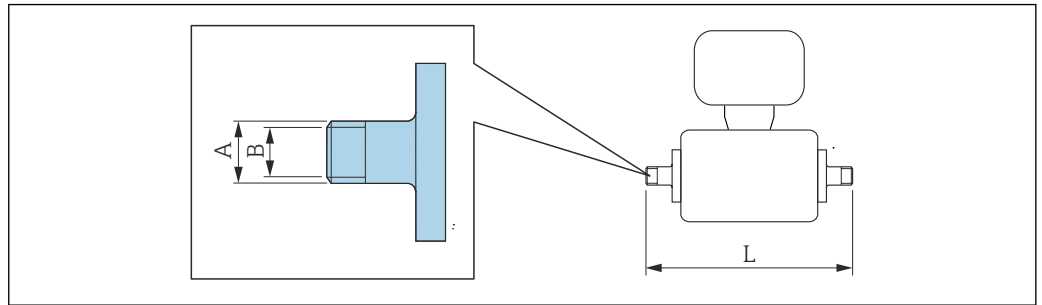
DN [in]	Suitable for pipe ISO 2037 [in]	DN Clamp ISO 2852 [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	0.96 × 0.06	1	2.00	0.89	6.87
$\frac{1}{2}$	0.96 × 0.06	1	2.00	0.89	6.87
1	0.96 × 0.06	1	2.00	0.89	6.87
1 $\frac{1}{2}$	1.50 × 0.06	1.50	1.99	1.40	8.66
2	2.00 × 0.06	2.01	2.52	1.91	8.66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

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]
½	Pipe ODT ¾	Rd 0.05 × 0.13	0.63	6.85
1 ½	1.65 × 0.06	Rd 2.56 × 1/6	1.5	10.2
2	2.13 × 0.06	Rd 3.07 × 1/6	1.97	10.2
3	3.35 × 0.08	Rd 4.33 × 1/4	3.19	11.0
4	4.09 × 0.08	Rd 5.12 × 1/4	3.94	11.4
5	5.08 × 0.08	Rd 6.30 × 1/4	4.92	15.0
6	6.06 × 0.08	Rd 6.30 × 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

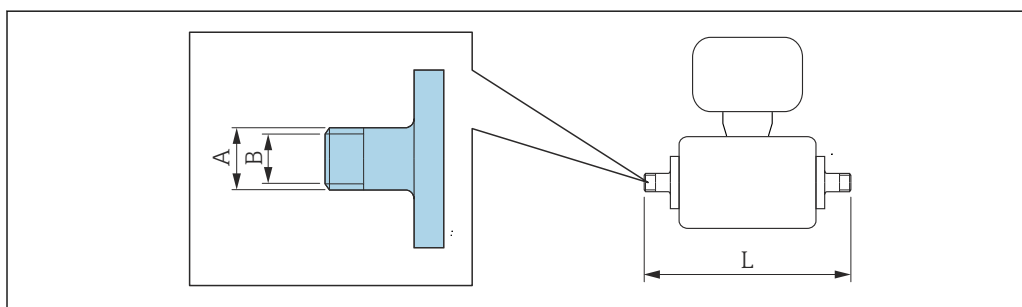
DN [in]	Suitable for pipe ODT [in]	DN SMS 1145 [in]	A [in]	B [in]	L [in]
1	1	1	Rd 1.57 × 0.17	0.89	5.81
1 ½	1.50 × 0.06	1.50	Rd 2.36 × 1/6	1.37	10.1
2	2.00 × 0.06	2.00	Rd 2.76 × 1/6	1.87	10.1

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]
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]
$\frac{1}{12}$ to $\frac{3}{8}$	R 3/8	Rd 0.40 × 3/8	0.39	6.53
$\frac{1}{2}$	R 1/2	Rd 0.52 × 1/2	0.63	6.53
1	R 1	Rd 0.66 × 1	0.98	6.69

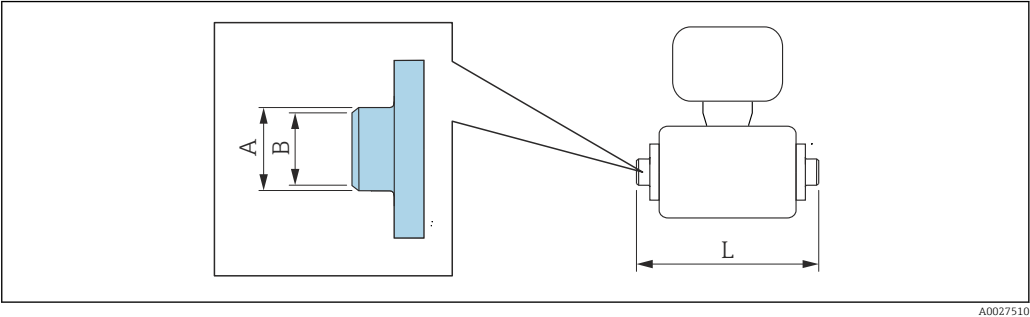
 Surface roughness: $R_a \leq 63 \mu\text{in}$
Internal thread according to ISO 228/DIN 2999
1.4404 (316L)
Order code for "Process connection", option I3S

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 3/8	Rd 0.51 × 3/8	0.35	6.93
$\frac{1}{2}$	Rp 1/2	Rd 0.55 × 1/2	0.63	6.93
1	Rp 1	Rd 0.67 × 1	1.07	7.41

