TI01227D/06/EN/04.18
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2018-06-01

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

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
- Standard cable between sensor and transmitter

Your benefits

- For direct underground installation or permanent underwater use
- Secure, 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

Endress+Hauser
People for Process Automation

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About this document

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 Earth (PE)** A terminal which must be connected to ground prior to establishing any other connections. The ground terminals are situated inside and outside the device: ▪ Inner ground terminal: Connects the protectiv earth to the mains supply. ▪ Outer ground terminal: Connects the device to the plant grounding system.

Communication symbols

Symbol	Meaning
	**Wireless Local Area Network (WLAN)** Communication via a wireless, local network.
	**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.

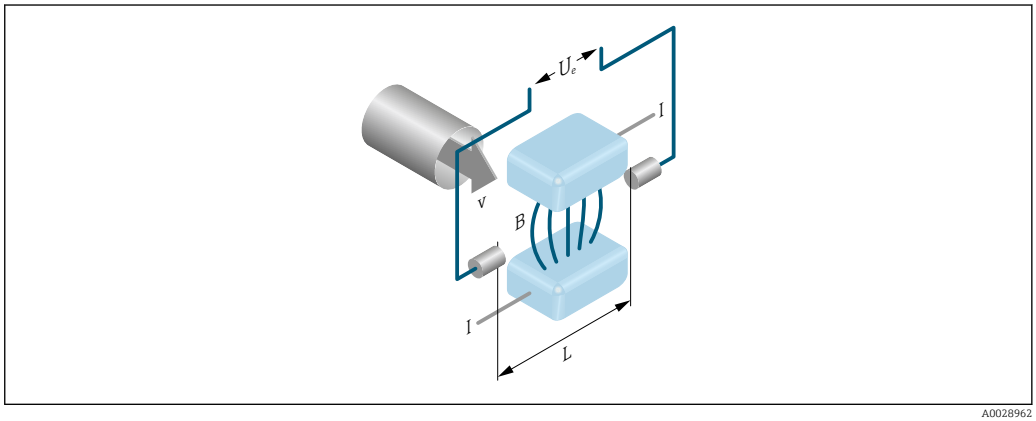
Symbols in graphics

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.



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Ue *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

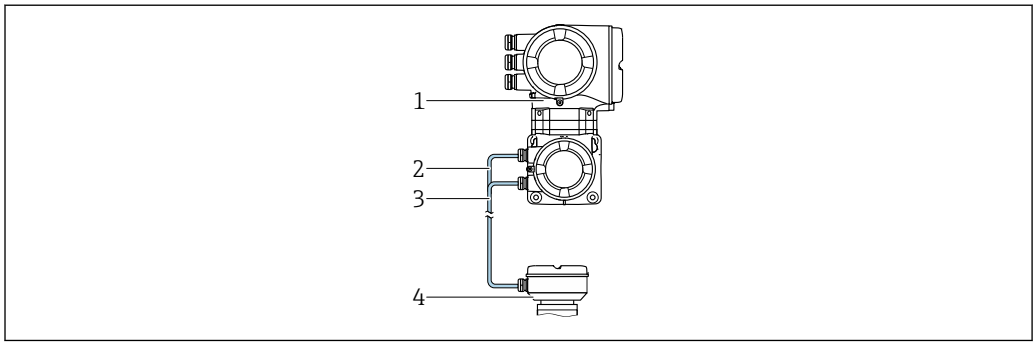
- Induced voltage $U_e = B \cdot L \cdot v$
- Volume flow $Q = A \cdot v$

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 connecting cables.

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 → 🖹 110)

- Length: max. 200 m (656 ft), depending on 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

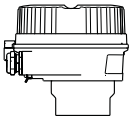
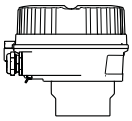
- Transmitter housing
  Aluminum, coated: aluminum, AlSi10Mg, coated
- Window material: glass

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, SmartBlue app)
  – Web server (access via Web browser, e.g. Microsoft Internet Explorer, Microsoft Edge)

Sensor connection housing

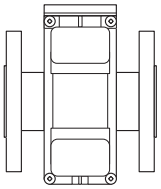
Different versions of the connection housing are available.

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

Sensor

Promag W

Fixed flange: DN 25 to 300 (1 to 12")



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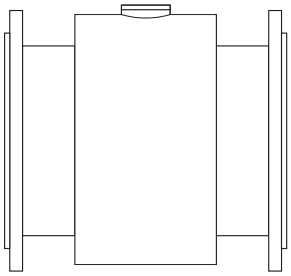
Fixed flange: DN 350 to 2000 (14 to 78")



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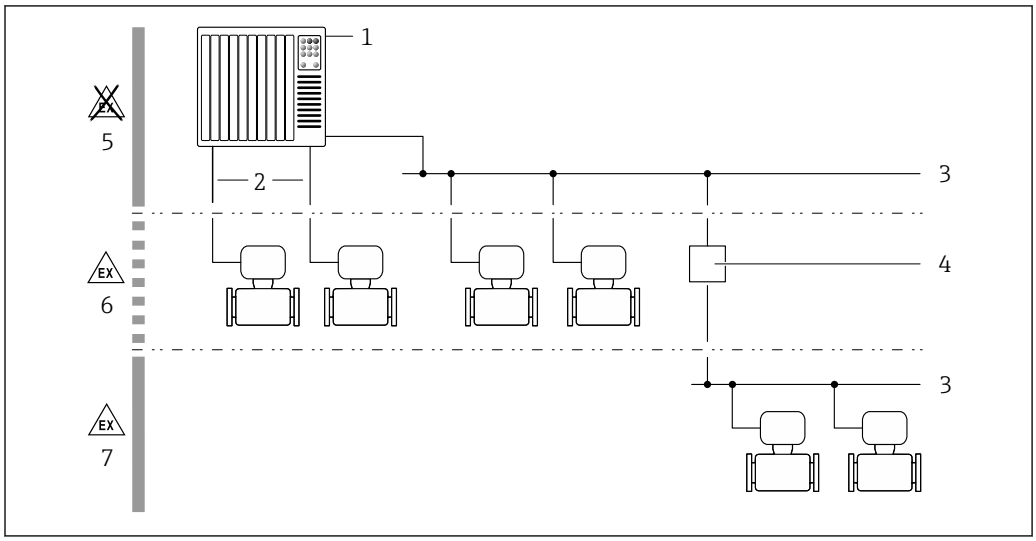
- Nominal diameter range: DN 25 to 2000 (1 to 78")
- Materials:
  - Sensor housing: aluminum, AlSi10Mg, coated; carbon steel with protective varnish
  - Sensor connection housing (standard): aluminum, AlSi10Mg, coated
    Sensor connection housing (option): polycarbonate
  - Measuring tubes [1]:
    DN 25 to 600 (1 to 24"): stainless steel, 1.4301/1.4306/304/304L
    DN 700 to 2000 (28 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:
    Stainless steel, 1.4404/1.4571/F316L
    Carbon steel, A105/A181/A350LF2/A515(70)/FE410WB/S235JRG2/S235J+N/S275JR/P235GH/P250GH/P265GH
  - Seals: as per DIN EN 1514-1 Form IBC
  - Ground disks: 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")

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 *Hazardous area: Zone 2; Class I, Division 2*
7 *Hazardous area: Zone 1; Class I, Division 1*

Safety

IT security

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

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

Device-specific IT security

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

Function/interface	Factory setting	Recommendation
Write protection via hardware write protection switch → 🖹 9	Not enabled.	On an individual basis following risk assessment.
Access code (also applies for Web server login or FieldCare connection) → 🖹 9	Not enabled (0000).	Assign a customized access code during commissioning.
WLAN (order option in display module)	Enabled.	On an individual basis following risk assessment.
WLAN security mode	Enabled (WPA2-PSK)	Do not change.
WLAN passphrase (password) → 🖹 9	Serial number	Assign a customized access code during commissioning.
WLAN mode	Access Point	On an individual basis following risk assessment.
Web server→ 🖹 9	Enabled.	On an individual basis following risk assessment.
CDI-RJ45 service interface → 🖹 10	–	On an individual basis following risk assessment.

