

Technical Information

Proline Promag W 500

Electromagnetic flowmeter



The remote version with up to 3 I/Os and a sensor with EN ISO 12944 corrosion protection

Application

- The measuring principle is practically independent of pressure, density, temperature and viscosity
- The specialist for very demanding applications in the water and wastewater industry

Device properties

- International drinking water approvals
- Degree of protection IP68 (Type 6P enclosure)
- Remote version with up to 3 I/Os
- Backlit display with touch control and WLAN access

Your benefits

- For direct underground installation or permanent underwater use
- Safe, reliable long-term operation – robust and completely welded sensor
- Energy-saving flow measurement – no pressure loss due to cross-section constriction
- Maintenance-free – no moving parts
- Full access to process and diagnostic information – numerous, freely combinable I/Os and fieldbuses
- Reduced complexity and variety – freely configurable I/O functionality
- Integrated verification – Heartbeat Technology

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


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Document information

Symbols used









Electrical symbols

Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current
	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

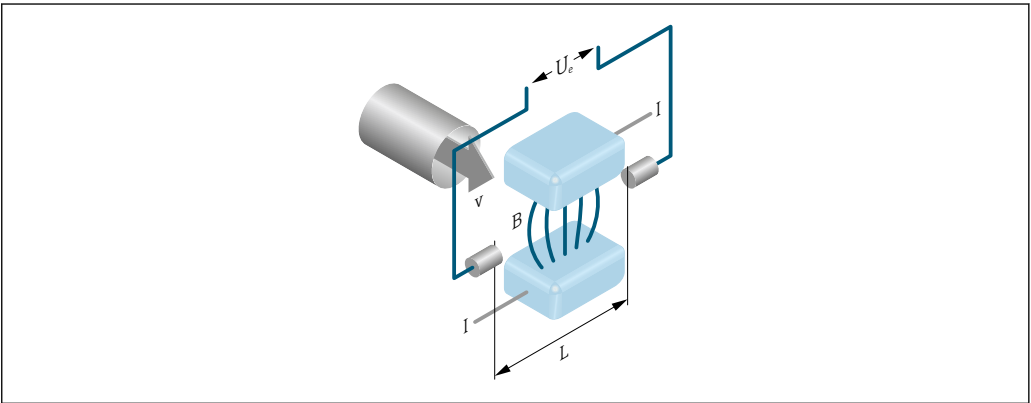
Symbols in graphics

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

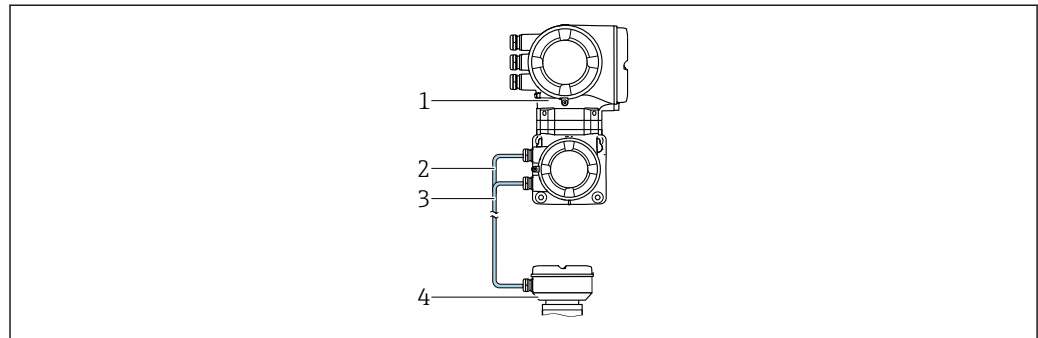
- Induced voltage $U_e = B \cdot L \cdot v$
- Volume flow $Q = A \cdot v$

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 two connecting cable(s).

Transmitter

For use in applications required to meet special requirements due to ambient or operating conditions.



- 1 Transmitter with integrated ISEM
- 2 Coil current cable
- 3 Signal cable
- 4 Sensor connection housing

Application examples for sensors without electronics:

- Strong vibrations at the sensor.
- 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

Connecting cables can be ordered in various lengths → 94)

- Length: max. 200 m (656 ft), depending on the medium conductivity
- Two connecting cables:
 - 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

Use in: Ex Zone 1 and 2; Class 1, Division 2 and Class 1, Division 1

Device versions and materials

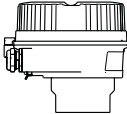
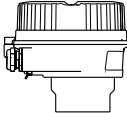
- Transmitter housing
 - Aluminum, coated: aluminum, AlSi10Mg, coated
- Window material: glass

Configuration

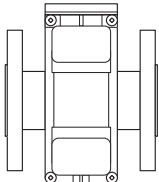
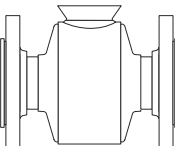
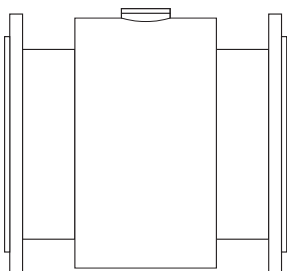
- External operation via 4-line, backlit, graphic local display with touch control and guided menus ("Make-it-run" wizards) for application-specific commissioning.
- Via service interface or WLAN connection:
 - Operating tools (e.g. FieldCare, DeviceCare)
 - Web server (access via Web browser, e.g. Microsoft Internet Explorer, Microsoft Edge)

Sensor connection housing

Different versions of the connection housing are available.

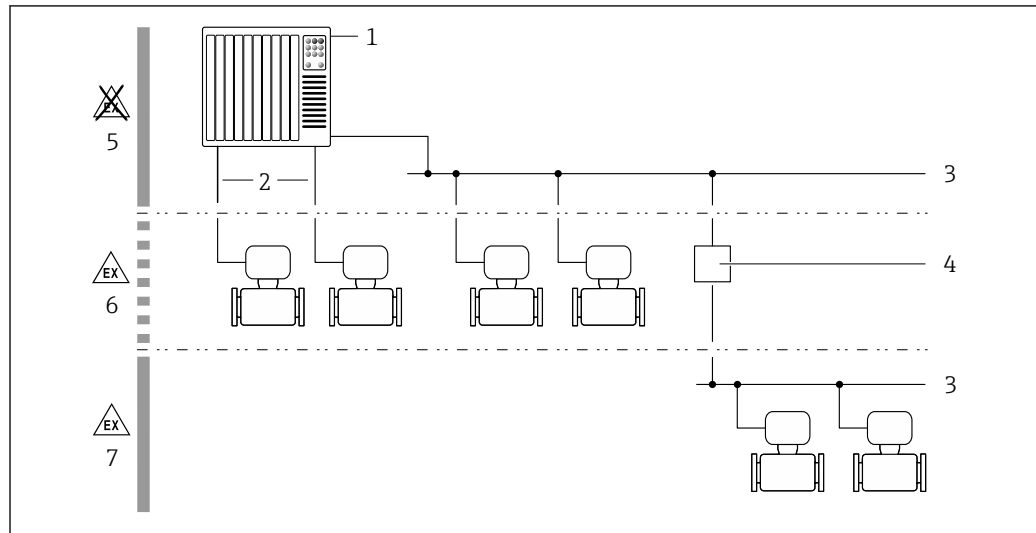
	Order code for "Sensor connection housing", option A , "Aluminum, coated": Aluminum, AlSi10Mg, coated
	Order code for "Sensor connection housing", option D , "Polycarbonate": Polycarbonate

Sensor

<p>Promag W</p> <p><i>Fixed flange: DN 25 to 300 (1 to 12")</i></p>  <p>A0017040</p>	<ul style="list-style-type: none">■ Nominal diameter range: DN 25 to 2000 (1 to 78")■ Materials:<ul style="list-style-type: none">– Sensor housing: aluminum, AlSi10Mg, coated; carbon steel with protective varnish– Sensor connection housing (standard): aluminum, AlSi10Mg, coated– Sensor connection housing (option): polycarbonate– Measuring tubes ¹⁾:<ul style="list-style-type: none">DN 25 to 300 (1 to 12"): stainless steel, 1.4301/1.4306/304/304LDN 350 to 2000 (14 to 78"): stainless steel, 1.4301/304– Liner: hard rubber, polyurethane– Electrodes: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum– Process connections:<ul style="list-style-type: none">Stainless steel, 1.4404/1.4571/F316LCarbon steel, A105/A181/A350LF2/A515(70)/FE410WB/S235JRG2/S235J+N/S275JR/P235GH/P250GH/P265GH– Seals: as per DIN EN 1514-1– Ground disks: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum
<p><i>Fixed flange: DN 25 to 300 (1 to 12")</i></p>  <p>A0022673</p>	
<p><i>Fixed flange: DN 350 to 2000 (14 to 78")</i></p>  <p>A0017041</p>	

1) For carbon steel flange material with Al/Zn protective coating (DN 25 to 300 (1 to 12")), protective varnish (IP68) (DN 50 to 300 (2 to 12")) or protective varnish ≥ DN 350 (14")

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
→ 96.

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
→ 96.

Input

Measured variable

Direct measured variables

- Volume flow (proportional to induced voltage)
- Electrical conductivity

Calculated measured variables

Mass flow

Measuring range

Typically $v = 0.01$ to 10 m/s (0.03 to 33 ft/s) with the specified accuracy
Electrical conductivity: ≥ 5 $\mu\text{S/cm}$ for liquids in general

Flow characteristic values in SI units

Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.3/10 m/s)	Factory settings		
[mm]	[in]		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)
		[m³/h]	[m³/h]	[m³]	[m³/h]
25	1	9 to 300 dm³/min	75 dm³/min	0.5 dm³	1 dm³/min
32	–	15 to 500 dm³/min	125 dm³/min	1 dm³	2 dm³/min
40	1 ½	25 to 700 dm³/min	200 dm³/min	1.5 dm³	3 dm³/min
50	2	35 to 1 100 dm³/min	300 dm³/min	2.5 dm³	5 dm³/min
65	–	60 to 2 000 dm³/min	500 dm³/min	5 dm³	8 dm³/min
80	3	90 to 3 000 dm³/min	750 dm³/min	5 dm³	12 dm³/min
100	4	145 to 4 700 dm³/min	1 200 dm³/min	10 dm³	20 dm³/min
125	–	220 to 7 500 dm³/min	1 850 dm³/min	15 dm³	30 dm³/min
150	6	20 to 600	150	0.025	2.5
200	8	35 to 1 100	300	0.05	5
250	10	55 to 1 700	500	0.05	7.5
300	12	80 to 2 400	750	0.1	10
350	14	110 to 3 300	1 000	0.1	15
375	15	140 to 4 200	1 200	0.15	20
400	16	140 to 4 200	1 200	0.15	20
450	18	180 to 5 400	1 500	0.25	25
500	20	220 to 6 600	2 000	0.25	30
600	24	310 to 9 600	2 500	0.3	40
700	28	420 to 13 500	3 500	0.5	50
750	30	480 to 15 000	4 000	0.5	60
800	32	550 to 18 000	4 500	0.75	75
900	36	690 to 22 500	6 000	0.75	100
1 000	40	850 to 28 000	7 000	1	125
–	42	950 to 30 000	8 000	1	125
1 200	48	1 250 to 40 000	10 000	1.5	150
–	54	1 550 to 50 000	13 000	1.5	200
1 400	–	1 700 to 55 000	14 000	2	225
–	60	1 950 to 60 000	16 000	2	250
1 600	–	2 200 to 70 000	18 000	2.5	300
–	66	2 500 to 80 000	20 500	2.5	325
1 800	72	2 800 to 90 000	23 000	3	350
–	78	3 300 to 100 000	28 500	3.5	450
2 000	–	3 400 to 110 000	28 500	3.5	450

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		
[in]	[mm]		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)
		[gal/min]	[gal/min]	[gal]	[gal/min]
1	25	2.5 to 80	18	0.2	0.25
–	32	4 to 130	30	0.2	0.5
1 ½	40	7 to 190	50	0.5	0.75
2	50	10 to 300	75	0.5	1.25
–	65	16 to 500	130	1	2
3	80	24 to 800	200	2	2.5
4	100	40 to 1250	300	2	4
–	125	60 to 1950	450	5	7
6	150	90 to 2 650	600	5	12
8	200	155 to 4 850	1 200	10	15
10	250	250 to 7 500	1 500	15	30
12	300	350 to 10 600	2 400	25	45
14	350	500 to 15 000	3 600	30	60
15	375	600 to 19 000	4 800	50	60
16	400	600 to 19 000	4 800	50	60
18	450	800 to 24 000	6 000	50	90
20	500	1 000 to 30 000	7 500	75	120
24	600	1 400 to 44 000	10 500	100	180
28	700	1 900 to 60 000	13 500	125	210
30	750	2 150 to 67 000	16 500	150	270
32	800	2 450 to 80 000	19 500	200	300
36	900	3 100 to 100 000	24 000	225	360
40	1 000	3 800 to 125 000	30 000	250	480
42	–	4 200 to 135 000	33 000	250	600
48	1 200	5 500 to 175 000	42 000	400	600
54	–	9 to 300 Mgal/d	75 Mgal/d	0.0005 Mgal/d	1.3 Mgal/d
–	1 400	10 to 340 Mgal/d	85 Mgal/d	0.0005 Mgal/d	1.3 Mgal/d
60	–	12 to 380 Mgal/d	95 Mgal/d	0.0005 Mgal/d	1.3 Mgal/d
–	1 600	13 to 450 Mgal/d	110 Mgal/d	0.0008 Mgal/d	1.7 Mgal/d
66	–	14 to 500 Mgal/d	120 Mgal/d	0.0008 Mgal/d	2.2 Mgal/d
72	1 800	16 to 570 Mgal/d	140 Mgal/d	0.0008 Mgal/d	2.6 Mgal/d
78	–	18 to 650 Mgal/d	175 Mgal/d	0.0010 Mgal/d	3.0 Mgal/d
–	2 000	20 to 700 Mgal/d	175 Mgal/d	0.0010 Mgal/d	2.9 Mgal/d

1) HART only

To calculate the measuring range, use the *Applicator* sizing tool → 95

Recommended measuring range

"Flow limit" section →  52

Operable flow range

Over 1000 : 1

Input signal**Input and output versions**

→  14

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 →  96

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 →  12.

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) →	↓	↓	↓	↓	↓	↓	↓
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) 3)}	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 → 18.

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 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 →  82

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 type	Safety-related values			
		Output; input 2		Output; input 3	
		24 (+)	25 (-)	22 (+)	23 (-)
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	$U_{nom} = 30\text{ V}$ $U_{max} = 250\text{ V}$			

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 type	Intrinsically safe values			
		Output; input 2		Output; input 3	
		24 (+)	25 (-)	22 (+)	23 (-)
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	$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1.25 \text{ W}$ $L_i = 0$ $C_i = 0$			

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 ■ 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 ■ 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 → 96.</p>

FOUNDATION Fieldbus


Manufacturer ID	0x452B48
Ident number	0x103C
Device revision	1
DD revision	Information and files under: <ul style="list-style-type: none"> ▪ www.endress.com ▪ www.fieldbus.org
CFF revision	
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="margin-right: 10px;"></div> <div>The compensation variables must be transmitted to the device in the SI basic units.</div> </div>
Multiple Digital Output Block (MDO)	1	5 ms	Channel_DO (122) <ul style="list-style-type: none"> ■ 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 →  96.</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 →  14.									

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 →  14.									

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 →  14.									

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 → 14.									

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 → 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" → 28
- Option SA "FOUNDATION Fieldbus" → 28

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

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

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

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

Pin assignment, device plug

PROFIBUS PA

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

FOUNDATION Fieldbus

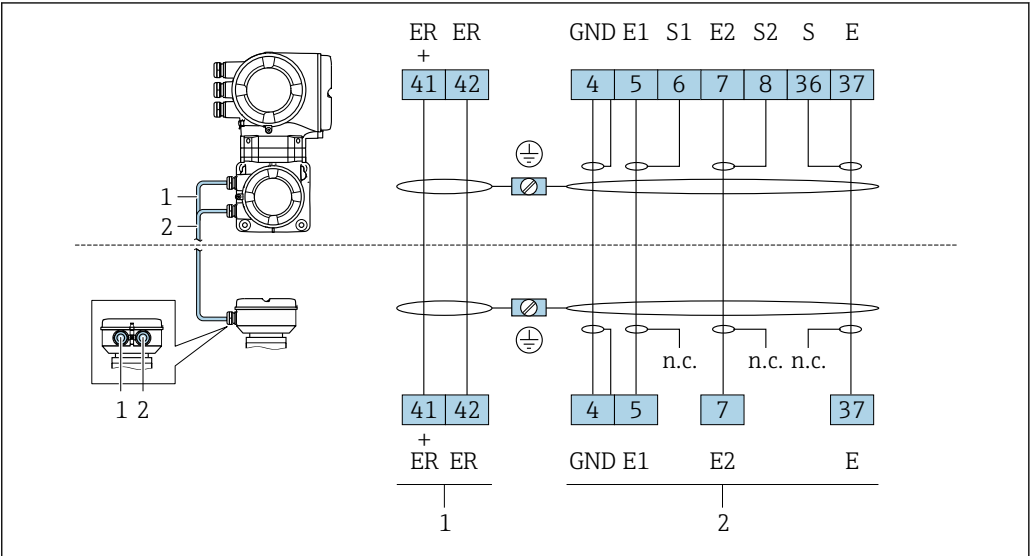
	Pin	Assignment		Coding	Plug/socket
	1	+	Signal +		
	2	-	Signal -		
	3		Grounding		
	4		Not assigned		

Supply voltage

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

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 the connecting cable The connecting cable is connected via terminals.
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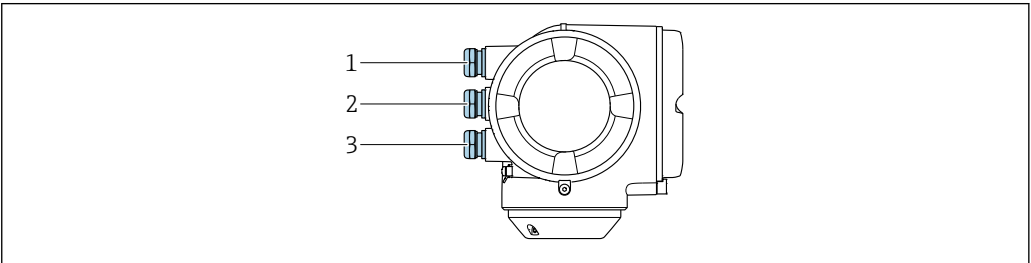


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- 1 Coil current cable
- 2 Signal cable

Connecting the transmitter

- Terminal assignment → 27
- Device plug pin assignment → 28

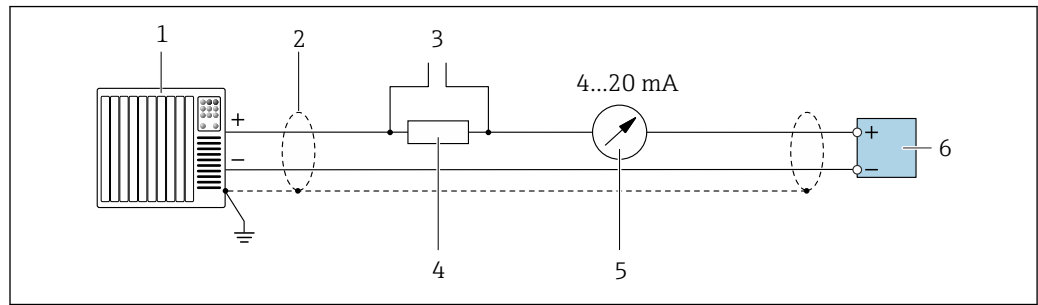


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- 1 Cable entry for supply voltage
- 2 Cable entry for input/output signal transmission
- 3 Cable entry for input/output signal transmission; optional: connection of external WLAN antenna or service connector

Connection examples

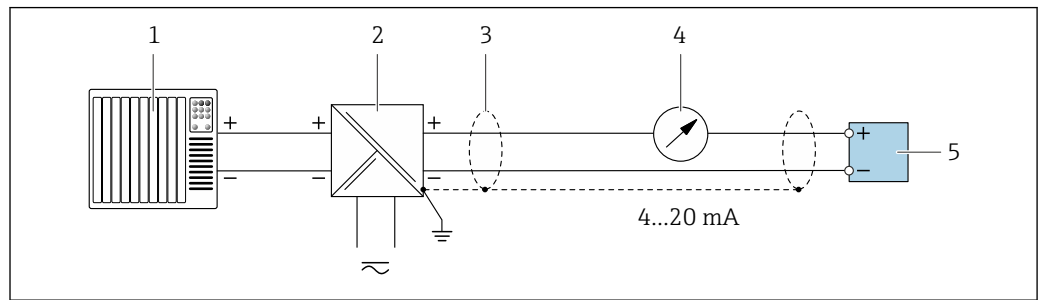
Current output 4 to 20 mA HART



A0029055

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

- 1 Automation system with current input (e.g. PLC)
- 2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 37
- 3 Connection for HART operating devices → 82
- 4 Resistor for HART communication ($\geq 250 \Omega$): observe maximum load → 15
- 5 Analog display unit: observe maximum load → 15
- 6 Transmitter