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

Adhesive sleeves

Adhesive sleeves with O-ring seal

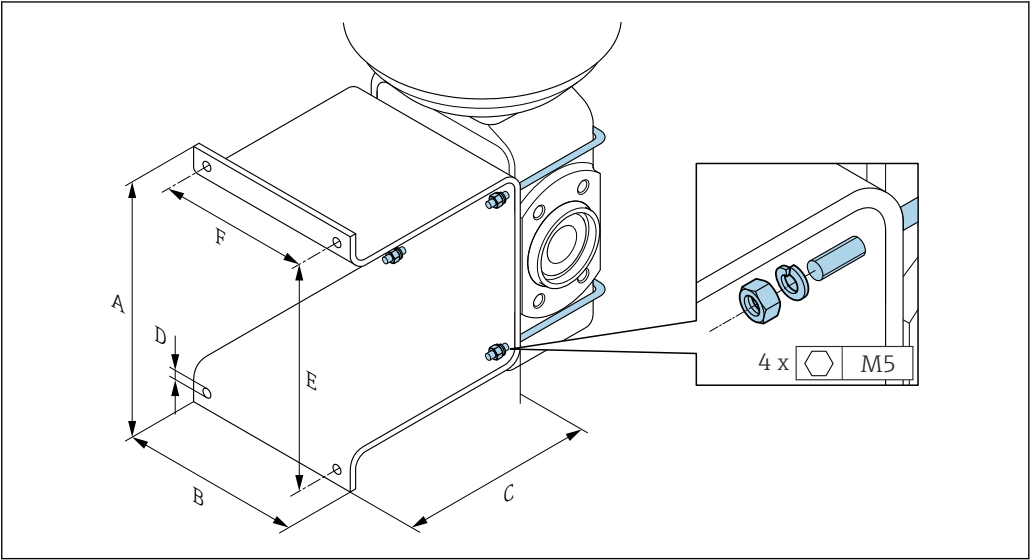


A0027510

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

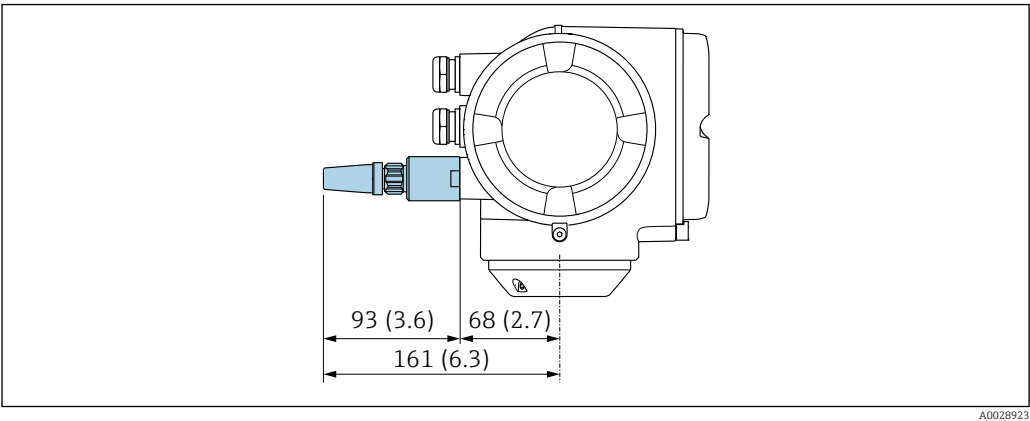


A0005537

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

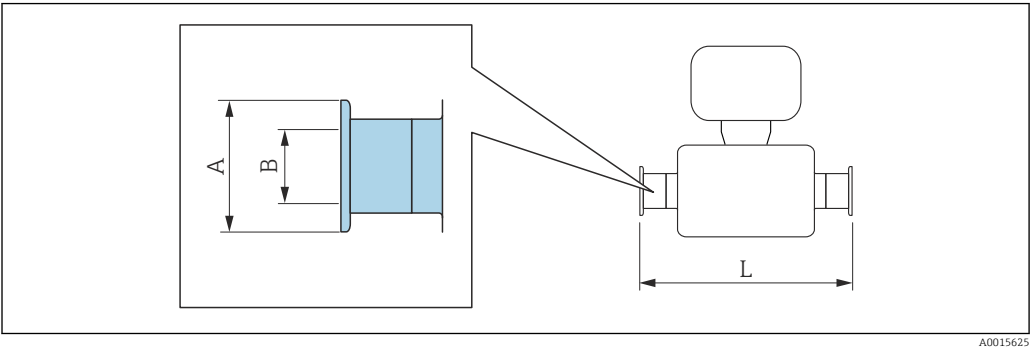
Accessories

External WLAN antenna



51 Engineering unit mm (in)

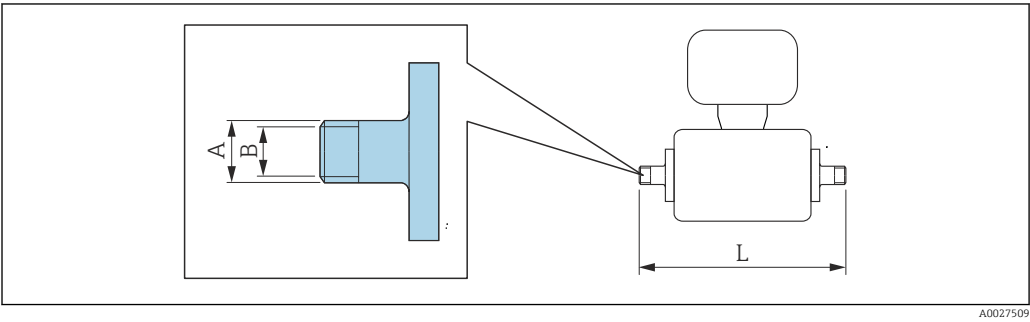
Clamp connections with aseptic molded seal available for order