Protecting access via hardware write protection

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

Hardware write protection is disabled when the device is delivered.

Protecting access via a password

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

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

User-specific access code

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

WLAN passphrase: Operation as WLAN access point

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

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

Infrastructure mode

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

General notes on the use of passwords

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

Access via Web server

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

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

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

For detailed information on device parameters, see:
The "Description of Device Parameters" document → 113

Access via OPC-UA

The "OPC UA Server" application package is available in the device version with the HART communication protocol → 110.

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

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

The following Security Modes are supported as per the OPC UA Specification (IEC 62541):
- None
- Basic128Rsa15 – signed
- Basic128Rsa15 – signed and encrypted

Access via service interface (CDI-RJ45)

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

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

The device can be integrated in a ring topology. The device is integrated via the terminal connection for signal transmission (output 1) and the connection to the service interface (CDI-RJ45) → 99.

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 µS/cm for liquids in general

Flow characteristic values in SI units: DN 25 to 125 (1 to 4")

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
25	1	9 to 300	75	0.5	1
32	–	15 to 500	125	1	2
40	1 ½	25 to 700	200	1.5	3
50	2	35 to 1 100	300	2.5	5
65	–	60 to 2 000	500	5	8
80	3	90 to 3 000	750	5	12
100	4	145 to 4 700	1 200	10	20
125	–	220 to 7 500	1 850	15	30

Flow characteristic values in SI units: DN 150 to 2000 (6 to 78")

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[m³/h]	[m³/h]	[m³]	[m³/h]
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

Flow characteristic values in US units

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[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

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
4	100	40 to 1250	300	2	4
–	125	60 to 1950	450	5	7
6	150	90 to 2650	600	5	12
8	200	155 to 4850	1200	10	15
10	250	250 to 7500	1500	15	30
12	300	350 to 10600	2400	25	45
14	350	500 to 15000	3600	30	60
15	375	600 to 19000	4800	50	60
16	400	600 to 19000	4800	50	60
18	450	800 to 24000	6000	50	90
20	500	1000 to 30000	7500	75	120
24	600	1400 to 44000	10500	100	180
28	700	1900 to 60000	13500	125	210
30	750	2150 to 67000	16500	150	270
32	800	2450 to 80000	19500	200	300
36	900	3100 to 100000	24000	225	360
40	1000	3800 to 125000	30000	250	480
42	–	4200 to 135000	33000	250	600
48	1200	5500 to 175000	42000	400	600
54	–	9 to 300 Mgal/d	75 Mgal/d	0.0005 Mgal/d	1.3 Mgal/d
–	1400	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
–	1600	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	1800	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
–	2000	20 to 700 Mgal/d	175 Mgal/d	0.0010 Mgal/d	2.9 Mgal/d

To calculate the measuring range, use the *Applicator* sizing tool → 112

Recommended measuring range

"Flow limit" section → 56

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:
- Medium 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 → 112

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

HART protocol

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

Current input

The measured values are written from the automation system to the measuring device via the current input → 13.

Digital communication

The measured values can be written from the automation system to the measuring via:
- FOUNDATION Fieldbus
- PROFIBUS DP
- PROFIBUS PA
- Modbus RS485
- EtherNet/IP
- PROFINET

Current input 0/4 to 20 mA

Current input	0/4 to 20 mA (active/passive)
Current span	▪ 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	▪ Pressure ▪ Temperature ▪ Density

Status input

Maximum input values	▪ DC −3 to 30 V ▪ If status input is active (ON): R_i >3 kΩ
Response time	Adjustable: 5 to 200 ms
Input signal level	▪ Low signal: DC −3 to +5 V ▪ High signal: DC 12 to 30 V
Assignable functions	▪ 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 "4–20 mA HART" was selected for output/input 1, one of the options A, B, D, E, F, H, I or J is available for output 2, and one of the options A, B, D, E, F, H, I or J is available for output 3 and 4.

Order code for "Output; input 1" (020) →	**Possible options**									
Current output 4 to 20 mA HART	**BA**									
Current output 4 to 20 mA HART Ex i	↓	**CA**								
FOUNDATION Fieldbus		↓	**SA**							
FOUNDATION Fieldbus Ex i			↓	**TA**						
PROFIBUS DP				↓	**LA**					
PROFIBUS PA					↓	**GA**				
PROFIBUS PA Ex i						↓	**HA**			
Modbus RS485							↓	**MA**		
EtherNet/IP 2-port switch integrated								↓	**NA**	
PROFINET 2-port switch integrated									↓	**RA**
Order code for "Output; input 2" (021) →	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Not assigned	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Current output 0/4 to 20 mA	**B**		**B**		**B**	**B**		**B**	**B**	**B**
Current output 0/4 to 20 mA (Ex i)		**C**		**C**			**C**			
User configurable input/output [1]	**D**		**D**		**D**	**D**		**D**	**D**	**D**
Pulse/frequency/switch output	**E**		**E**		**E**	**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**		**H**	**H**	**H**
Current input 0/4 to 20 mA	**I**		**I**		**I**	**I**		**I**	**I**	**I**
Status input	**J**		**J**		**J**	**J**		**J**	**J**	**J**
Order code for "Output; input 3" (022) →	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Not assigned	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Current output 0/4 to 20 mA	**B**				**B**			**B**	**B**	**B**
Current output 0/4 to 20 mA (Ex i)		**C**								
User configurable input/output	**D**				**D**			**D**	**D**	**D**
Pulse/frequency/switch output	**E**				**E**			**E**	**E**	**E**
Double pulse output (slave) [3]	**F**							**F**		
Pulse/frequency/switch output (Ex i)		**G**								
Relay output	**H**				**H**			**H**	**H**	**H**
Current input 0/4 to 20 mA	**I**				**I**			**I**	**I**	**I**
Status input	**J**				**J**			**J**	**J**	**J**

1) A specific input or output can be assigned to a user configurable input/output → 🖹 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) Ex-i, passive
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	250 to 700 Ω
Resolution	0.38 µA
Damping	Configurable: 0.07 to 999 s
Assignable measured variables	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ▪ Corrected conductivity ▪ Electronic temperature

PROFIBUS PA

PROFIBUS PA	In accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
Data transmission	31.25 kbit/s
Current consumption	10 mA 16 mA
Permitted supply voltage	9 to 32 V
Bus connection	With integrated reverse polarity protection

PROFIBUS DP

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

EtherNet/IP

Standards	In accordance with IEEE 802.3

PROFINET

Standards	In accordance with IEEE 802.3

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: ▪ 4 to 20 mA (active) ▪ 0/4 to 20 mA (passive) Ex-i, passive
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	0 to 700 Ω
Resolution	0.38 µA
Damping	Adjustable: 0.07 to 999 s
Assignable measured variables	▪ 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: ▪ Active ▪ Passive Ex-i, 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
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	▪ 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	▪ 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	▪ Off ▪ On ▪ Diagnostic behavior ▪ Limit value: – Off – Volume flow – Mass flow – Corrected volume flow – Flow velocity – Conductivity – Corrected conductivity – Totalizer 1-3 – Temperature – Electronic temperature ▪ Flow direction monitoring ▪ Status – Empty pipe detection – Low flow

Double pulse output

Function	Double pulse
Version	Open collector Can be set to: ▪ 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	▪ 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: ▪ NO (normally open), factory setting ▪ NC (normally closed)
Maximum switching capacity (passive)	▪ DC 30 V, 0.1 A ▪ AC 30 V, 0.5 A
Assignable functions	▪ Off ▪ On ▪ Diagnostic behavior ▪ Limit value: – Off – Volume flow – Mass flow – Corrected volume flow – Flow velocity – Conductivity – Corrected conductivity – Totalizer 1-3 – Temperature – Electronic temperature ▪ Flow direction monitoring ▪ Status – Empty pipe detection – Low flow

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

PROFIBUS DP

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

EtherNet/IP

Device diagnostics	Device condition can be read out in Input Assembly

PROFINET

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

FOUNDATION Fieldbus

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

Modbus RS485

Failure mode	Choose from: ▪ NaN value instead of current value ▪ Last valid value