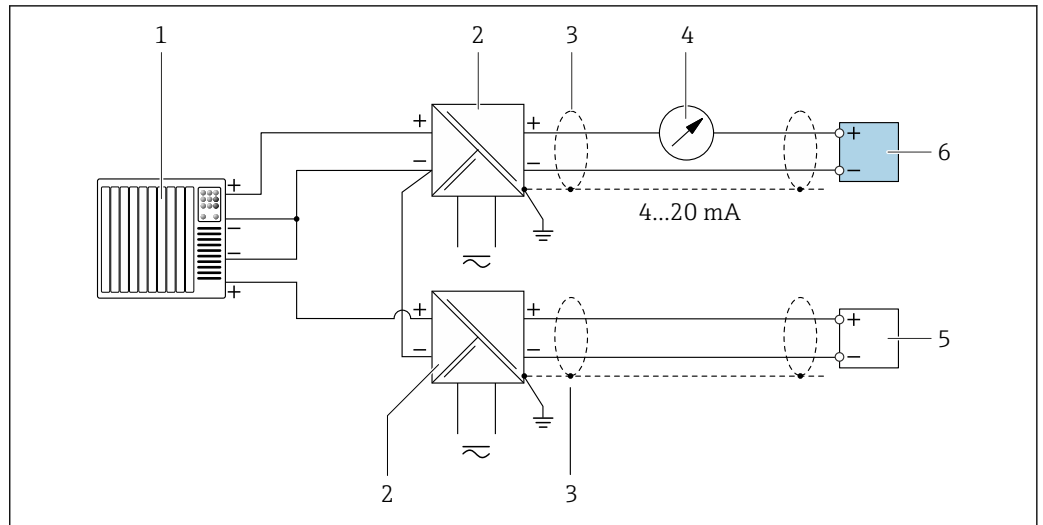


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3 Connection example for 4 to 20 mA HART current output (passive)

- 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 → 15
- 5 Transmitter

HART input

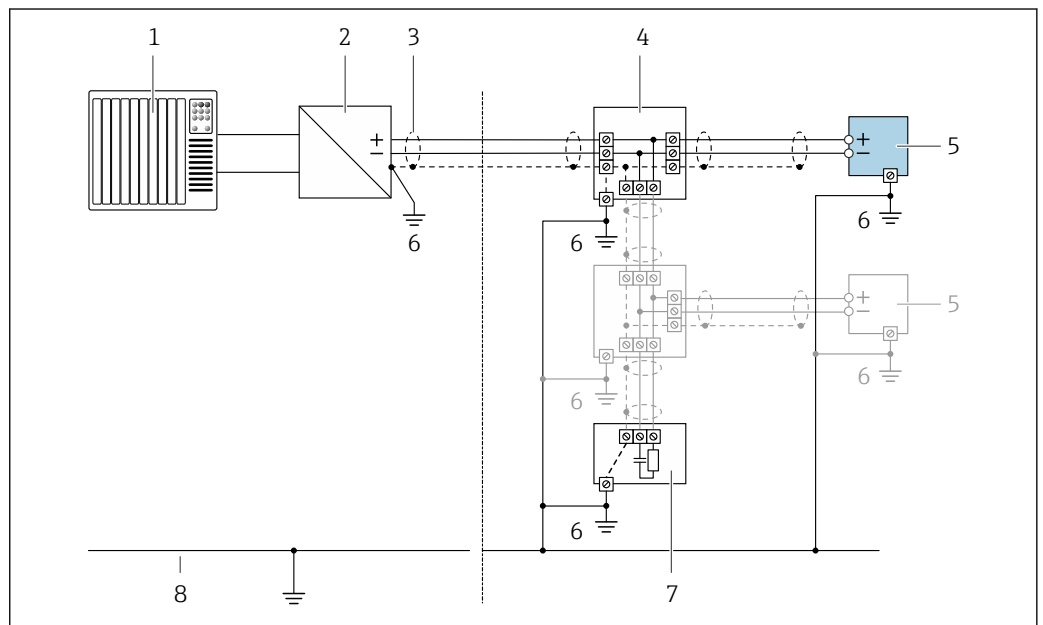


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4 Connection example for HART input with a common negative (passive)

- 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

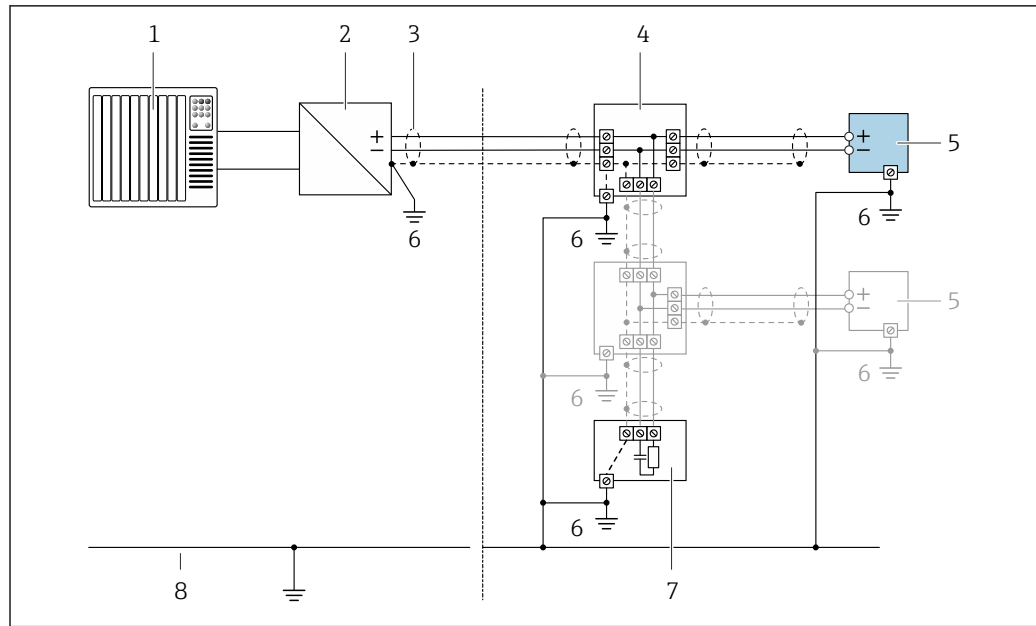


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5 Connection example for PROFIBUS-PA

- 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

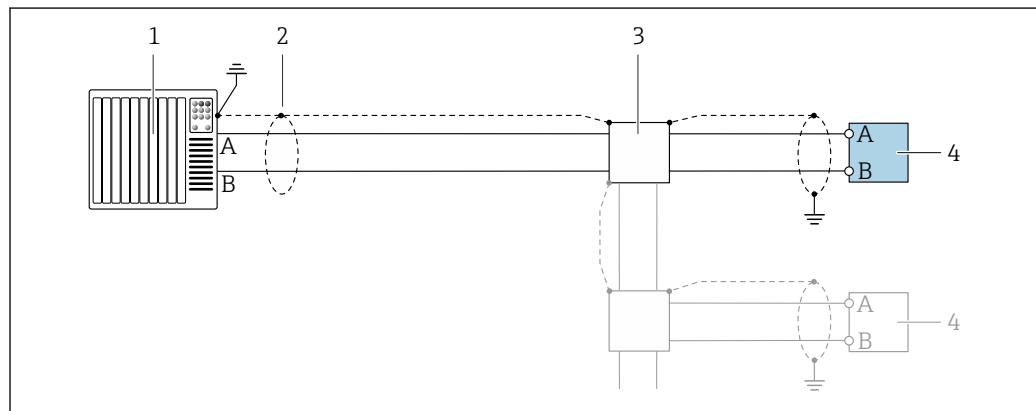


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6 Connection example for FOUNDATION Fieldbus

- 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

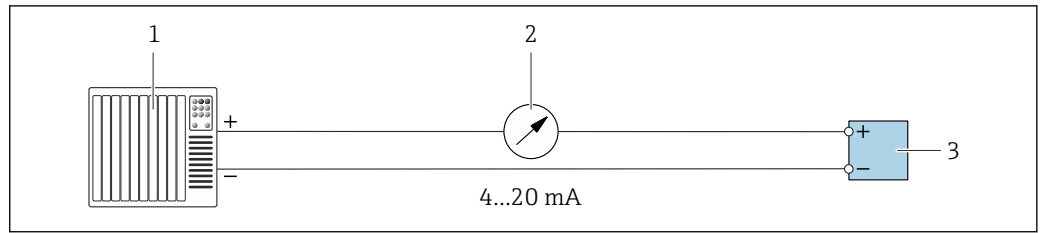


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7 Connection example for Modbus RS485, non-hazardous area and Zone 2/Div. 2

- 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

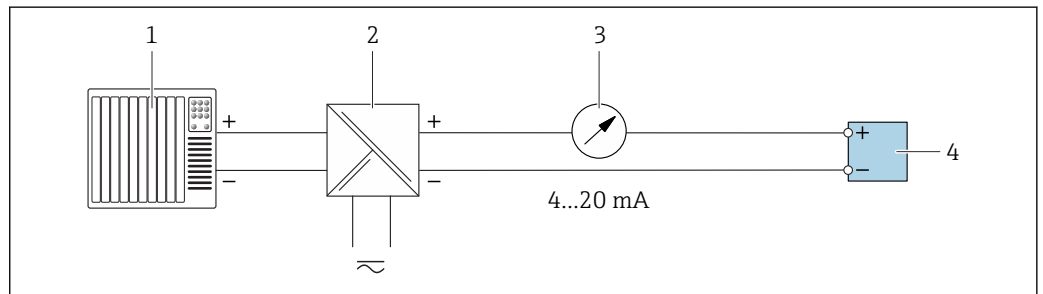
Current output 4-20 mA



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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

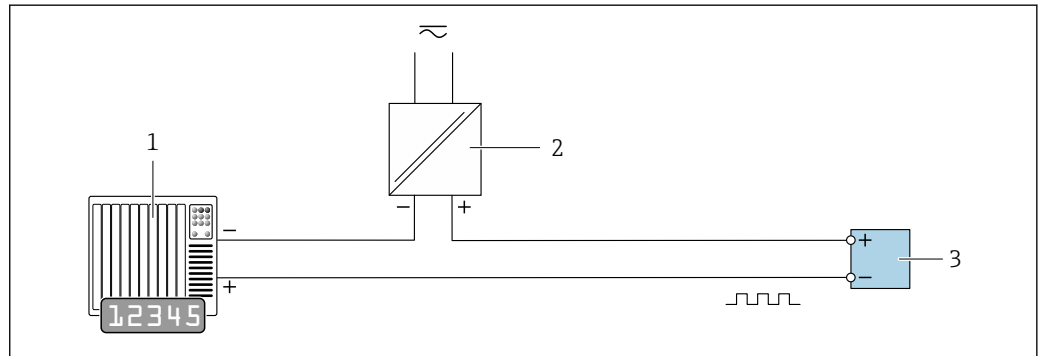


A0028759

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

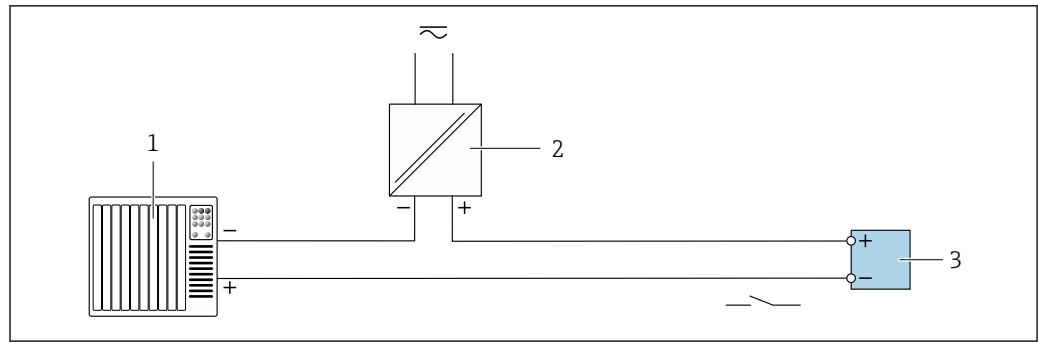


A0028761

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 → 16

Switch output

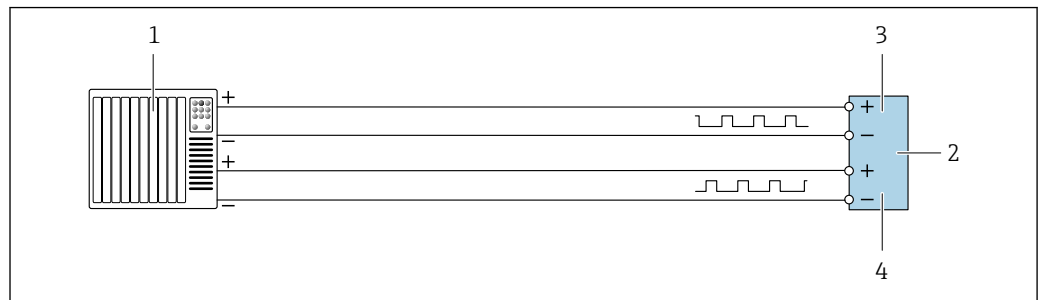


A0028760

11 Connection example for switch output (passive)

- 1 Automation system with switch input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values → 16

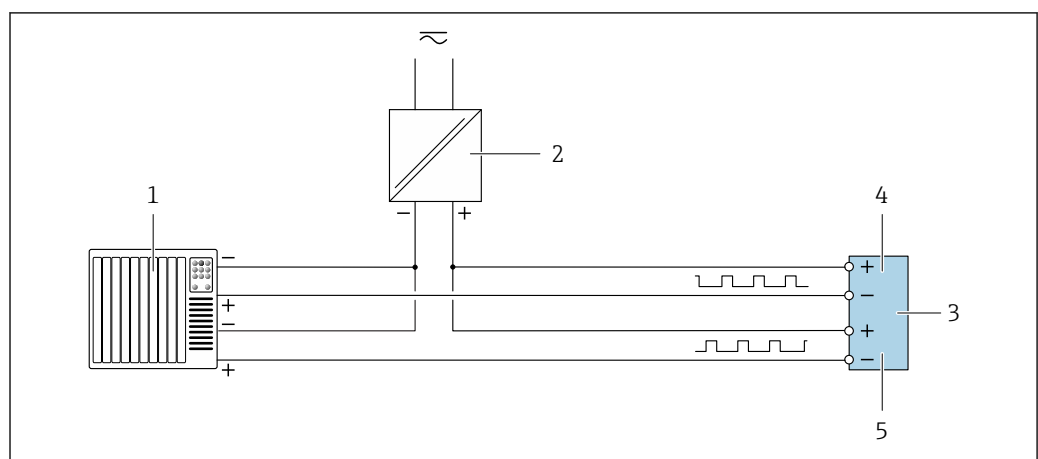
Double pulse output



A0029280

12 Connection example for double pulse output (active)

- 1 Automation system with double pulse input (e.g. PLC)
- 2 Transmitter: Observe input values → 17
- 3 Double pulse output
- 4 Double pulse output (slave), phase-shifted

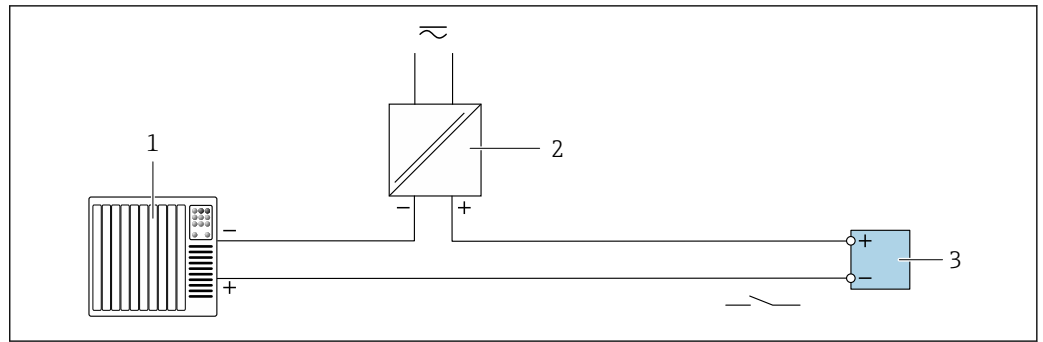


A0029279

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 → 17
- 4 Double pulse output
- 5 Double pulse output (slave), phase-shifted

Relay output

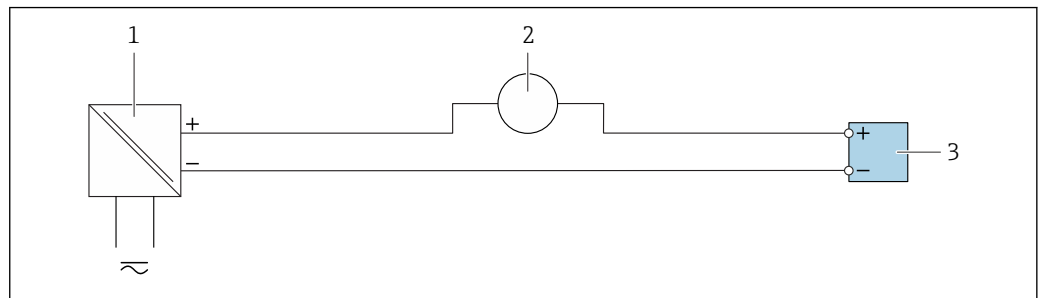


A0028760

14 Connection example for relay output (passive)

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

Current input

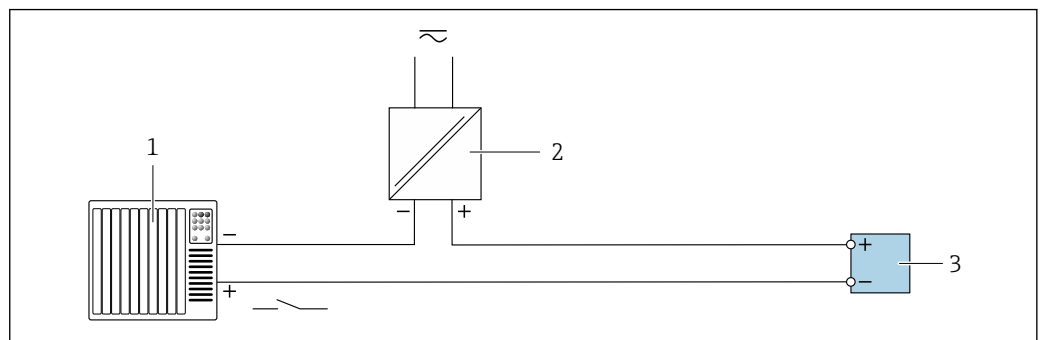


A0028915

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

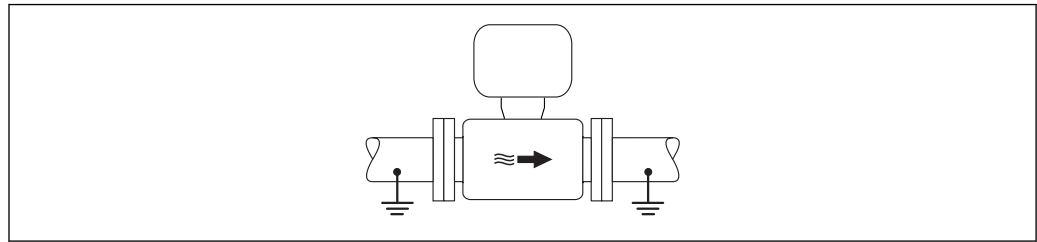
Requirements

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, grounded pipe



A0016315

17 Potential equalization via measuring tube

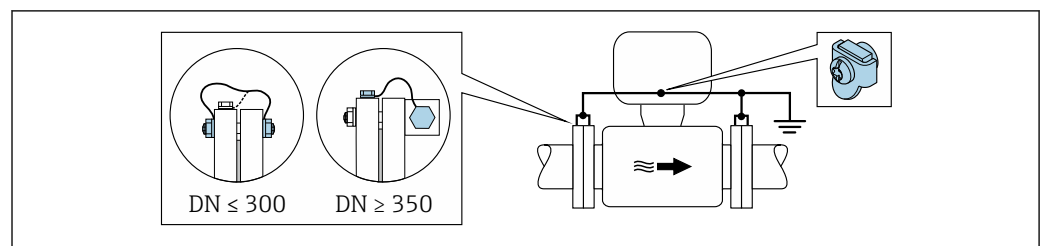
Connection example in special situations

Unlined and ungrounded metal pipe

This connection method also applies in situations where:

- The customary potential equalization is not used
- Equalizing currents are present

Ground cable	Copper wire, at least 6 mm ² (0.0093 in ²)
---------------------	---



A0029338

18 Potential equalization via ground terminal and pipe flanges

Note the following when installing:

- Connect both sensor flanges to the pipe flange via a ground cable and ground them.
- Connect the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for the purpose. To mount the ground cable:
 - If DN ≤ 300 (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws.
 - If DN ≥ 350 (14"): Mount the ground cable directly on the metal transport bracket.

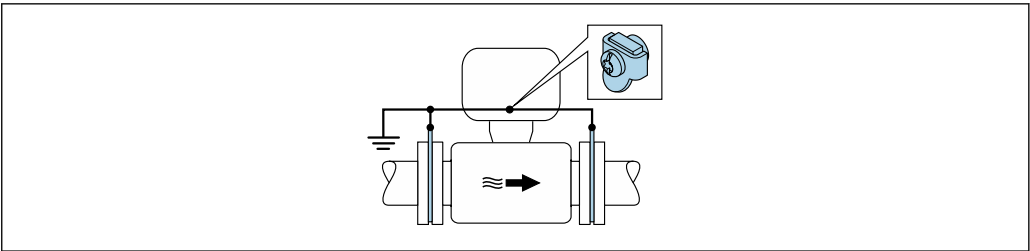
i You can order the necessary ground cable from Endress+Hauser: → 94.

Plastic pipe or pipe with insulating liner

This connection method also applies in situations where:

- The customary potential equalization is not used
- Equalizing currents are present


Ground cable	Copper wire, at least 6 mm ² (0.0093 in ²)
---------------------	---



A0029339

19 Potential equalization via ground terminal and ground disks

Note the following when installing:
The ground disks must be connected to the ground terminal via the ground cable and be connected to ground potential.

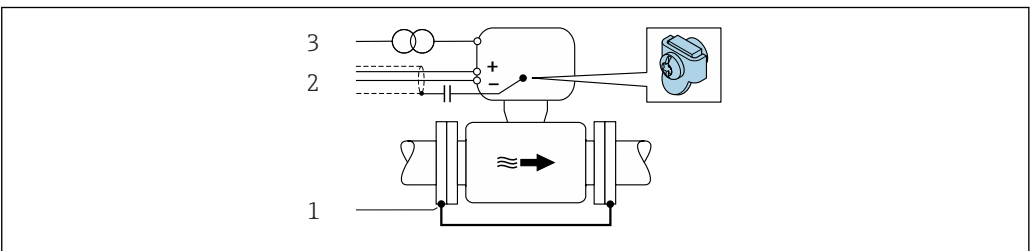
 The ground cable and ground disks can be ordered from Endress+Hauser .