52 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]
½	Pipe ODT 1	2	0.87	5.63
Surface roughness: R _a ≤ 31.5 µin, optional ≤ 15 µin 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



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

DN [in]	Suitable for NPT internal thread [in]	A [in]	B [in]	L [in]
$\frac{1}{12}$ to $\frac{3}{8}$	NPT 3/8	$R 0.61 \times 3/8$	0.39	7.39
$\frac{1}{2}$	NPT $\frac{1}{2}$	$R 0.79 \times \frac{1}{2}$	0.63	7.39
1	NPT 1	$R 1 \times 1$	1	7.73

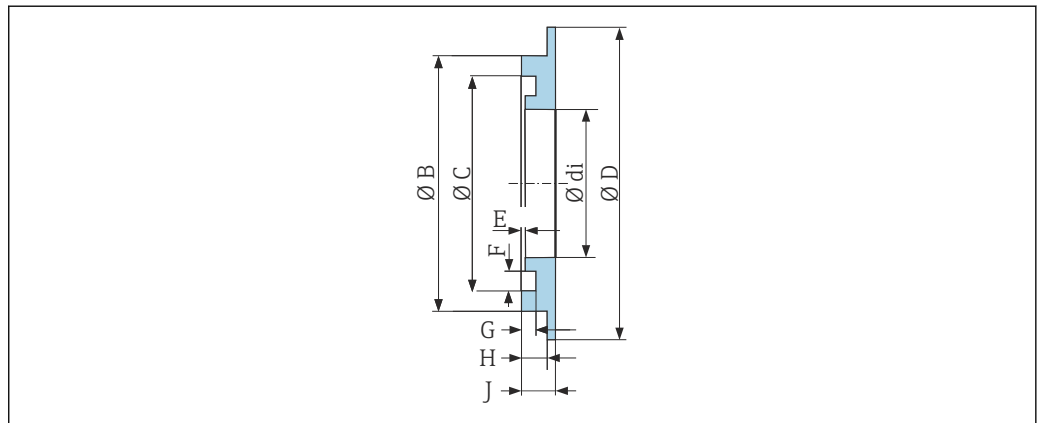
Surface roughness: $R_a \leq 63 \mu\text{in}$

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

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

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

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]
$\frac{1}{12}$ to $\frac{3}{8}$	0.35	0.87	0.69	1.33	0.02	0.14	0.07	0.13	0.18
$\frac{1}{2}$	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

Excluding the transmitter

- Aluminum
 - 6.5 kg (14.3 lbs)
 - Digital: 2.4 kg (5.3 lbs)
- Polycarbonate: 1.4 kg (3.1 lbs)

Weight specifications apply to standard pressure ratings and without packaging material.

Nominal diameter		Weight	
[mm]	[in]	[kg]	[lbs]
2	1/12	2.00	4.41
4	1/8	2.00	4.41
8	3/8	2.00	4.41
15	½	1.90	4.19
25	1	2.80	6.17
40	1 ½	4.10	9.04
50	2	4.60	10.1
65	–	5.40	11.9
80	3	6.00	13.2
100	4	7.30	16.1
125	5	12.7	28.0
150	6	15.1	33.3

Measuring tube specification

Nominal diameter		Pressure rating ¹⁾	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

Proline 500 – digital transmitter housing

Order code for "Transmitter housing":

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

Proline 500 transmitter housing

Order code for "Transmitter housing":

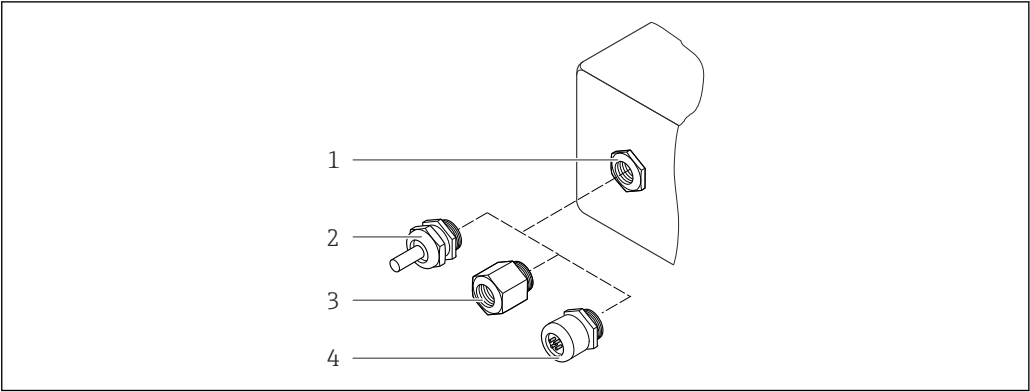
Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated

Window material

Order code for "Transmitter housing":

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

Cable entries/cable glands



53 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

Cable entries and adapters	Material
Cable gland M20 × 1.5	Plastic
<ul style="list-style-type: none">■ Adapter for cable entry with internal thread G ½"■ Adapter for cable entry with internal thread NPT ½" <div><div></div><div>Only available for certain device versions:<ul style="list-style-type: none">■ Order code for "Transmitter housing":<ul style="list-style-type: none">– Option A "Aluminum, coated"– Option D "Polycarbonate"■ Order code for "Sensor connection housing":<ul style="list-style-type: none">– Proline 500 – digital: Option B "Stainless"– Proline 500: Option B "Hygienic, stainless"– Option C "Ultra-compact hygienic, stainless"</div></div>	Nickel-plated brass
Adapter for device plug <div><div></div><div><ul style="list-style-type: none">■ Device plug for digital communication: Only available for certain device versions → 26.■ Device plug for connecting cable: A device plug is always used for the device version, order code for "Sensor connection housing", option C (ultra-compact, hygienic, stainless).</div></div>	Stainless steel, 1.4404 (316L)
Device plug coupling	Plug M12 × 1 <ul style="list-style-type: none">■ Socket: Stainless steel, 1.4404 (316L)■ Contact housing: Polyamide■ Contacts: Gold-plated brass