Current output 0/4 to 20 mA

4 to 20 mA

Failure mode	Choose from: ▪ 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: ▪ Maximum alarm: 22 mA ▪ Freely definable value between: 0 to 20.5 mA

Pulse/frequency/switch output

Pulse output	
Failure mode	Choose from: ▪ Actual value ▪ No pulses
Frequency output	
Failure mode	Choose from: ▪ Actual value ▪ 0 Hz ▪ Defined value (f_{max} 2 to 12 500 Hz)
Switch output	
Failure mode	Choose from: ▪ Current status ▪ Open ▪ Closed

Relay output

Failure mode	Choose from: ▪ 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
  - PROFIBUS DP
  - Modbus RS485
  - EtherNet/IP
  - PROFINET
- Via service interface
  - CDI-RJ45 service interface
  - WLAN interface

Plain text display	With information on cause and remedial measures

Additional information on remote operation → 95

Web server

Plain text display	With information on cause and remedial measures

Light emitting diodes (LED)

Status information	Status indicated by various light emitting diodes The following information is displayed depending on the device version: ▪ Supply voltage active ▪ Data transmission active ▪ Device alarm/error has occurred ▪ EtherNet/IP network available ▪ EtherNet/IP connection established ▪ PROFINET network available ▪ PROFINET connection established ▪ PROFINET blinking feature

Ex connection data

Safety-related values

Order code for "Output; input 1"	Output type	Safety-related values "Output; input 1"	
		26 (+)	27 (–)
Option **BA**	Current output 4 to 20 mA HART	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **GA**	PROFIBUS PA	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **LA**	PROFIBUS DP	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **MA**	Modbus RS485	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **SA**	FOUNDATION Fieldbus	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **NA**	EtherNet/IP	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **RA**	PROFINET	U_N = 30 V_{DC} U_M = 250 V_{AC}	

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

Intrinsically safe values

Order code 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 V I_i = 100 mA P_i = 1.25 W L_i = 0 C_i = 0	
Option **HA**	PROFIBUS PA Ex i	**Ex ia** [1] U_i = 30 V I_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF	
Option **TA**	FOUNDATION Fieldbus Ex i	**Ex ia** U_i = 30 V I_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF	

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

Order code for "Output; input 2"; "Output; input 3"	Output type	Intrinsically safe values or NIFW values			
		Output; input 2		Output; input 3	
		24 (+)	25 (–)	22 (+)	23 (–)
Option **C**	Current output 4 to 20 mA Ex i	U_i = 30 V I_i = 100 mA P_i = 1.25 W L_i = 0 C_i = 0			
Option **G**	Pulse/frequency/switch output Ex i	U_i = 30 V I_i = 100 mA P_i = 1.25 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
System integration	Information on system integration: Operating Instructions → 🖹 113. ▪ Measured variables via HART protocol ▪ Burst Mode functionality

PROFIBUS PA

Manufacturer ID	0x11
Ident number	0x156C
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: ▪ www.endress.com ▪ www.profibus.org
Supported functions	▪ 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	▪ DIP switches on the I/O electronics module ▪ Local display ▪ Via operating tools (e.g. FieldCare)
Compatibility with earlier model	If the device is replaced, the measuring device Promag 500 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promag 500 GSD file. Earlier models: ▪ Promag 50 PROFIBUS PA – ID No.: 1525 (hex) – Extended GSD file: EH3x1525.gsd – Standard GSD file: EH3_1525.gsd ▪ Promag 53 PROFIBUS PA – ID No.: 1527 (hex) – Extended GSD file: EH3x1527.gsd – Standard GSD file: EH3_1527.gsd Description of the function scope of compatibility: Operating Instructions → 113.
System integration	Information regarding system integration: Operating Instructions → 113. ▪ Cyclic data transmission ▪ Block model ▪ Description of the modules

PROFIBUS DP

Manufacturer ID	0x11
Ident number	0x1570
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: ▪ www.endress.com On the product page for the device: Documents/Software → Device drivers ▪ www.profibus.org
Supported functions	▪ 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	▪ DIP switches on the I/O electronics module ▪ Via operating tools (e.g. FieldCare)
System integration	Information regarding system integration: Operating Instructions → 🖹 113. ▪ Cyclic data transmission ▪ Block model ▪ Description of the modules

EtherNet/IP

Protocol	▪ The CIP Networks Library Volume 1: Common Industrial Protocol ▪ The CIP Networks Library Volume 2: EtherNet/IP Adaptation of CIP
Communication type	▪ 10Base-T ▪ 100Base-TX
Device profile	Generic device (product type: 0x2B)
Manufacturer ID	0x11
Device type ID	0x103C
Baud rates	Automatic $^{10}/_{100}$ Mbit with half-duplex and full-duplex detection
Polarity	Auto-polarity for automatic correction of crossed TxD and RxD pairs
Supported CIP connections	Max. 3 connections
Explicit connections	Max. 6 connections
I/O connections	Max. 6 connections (scanner)
Configuration options for measuring device	▪ DIP switches on the electronics module for IP addressing ▪ Manufacturer-specific software (FieldCare) ▪ Add-on Profile Level 3 for Rockwell Automation control systems ▪ Web browser ▪ Electronic Data Sheet (EDS) integrated in the measuring device
Configuration of the EtherNet interface	▪ Speed: 10 MBit, 100 MBit, auto (factory setting) ▪ Duplex: half-duplex, full-duplex, auto (factory setting)
Configuration of the device address	▪ DIP switches on the electronics module for IP addressing (last octet) ▪ DHCP ▪ Manufacturer-specific software (FieldCare) ▪ Add-on Profile Level 3 for Rockwell Automation control systems ▪ Web browser ▪ EtherNet/IP tools, e.g. RSLinx (Rockwell Automation)
Device Level Ring (DLR)	Yes
System integration	Information regarding system integration: Operating Instructions → 🖹 113. ▪ Cyclic data transmission ▪ Block model ▪ Input and output groups

PROFINET

Protocol	"Application layer protocol for decentral device periphery and distributed automation", version 2.3
Communication type	100 MBit/s
Conformity class	Conformance Class B
Netload Class	Netload Class II
Baud rates	Automatic 100 Mbit/s with full-duplex detection
Cycle times	From 8 ms
Polarity	Auto-polarity for automatic correction of crossed TxD and RxD pairs

Media Redundancy Protocol (MRP)	Yes
Device profile	Application interface identifier 0xF600 Generic device
Manufacturer ID	0x11
Device type ID	0x843C
Device description files (GSD, DTM, DD)	Information and files under: ▪ www.endress.com On the product page for the device: Documents/Software → Device drivers ▪ www.profibus.org
Supported connections	▪ 1 x AR (IO Controller AR) ▪ 1 x AR (IO-Supervisor Device AR connection allowed) ▪ 1 x Input CR (Communication Relation) ▪ 1 x Output CR (Communication Relation) ▪ 1 x Alarm CR (Communication Relation)
Configuration options for measuring device	▪ DIP switches on the electronics module, for device name assignment (last part) ▪ Manufacturer-specific software (FieldCare, DeviceCare) ▪ Web browser ▪ Device master file (GSD), can be read out via the integrated Web server of the measuring device
Configuration of the device name	▪ DIP switches on the electronics module, for device name assignment (last part) ▪ DCP protocol ▪ Process Device Manager (PDM) ▪ Integrated Web server
Supported functions	▪ Identification & Maintenance Simple device identification via: – Control system – Nameplate ▪ Measured value status The process variables are communicated with a measured value status ▪ Blinking feature via the onsite display for simple device identification and assignment ▪ Device operation via operating tools (e.g. FieldCare, DeviceCare, SIMATIC PDM)
System integration	Information regarding system integration: Operating Instructions → 🖹 113. ▪ Cyclic data transmission ▪ Overview and description of the modules ▪ Status coding ▪ Startup configuration ▪ Factory setting:

FOUNDATION Fieldbus

Manufacturer ID	0x452B48 (hex)
Ident number	0x103C (hex)
Device revision	1
DD revision	Information and files under: ▪ www.endress.com ▪ www.fieldbus.org
CFF revision	
Interoperability Test Kit (ITK)	Version 6.2.0
ITK Test Campaign Number	Information: ▪ 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: ▪ Restart ▪ ENP Restart ▪ Diagnostic ▪ Set to OOS ▪ Set to AUTO ▪ Read trend data ▪ Read event logbook
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	16
System integration	Information regarding system integration: Operating Instructions → 113. ▪ Cyclic data transmission ▪ Description of the modules ▪ Execution times ▪ Methods