Pipe with a cathodic protection unit

This connection method is only used if the following two conditions are met:

- Metal pipe without liner or pipe with electrically conductive liner
- Cathodic protection is integrated in the personal protection equipment

Ground cable	Copper wire, at least 6 mm ² (0.0093 in ²)
--------------	---




A0030377

- 1 Connection of the two flanges of the pipe via a ground cable
- 2 Signal line shielding via a capacitor
- 3 Measuring device connected to power supply such that it is floating in relation to the protective ground (isolation transformer)

Note the following when installing:
The sensor is installed in the pipe in a way that provides electrical insulation.

 You can order the necessary ground cable from Endress+Hauser: →  94.

Terminals	Transmitter Spring terminals for conductor cross-section 0.2 to 2.5 mm ² (24 to 12 AWG)
Cable entries	<ul style="list-style-type: none">■ Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)■ Thread for cable entry:<ul style="list-style-type: none">– NPT ½"– G ½"– M20■ Device plug for digital communication: M12 Only available for certain device versions →  28.
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	≤110 Ω/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

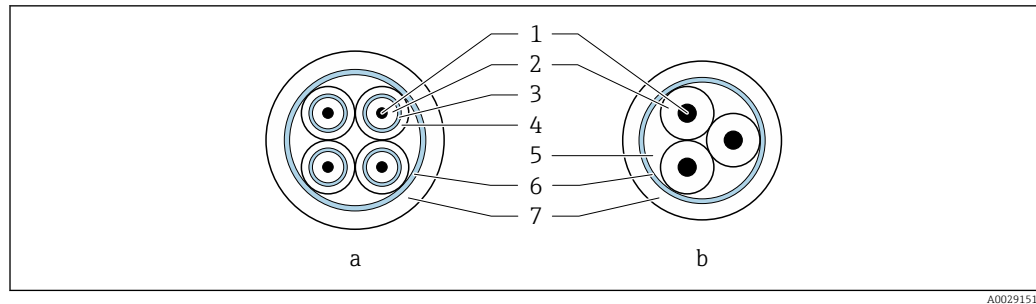
Standard installation cable is sufficient.

Connecting cable for sensor - transmitter*Signal cable*

Standard cable	3 × 0.38 mm ² (20 AWG) with common, braided copper shield (Ø ~ 9.5 mm (0.37 in)) and individual shielded cores
Cable for empty pipe detection (EPD)	4 × 0.38 mm ² (20 AWG) with common, braided copper shield (Ø ~ 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 (Ø ~ 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

20 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



A connecting cable can be ordered from Endress+Hauser for IP68:

- Pre-terminated cables that are already connected to the sensor.
- Pre-terminated cables, where the cables are connected by the customer onsite (incl. tools for sealing the connection compartment)

Reinforced connecting cables

Reinforced connecting cables with an additional, reinforcing metal braid should be used for:

- When laying the cable directly in the ground
- Where there is a risk of damage from rodents
- If using the device below IP68 degree of protection



Reinforced connecting cables with an additional, reinforcing metal braid can be ordered from Endress+Hauser .

Operation in zones of severe electrical interference

The measuring system meets the general safety requirements → 92 and EMC specifications → 49.

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

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

Maximum measured error

Error limits under reference operating conditions

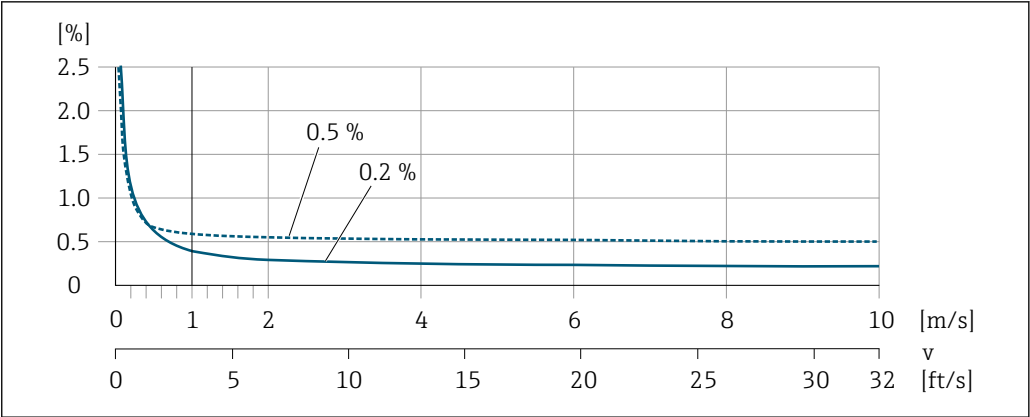
o.r. = of reading

Volume flow

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

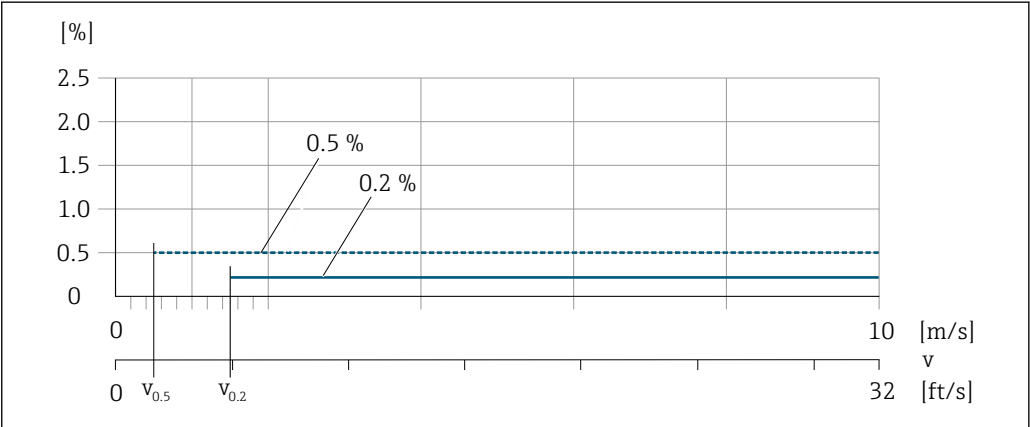


Fluctuations in the supply voltage do not have any effect within the specified range.



A0028974

21 Maximum measured error in % o.r.



A0017051

22 Flat Spec in % o.r.

Flat Spec flow values0.5 %

Nominal diameter		$v_{0.5}$	
[mm]	[in]	[m/s]	[ft/s]
25 to 600	1 to 24	0.5	1.64

Flat Spec flow values0.2 %

Nominal diameter		$v_{0.2}$	
[mm]	[in]	[m/s]	[ft/s]
25 to 600	1 to 24	1.5	4.92

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. ± 50 ppm o.r. (across the entire ambient temperature range)
-----------------	--

Repeatability

o.r. = of reading

Volume flowMax. ± 0.1 % o.r. ± 0.5 mm/s (0.02 in/s)**Electrical conductivity**Max. ± 5 % o.r.**Influence of ambient temperature****Current output**

o.r. = of reading

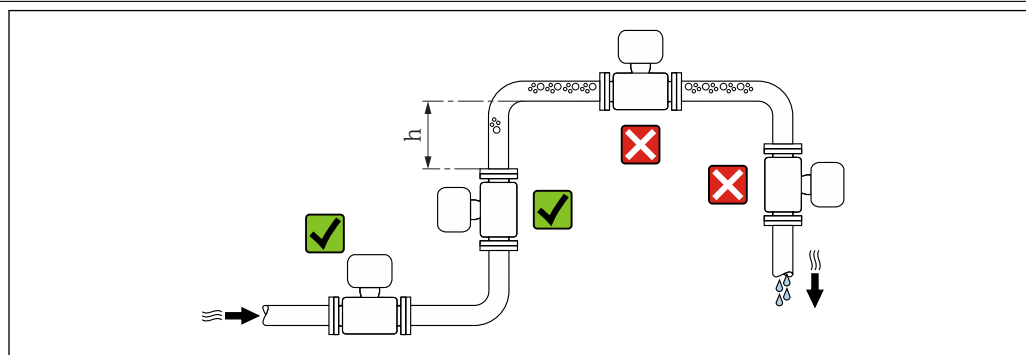
Temperature coefficient	Typically $1 \mu\text{A}/^\circ\text{C}$
--------------------------------	--

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:

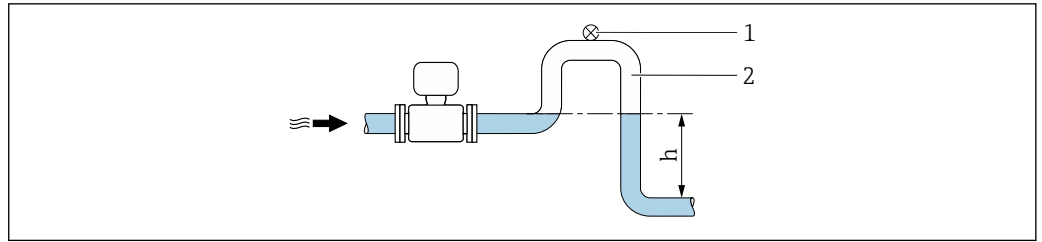
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

Installation in down pipes

Install a siphon with a vent valve downstream of the sensor in down pipes whose length $h \geq 5$ 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



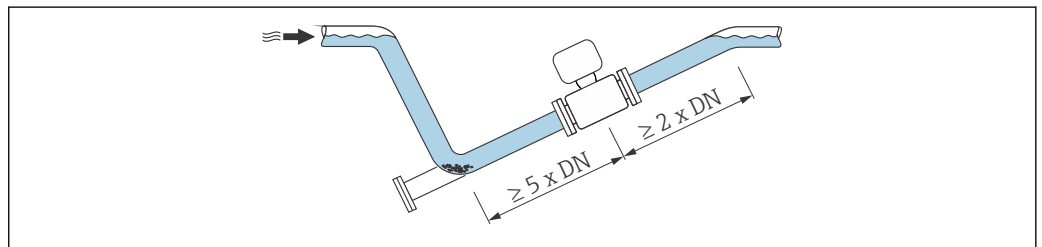
A0028981

23 Installation in a down pipe

- 1 Vent valve
- 2 Pipe siphon
- h Length of down pipe

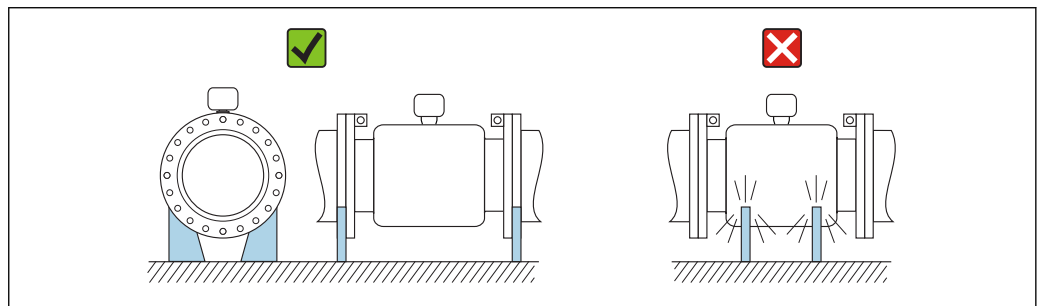
Installation in partially filled pipes

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

For heavy sensors DN ≥ 350 (14")



A0016276

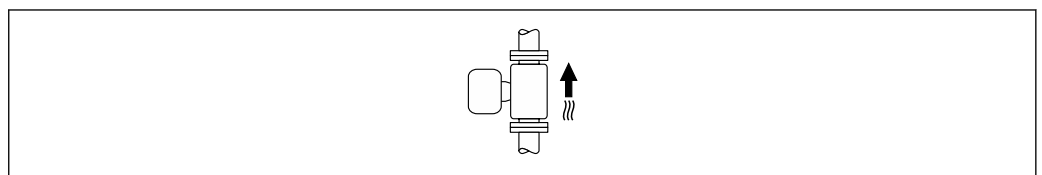
Orientation

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.

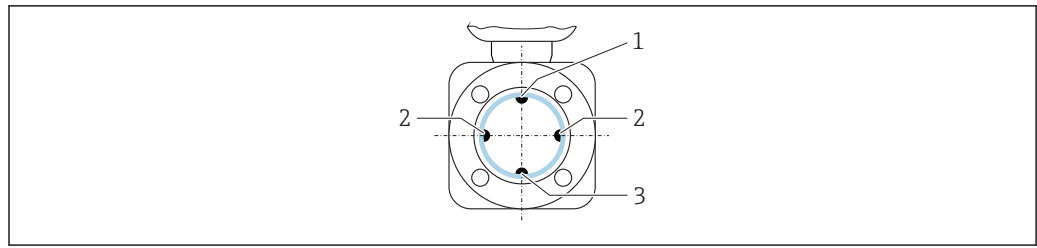
The measuring device also offers the empty pipe detection function to detect partially filled measuring pipes in the event of outgassing fluids or variable process pressures.

Vertical



A0015591

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

Horizontal

A0029344

- 1 EPD electrode for empty pipe detection
 2 Measuring electrodes for signal detection
 3 Reference electrode for potential equalization

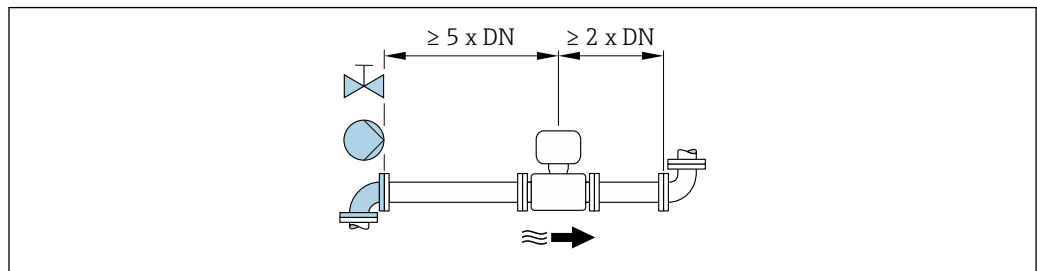


- Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.
- Empty pipe detection only works if the transmitter housing is pointing upwards as otherwise there is no guarantee that the empty pipe detection function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

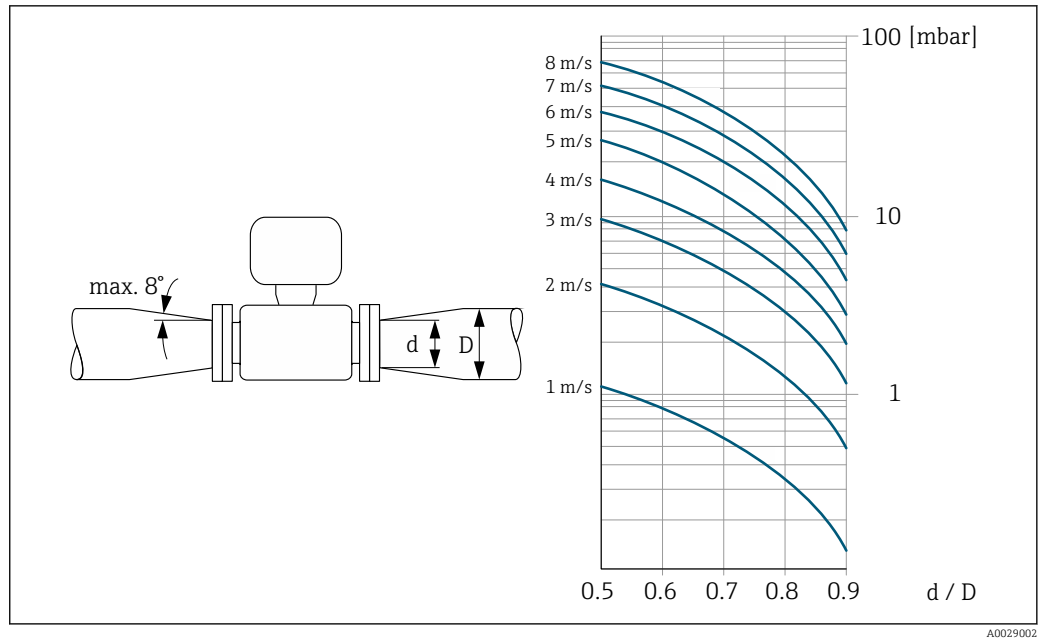
Suitable adapters to DIN EN 545 (double-flange reducers) can be used to install the sensor in larger-diameter pipes. The resultant increase in the rate of flow improves measuring accuracy with very slow-moving fluids.

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.



The nomogram only applies to liquids with a viscosity similar to that of water.