Device plug

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

Connecting cable

Connecting cable for sensor - Proline 500 – digital transmitter

PVC cable with copper shield

Connecting cable for sensor - Proline 500 transmitter

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

Sensor connection housing

Order code for "Sensor connection housing":

- Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated
- Option **B** "Stainless, hygienic":
Stainless steel 1.4301 (304)
- Option **C** "Ultra-compact hygienic, stainless":
Stainless steel 1.4301 (304)

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 ¹⁾, FKM, silicone ¹⁾

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)


Spacer

1.4435 (F316L)

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

Fitted electrodes	<ul style="list-style-type: none"> ■ 2 measuring electrodes for signal detection ■ 1 empty pipe detection electrode for empty pipe detection/temperature measurement (only DN 15 to 150 (½ to 6"))
Process connections	<p>With O-ring seal</p> <ul style="list-style-type: none"> ■ Welding nipple (DIN EN ISO 1127, ODT/SMS, ISO 2037) ■ Flange (EN (DIN), ASME, JIS) ■ Flange from PVDF (EN (DIN), ASME, JIS) ■ External thread ■ Internal thread ■ Hose connection ■ PVC adhesive sleeve <p>With aseptic molded seal:</p> <ul style="list-style-type: none"> ■ Coupling (DIN 11851, DIN 11864-1, ISO 2853, SMS 1145) ■ Flange DIN 11864-2 <p> For information on the different materials used in the process connections →  88</p>
Surface roughness	<p>Stainless steel electrodes, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum: ≤ 0.3 to $0.5\ \mu\text{m}$ (11.8 to $19.7\ \mu\text{in}$) (All data relate to parts in contact with fluid)</p> <p>Liner with PFA: $\leq 0.4\ \mu\text{m}$ ($15.7\ \mu\text{in}$) (All data relate to parts in contact with fluid)</p> <p>Stainless steel process connections:</p> <ul style="list-style-type: none"> ■ With O-ring seal: $\leq 1.6\ \mu\text{m}$ ($63\ \mu\text{in}$) ■ With aseptic seal: $\leq 0.8\ \mu\text{m}$ ($31.5\ \mu\text{in}$) Optional: $\leq 0.38\ \mu\text{m}$ ($15\ \mu\text{in}$) <p>(All data relate to parts in contact with fluid)</p>

Operability

Operating concept	<p>Operator-oriented menu structure for user-specific tasks</p> <ul style="list-style-type: none"> ■ Commissioning ■ Operation ■ Diagnostics ■ Expert level <p>Fast and safe commissioning</p> <ul style="list-style-type: none"> ■ Guided menus ("Make-it-run" wizards) for applications ■ Menu guidance with brief explanations of the individual parameter functions ■ Device access via Web server ■ Optional: WLAN access to device via mobile handheld terminal <p>Reliable operation</p> <ul style="list-style-type: none"> ■ Operation in local language →  90 ■ Uniform operating philosophy applied to device and operating tools ■ 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. <p>Efficient diagnostics increase measurement availability</p> <ul style="list-style-type: none"> ■ Troubleshooting measures can be called up via the device and in the operating tools ■ Diverse simulation options, logbook for events that occur and optional line recorder functions
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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