Modbus RS485

Protocol	Modbus Applications Protocol Specification V1.1
Response times	▪ 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	▪ 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: ▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers

Supported baud rate	▪ 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	▪ ASCII ▪ RTU
Data access	Each device parameter can be accessed via Modbus RS485. For Modbus register information
Compatibility with earlier model	If the device is replaced, the measuring device Promag 500 supports the compatibility of the Modbus registers for the process variables and the diagnostic information with the previous model Promag 53. It is not necessary to change the engineering parameters in the automation system. Description of the function scope of compatibility: Operating Instructions → 113.
System integration	Information on system integration: Operating Instructions → 113. ▪ Modbus RS485 information ▪ Function codes ▪ Register information ▪ Response time ▪ Modbus data map

Power supply

Terminal assignment

Transmitter: supply voltage, input/outputs

HART

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (–)	26 (+)	27 (–)	24 (+)	25 (–)	22 (+)	23 (–)
		The terminal assignment depends on the specific device version ordered → 14.					

FOUNDATION Fieldbus

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (–)	26 (A)	27 (B)	24 (+)	25 (–)	22 (+)	23 (–)
		The terminal assignment depends on the specific device version ordered → 14.					

PROFIBUS PA

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (–)	26 (B)	27 (A)	24 (+)	25 (–)	22 (+)	23 (–)
		The terminal assignment depends on the specific device version ordered → 14.					

PROFIBUS DP

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (–)	26 (B)	27 (A)	24 (+)	25 (–)	22 (+)	23 (–)
		The terminal assignment depends on the specific device version ordered → 14.					

PROFINET

Supply voltage		Input/output 1	Input/output 2		Input/output 3	
1 (+)	2 (–)	PROFINET (RJ45 connector)	24 (+)	25 (–)	22 (+)	23 (–)
			The terminal assignment depends on the specific device version ordered → 14.			

Modbus RS485

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (–)	26 (B)	27 (A)	24 (+)	25 (–)	22 (+)	23 (–)
		The terminal assignment depends on the specific device version ordered → 14.					

EtherNet/IP

Supply voltage		Input/output 1	Input/output 2		Input/output 3	
1 (+)	2 (–)	EtherNet/IP (RJ45 connector)	24 (+)	25 (–)	22 (+)	23 (–)
			The terminal assignment depends on the specific device version ordered → 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 → 32

Device plugs available

Device plugs may not be used in hazardous areas!

Device plugs for fieldbus systems:
Order code for "Input; output 1"
- Option **SA** "FOUNDATION Fieldbus" → 28
- Option **GA** "PROFIBUS PA" → 28
- Option **RA** "PROFINET" → 29
- Option **NA** "EtherNet/IP" → 29

Device plug for connecting to the service interface:
Order code for "Accessory mounted"
option **NB**, adapter RJ45 M12 (service interface) → 30

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

Order code for "Electrical connection"	Cable entry/connection → 32	
	2	3
M, 3, 4, 5	7/8" connector	–

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

Order code for "Electrical connection"	Cable entry/connection → 32	
	2	3
L, N, P, U	Connector M12 × 1	–

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

Order code for "Electrical connection"	Cable entry/connection → 🖹 32	
	2	3
L, N, P, U	Connector M12 × 1	–
R [1) 2)], S [1) 2)], T [1) 2)], V [1) 2)]	Connector M12 × 1	Connector M12 × 1

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

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

Order code for "Electrical connection"	Cable entry/connection → 🖹 32	
	2	3
L, N, P, U	Connector M12 × 1	–
R [1) 2)], S [1) 2)], T [1) 2)], V [1) 2)]	Connector M12 × 1	Connector M12 × 1

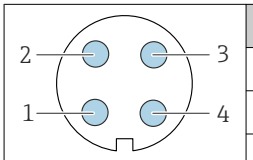
1) Cannot be combined with an external WLAN antenna (order code for "Enclosed accessories", option P8) of an RJ45 M12 adapter for the service interface (order code for "Accessories mounted", option NB) or of the remote display and operating module DKX001
2) Suitable for integrating the device in a ring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

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

Order code "Accessory mounted"	Cable entry/coupling → 🖹 32	
	Cable entry 2	Cable entry 3
NB	Plug M12 × 1	–

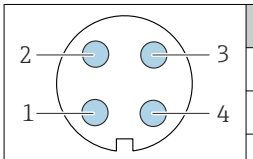
Pin assignment, device plug

FOUNDATION Fieldbus



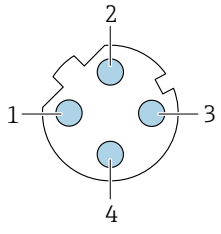
Pin	Assignment		Coding	Plug/socket
1	+	Signal +	A	Plug
2	-	Signal –		
3		Grounding		
4		Not assigned		

PROFIBUS PA



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

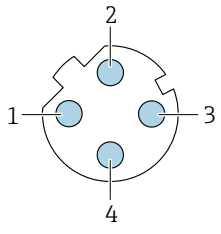
PROFINET



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

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

EtherNet/IP

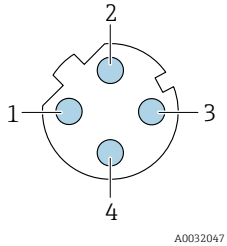


Pin		Assignment
1	+	Tx
2	+	Rx
3	-	Tx
4	-	Rx
Coding		**Plug/socket**
D		Socket

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

Service interface

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



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

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

Supply voltage

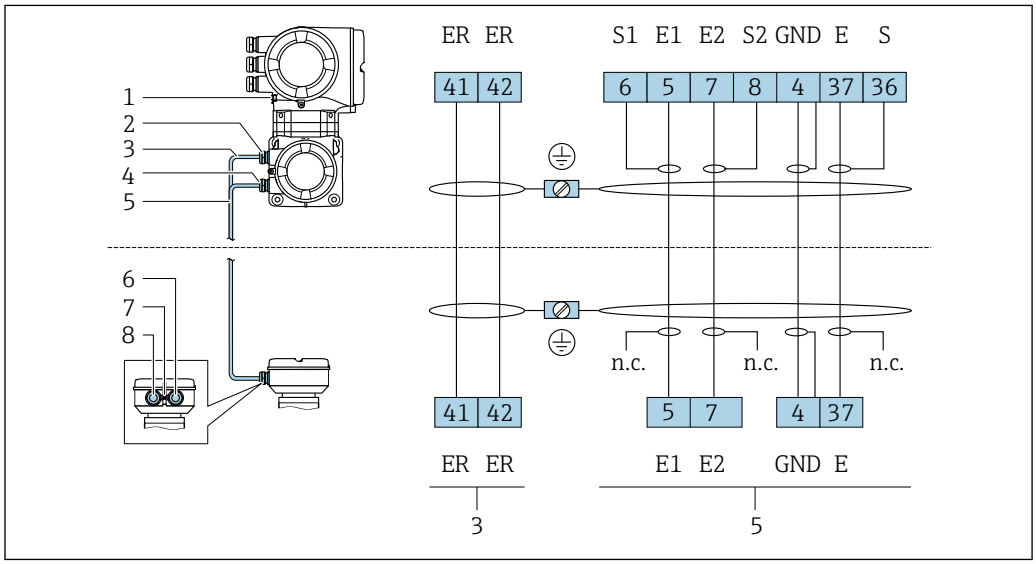
Order code for "Power supply"	terminal voltage		Frequency range
Option **D**	DC24 V	±20%	–
Option **E**	AC100 to 240 V	–15…+10%	50/60 Hz, ±4 Hz
Option **I**	DC24 V	±20%	–
	AC100 to 240 V	–15…+10%	50/60 Hz, ±4 Hz

Power consumption	**Transmitter** Max. 10 W (active power)
Current consumption	**Transmitter** ▪ Max. 400 mA (24 V) ▪ Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)
Power supply failure	Depending on the device version, the configuration is retained in the device memoryor in the pluggable data memory (HistoROM DAT).