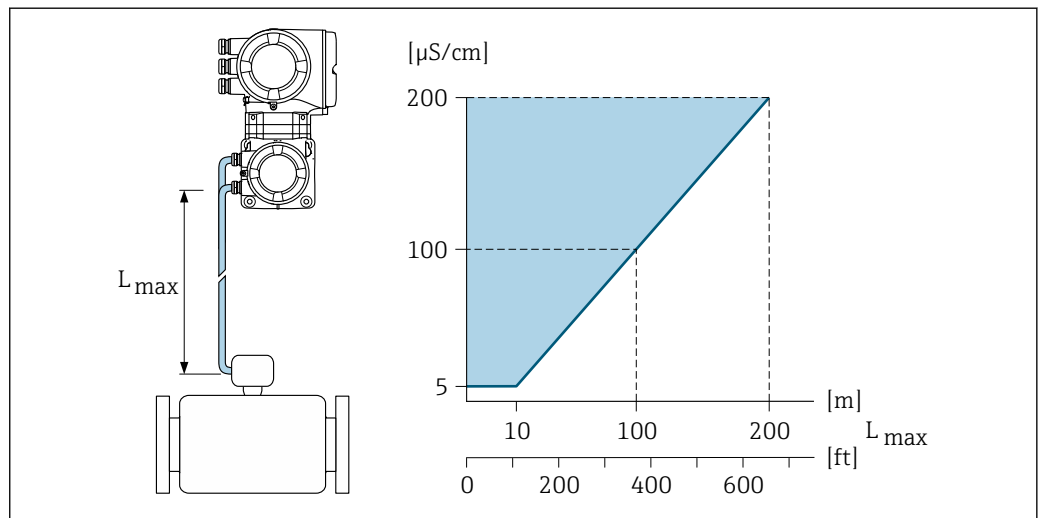
Length of connecting cable

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 $\mu\text{S/cm}$



24 Permitted length of connecting cable

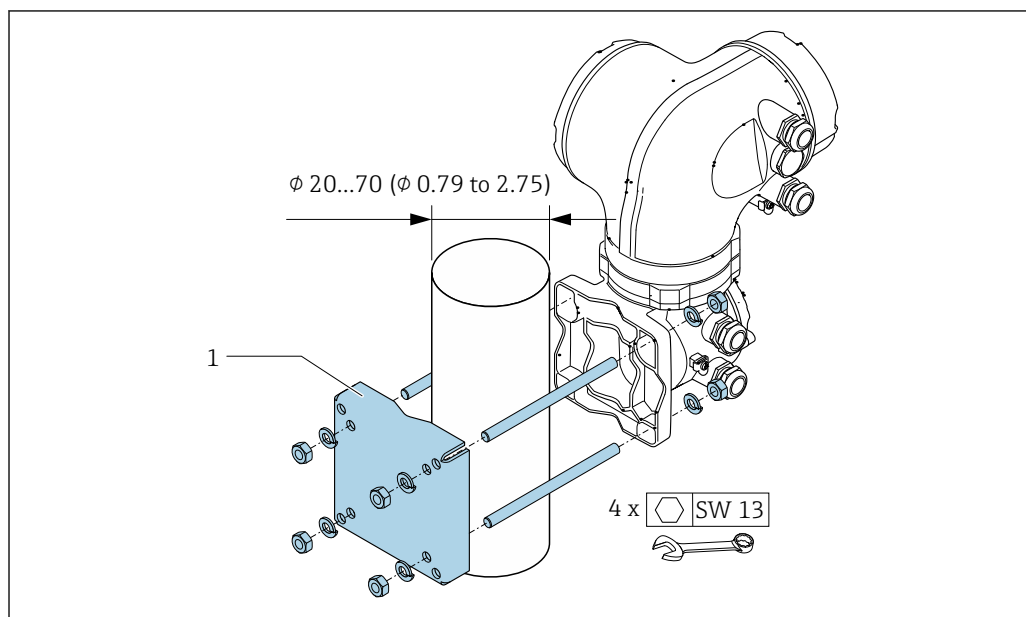
Colored area = permitted range

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

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

Mounting the transmitter housing

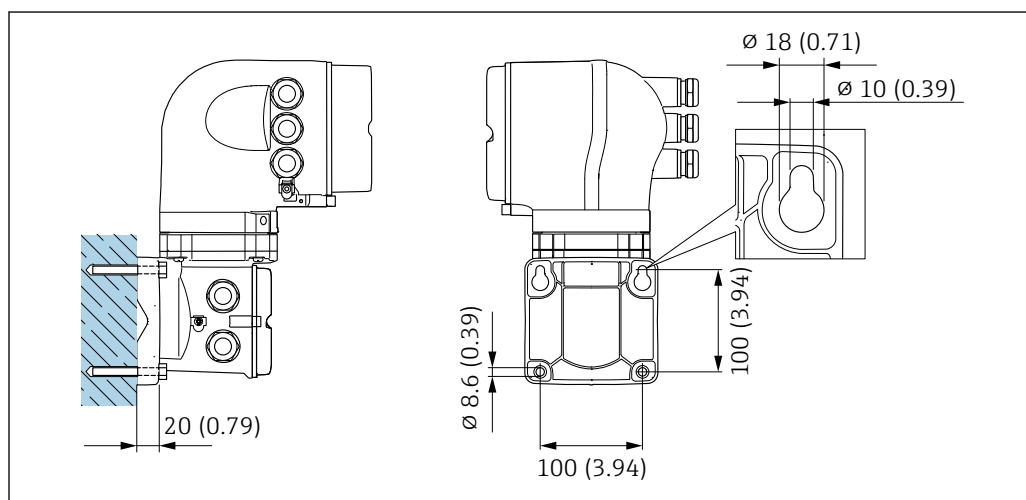
Post mounting



A0029057

25 Engineering unit mm (in)

Wall mounting

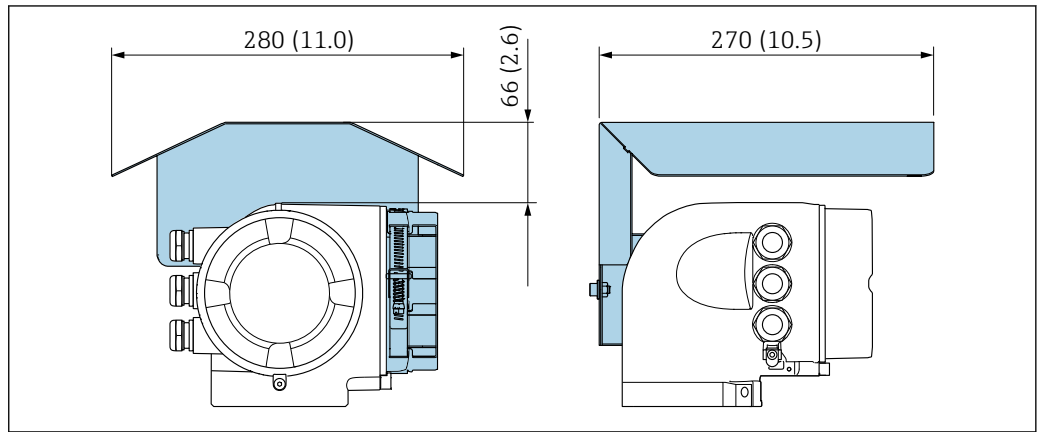


A0029068

26 Engineering unit mm (in)

Special mounting instructions

Protective cover

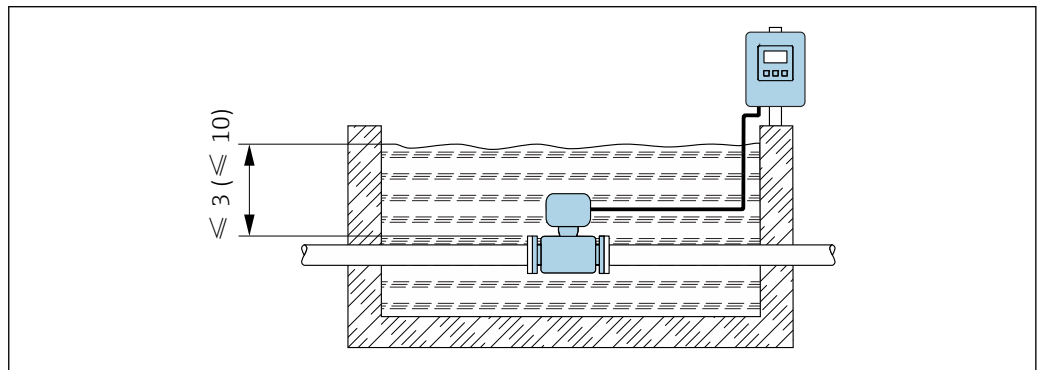


A0029553

27 Weather protection cover for Proline 500

Permanent immersion in water

A fully welded remote version with IP68 protection is optionally available for permanent immersion in water ≤ 3 m (10 ft) or in exceptional cases for use for up to 48 hours at ≤ 10 m (30 ft). The measuring device meets the requirements of corrosion categories C5-M and Im1/Im2/Im3. The fully welded design along with the connection compartment sealing system ensure that moisture cannot enter the measuring device.



A0029320

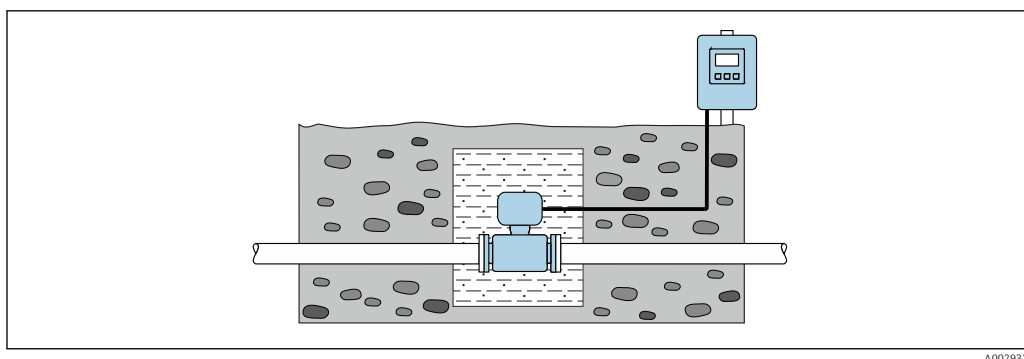
28 Engineering unit in m(ft)



Replacement of cable gland on connection housing

Buried applications

A remote version with IP68 protection is optionally available for buried applications. The measuring device satisfies the certified corrosion protection Im1/Im2/Im3 in accordance with EN ISO 12944. It can be used directly underground without the need for additional protective measures. The device is mounted in accordance with the usual regional installation regulations (e.g. EN DIN 1610).



A0029321

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	<ul style="list-style-type: none"> Process connection material, carbon steel: -10 to +60 °C (+14 to +140 °F) Process connection material, stainless steel: -40 to +60 °C (-40 to +140 °F) <p>Mount the transmitter separately from the sensor if both the ambient and fluid temperatures are high.</p>
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

- As standard: IP66/67, type 4X enclosure
- When housing is open: IP20, type 1 enclosure
- Display module: IP20, type 1 enclosure



Sensor

- As standard: IP66/67, type 4X enclosure
- Optionally available for order:
 - IP66/67, type 4X enclosure; fully welded, with protective varnish EN ISO 12944 C5-M. Suitable for use in corrosive atmospheres.
 - IP68, type 6P enclosure; fully welded, with protective varnish as per EN ISO 12944 C5-M. Suitable for permanent immersion in water ≤ 3 m (10 ft) or up to 48 hours at depths ≤ 10 m (30 ft).
 - IP68, type 6P enclosure; fully welded, with protective varnish as per EN ISO 12944 Im1/Im2/Im3. Suitable for permanent immersion in saline water ≤ 3 m (10 ft) or up to 48 hours at depths ≤ 10 m (30 ft) or in buried applications.

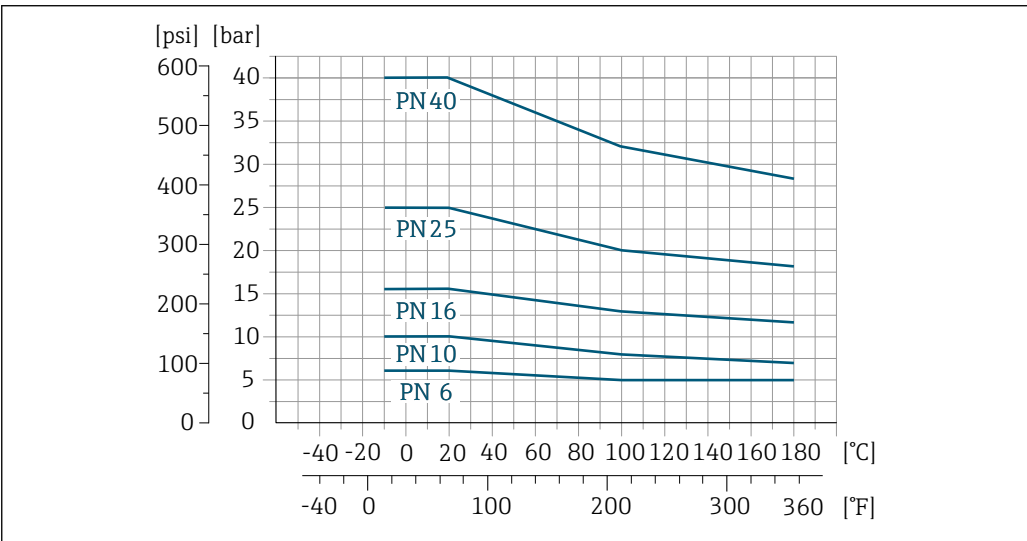
External WLAN antenna
IP67


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; the use of the remote version is sometimes preferable.■ Never use the transmitter housing as a ladder or climbing aid.
Electromagnetic compatibility (EMC)	As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)  For details, refer to the Declaration of Conformity.

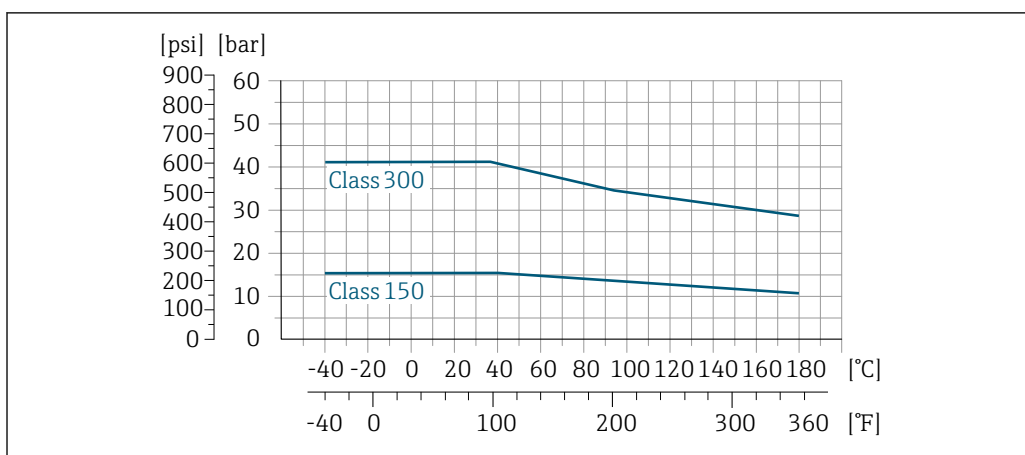
Process

Medium temperature range	<ul style="list-style-type: none">■ 0 to +80 °C (+32 to +176 °F) for hard rubber, DN 50 to 2000 (2 to 78")■ -20 to +50 °C (-4 to +122 °F) for polyurethane, DN 25 to 1200 (1 to 48")
Conductivity	≥ 5 µS/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 →  45.
Pressure-temperature ratings	The following pressure/temperature diagrams apply to all pressure-bearing parts of the device and not just the process connection.

Process connection: fixed flange according to EN 1092-1 (DIN 2501)

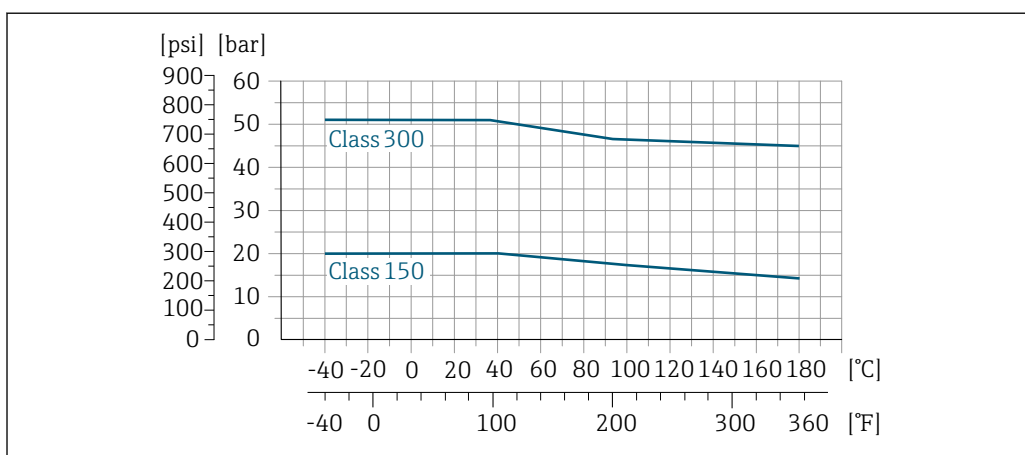


 29 Process connection material: stainless steel, 1.4404/1.4571/F316L; carbon steel, A105/FE410WB/P250GH/S235JRG2/S235JR+N

Process connection: fixed flange according to ASME B16.5

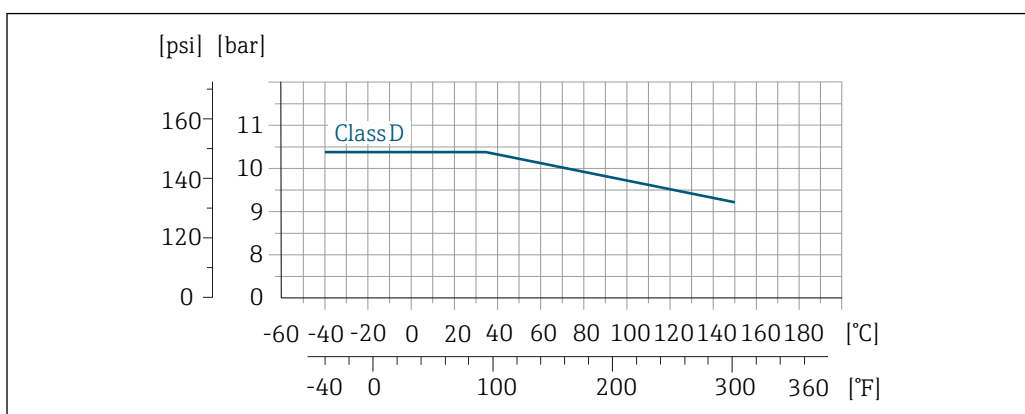
A0029394-EN

30 Process connection material: stainless steel, F316L similar to 1.4404



A0029393-EN

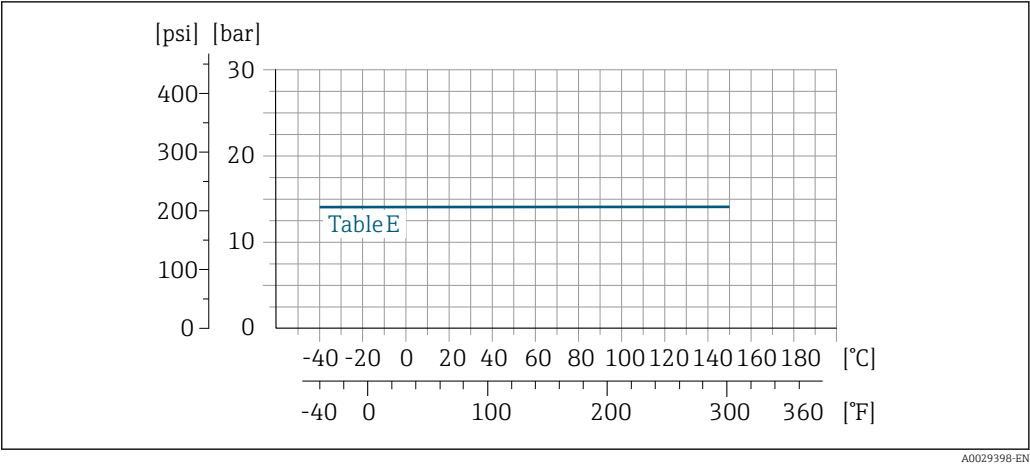
31 Process connection material: carbon steel, A105/A515(70)

Process connection: fixed flange according to AWWA C207

A0029818-EN

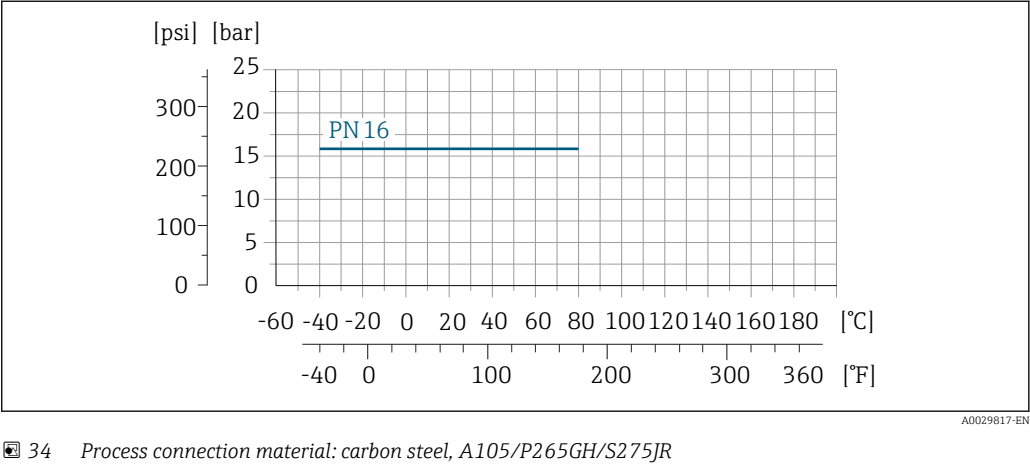
32 Process connection material: carbon steel, A105/A181/P265GH/S275JR

Process connection: fixed flange according to AS 2129



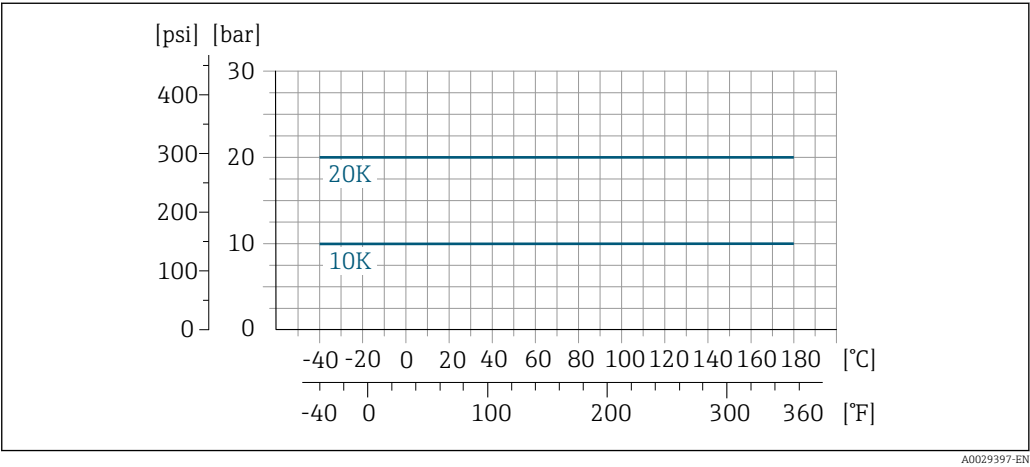
33 Process connection material: carbon steel, A105/FE410WB/P235GH/P265GH/S235JRG2

Process connection: fixed flange according to AS 4087



34 Process connection material: carbon steel, A105/P265GH/S275JR

Process connection: fixed flange according to JIS B2220



35 Process connection material: stainless steel, F316L similar to 1.4404; carbon steel, A105/A350LF2

Pressure tightness*Liner: hard rubber*

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:		
[mm]	[in]	+25 °C (+77 °F)	+50 °C (+122 °F)	+80 °C (+176 °F)
50...2000	2...78	0 (0)	0 (0)	0 (0)

Liner: polyurethane

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:	
[mm]	[in]	+25 °C (+77 °F)	+50 °C (+122 °F)
25...1200	1...48	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:

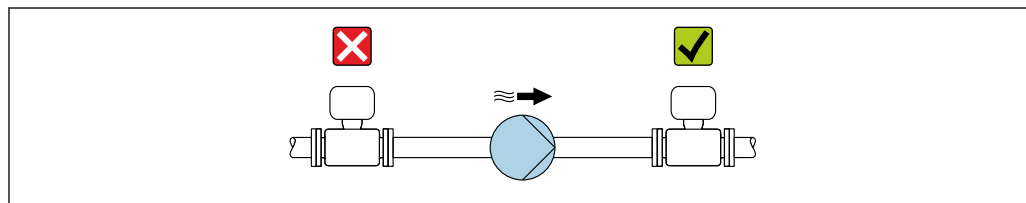
- $v < 2 \text{ m/s}$ (6.56 ft/s): for abrasive fluids (e.g. potter's clay, lime milk, ore slurry)
- $v > 2 \text{ m/s}$ (6.56 ft/s): for fluids producing buildup (e.g. wastewater sludge)

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 if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545 → 44

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.

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

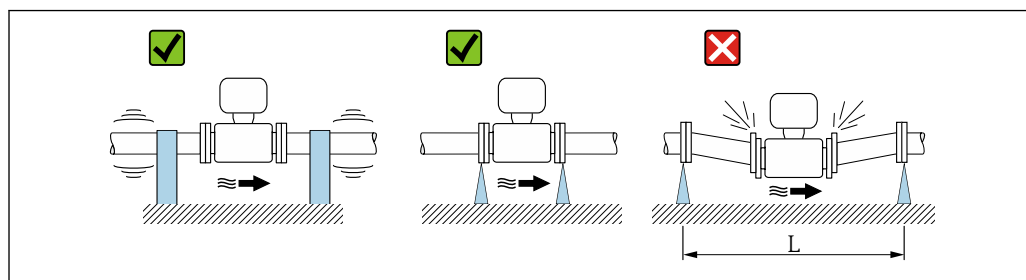
- i**
- For information on the liner's resistance to partial vacuum
 - For information on the shock resistance of the measuring system
 - For information on the vibration resistance of the measuring system

Vibrations

In the event of very strong vibrations, the pipe and sensor must be supported and fixed.

It is also advisable to mount the sensor and transmitter separately.