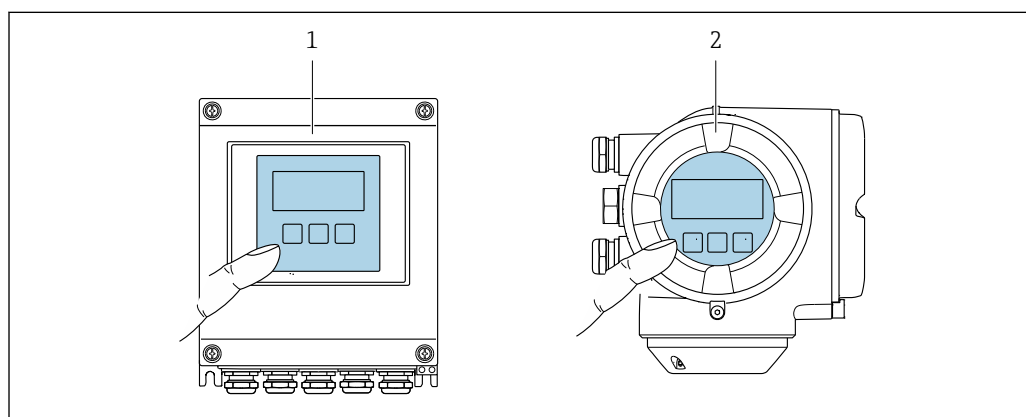
Via display module

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 → 94



A0028232

54 Operation with touch control

- 1 Proline 500 – digital
- 2 Proline 500

Display elements

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

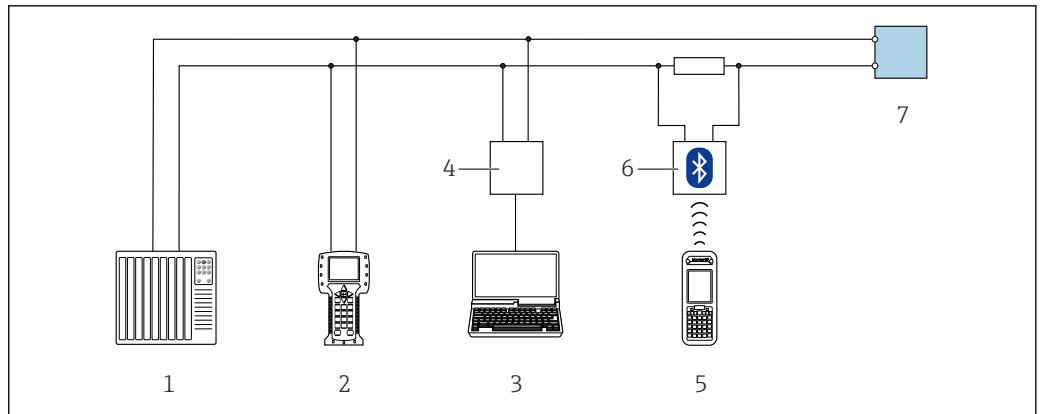
Operating elements

- External operation via touch control (3 optical keys) without opening the housing: \oplus , \ominus , \boxplus
- Operating elements also accessible in various hazardous areas

Remote operation

Via HART protocol

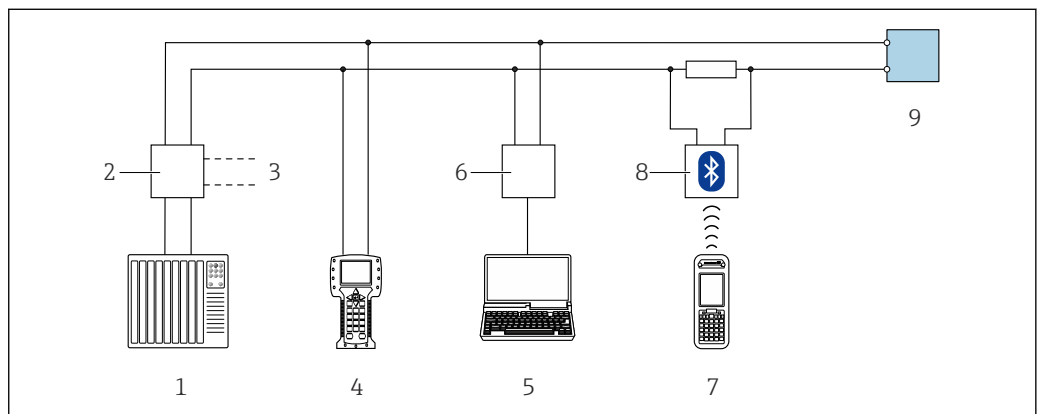
This communication interface is available in device versions with a HART output.



A0028747

55 Options for remote operation via HART protocol (active)

- 1 Control system (e.g. PLC)
- 2 Field Communicator 475
- 3 Computer with Web browser (e.g. Internet Explorer) for 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"
- 4 Commubox FXA195 (USB)
- 5 Field Xpert SFX350 or SFX370
- 6 VIATOR Bluetooth modem with connecting cable
- 7 Transmitter



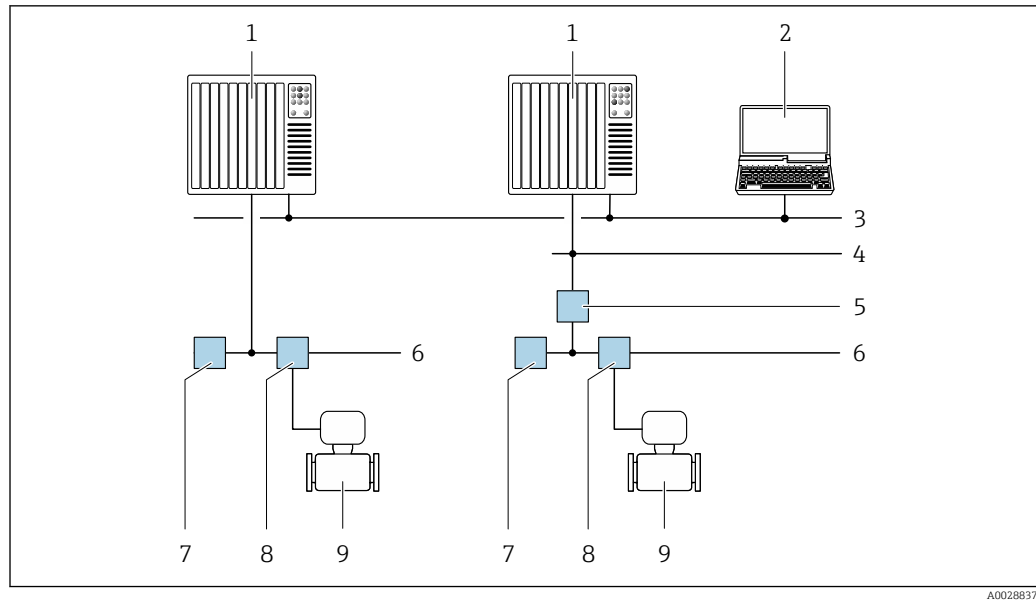
A0028746

56 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.