Electrical connection

Connection of the connecting cable

The connecting cable is connected via terminals.

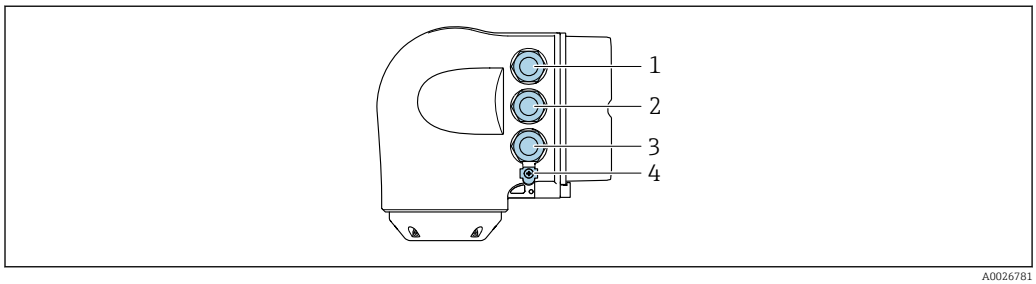


A0029145

1 *Protective ground (PE)*
2 *Cable entry for coil current cable on transmitter connection housing*
3 *Coil current cable*
4 *Cable entry for signal cable on transmitter connection housing*
5 *Signal cable*
6 *Cable entry for signal cable on sensor connection housing*
7 *Cable entry for coil current cable on sensor connection housing*
8 *Protective ground (PE)*

Connecting the transmitter

- Terminal assignment → 27
- Device plug pin assignment → 29



A0026781

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

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

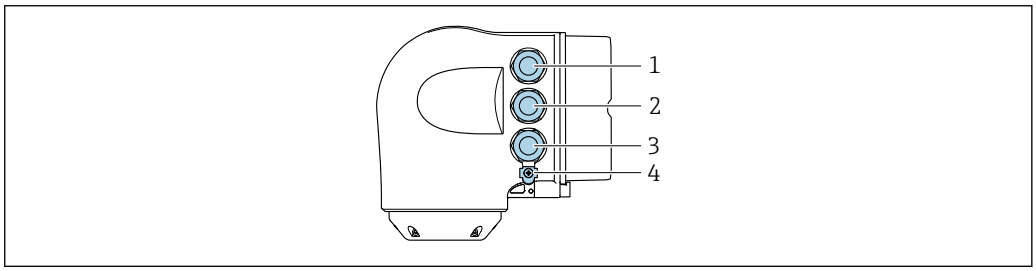
The adapter connects the service interface (CDI-RJ45) to an M12 connector mounted in the cable entry. Therefore the connection to the service interface can be established via an M12 connector without opening the device.

Network connection (DHCP client) via service interface (CDI-RJ45) → 101

Connecting in a ring topology

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

Integrating the transmitter into a ring topology:
- EtherNet/IP → 99
- PROFINET → 100



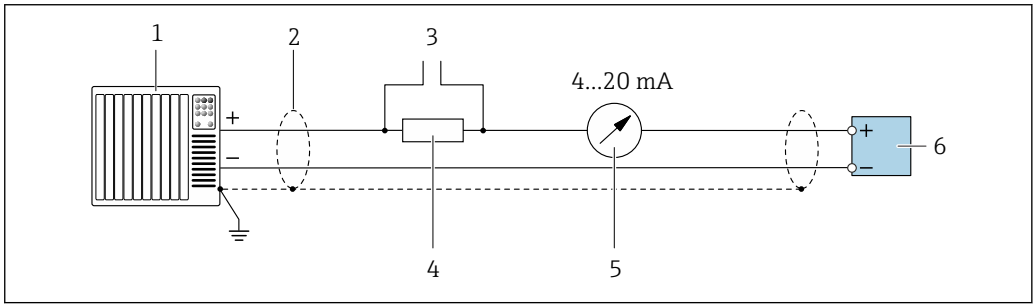
A0026781

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

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

Connection examples

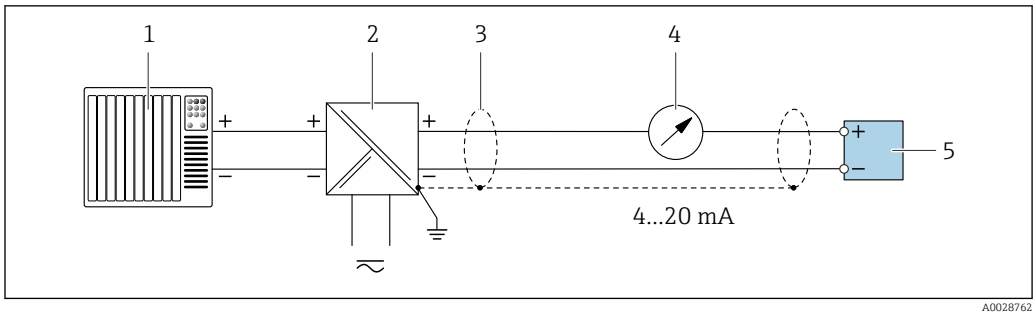
Current output 4 to 20 mA HART



A0029055

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

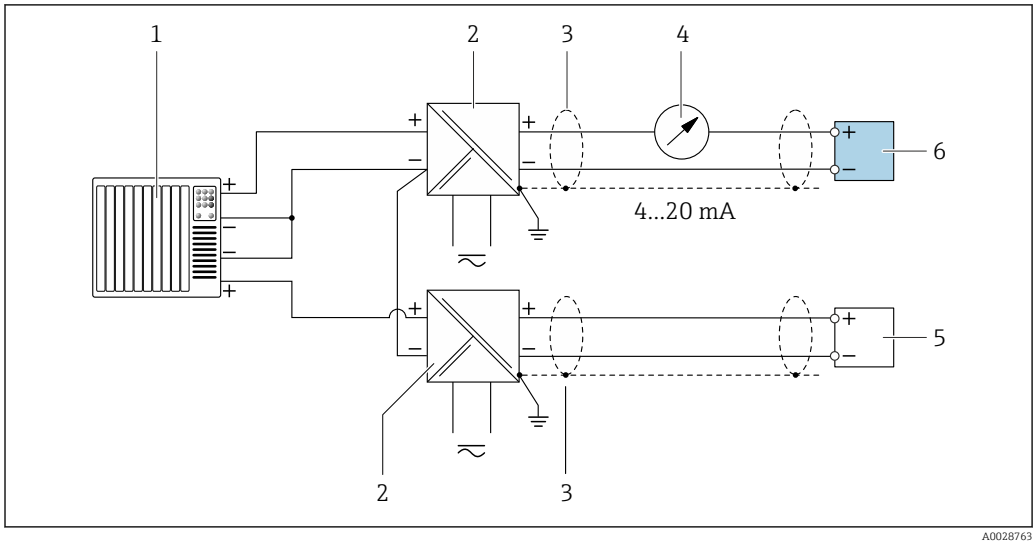
1 Automation system with current input (e.g. PLC)
2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 43
3 Connection for HART operating devices → 95
4 Resistor for HART communication (≥ 250 Ω): observe maximum load → 15
5 Analog display unit: observe maximum load → 15
6 Transmitter



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 → 43*
4 *Analog display unit: observe maximum load → 15*
5 *Transmitter*