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



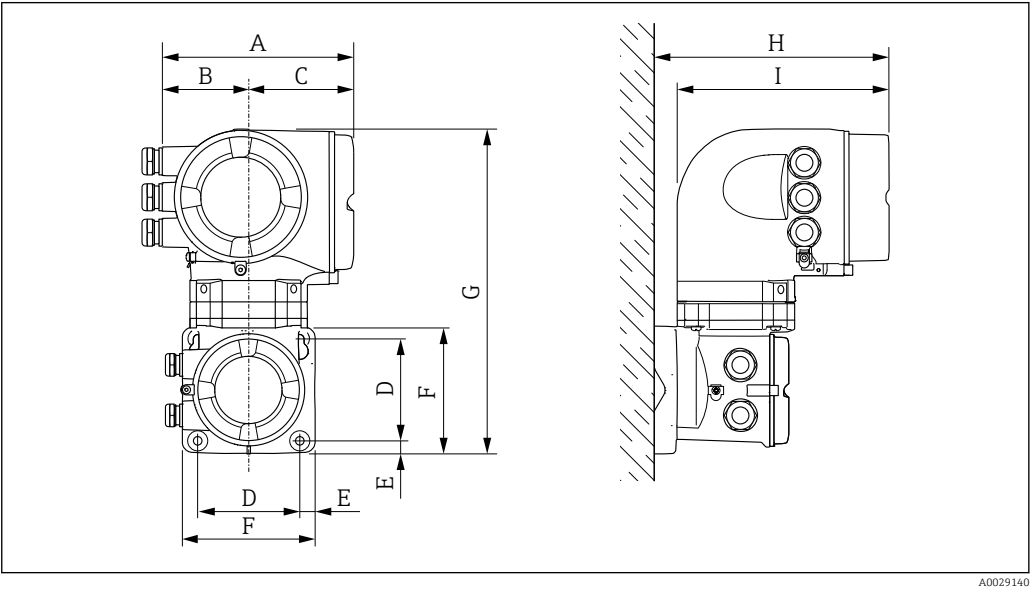
A0029004

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

Mechanical construction

Dimensions in SI units

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



A0029140

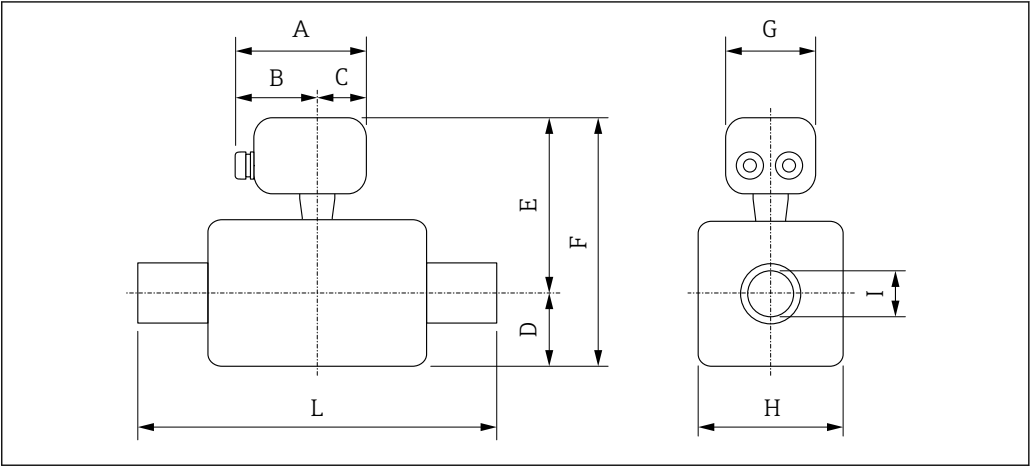
Order code for "Transmitter housing", option A "Aluminum, coated" and order code for "Integrated ISEM electronics", option B "Analog, transmitter"

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

Order code for "Transmitter housing", option L "Cast, stainless" 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	295	239	217

Sensor connection housing



A0029685

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

DN [mm]	L [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]
25	200	147.5	93.5	54	84	207	291	136	120	1)
32	200	147.5	93.5	54	84	207	291	136	120	
40	200	147.5	93.5	54	84	207	291	136	120	
50	200	147.5	93.5	54	84	207	291	136	120	
65	200	147.5	93.5	54	109	232	341	136	180	
80	200	147.5	93.5	54	109	232	341	136	180	
100	250	147.5	93.5	54	109	232	341	136	180	
125	250	147.5	93.5	54	150	272	422	136	260	
150	300	147.5	93.5	54	150	272	422	136	260	
200	350	147.5	93.5	54	180	297	477	136	324	
250	450	147.5	93.5	54	205	322	527	136	400	
300	500	147.5	93.5	54	230	347	577	136	460	
350	550	147.5	93.5	54	282	407	689	136	564	
375	600	147.5	93.5	54	308	433	741	136	616	
400	600	147.5	93.5	54	308	433	741	136	616	
450	650	147.5	93.5	54	333	458	791	136	666	
500	650	147.5	93.5	54	359	483	842	136	717	
600	780	147.5	93.5	54	411	535	946	136	821	
700	910	147.5	93.5	54	512	637	1149	136	1024	
750	975	147.5	93.5	54	512	637	1149	136	1024	
800	1040	147.5	93.5	54	534	658	1192	136	1067	
900	1170	147.5	93.5	54	610	735	1345	136	1220	
1000	1300	147.5	93.5	54	686	811	1497	136	1372	
1050	1365	147.5	93.5	54	712	837	1549	136	1424	
1200	1560	147.5	93.5	54	811	936	1747	136	1622	
1350	1755	147.5	93.5	54	912	1037	1949	136	1824	
1400	1820	147.5	93.5	54	987	1112	2099	136	1974	
1500	1950	147.5	93.5	54	1011	1136	2147	136	2022	
1600	2080	147.5	93.5	54	1056	1181	2237	136	2112	
1650	2145	147.5	93.5	54	1093	1218	2311	136	2186	
1800	2340	147.5	93.5	54	1188	1313	2501	136	2376	
2000	2600	147.5	93.5	54	1238	1363	2601	136	2476	

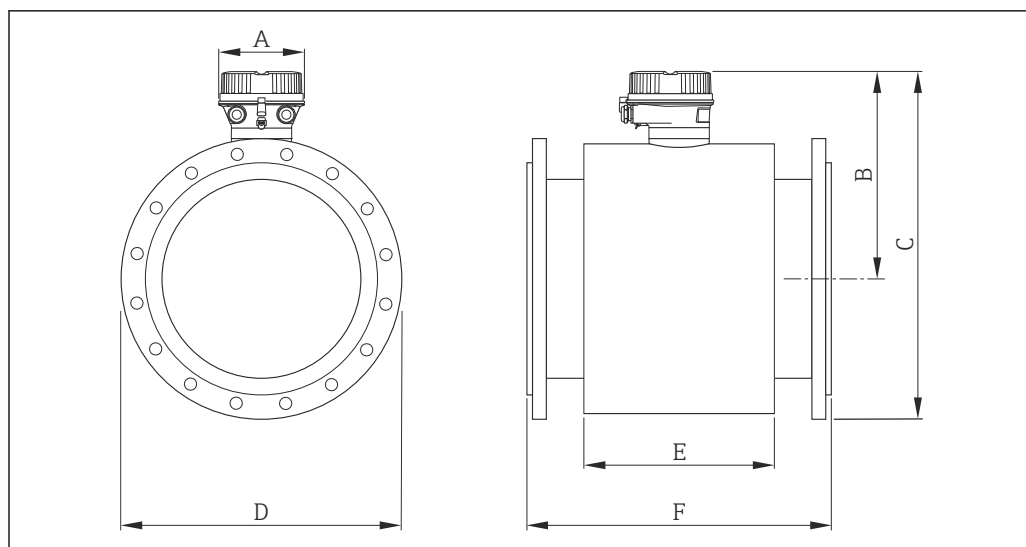
1) Depends on the liner

Order code for "Sensor connection housing", option D "Polycarbonate"

DN [mm]	L [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]
25	200	147.5	93.5	54	84	207	291	136	120	1)
32	200	147.5	93.5	54	84	207	291	136	120	
40	200	147.5	93.5	54	84	207	291	136	120	

DN [mm]	L [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]
50	200	147.5	93.5	54	84	207	291	136	120	
65	200	147.5	93.5	54	109	232	341	136	180	
80	200	147.5	93.5	54	109	232	341	136	180	
100	250	147.5	93.5	54	109	232	341	136	180	
125	250	147.5	93.5	54	150	272	422	136	260	
150	300	147.5	93.5	54	150	272	422	136	260	
200	350	147.5	93.5	54	180	297	477	136	324	
250	450	147.5	93.5	54	205	322	527	136	400	
300	500	147.5	93.5	54	230	347	577	136	460	
350	550	147.5	93.5	54	282	407	689	136	564	
375	600	147.5	93.5	54	308	433	741	136	616	
400	600	147.5	93.5	54	308	433	741	136	616	
450	650	147.5	93.5	54	333	458	791	136	666	
500	650	147.5	93.5	54	359	483	842	136	717	
600	780	147.5	93.5	54	411	535	946	136	821	
700	910	147.5	93.5	54	512	637	1149	136	1024	
750	975	147.5	93.5	54	512	637	1149	136	1024	
800	1040	147.5	93.5	54	534	658	1192	136	1067	
900	1170	147.5	93.5	54	610	735	1345	136	1220	
1000	1300	147.5	93.5	54	686	811	1497	136	1372	
1050	1365	147.5	93.5	54	712	837	1549	136	1424	
1200	1560	147.5	93.5	54	811	936	1747	136	1622	
1350	1755	147.5	93.5	54	912	1037	1949	136	1824	
1400	1820	147.5	93.5	54	987	1112	2099	136	1974	
1500	1950	147.5	93.5	54	1011	1136	2147	136	2022	
1600	2080	147.5	93.5	54	1056	1181	2237	136	2112	
1650	2145	147.5	93.5	54	1093	1218	2311	136	2186	
1800	2340	147.5	93.5	54	1188	1313	2501	136	2376	
2000	2600	147.5	93.5	54	1238	1363	2601	136	2476	

1) Depends on the liner

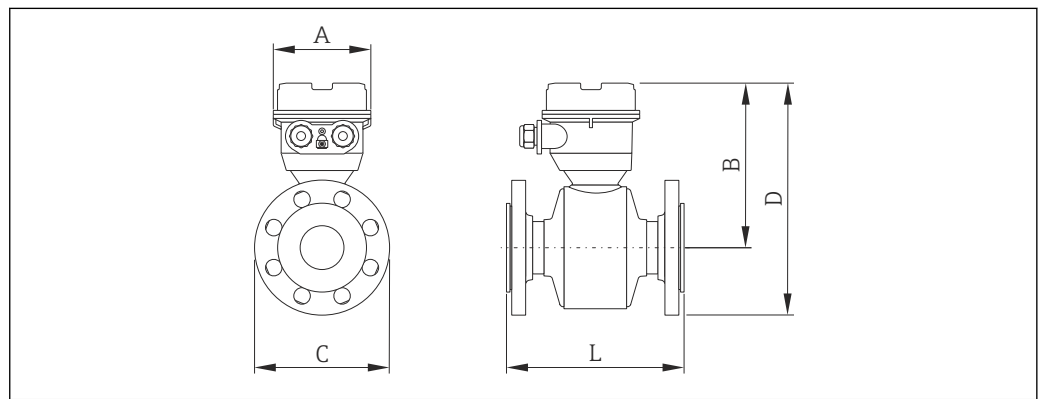


A0017284

Order code for "Design", option A "Insertion length short"

DN [mm]	A [mm]	B [mm]	E [mm]	F [mm]
350	136	358	290	550
375	136	384	290	600
400	136	384	290	600
450	136	412	290	600
500	136	437	290	600
600	136	478	290	600
700	136	543	424	700
750	136	579	454	750
800	136	599	500	800
900	136	649	580	900
1000	136	699	660	1000
1050	136	735	755	1050
1200	136	813	828	1200
1350	136	925	1008	1350
1400	136	925	1008	1400
1500	136	1025	1147	1500
1600	136	1025	1147	1600
1650	136	1076	1284	1650
1800	136	1133	1379	1800
2000	136	1244	1569	2000

DN [mm]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]
350	603	610	616	625	620	490	505	520	533	525
375	–	–	–	–	659	–	–	–	–	550
400	654	666	672	682	674	540	565	580	597	580
450	709	719	729	729	732	595	615	640	635	640
500	759	772	791	786	789	645	670	715	699	705
600	855	868	903	884	890	755	780	840	813	825
700	973	990	1009	1006	998	860	895	910	927	910
750	–	–	–	1072	1078	–	–	–	984	995
800	1087	1107	1123	1129	1129	975	1015	1025	1060	1060
900	1187	1207	1223	1233	1237	1075	1115	1125	1168	1175
1000	1287	1314	1338	1344	1327	1175	1230	1225	1289	1255
1050	–	–	–	1408	–	–	–	–	1346	–
1200	1516	1541	1567	1569	1558	1405	1455	1255	1511	1490
1350	–	–	–	1767	–	–	–	–	1683	–
1400	1740	1763	1779	–	–	1630	1675	1685	–	–
1500	–	–	–	1952	–	–	–	–	1854	–
1600	1940	1983	2002	–	–	1830	1915	1930	–	–
1650	–	–	–	2092	–	–	–	–	2032	–
1800	2155	2190	2209	2231	–	2045	2115	2130	2197	–
2000	2376	2406	2427	2425	–	2265	2325	2345	2362	–



A0020399

Order code for "Sensor option", option CB...CE "Corrosion protection"

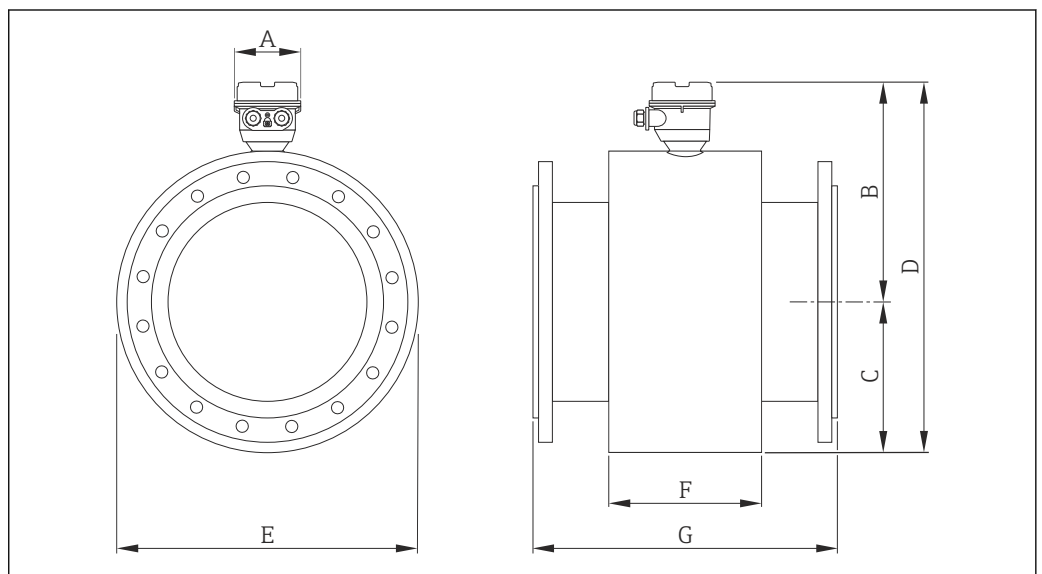
Option	Description
CB	IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 Im2/Im3

DN [mm]	A [mm]	B [mm]	L [mm]
25	112	189	200
32	112	189	200
40	112	189	200
50	112	189	200
65	112	202	200
80	112	207	200
100	112	219	250
125	112	232	250
150	112	254	300
200	112	279	350
250	112	313	450
300	112	338	500

Dimension C										
DN [mm]	EN (DIN)				ASME		AS		JIS	
	PN 10 [mm]	PN 16 [mm]	PN 25 [mm]	PN 40 [mm]	Class 150 [mm]	Class 300 [mm]	Table E [mm]	PN 16 [mm]	10K [mm]	20K [mm]
25	–	–	–	140	110	140	140	–	140	140
32	–	–	–	140	–	–	–	–	140	140
40	–	–	–	150	125	155	–	–	140	140
50	–	–	–	165	150	165	150	150	155	155
65	–	185	–	185	–	–	–	–	175	175
80	–	200	–	200	190	209.6	185	185	185	200
100	–	220	–	325	230	254	215	215	210	225
125	–	250	–	270	–	–	–	–	250	270
150	–	285	–	300	280	317.5	280	280	280	305
200	340	340	360	–	345	–	335	335	330	350
250	395	405	425	–	405	–	405	405	400	430
300	445	460	485	–	485	–	455	455	445	480

Dimension D										
DN [mm]	EN (DIN)				ASME		AS		JIS	
	PN 10 [mm]	PN 16 [mm]	PN 25 [mm]	PN 40 [mm]	Class 150 [mm]	Class 300 [mm]	Table E [mm]	PN 16 [mm]	10K [mm]	20K [mm]
25	–	–	–	260	260	260	260	–	260	260
32	–	–	–	260	–	–	–	–	260	260
40	–	–	–	264	260	267	–	–	260	260
50	–	–	–	272	265	272	264	264	267	267
65	–	295	–	295	–	–	–	–	290	290
80	–	307	–	307	302	311	300	300	300	307

Dimension D										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
100	–	330	–	382	333	346	327	327	325	332
125	–	357	–	367	–	–	–	–	357	367
150	–	396	–	404	393	412	395	395	395	406
200	450	450	460	–	450	–	447	447	445	454
250	510	515	525	–	516	–	515	515	513	528
300	560	568	580	–	580	–	565	565	560	578

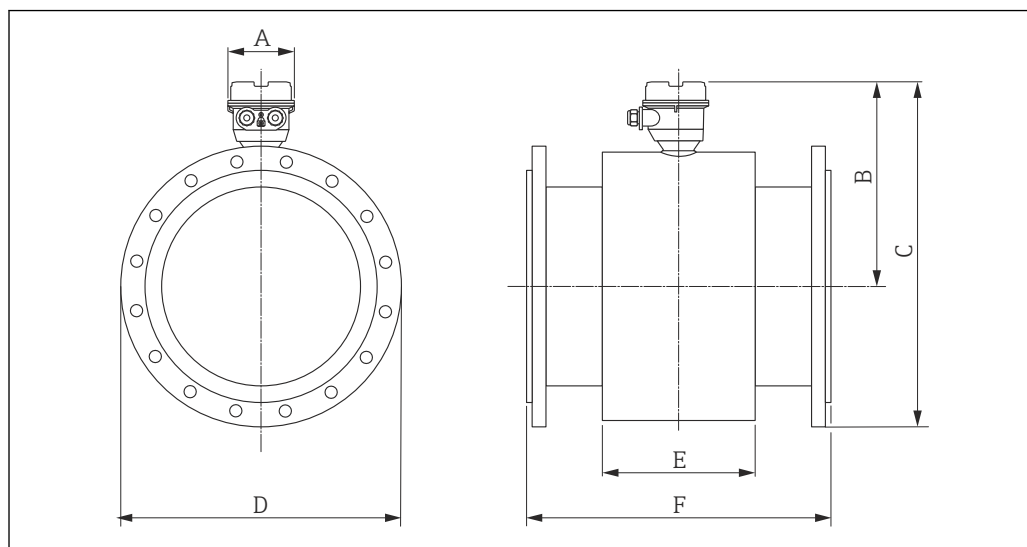


A0020435

DN	A	B	C	D	E	F	G ¹⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
350	112	395	282	677	564	276	550
375	112	421	308	729	616	276	600
400	112	421	308	729	616	276	600
450	112	446	333	779	666	292	650
500	112	472	359	830	717	292	650
600	112	524	411	934	821	402	780
700	112	625	512	1137	1024	589	910
750	112	625	512	1137	1024	626	975
800	112	647	534	1180	1067	647	1040
900	112	723	610	1333	1220	785	1170
1000	112	799	686	1485	1372	862	1300
1050	112	825	712	1537	1424	912	1365
1200	112	924	811	1735	1622	992	1560
1350	112	1025	912	1937	1824	1252	1755
1400	112	1100	987	2087	1974	1252	1820

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G ¹⁾ [mm]
1500	112	1124	1011	2135	2022	1392	1950
1600	112	1169	1056	2225	2112	1482	2080
1650	112	1206	1093	2299	2186	1482	2145
1800	112	1301	1188	2489	2376	1632	2340
2000	112	1351	1238	2589	2476	1732	2600

1) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.