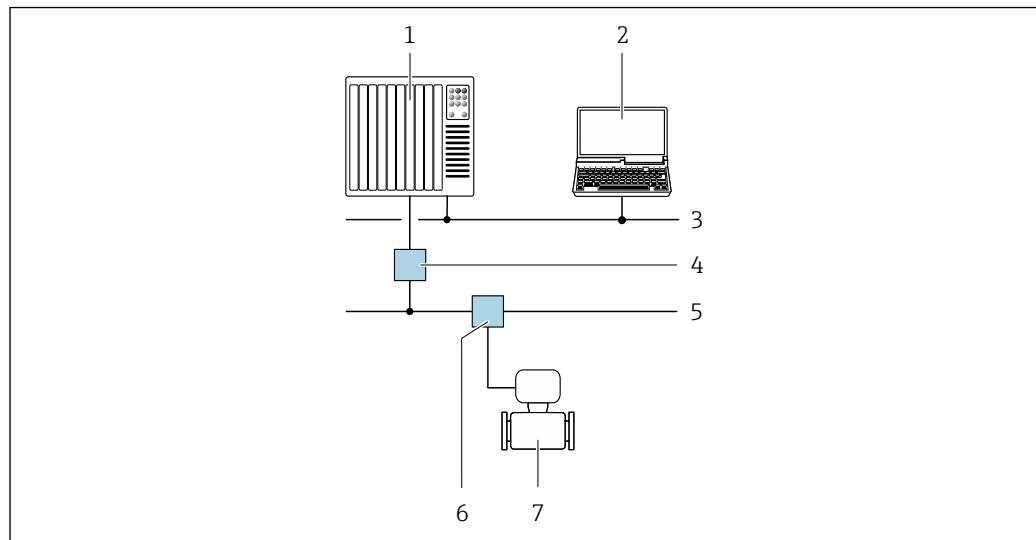
A0028837

57 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.



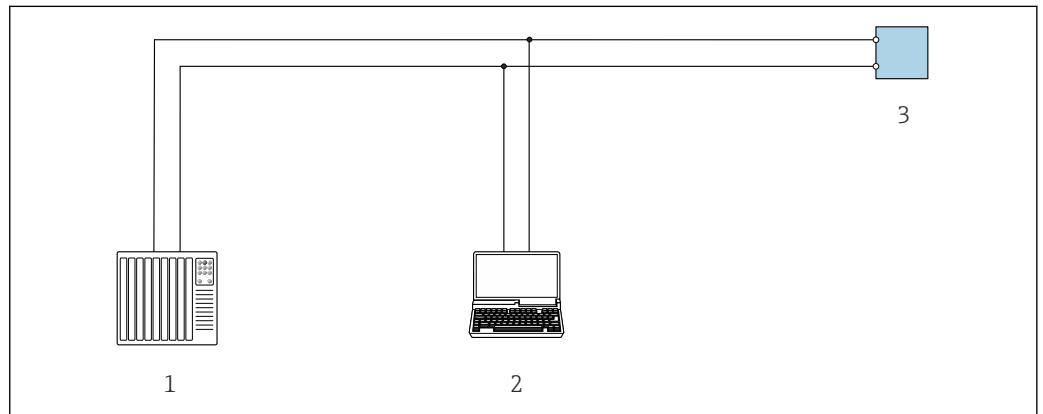
A0028838

58 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.



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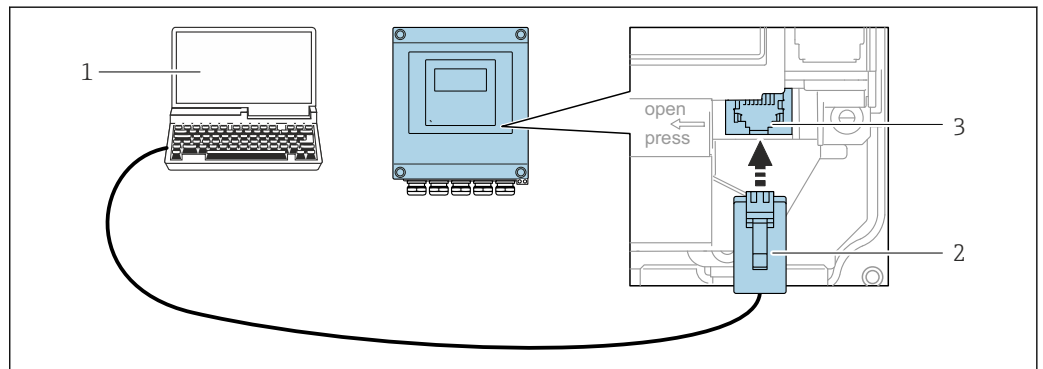
59 Options for remote operation via Modbus-RS485 protocol (active)

- 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)