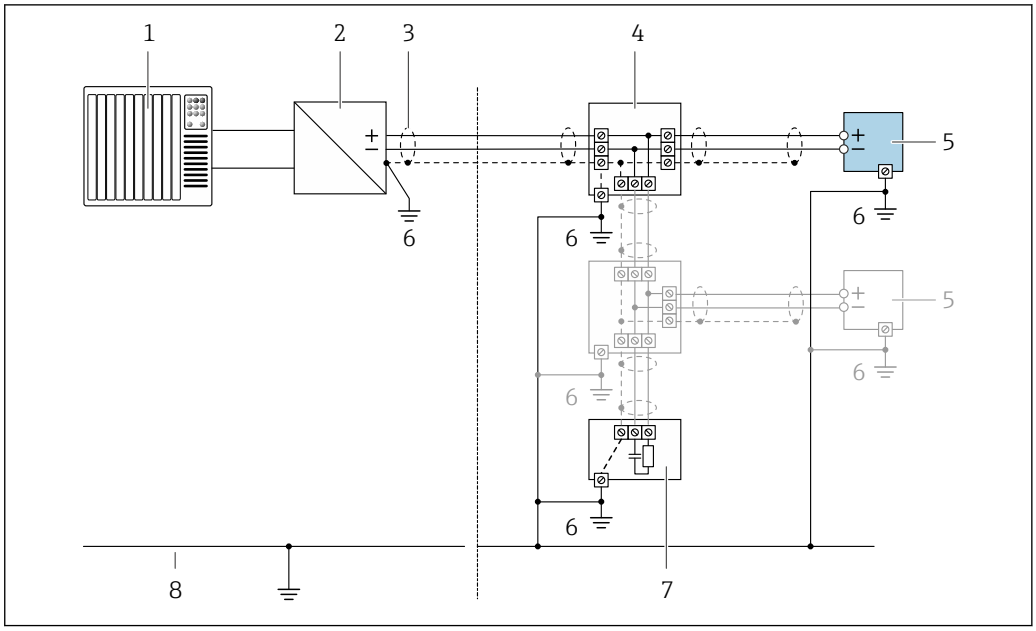
HART input



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*

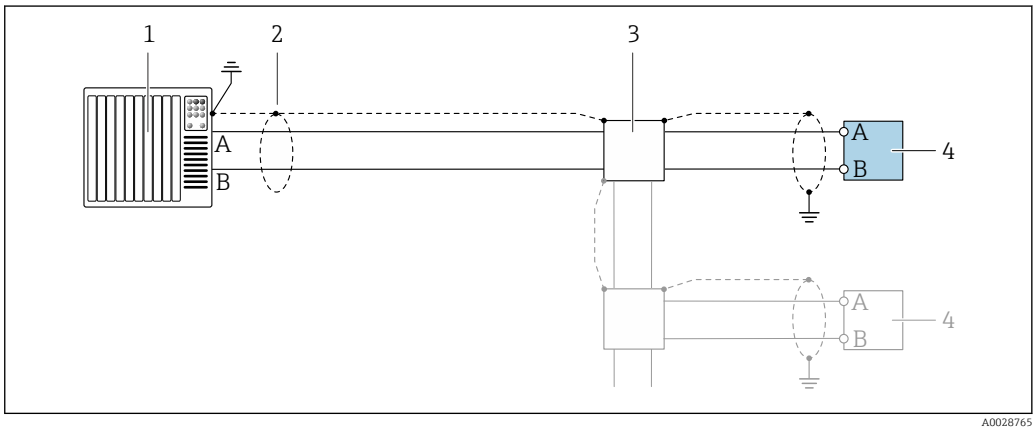
PROFIBUS PA



5 *Connection example for PROFIBUS PA*

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

PROFIBUS DP

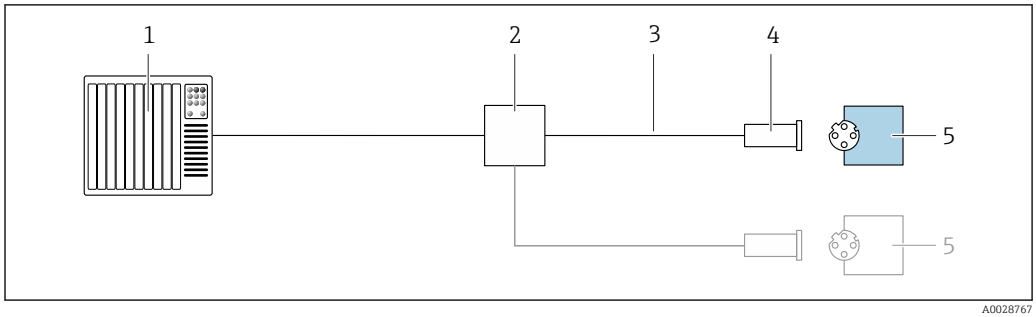


6 *Connection example for PROFIBUS DP, non-hazardous area and Zone 2/Div. 2*

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

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

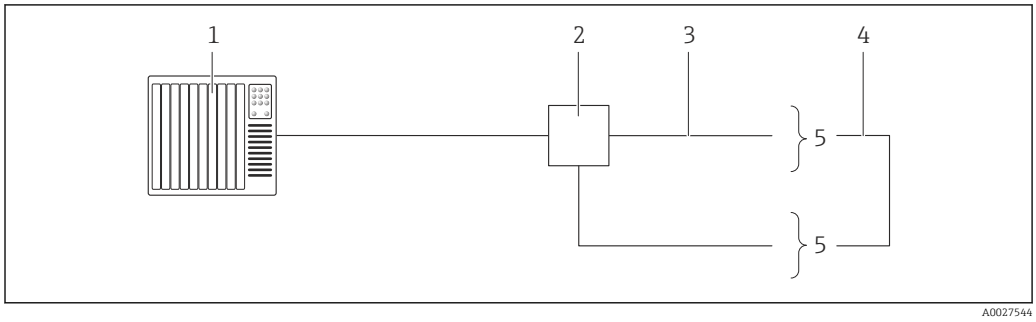
EtherNet/IP



7 Connection example for EtherNet/IP

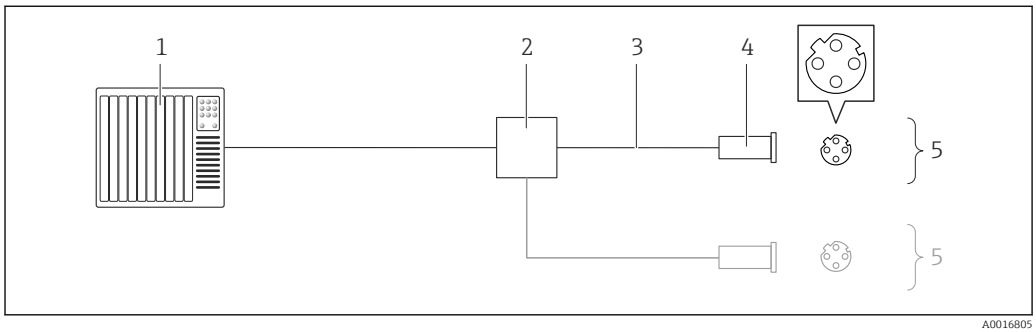
1 *Control system (e.g. PLC)*
2 *Ethernet switch*
3 *Observe cable specifications*
4 *Device plug*
5 *Transmitter*

EtherNet/IP: DLR (Device Level Ring)



1 *Control system (e.g. PLC)*
2 *Ethernet switch*
3 *Observe cable specifications* → *43*
4 *Connecting cable between the two transmitters*
5 *Transmitter*