A0018158

Order code for "Design", option A "Insertion length short" and order code for "Sensor option", option CB...
CE "Corrosion protection"

Option	Description
CB	IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 Im2/Im3

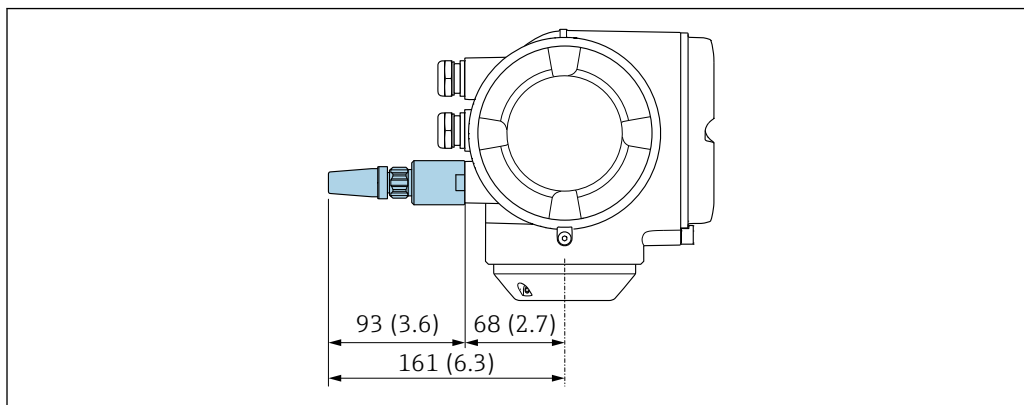
DN [mm]	A [mm]	B [mm]	E [mm]	F [mm]
350	112	350	290	550
375	112	376	290	600
400	112	376	290	600
450	112	403	290	600
500	112	428	290	600
600	112	478	290	600
700	112	549	424	700
750	112	586	454	750
800	112	605	500	800
900	112	655	580	900

DN [mm]	A [mm]	B [mm]	E [mm]	F [mm]
1000	112	705	660	1000
1050	112	741	755	1050
1200	112	819	828	1200
1350	112	931	1008	1350
1400	112	931	1008	1400
1500	112	1031	1147	1500
1600	112	1031	1147	1600
1650	112	1082	1284	1650
1800	112	1139	1379	1800
2000	112	1250	1569	2000

DN [mm]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]
350	595	603	610	–	613	490	505	520	–	525
375	–	–	–	–	651	–	–	–	–	550
400	646	659	666	–	666	540	565	580	–	580
450	701	711	723	–	723	595	615	640	–	640
500	751	763	786	–	781	645	670	715	–	705
600	856	868	898	–	891	755	780	840	–	825
700	979	996	1004	1012	1004	860	895	910	927	910
750	–	–	–	1078	1084	–	–	–	984	995
800	1093	1113	1118	1135	1135	975	1015	1025	1060	1060
900	1193	1213	1218	1239	1243	1075	1115	1125	1168	1175
1000	1293	1320	1333	1350	1333	1175	1230	1225	1289	1255
1050	–	–	–	1414	–	–	–	–	1346	–
1200	1522	1547	1562	1575	1564	1405	1455	1255	1511	1490
1350	–	–	–	1773	–	–	–	–	1683	–
1400	1746	1769	1774	–	–	1630	1675	1685	–	–
1500	–	–	–	1958	–	–	–	–	1854	–
1600	1946	1989	1997	–	–	1830	1915	1930	–	–
1650	–	–	–	2098	–	–	–	–	2032	–
1800	2161	2196	2204	2237	–	2045	2115	2130	2197	–
2000	2382	2412	2422	2431	–	2265	2325	2345	2362	–

Accessories

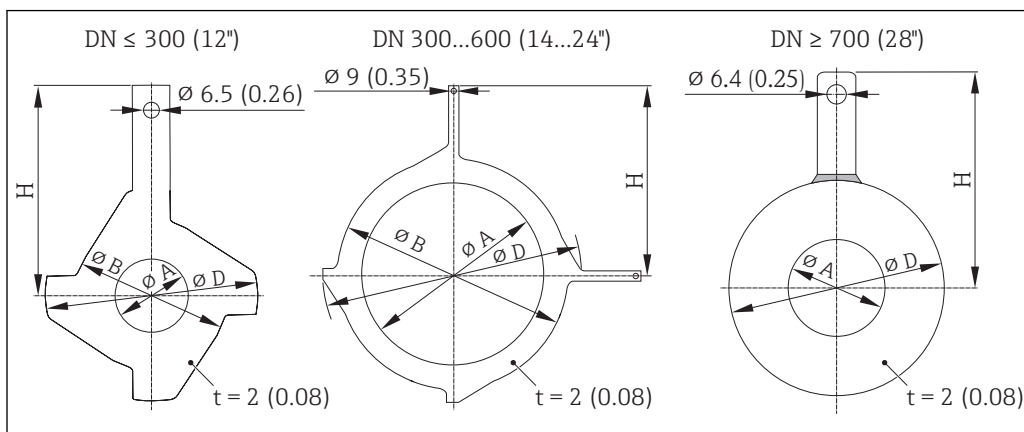
External WLAN antenna



A0028923

37 Engineering unit mm (in)

Ground disks for flange connections



A0015442

38 Engineering unit mm (in)

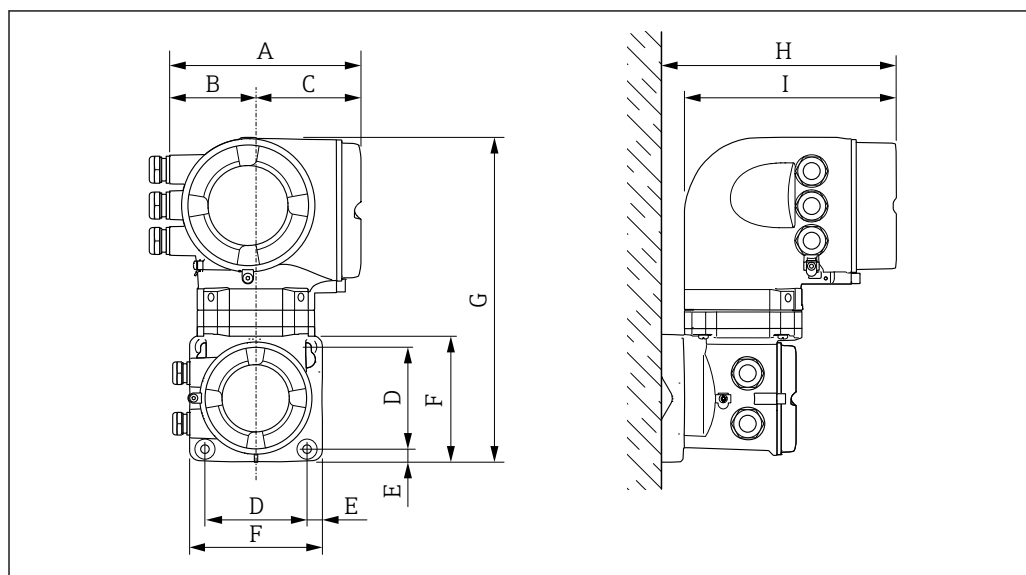
DN [mm]	Pressure rating	A [mm]	B [mm]	D [mm]	H [mm]
25	1)	26	62	77.5	87.5
32	1)	35	80	87.5	94.5
40	1)	41	82	101	103
50	1)	52	101	115.5	108
65	1)	68	121	131.5	118
80	1)	80	131	154.5	135
100	1)	104	156	186.5	153
125	1)	130	187	206.5	160
150	1)	158	217	256	184
200	1)	206	267	288	205
250	1)	260	328	359	240
300	1)	312	375	413	273
350	DIN, PN 6	343	433	479	365

DN [mm]	Pressure rating	A [mm]	B [mm]	D [mm]	H [mm]
350	DIN, PN 10	343	400	479	365
350	ASME, Class 150	343	400	479	365
400	DIN, PN 6	393	470	542	395
400	DIN, PN 10	393	469	542	395
400	ASME, Class 150	393	469	542	395
450	DIN, PN 6	439	525	583	417
450	DIN, PN 10	439	535	583	417
450	ASME, Class 150	439	535	583	417
500	DIN, PN 6	493	575	650	460
500	DIN, PN 10	493	588	650	460
500	ASME, Class 150	493	588	650	460
600	DIN, PN 6	593	676	766	522
600	DIN, PN 10	593	688	766	522
600	ASME, Class 150	593	688	766	522
700	DIN, PN 6	697	–	786	460
700	DIN, PN 10	693	–	813	480
700	AS, PN 16	687	–	807	490
700	AWWA, Class D	693	–	832	494
750	AWWA, Class D	743	–	833	523
800	DIN, PN 6	799	–	893	520
800	DIN, PN 10	795	–	920	540
800	AS, PN 16	789	–	914	550
800	AWWA, Class D	795	–	940	561
900	DIN, PN 6	897	–	993	570
900	DIN, PN 10	893	–	1020	590
900	AS, PN 16	886	–	1014	595
900	AWWA, Class D	893	–	1048	615
1000	DIN, PN 6	999	–	1093	620
1000	DIN, PN 10	995	–	1127	650
1000	AS, PN 16	988	–	1131	660
1000	AWWA, Class D	995	–	1163	675
1050	AWWA, Class D	1044	–	1220	704
1200	DIN, PN 6	1203	–	1310	733

- 1) Ground disks can be used for all the flange standards/pressure ratings which can be supplied in the standard version.

Dimensions in US units

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



A0029140

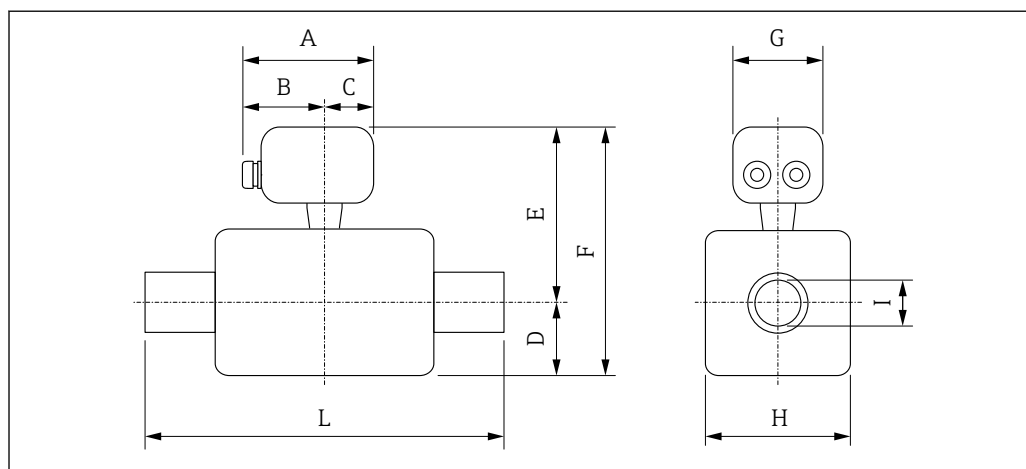
Order code for "Transmitter housing", option A "Aluminum, coated" and order code for "Integrated ISEM electronics", option B "Analog, transmitter"

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

Order code for "Transmitter housing", option L "Cast, stainless" 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	11.6	9.41	8.54

Sensor connection housing



A0029685

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

DN [in]	L [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	I [in]
1	7.87	5.81	3.68	2.13	3.31	8.15	11.5	5.35	4.72	1)
1 ½	7.87	5.81	3.68	2.13	3.31	8.15	11.5	5.35	4.72	
2	7.87	5.81	3.68	2.13	3.31	8.15	11.5	5.35	4.72	
3	7.87	5.81	3.68	2.13	4.29	9.13	13.4	5.35	7.09	
4	9.84	5.81	3.68	2.13	4.29	9.13	13.4	5.35	7.09	
6	11.8	5.81	3.68	2.13	5.91	10.7	16.6	5.35	10.2	
8	13.8	5.81	3.68	2.13	7.09	11.7	18.8	5.35	12.8	
10	17.7	5.81	3.68	2.13	8.07	12.7	20.8	5.35	15.8	
12	19.7	5.81	3.68	2.13	9.06	13.7	22.8	5.35	18.1	
14	21.7	5.81	3.68	2.13	11.1	16.0	29.3	5.35	22.2	
15	23.6	5.81	3.68	2.13	12.1	17.0	31.3	5.35	24.2	
16	23.6	5.81	3.68	2.13	12.1	17.0	31.3	5.35	24.2	
18	25.6	5.81	3.68	2.13	13.1	18.0	33.3	5.35	26.2	
20	25.6	5.81	3.68	2.13	14.1	19.0	35.3	5.35	28.2	
24	30.7	5.81	3.68	2.13	16.2	21.1	39.4	5.35	32.3	
28	35.8	5.81	3.68	2.13	20.1	25.1	45.2	5.35	40.3	
30	38.4	5.81	3.68	2.13	20.1	25.1	45.2	5.35	40.3	
32	40.9	5.81	3.68	2.13	21.0	25.9	46.9	5.35	42.0	
36	46.0	5.81	3.68	2.13	24.0	28.9	52.9	5.35	48.0	
40	51.2	5.81	3.68	2.13	27.0	31.9	58.9	5.35	54.0	
42	53.7	5.81	3.68	2.13	28.0	32.9	60.9	5.35	56.0	
48	61.4	5.81	3.68	2.13	31.9	36.8	68.7	5.35	63.8	
54	69.1	5.81	3.68	2.13	35.9	40.8	76.7	5.35	71.8	
60	76.8	5.81	3.68	2.13	39.8	44.7	84.5	5.35	79.6	
66	84.4	5.81	3.68	2.13	43.0	47.9	91.0	5.35	86.0	
72	92.1	5.81	3.68	2.13	46.8	51.7	98.4	5.35	93.5	
78	102.3	5.81	3.68	2.13	48.7	53.6	102.4	5.35	97.5	

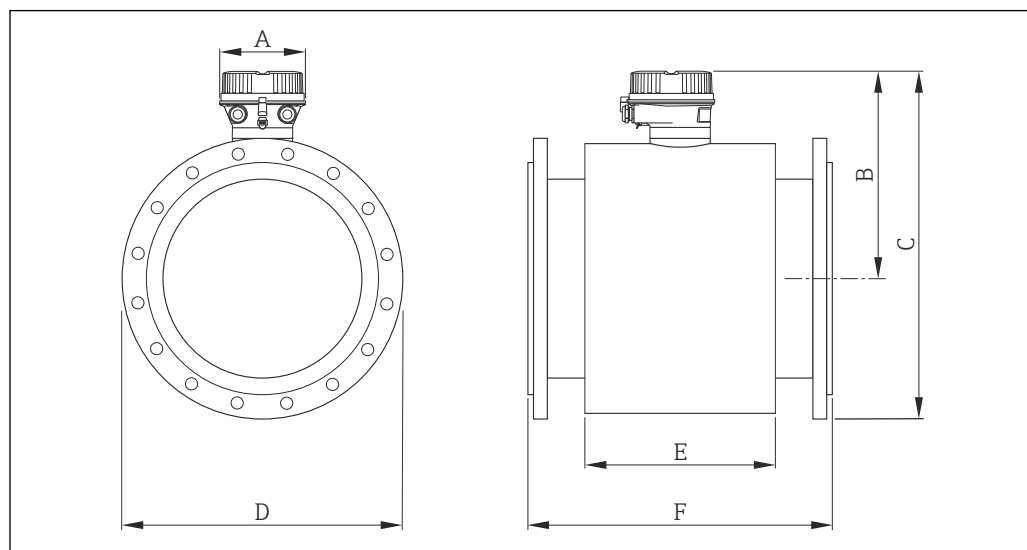
1) Depends on the liner

Order code for "Sensor connection housing", option D "Polycarbonate"

DN [in]	L [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	I [in]
1	7.87	5.81	3.68	2.13	3.31	8.15	11.5	5.35	4.72	1)
1 ½	7.87	5.81	3.68	2.13	3.31	8.15	11.5	5.35	4.72	
2	7.87	5.81	3.68	2.13	3.31	8.15	11.5	5.35	4.72	
3	7.87	5.81	3.68	2.13	4.29	9.13	13.4	5.35	7.09	
4	9.84	5.81	3.68	2.13	4.29	9.13	13.4	5.35	7.09	
6	11.8	5.81	3.68	2.13	5.91	10.7	16.6	5.35	10.2	
8	13.8	5.81	3.68	2.13	7.09	11.7	18.8	5.35	12.8	
10	17.7	5.81	3.68	2.13	8.07	12.7	20.8	5.35	15.8	

DN [in]	L [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	I [in]
12	19.7	5.81	3.68	2.13	9.06	13.7	22.8	5.35	18.1	
14	21.7	5.81	3.68	2.13	11.1	16.0	29.3	5.35	22.2	
15	23.6	5.81	3.68	2.13	12.1	17.0	31.3	5.35	24.2	
16	23.6	5.81	3.68	2.13	12.1	17.0	31.3	5.35	24.2	
18	25.6	5.81	3.68	2.13	13.1	18.0	33.3	5.35	26.2	
20	25.6	5.81	3.68	2.13	14.1	19.0	35.3	5.35	28.2	
24	30.7	5.81	3.68	2.13	16.2	21.1	39.4	5.35	32.3	
28	35.8	5.81	3.68	2.13	20.1	25.1	45.2	5.35	40.3	
30	38.4	5.81	3.68	2.13	20.1	25.1	45.2	5.35	40.3	
32	40.9	5.81	3.68	2.13	21.0	25.9	46.9	5.35	42.0	
36	46.0	5.81	3.68	2.13	24.0	28.9	52.9	5.35	48.0	
40	51.2	5.81	3.68	2.13	27.0	31.9	58.9	5.35	54.0	
42	53.7	5.81	3.68	2.13	28.0	32.9	60.9	5.35	56.0	
48	61.4	5.81	3.68	2.13	31.9	36.8	68.7	5.35	63.8	
54	69.1	5.81	3.68	2.13	35.9	40.8	76.7	5.35	71.8	
60	76.8	5.81	3.68	2.13	39.8	44.7	84.5	5.35	79.6	
66	84.4	5.81	3.68	2.13	43.0	47.9	91.0	5.35	86.0	
72	92.1	5.81	3.68	2.13	46.8	51.7	98.4	5.35	93.5	
78	102.3	5.81	3.68	2.13	48.7	53.6	102.4	5.35	97.5	

1) Depends on the liner



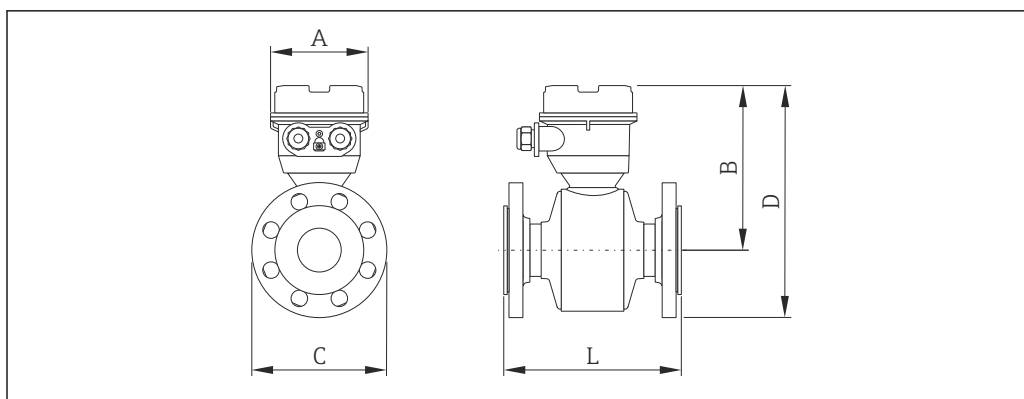
A0017284

Order code for "Design", option A "Insertion length short"

DN [in]	A [in]	B [in]	E [in]	F [in]
14	5.35	14.1	11.4	21.6
15	5.35	15.1	11.4	23.6
16	5.35	15.1	11.4	23.6

DN [in]	A [in]	B [in]	E [in]	F [in]
18	5.35	16.2	11.4	23.6
20	5.35	17.2	11.4	23.6
24	5.35	18.8	11.4	23.6
28	5.35	21.6	16.7	27.6
30	5.35	23.0	17.9	29.5
32	5.35	23.6	19.7	31.5
36	5.35	25.6	22.8	35.4
40	5.35	27.5	26.0	39.4
42	5.35	28.9	29.7	41.3
48	5.35	32.0	32.6	47.2
54	5.35	36.4	39.6	53.1
60	5.35	40.4	45.2	59.0
66	5.35	42.4	50.6	64.9
72	5.35	44.6	54.2	70.8
78	5.35	49.0	61.8	78.7

DN [in]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]
14	23.7	24.0	24.3	24.6	24.4	19.3	19.9	20.5	21.0	20.7
15	–	–	–	–	25.9	–	–	–	–	21.7
16	25.8	26.2	26.5	26.9	26.5	21.3	22.2	22.8	23.5	22.8
18	27.9	28.3	28.7	28.7	28.8	23.4	24.2	25.2	25.0	25.2
20	29.9	30.4	31.1	30.9	31.1	25.4	26.4	28.1	27.5	27.8
24	33.7	34.2	35.6	34.8	35.0	29.7	30.7	33.1	32.0	32.5
28	38.5	39.2	39.7	39.8	39.5	33.9	35.2	35.8	36.5	35.8
30	–	–	–	42.4	42.4	–	–	–	38.7	39.2
32	43.0	43.8	44.2	44.6	44.6	38.4	40.0	40.4	41.7	41.7
36	46.9	47.7	48.2	48.7	48.9	42.3	43.9	44.3	46.0	46.3
40	50.8	51.9	52.7	53.1	52.4	46.3	48.4	48.2	50.7	49.4
42	–	–	–	55.6	–	–	–	–	53.0	–
48	59.9	60.8	61.7	62.0	61.5	55.3	57.3	49.4	59.5	58.7
54	–	–	–	69.6	–	–	–	–	66.3	–
60	–	–	–	76.9	–	–	–	–	73.0	–
66	–	–	–	82.4	–	–	–	–	80.0	–
72	84.9	86.3	87.0	87.9	–	80.5	83.3	83.9	86.5	–
78	93.6	94.7	95.6	95.5	–	89.2	91.5	92.3	93.0	–



A0020399

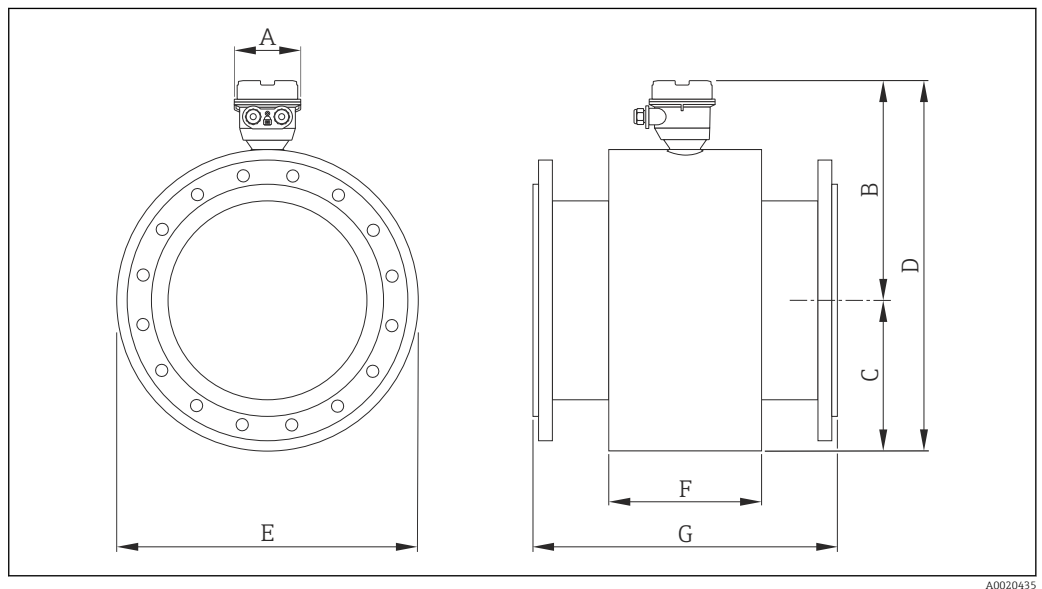
Order code for "Sensor option", option CB...CE "Corrosion protection"