Proline 500 – digital transmitter

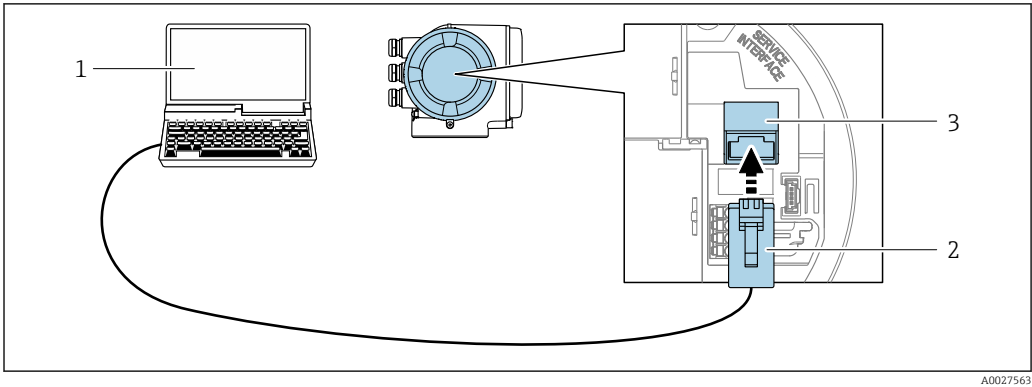


A0029163

60 Connection via service interface (CDI-RJ45)

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

Proline 500 transmitter

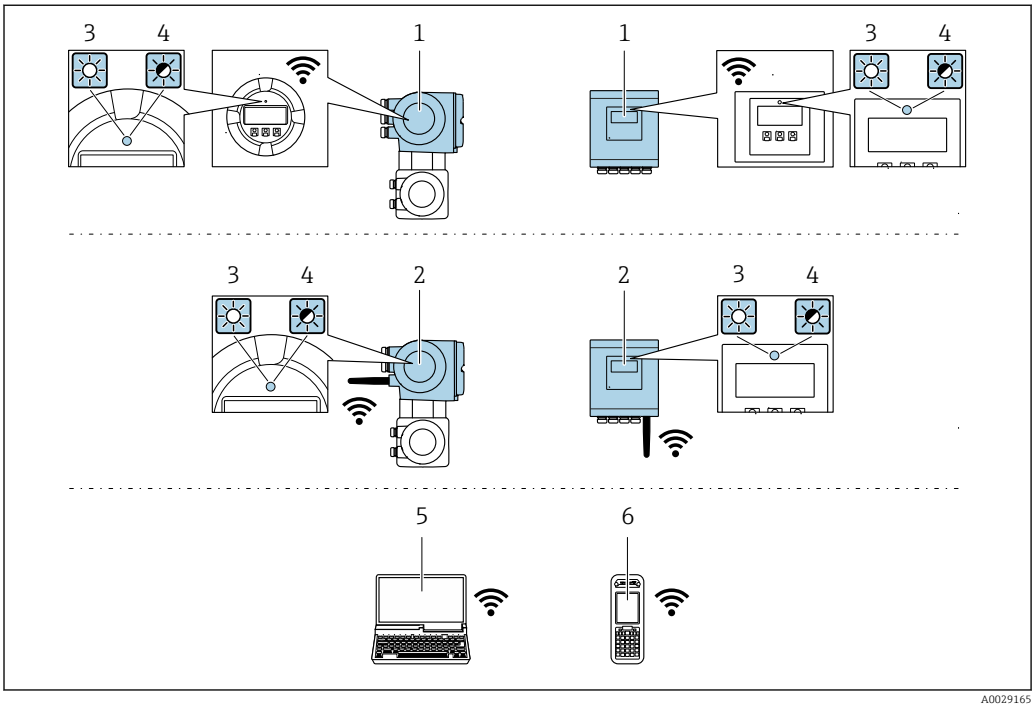


61 Connection via service interface (CDI-RJ45)

- 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"






- 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"> ■ CDI-RJ45 service interface ■ WLAN interface 	Special Documentation for the device →  106
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Fieldbus protocol 	→  104
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Fieldbus protocol 	→  104
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
- Asset Management Solutions (AMS) by Emerson → www.emersonprocess.com
- FieldCommunicator 375/475 by Emerson → www.emersonprocess.com
- Field Device Manager (FDM) by Honeywell → www.honeywellprocess.com
- FieldMate by Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The associated device description files are available at: 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
Available data	<ul style="list-style-type: none"> ▪ Event history, such as diagnostic events ▪ Parameter data record backup ▪ Device firmware package ▪ Driver for system integration e.g.: <ul style="list-style-type: none"> – DD for HART – GSD for PROFIBUS PA – DD for FOUNDATION Fieldbus 	<ul style="list-style-type: none"> ▪ Measured value memory ("Extended HistoROM" order option) ▪ Current parameter data record (used by firmware at run time) ▪ Maximum indicators (min/max values) ▪ Totalizer values 	<ul style="list-style-type: none"> ▪ Sensor data: diameter etc. ▪ Serial number ▪ User-specific access code (to use the "Maintenance" user role) ▪ Calibration data ▪ Device configuration (e.g. SW options, fixed I/O or multi I/O)
Storage location	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

CE mark

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.

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

C-Tick symbol

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

Ex approval

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



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

Proline 500 – digital

ATEX, IECEx

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

Ex ia, Ex db

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

Ex tb

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

Non-Ex, Ex ec

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

cCSAus

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

IS (Ex nA, Ex i)

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

NI (Ex nA)

Transmitter	Sensor
Class I Division 2 Groups A - D	

Ex nA, Ex i

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

Ex nA

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

Ex tb

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

Proline 500*ATEX, IECEx*

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

Ex db eb

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

Ex db

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

Ex tb

Category	Type of protection	
	Transmitter	Sensor
II2G	Ex tb IIIC T85°C Db	Ex ia tb IIIC T** °C Db

Ex ec

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

cCSAus

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

IS (Ex i), XP (Ex d)

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

NI (Ex nA)

Transmitter	Sensor
Class I Division 2 Groups A - D	

Ex de

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

Ex d

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

Ex nA

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

Ex tb

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

Sanitary compatibility

- 3A approval and EHEDG-certified
- Seals → FDA-compliant (apart from Kalrez seals)

Functional safety

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

The following types of monitoring in safety equipment are possible:
Volume flow



Functional Safety Manual with information on the SIL device → 105

HART certification

HART interface

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

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

FOUNDATION Fieldbus certification

FOUNDATION Fieldbus interface

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

- Certified in accordance with FOUNDATION Fieldbus H1
- Interoperability Test Kit (ITK), revision version 6.1.2 (certificate available on request)
- Physical Layer Conformance Test
- The device can also be operated with certified devices of other manufacturers (interoperability)

Certification PROFIBUS

PROFIBUS interface

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

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

Modbus RS485 certification

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.