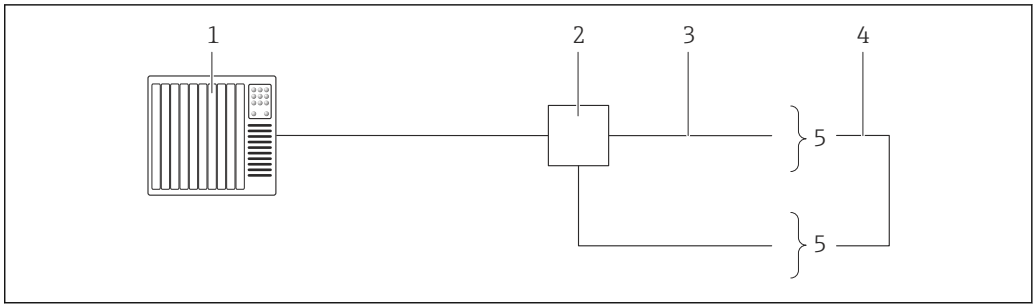
PROFINET



8 Connection example for PROFINET

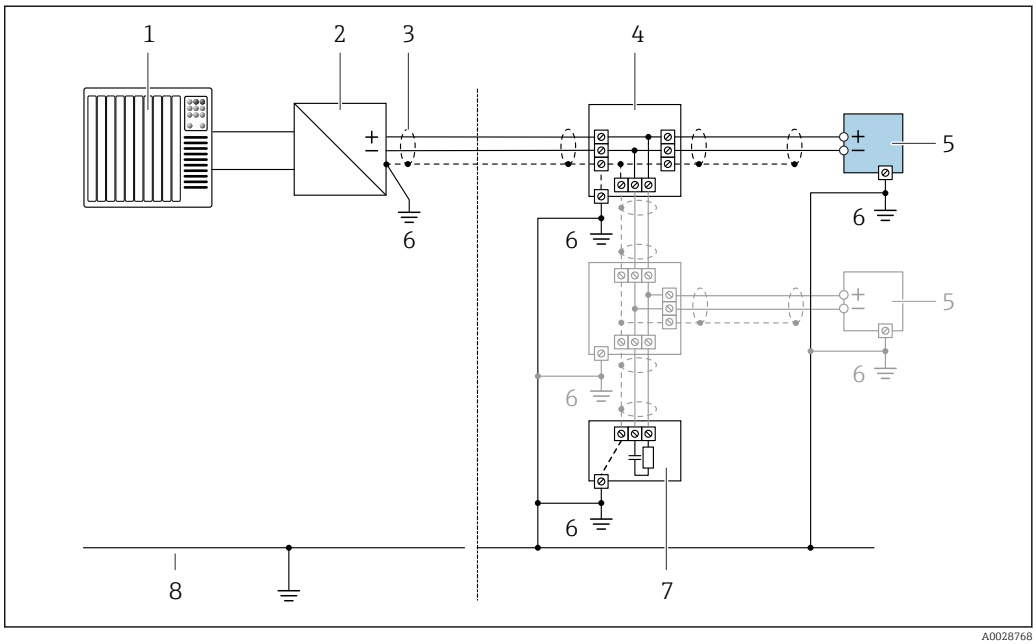
1 *Control system (e.g. PLC)*
2 *Ethernet switch*
3 *Observe cable specifications*
4 *Device plug*
5 *Transmitter*

PROFINET: MRP (Media Redundancy Protocol)



1 Control system (e.g. PLC)
2 Ethernet switch
3 Observe cable specifications → 📄 43
4 Connecting cable between the two transmitters
5 Transmitter

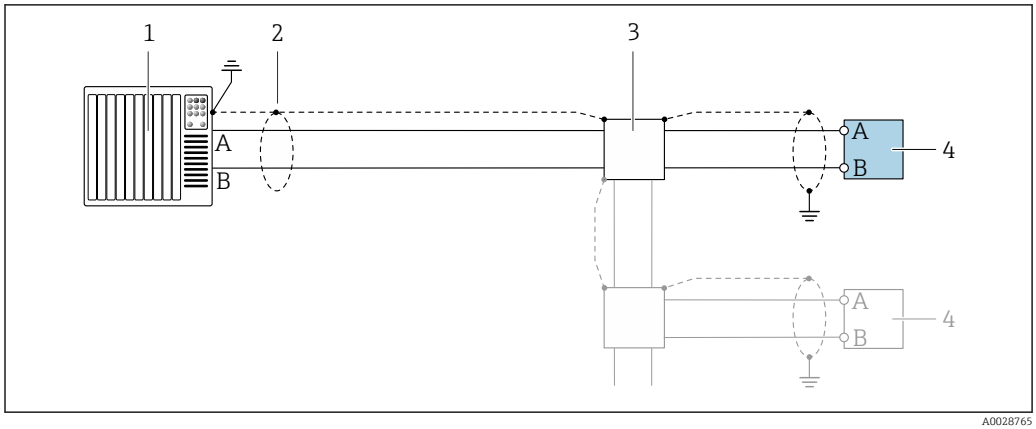
FOUNDATION Fieldbus



📄 *9 Connection example for FOUNDATION Fieldbus*

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

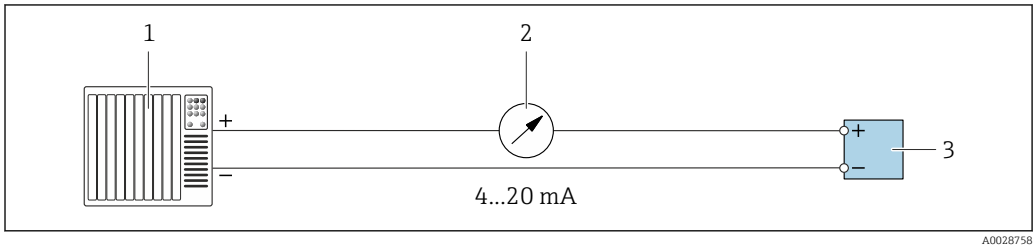
Modbus RS485



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

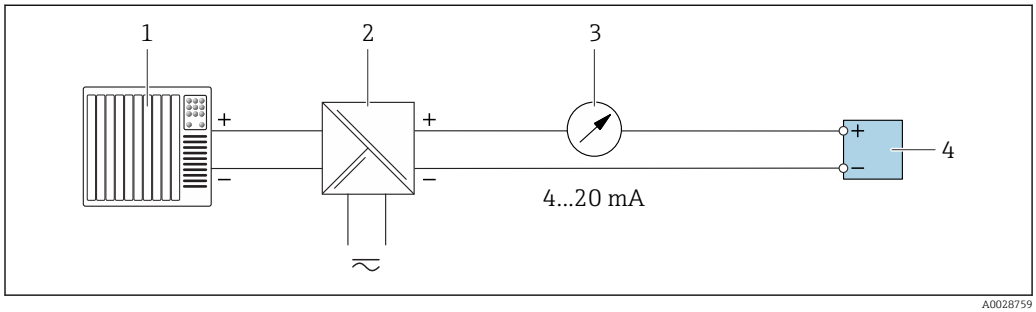
1 Control system (e.g. PLC)
2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
3 Distribution box
4 Transmitter

Current output 4-20 mA



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

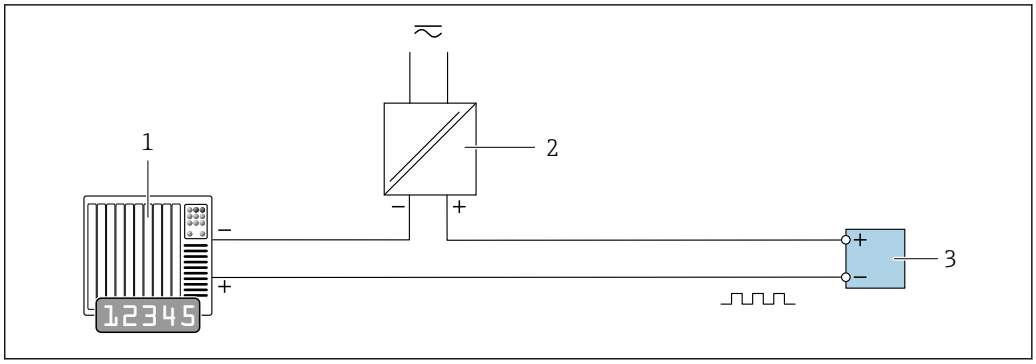
1 Automation system with current input (e.g. PLC)
2 Analog display unit: observe maximum load
3 Transmitter