Option	Description
CB	IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 Im2/Im3

DN [in]	A [in]	B [in]	L [in]
1	4.41	7.44	7.87
2	4.41	7.44	7.87
3	4.41	8.15	7.87
4	4.41	8.62	9.84
6	4.41	10.0	11.8
8	4.41	11.0	13.8
10	4.41	12.3	17.7
12	4.41	13.3	19.7

Dimension C										
DN [in]	EN (DIN)				ASME		AS		JIS	
	PN 10 [in]	PN 16 [in]	PN 25 [in]	PN 40 [in]	Class 150 [in]	Class 300 [in]	Table E [in]	PN 16 [in]	10K [in]	20K [in]
1	–	–	–	5.51	4.33	5.51	5.51	–	5.51	5.51
2	–	–	–	6.50	5.91	6.50	5.91	5.91	6.10	6.10
3	–	7.87	–	7.87	7.48	8.25	7.28	7.28	7.28	7.87
4	–	8.66	–	12.8	9.06	10.0	8.46	8.46	8.27	8.86
6	–	11.2	–	11.8	11.0	12.5	11.0	11.0	11.0	12.0
8	13.4	13.4	14.2	–	13.6	–	13.2	13.2	13.0	13.8
10	15.6	15.9	16.7	–	16.0	–	15.9	15.9	15.8	16.9
12	17.5	18.1	19.1	–	19.1	–	17.9	17.9	17.5	18.9

Dimension D										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	–	–	–	10.2	10.2	10.2	10.2	–	10.2	10.2
2	–	–	–	10.7	10.4	10.7	10.4	10.4	10.5	10.5
3	–	12.1	–	12.1	11.9	12.2	11.8	11.8	11.8	12.1
4	–	13.0	–	15.0	13.1	13.6	12.9	12.9	12.8	13.1
6	–	15.6	–	15.9	15.5	16.2	15.6	15.6	15.6	16.0
8	17.7	17.7	18.1	–	17.7	–	17.6	17.6	17.5	17.9
10	20.1	20.3	20.7	–	20.3	–	20.3	20.3	20.2	20.8
12	22.0	22.4	22.8	–	22.8	–	22.2	22.2	22.0	22.8

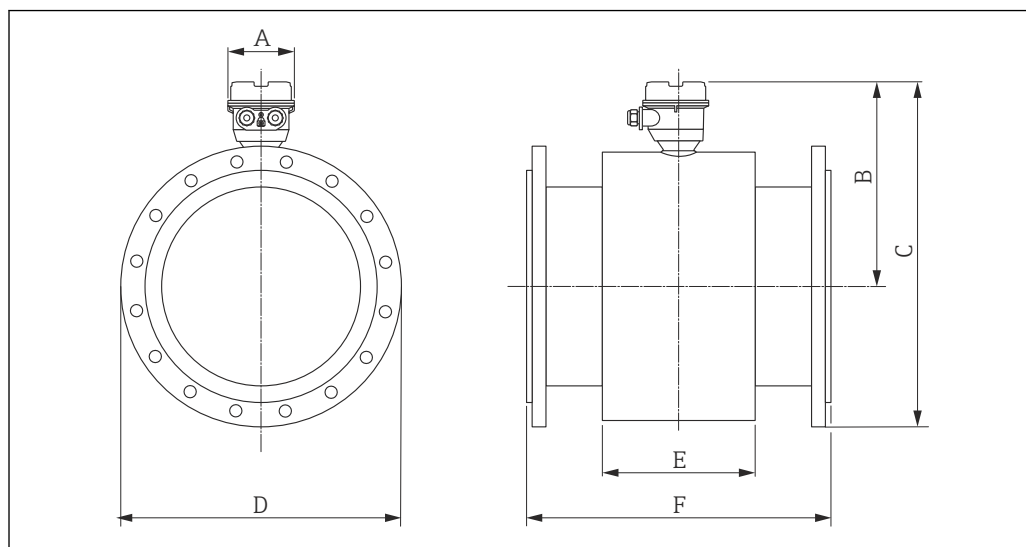


A0020435

DN	A	B	C	D	E	F	G ¹⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
14	4.41	15.6	11.1	26.7	22.2	10.9	21.7
15	4.41	16.6	12.1	28.7	24.2	10.9	23.6
16	4.41	16.6	12.1	28.7	24.2	10.9	23.6
18	4.41	17.6	13.1	30.7	26.2	11.5	25.6
20	4.41	18.6	14.1	32.7	28.2	11.5	25.6
24	4.41	20.6	16.2	36.8	32.3	15.8	30.7
28	4.41	24.6	20.2	44.8	40.3	23.2	35.8
30	4.41	24.6	20.2	44.8	40.3	24.6	38.4
32	4.41	25.5	21.0	46.5	42.0	25.5	40.9
36	4.41	28.5	24.0	52.5	48.0	30.9	46.0
40	4.41	31.5	27.0	58.5	54.0	33.9	51.2
42	4.41	32.5	28.0	60.5	56.0	35.9	53.7
48	4.41	36.4	31.9	68.3	63.8	39.0	61.4

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ¹⁾ [in]
54	4.41	40.4	35.9	76.3	71.8	42.3	69.1
60	4.41	44.3	39.8	84.1	79.6	54.8	76.8
66	4.41	47.5	43.0	90.5	86.0	58.4	84.4
72	4.41	51.2	46.8	98.0	93.5	64.2	92.1
78	4.41	53.2	48.7	101.9	97.5	68.2	102.3

1) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.



A0018158

Order code for "Design", option A "Insertion length short" and order code for "Sensor option", option CB...
CE "Corrosion protection"

Option	Description
CB	IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 Im2/Im3

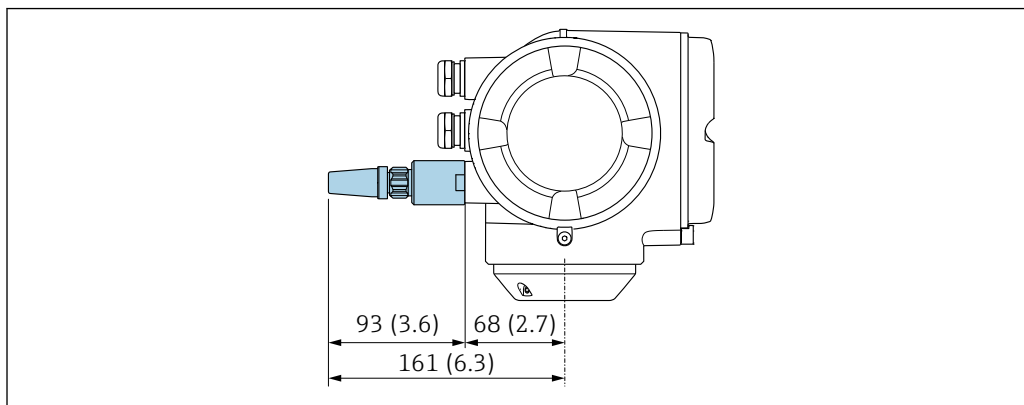
DN [in]	A [in]	B [in]	E [in]	F [in]
14	4.41	13.8	11.4	21.7
15	4.41	14.8	11.4	23.6
16	4.41	14.8	11.4	23.6
18	4.41	15.9	11.4	23.6
20	4.41	16.9	11.4	23.6
24	4.41	18.8	11.4	23.6
28	4.41	21.6	16.7	27.6
30	4.41	23.1	17.9	29.5
32	4.41	23.8	19.7	31.5
36	4.41	25.8	22.8	35.4

DN [in]	A [in]	B [in]	E [in]	F [in]
40	4.41	27.8	26.0	39.4
42	4.41	29.2	29.7	41.3
48	4.41	32.2	32.6	47.2
54	4.41	36.7	39.7	53.2
60	4.41	40.6	45.2	59.1
66	4.41	42.6	50.6	65.0
72	4.41	44.8	54.3	70.9
78	4.41	49.2	61.8	78.7

DN [in]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]
14	23.4	23.7	24.0	–	24.1	19.3	19.9	20.5	–	20.7
15	–	–	–	–	25.6	–	–	–	–	21.7
16	25.4	25.9	26.2	–	26.2	21.3	22.2	22.8	–	22.8
18	27.6	28.0	28.5	–	28.5	23.4	24.2	25.2	–	25.2
20	29.6	30.0	30.9	–	30.7	25.4	26.4	28.1	–	27.8
24	33.7	34.2	35.4	–	35.1	29.7	30.7	33.1	–	32.5
28	38.5	39.2	39.5	39.8	39.5	33.9	35.2	35.8	36.5	35.8
30	–	–	–	42.4	42.7	–	–	–	38.7	39.2
32	43.0	43.8	44.0	44.7	44.7	38.4	40.0	40.4	41.7	41.7
36	47.0	47.8	48.0	48.8	48.9	42.3	43.9	44.3	46.0	46.3
40	50.9	52.0	52.5	53.1	52.5	46.3	48.4	48.2	50.7	49.4
42	–	–	–	55.7	–	–	–	–	53.0	–
48	59.9	60.9	61.5	62.0	61.6	55.3	57.3	49.4	59.5	58.7
54	–	–	–	69.8	–	–	–	–	66.3	–
60	–	–	–	77.1	–	–	–	–	73.0	–
66	–	–	–	82.6	–	–	–	–	80.0	–
72	85.1	86.5	86.8	88.1	–	80.5	83.3	83.9	86.5	–
78	93.8	95.0	95.4	95.7	–	89.2	91.5	92.3	93.0	–

Accessories

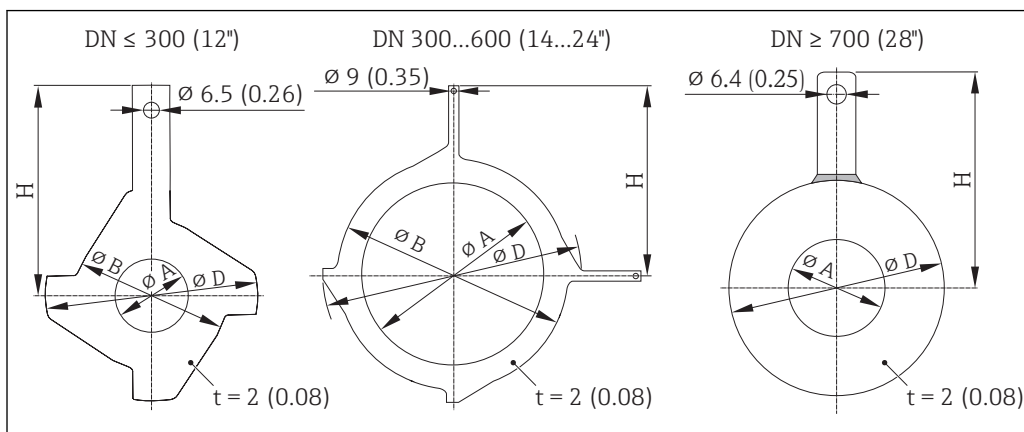
External WLAN antenna



A0028923

39 Engineering unit mm (in)

Ground disks for flange connections



A0015442

40 Engineering unit mm (in)

DN [in]	Pressure rating	A [in]	B [in]	D [in]	H [in]
1	¹⁾	1.02	2.44	3.05	3.44
1 ¼	¹⁾	1.38	3.15	3.44	3.72
1 ½	¹⁾	1.61	3.23	3.98	4.06
2	¹⁾	2.05	3.98	4.55	4.25
2 ½	¹⁾	2.68	4.76	5.18	4.65
3	¹⁾	3.15	5.16	6.08	5.31
4	¹⁾	4.09	6.14	7.34	6.02
5	¹⁾	5.12	7.36	8.13	6.30
6	¹⁾	6.22	8.54	10.1	7.24
8	¹⁾	8.11	10.5	11.3	8.07
10	¹⁾	10.2	12.9	14.1	9.45
12	¹⁾	12.3	14.8	16.3	10.8
14	DIN, PN 6	13.5	16.5	18.9	14.4

DN [in]	Pressure rating	A [in]	B [in]	D [in]	H [in]
14	DIN, PN 10	13.5	15.8	18.9	14.4
14	ASME, Class 150	13.5	15.8	18.9	14.4
16	DIN, PN 6	15.5	18.5	21.3	15.6
16	DIN, PN 10	15.5	18.5	21.3	15.6
16	ASME, Class 150	15.5	18.5	21.3	15.6
18	DIN, PN 6	17.3	20.7	23.0	16.4
18	DIN, PN 10	17.3	21.1	23.0	16.4
18	ASME, Class 150	17.3	21.1	23.0	16.4
20	DIN, PN 6	19.4	23.3	25.6	18.1
20	DIN, PN 10	19.4	23.2	25.6	18.1
20	ASME, Class 150	19.4	23.2	25.6	18.1
24	DIN, PN 6	23.4	27.3	30.2	20.6
24	DIN, PN 10	23.4	27.1	30.2	20.6
24	ASME, Class 150	23.4	27.1	30.2	20.6
28	DIN, PN 6	27.4	–	30.9	18.1
28	DIN, PN 10	27.3	–	32.0	18.9
28	AS, PN 16	27.1	–	31.8	19.3
28	AWWA, Class D	27.3	–	32.8	19.5
30	AWWA, Class D	29.3	–	32.8	20.6
32	DIN, PN 6	31.5	–	35.2	20.5
32	DIN, PN 10	31.3	–	36.2	21.3
32	AS, PN 16	31.1	–	36.0	21.7
32	AWWA, Class D	31.3	–	37.0	22.1
36	DIN, PN 6	35.3	–	39.1	22.4
36	DIN, PN 10	35.2	–	40.2	23.2
36	AS, PN 16	34.9	–	39.9	23.4
36	AWWA, Class D	35.2	–	41.3	24.2
40	DIN, PN 6	39.3	–	43.0	24.4
40	DIN, PN 10	39.2	–	44.4	25.6
40	AS, PN 16	38.9	–	44.5	26.0
40	AWWA, Class D	39.2	–	45.8	26.6
42	AWWA, Class D	41.1	–	48.0	27.7
48	DIN, PN 6	47.4	–	51.6	28.9

- 1) Ground disks can be used for all the flange standards/pressure ratings which can be supplied in the standard version.

Weight

Excluding the transmitter

- Aluminum
 - 6.5 kg (14.3 lbs)
 - Digital: 2.4 kg (5.3 lbs)
- Cast, stainless: 15.6 kg (34.4 lbs)

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

Weight in SI units

Nominal diameter		EN (DIN), AS ¹⁾		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]
25	1	PN 40	5	10K	5
32	–	PN 40	6	10K	5
40	1 ½	PN 40	7	10K	6
50	2	PN 40	9	10K	7
65	–	PN 16	10	10K	9
80	3	PN 16	12	10K	11
100	4	PN 16	14	10K	13
125	–	PN 16	20	10K	19
150	6	PN 16	24	10K	23
200	8	PN 10	43	10K	40
250	10	PN 10	63	10K	67
300	12	PN 10	68	10K	70
350	14	PN 6	103		
375	15	PN 6	118		
400	16	PN 6	118		
450	18	PN 6	159		
500	20	PN 6	154		
600	24	PN 6	206		
700	28	PN 6	302		
800	32	PN 6	355		
900	36	PN 6	483		
1000	40	PN 6	587		
1200	48	PN 6	848		
1400	–	PN 6	1298		
1600	–	PN 6	1698		
1800	72	PN 6	2198		
2000	–	PN 6	2798		

1) For flanges according to AS, only DN 80 to 150 are available.

Order code for "Design", option A

Option A "Insertion length short; ISO/DVGW to DN400, DN450-2000 1:1"

EN 1092-1 (DIN 2501)			
DN [mm]	Weight [kg]		
	PN 6	PN 10	PN 16
450	98	111	139
500	113	131	179
600	154	161	224
700	190	240	288
800	240	315	350
900	308	393	441
1000	359	468	563
1200	529	717	840
1400	784	1 114	1 200
1600	1 058	1 624	1 841
1800	1 418	2 107	2 353
2 000	1 877	2 630	2 925

AS 2129, Table E	
DN [mm]	Weight [kg]
450	142
500	181
600	259
700	346
750	433
800	493
900	690
1 000	761
1 200	1 237

AS 4087, PN 16	
DN [mm]	Weight [kg]
450	132
500	181
600	259
700	367
750	445
800	503
900	702
1 000	759
1 200	1 219

Weight in US units

Nominal diameter		ASME		AWWA	
[mm]	[in]	Pressure rating	[lbs]	Pressure rating	[lbs]
25	1	Class 150	11		
40	1 ½	Class 150	15		
50	2	Class 150	20		
80	3	Class 150	26		
100	4	Class 150	31		
150	6	Class 150	53		
200	8	Class 150	95		
250	10	Class 150	161		
300	12	Class 150	238		
350	14	Class 150	381		
400	16	Class 150	448		
450	18	Class 150	558		
500	20	Class 150	624		
600	24	Class 150	889		
700	28			Class D	878
–	30			Class D	1010
800	32			Class D	1208
900	36			Class D	1760
1000	40			Class D	1980
–	42			Class D	2421
1200	48			Class D	3083
–	54			Class D	4847
–	60			Class D	5949
–	66			Class D	8154
1800	72			Class D	9036
–	78			Class D	10139

Order code for "Design", option A

Option A "Insertion length short; ISO/DVGW to DN400, DN450-2000 1:1"

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
18	420
20	501
24	664

AWWA C207, Class D	
DN [in]	Weight [lbs]
28	587
30	701
32	845
36	1036
40	1294
42	1477
48	1987
54	1273
60	3515
66	4699
72	5662
78	6864

Measuring tube specification

Nominal diameter		Pressure rating				Measuring tube internal diameter			
		EN (DIN)	ASME AWWA	AS 2129 AS 4087	JIS	Hard rubber		Polyurethane	
[mm]	[in]					[mm]	[in]	[mm]	[in]
25	1	PN 40	Class 150	–	20K	–	–	24	0.94
32	–	PN 40	–	–	20K	–	–	32	1.26
40	1 ½	PN 40	Class 150	–	20K	–	–	38	1.50
50	2	PN 40	Class 150	Table E, PN 16	10K	50	1.97	50	1.97
65	–	PN 16	–	–	10K	66	2.60	66	2.60
80	3	PN 16	Class 150	Table E, PN 16	10K	79	3.11	79	3.11
100	4	PN 16	Class 150	Table E, PN 16	10K	102	4.02	102	4.02
125	–	PN 16	–	–	10K	127	5.00	127	5.00
150	6	PN 16	Class 150	Table E, PN 16	10K	156	6.14	156	6.14
200	8	PN 10	Class 150	Table E, PN 16	10K	204	8.03	204	8.03
250	10	PN 10	Class 150	Table E, PN 16	10K	258	10.2	258	10.2
300	12	PN 10	Class 150	Table E, PN 16	10K	309	12.2	309	12.2
350	14	PN 6	Class 150	Table E, PN 16	–	342	13.5	342	13.5
375	15	–	–	PN 16	–	392	15.4	–	–
400	16	PN 6	Class 150	Table E, PN 16	–	392	15.4	392	15.4
450	18	PN 6	Class 150	–	–	437	17.2	437	17.2
500	20	PN 6	Class 150	Table E, PN 16	–	492	19.4	492	19.4
600	24	PN 6	Class 150	Table E, PN 16	–	594	23.4	594	23.4
700	28	PN 6	Class D	Table E, PN 16	–	692	27.2	692	27.2
750	30	–	Class D	Table E, PN 16	–	742	29.2	742	29.2
800	32	PN 6	Class D	Table E, PN 16	–	794	31.3	794	31.3
900	36	PN 6	Class D	Table E, PN 16	–	891	35.1	891	35.1
1000	40	PN 6	Class D	Table E, PN 16	–	994	39.1	994	39.1
–	42	–	Class D	–	–	1043	41.1	1043	41.1

Nominal diameter		Pressure rating				Measuring tube internal diameter			
		EN (DIN)	ASME AWWA	AS 2129 AS 4087	JIS	Hard rubber		Polyurethane	
[mm]	[in]					[mm]	[in]	[mm]	[in]
1 200	48	PN 6	Class D	Table E, PN 16	–	1 197	47.1	1 197	47.1
–	54	–	Class D	–	–	1 339	52.7	–	–
1 400	–	PN 6	–	–	–	1 402	55.2	–	–
–	60	–	Class D	–	–	1 492	58.7	–	–
1 600	–	PN 6	–	–	–	1 600	63.0	–	–
–	66	–	Class D	–	–	1 638	64.5	–	–
1 800	72	PN 6	Class D	–	–	1 786	70.3	–	–
2 000	78	PN 6	Class D	–	–	1 989	78.3	–	–

Materials

Transmitter housing

Order code for "Transmitter housing":

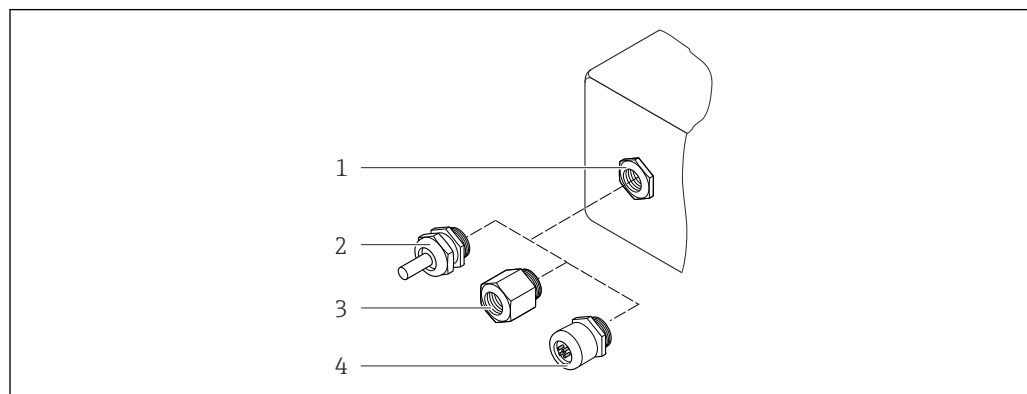
Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated

Window material

Order code for "Transmitter housing":

Option **A** "Aluminum, coated": glass

Cable entries/cable glands



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41 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" <p>i Only available for certain device versions:</p> <ul style="list-style-type: none"> Order code for "Transmitter housing": Option A "Aluminum, coated" Order code for "Sensor connection housing": Option A "Aluminum coated" 	Nickel-plated brass

Cable entries and adapters	Material
Adapter for device plug  Device plug for digital communication: Only available for certain device versions →  28.	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 - 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 **D** "Polycarbonate":
 - Polycarbonate
 - Optional: Order code for "Sensor option", option **CB...CE** "Corrosion protection": polycarbonate

Sensor housing

- DN 25 to 300 (1 to 12"):
 - Aluminum, AlSi10Mg, coated
 - Carbon steel with Al/Zn protective coating
- DN 50 to 300 (2 to 12"):
 - Carbon steel with protective varnish (IP68)
- DN 350 to 2000 (14 to 78"):
 - Carbon steel with protective varnish

Measuring tubes

- DN 25 to 300 (1 to 12") ¹⁾: stainless steel, 1.4301/1.4306/304/304L
- DN 350 to 1200 (14 to 48") ¹⁾: stainless steel, 1.4301/304
- DN 1350 to 2000 (54 to 78") ¹⁾: stainless steel, 1.4301 similar to 304

Liner

- DN 25 to 1200 (1 to 48"): polyurethane
- DN 50 to 2000 (2 to 78"): hard rubber

Electrodes

- Stainless steel, 1.4435 (316L)
- Alloy C22, 2.4602 (UNS N06022)
- Tantalum

1) For carbon steel flange material with Al/Zn protective coating (DN 25 to 300 (1 to 12")), protective varnish (IP68) (DN 50 to 300 (2 to 12")) or protective varnish ≥ DN 350 (14")

Process connections*EN 1092-1 (DIN 2501)*

- DN 25 to 1200 ¹⁾:
 - Stainless steel, 1.4404/1.4571/F316L
 - Carbon steel, A105/FE410WB/P250GH/S235JRG2/S235JR+N
- DN 1350 to 2000 ¹⁾:
 - Stainless steel, 1.4404/1.4571
 - Carbon steel, P250GH/S235JRG2
- DN 450 to 2000 ²⁾:
 - Carbon steel, A105/S235JRG2

EN 1092-1 (DIN 2501), PN6:DN 350 to 1000 ¹⁾:

Carbon steel, A105/FE410WB/S235JRG2

ASME B16.5

- DN 25 to 1200 (1 to 48"):
- Stainless steel, F316L similar to 1.4404
- DN 25 to 300 (1 to 12") ²⁾:
- Carbon steel, A105 similar to 1.0432
- DN 350 to 1200 (14 to 48") ²⁾:
- Carbon steel, A105/A515 Grade 70

AWWA C207

- DN 48":
- Carbon steel, A105/A181/P265GH/S275JR
- DN 54 to 72":
- Carbon steel, P265GH similar to 1.0425
- DN 48 to 78" ²⁾:
- Carbon steel, A105/A181/P265GH/S275JR

AS 2129

- DN 50 to 1200:
- Carbon steel, A105/S235JRG2
- DN 350 to 1200 ²⁾:
- Carbon steel, A105/FE410WB/P235GH/P265GH/S235JRG2

AS 4087

- DN 50 to 1200:
- Carbon steel, A105/S275JR
- DN 350 to 1200 ²⁾:
- Carbon steel, A105/P265GH/S275JR

JIS B2220

- Stainless steel, F316L similar to 1.4404
- Carbon steel, A105/A350LF2 ¹⁾

Seals

In accordance with DIN EN 1514-1

Accessories*Protective cover*

Stainless steel, 1.4404 (316L)

2) Order Code for "Design", Option A "Insertion length short"

External WLAN antenna

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

Ground disks

- Stainless steel, 1.4435 (316L)
- Alloy C22, 2.4602 (UNS N06022)
- Tantalum

Fitted electrodes

Measurement, reference and empty pipe detection electrodes available as standard with:

- 1.4435 (316L)
- Alloy C22, 2.4602 (UNS N06022)
- Tantalum

Optionally available with DN 350 to 2000 (14 to 78"):

Exchangeable measuring electrodes made from 1.4435 (316L)

Process connections

- EN 1092-1 (DIN 2501) ³⁾
 - DN ≤ 300: fixed flange (PN 10/16/25/40) = form A
 - DN ≥ 350: fixed flange (PN 6/10/16/25) = flat face
 - DN 450 to 2000 ⁴⁾: fixed flange (PN 6/10/16) = flat face
- ASME B16.5
 - DN 25 to 600 (1 to 24"): fixed flange (Class 150)
 - DN 350 to 2000 (14 to 78") ⁴⁾: fixed flange (Class 150)
 - DN 25 to 150 (1 to 6"): fixed flange (Class 300)
- AWWA C207
 - DN 48 to 72": fixed flange (Class D)
 - DN 48 to 78" ⁴⁾: fixed flange (Class D)
- AS 2129
 - DN 50 to 1200: fixed flange (Table E)
 - DN 350 to 1200 ⁴⁾: fixed flange (Table E)
- AS 4087
 - DN 50 to 1200: fixed flange (PN 16)
 - DN 350 to 1200 ⁴⁾: fixed flange (PN 16)
- JIS B2220
 - DN 50 to 300: fixed flange (10K)
 - DN 25 to 300: fixed flange (20K)



For information on the different materials used in the process connections → 80

Surface roughness

Electrodes with 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum:
≤ 0.3 to 0.5 µm (11.8 to 19.7 µin)
(All data relate to parts in contact with fluid)

Operability

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

- Commissioning
- Operation
- Diagnostics
- Expert level


3) Dimensions as per DIN 2501, DN 65 (2 ½") PN 16 and DN 600 (24") PN 16 only as per EN 1092-1

4) Order code for "Design", option A "Insertion length short"

Fast and safe commissioning

- 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

Reliable operation

- Operation in local language →  82
- 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.

Efficient diagnostics increase measurement availability

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

Languages

Can be operated in the following languages:

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

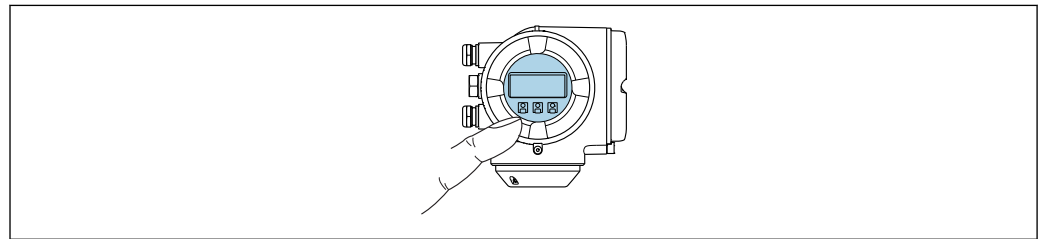
Local operation**Via display module**

Two display modules are available:


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



Information about WLAN interface →  85






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 42 Operation with touch control

Display elements

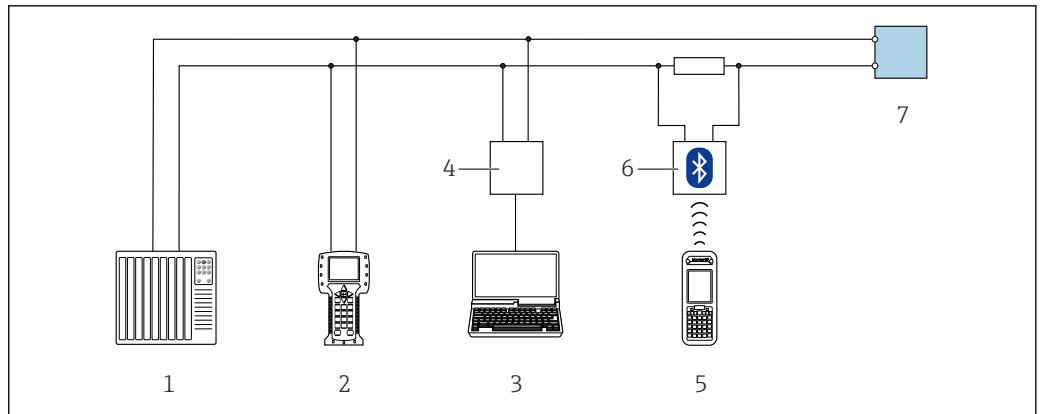
- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: -20 to +60 °C (-4 to +140 °F)
The readability of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

Operating elements

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

Remote operation**Via HART protocol**

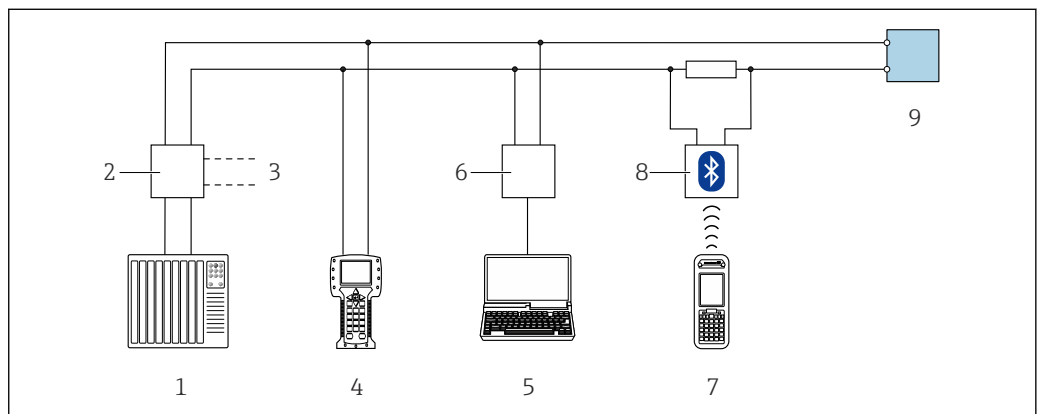
This communication interface is available in device versions with a HART output.



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43 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



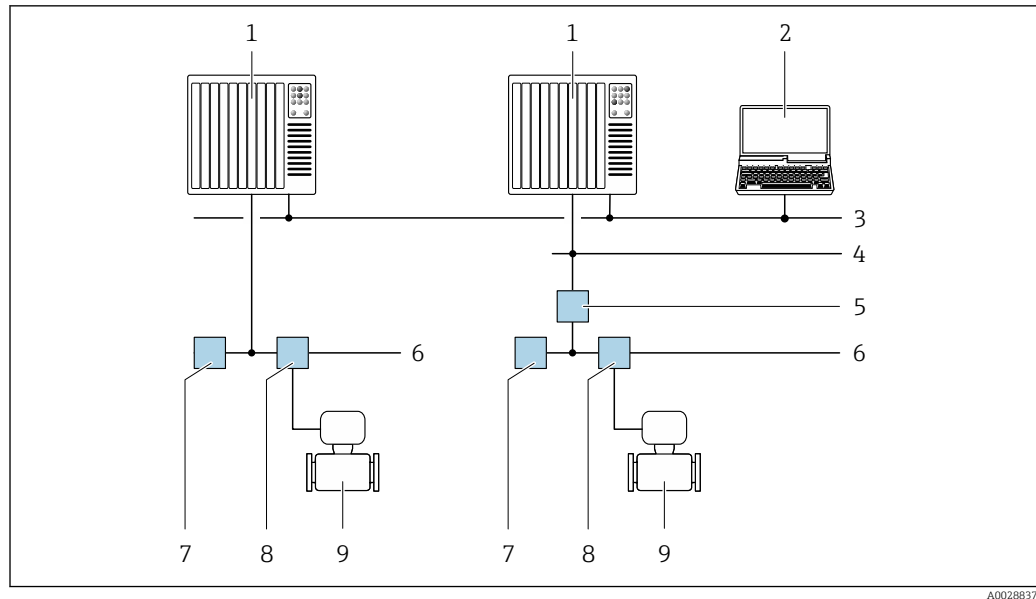
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44 Options for remote operation via HART protocol (passive)

- 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.

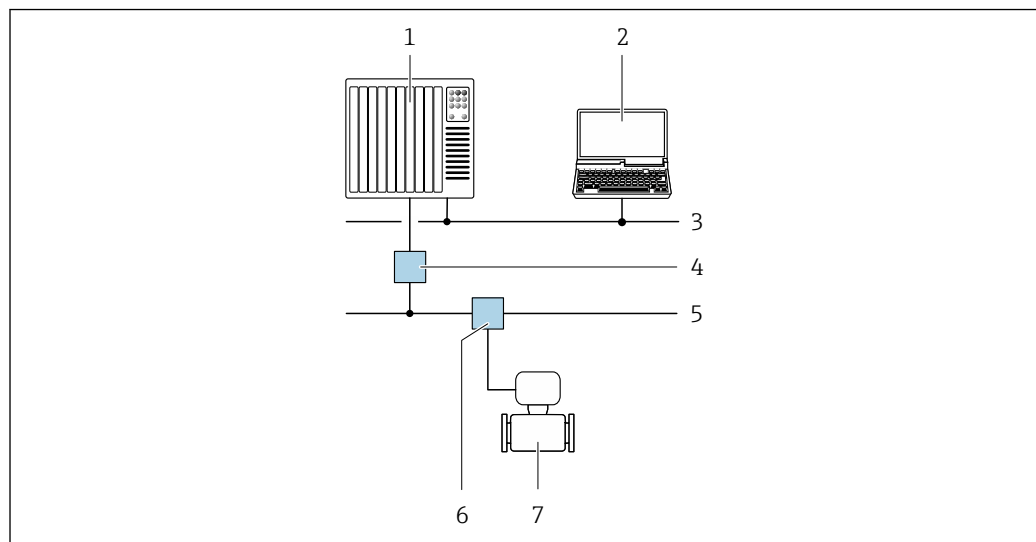


45 Options for remote operation via FOUNDATION Fieldbus network

- 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.

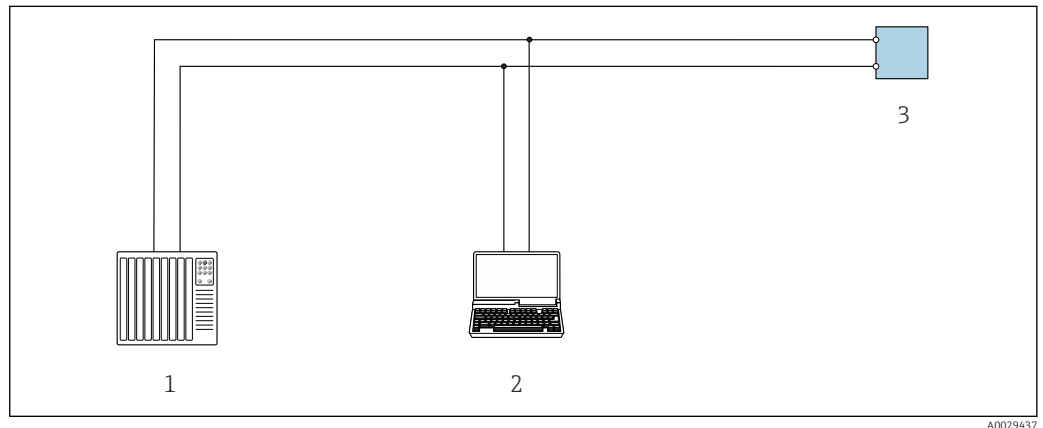


46 Options for remote operation via PROFIBUS PA network

- 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.



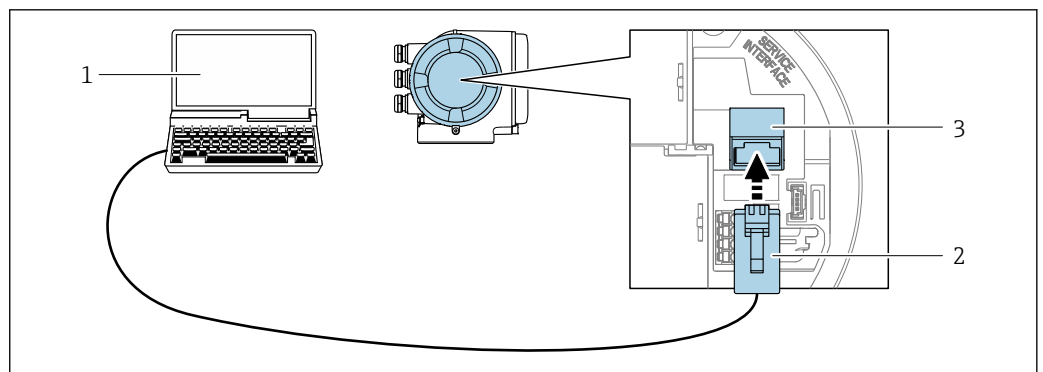
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47 Options for remote operation via Modbus-RS485 protocol (active)

- 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)



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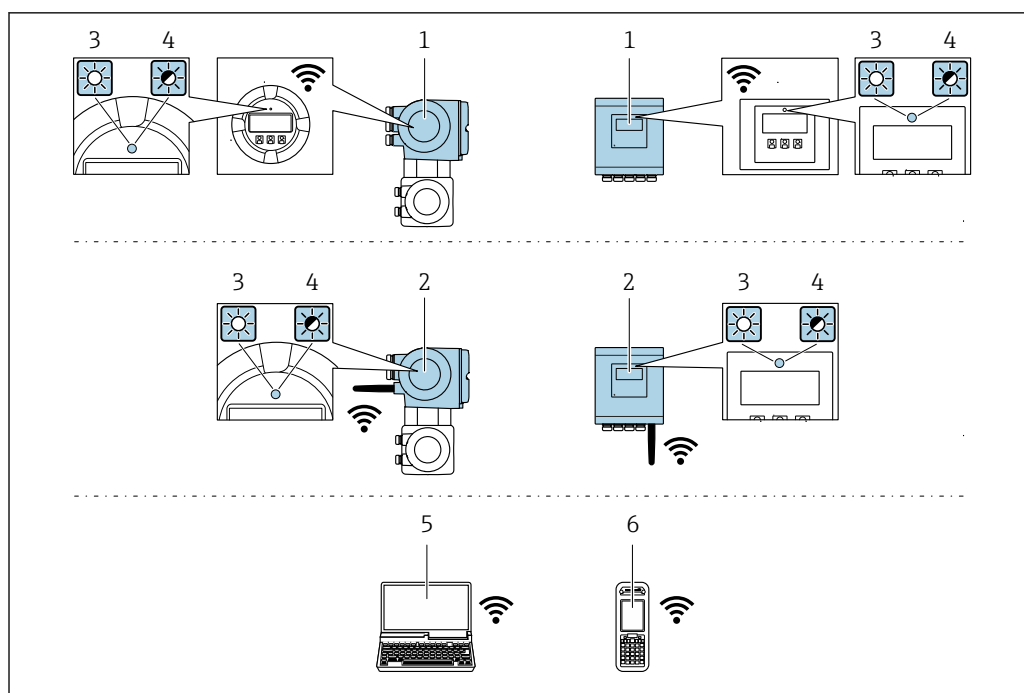
48 Connection via service interface (CDI-RJ45)

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

Via WLAN interface

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

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



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


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

Supported operating tools

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

Supported operating tools	Operating unit	Interface	Additional information
Web browser	Notebook, PC or tablet with Web browser	<ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface 	Special Documentation for the device → 97
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Fieldbus protocol 	→ 95

Supported operating tools	Operating unit	Interface	Additional information
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Fieldbus protocol 	→  95
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	<p>The measuring system is in conformity with the statutory requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.</p> <p>Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.</p>
C-Tick symbol	<p>The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".</p>
Ex approval	<p>The measuring device is certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate.</p> <p> The separate Ex documentation (XA) containing all the relevant explosion protection data is available from your Endress+Hauser sales center.</p>

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 2 I 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

Drinking water approval

- ACS
- KTW/W270
- NSF 61
- WRAS BS 6920

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 <p>The measuring device is certified and registered by the PROFIBUS User Organization (PNO). The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ■ 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	<p>The measuring device meets all the requirements of the MODBUS/TCP conformity test and has the "MODBUS/TCP Conformance Test Policy, Version 2.0". The measuring device has successfully passed all the test procedures carried out.</p>
Radio approval	<p>Europe: RED 2014/53/EU</p> <p>United States of America: CFR Title 47, FCC Part 15.247</p> <p>Canada: RSS-247 Issue 1</p> <p>Japan: Article 2 clause 1 item 19</p> <p> Additional country-specific approvals on request.</p>
Other standards and guidelines	<ul style="list-style-type: none"> ■ 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_3O_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 Proline 500	<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 EA01152</p> <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 →  85.</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	<p>Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight.</p> <p> For details, see Installation Instructions EA01160</p>
Ground cable	Set, consisting of two ground cables for potential equalization.
Connecting cable Sensor – Transmitter	<p>The following cable lengths are available: order code for "Cable, sensor connection"</p> <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) <p>Reinforced connecting cable with an additional, reinforcing metal braid:</p> <ul style="list-style-type: none"> ▪ Option 6: User-configurable cable length (m) ▪ Option 7: User-configurable cable length (ft) <p> Possible cable length: depends on the medium conductivity, max. 200 m (660 ft)</p>

For the sensor



Accessories	Description
Ground disks	Are used to ground the fluid in lined measuring tubes to ensure proper measurement.  For details, see Installation Instructions EA00070D

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 W 500	BA01400D	BA01481D	BA01406D	BA01403D

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

PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

FOUNDATION™ Fieldbus

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

Modbus®

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