Radio approval

Europe:
RED 2014/53/EU

United States of America:
CFR Title 47, FCC Part 15.247

Canada:
RSS-247 Issue 1

Japan:
Article 2 clause 1 item 19



Additional country-specific approvals on request.

Other standards and guidelines

- EN 60529
Degrees of protection provided by enclosures (IP code)
- EN 61010-1
Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
- IEC/EN 61326
Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements).
- NAMUR NE 21
Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NAMUR NE 32
Data retention in the event of a power failure in field and control instruments with microprocessors
- NAMUR NE 43
Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53
Software of field devices and signal-processing devices with digital electronics

- NAMUR NE 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

Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: 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



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.

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

Heartbeat Technology

Package	Description
Heartbeat Verification +Monitoring	<p>Heartbeat Monitoring Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to:</p> <ul style="list-style-type: none"> ■ 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. ■ Schedule servicing in time. ■ Monitor the process or product quality, e.g. gas pockets. <p>Heartbeat Verification 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"> ■ Functional testing in the installed state without interrupting the process. ■ Traceable verification results on request, including a report. ■ Simple testing process via local operation or other operating interfaces. ■ Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications. ■ Extension of calibration intervals according to operator's risk assessment.






Cleaning





Package	Description
Electrode cleaning circuit (ECC)	The electrode cleaning circuit (ECC) function has been developed to have a solution for applications where magnetite (Fe ₃ 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.

Device-specific accessories**For the transmitter**



Accessories	Description
Transmitter <ul style="list-style-type: none"> ■ Proline 500 ■ Proline 500 – digital 	<p>Transmitter for replacement or storage. Use the order code to define the following specifications:</p> <ul style="list-style-type: none"> ■ Approvals ■ Output ■ Input ■ Display / operation ■ Housing ■ Software <p> For details, see Installation Instructions EA01150</p> <p>For details</p> <ul style="list-style-type: none"> ■ Proline 500 – digital transmitter: Installation Instructions EA01151 ■ Proline 500 transmitter: Installation Instructions EA01152 <p> Proline 500 transmitter for replacement: the serial number of the current transmitter should always be quoted when ordering. On the basis of the serial number, the device-specific data of the replacement device can also be used for the new transmitter.</p>
WLAN antenna Wide range	<p>External WLAN antenna for a range of up to 50 m (165 ft).</p> <p> Further information on the WLAN interface →  94.</p>
Post mounting kit	<p>Post mounting kit for transmitter.</p> <p> The post mounting kit can only be ordered together with a transmitter.</p>





Protective cover Proline 500	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
Display guard Proline 500 – digital	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight.  For details, see Installation Instructions EA01161
Connecting cable Proline 500 – digital Sensor – Transmitter	The following cable lengths are available: order code for "Cable, sensor connection" <ul style="list-style-type: none"> ■ Option B: 20 m (65 ft) ■ Option E: User configurable up to max. 50 m ■ Option F: User configurable up to max. 165 ft  Maximum possible cable length for a Proline 500 – digital connecting cable: 300 m (1 000 ft)
Connecting cable Proline 500 Sensor – Transmitter	The following cable lengths are available: order code for "Cable, sensor connection" <ul style="list-style-type: none"> ■ Option 1: 5 m (16 ft) ■ Option 2: 10 m (32 ft) ■ Option 3: 20 m (65 ft) ■ Option 4: User-configurable cable length (m) ■ Option 5: User-configurable cable length (ft)  Possible cable length for a Proline 500 connecting cable: depends on the medium conductivity, max. 200 m (660 ft)

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"> ■ 2 process connections ■ Screws ■ Seals
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
Ground disks	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"> ■ 2 process connections ■ Screws ■ Seals
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 non-Ex area .  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 non-Ex area and the Ex area .  For details, see Operating Instructions BA01202S

Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: <ul style="list-style-type: none"> Choice of measuring devices for industrial requirements Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and accuracy. Graphic illustration of the calculation results 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. Applicator is available: <ul style="list-style-type: none"> Via the Internet: https://wapps.endress.com/applicator As a downloadable DVD for local PC installation.
W@M	W@M Life Cycle Management 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. 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. Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, visit www.endress.com/lifecyclemanagement
FieldCare	FDT-based plant asset management tool from Endress+Hauser. 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.  For details, see Operating Instructions BA00027S and BA00059S
DeviceCare	Tool for connecting and configuring Endress+Hauser field devices.  For details, see Innovation brochure IN01047S

System components

Accessories	Description
Memograph M graphic display recorder	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.  For details, see "Technical Information" TI00133R and Operating Instructions BA00247R

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)
- 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 500	KA01230D	KA01233D	KA01231D	KA01232D

Operating Instructions

Measuring device	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Promag H 500	BA01398D	BA01479D	BA01404D	BA01401D

Description of device parameters

Measuring device	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Promag 500	GP01054D	GP01099D	GP01056D	GP01055D

Supplementary device-dependent documentation

Safety Instructions

Contents	Documentation code
ATEX/IECEX Ex i	XA01522D
ATEX/IECEX Ex ec	XA01523D
cCSAus IS	XA01524D
cCSAus Ex e ia / Ex d ia	XA01525D
cCSAus Ex nA	XA01526D
INMETRO Ex i	XA01527D
INMETRO Ex ec	XA01528D
NEPSI Ex i	XA01529D
NEPSI Ex nA	XA01530D

Special documentation

Contents	Documentation code			
Information on the Pressure Equipment Directive	SD01614D			
Functional Safety Manual	SD01741D			
Contents	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Heartbeat Technology	SD01641D	SD01745D	SD01747D	SD01746D
Contents	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Web server	SD01658D	SD01661D	SD01660D	SD01659D

Installation Instructions

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

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