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

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

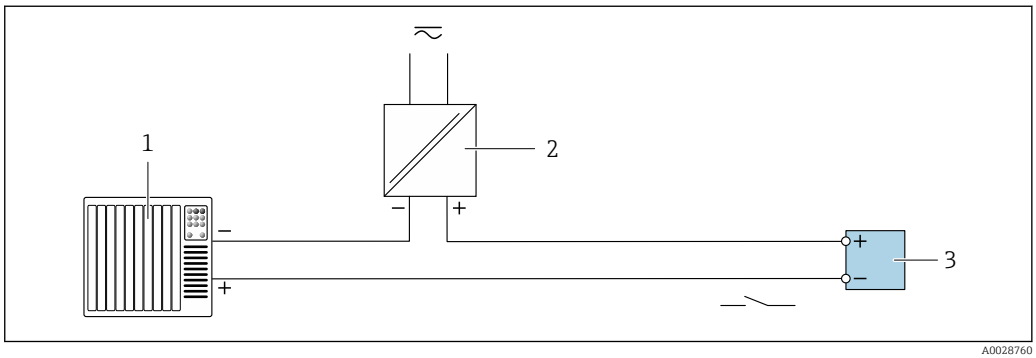
Pulse/frequency output



13 Connection example for pulse/frequency output (passive)

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

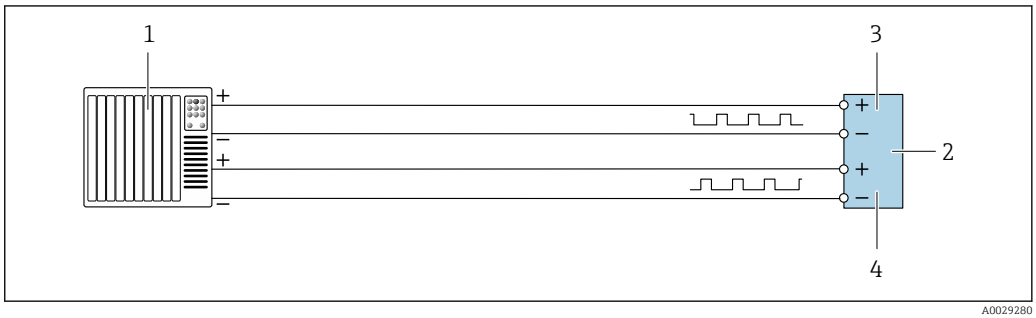
Switch output



14 Connection example for switch output (passive)

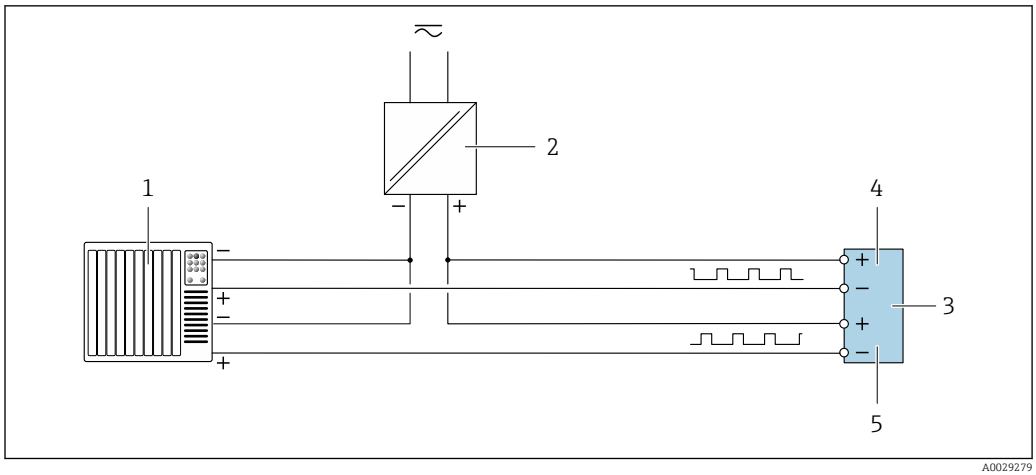
1 Automation system with switch input (e.g. PLC)
2 Power supply
3 Transmitter: Observe input values → 16

Double pulse output



15 Connection example for double pulse output (active)

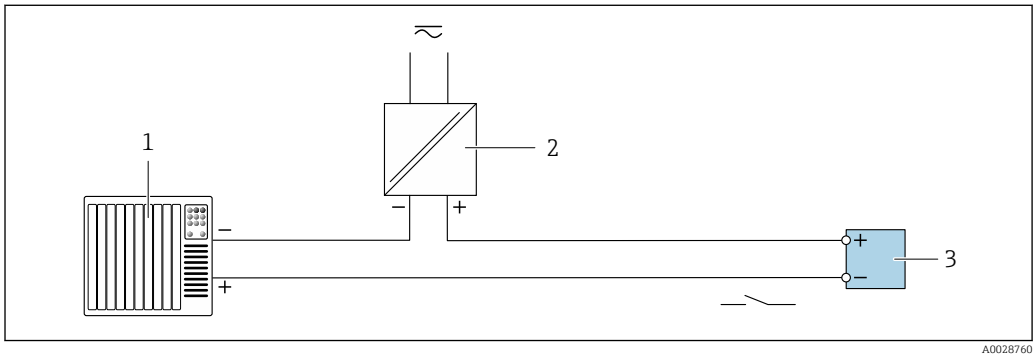
1 Automation system with double pulse input (e.g. PLC)
2 Transmitter: Observe input values → 17
3 Double pulse output
4 Double pulse output (slave), phase-shifted



16 *Connection example for double pulse output (passive)*

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

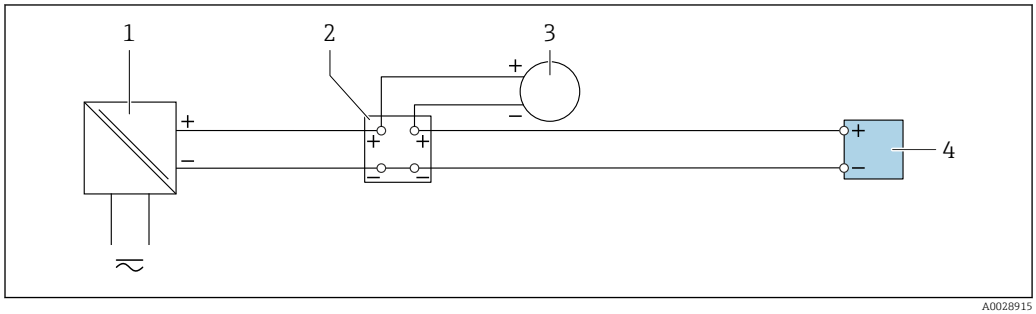
Relay output



17 *Connection example for relay output (passive)*

1 *Automation system with relay input (e.g. PLC)*
2 *Power supply*
3 *Transmitter: Observe input values → 18*

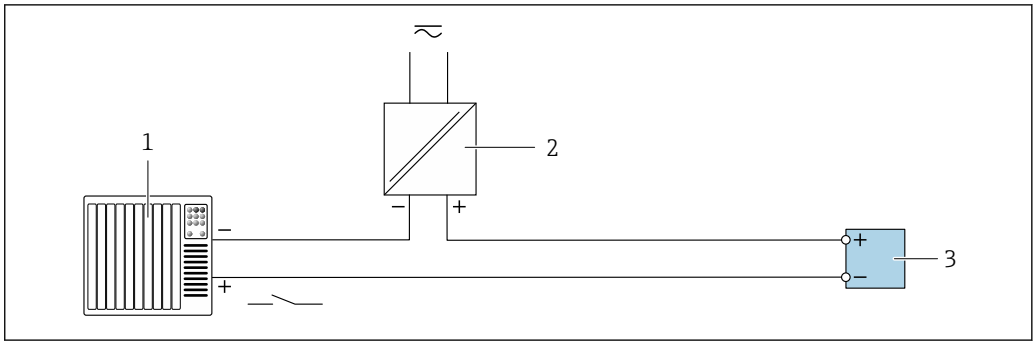
Current input



18 *Connection example for 4 to 20 mA current input*

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

Status input



19 *Connection example for status input*

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

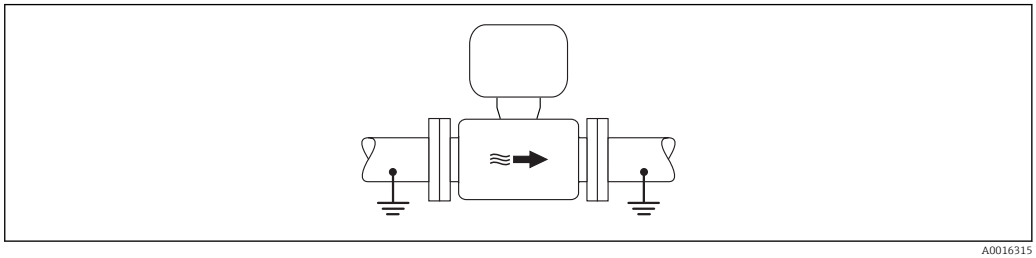
Potential equalization

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



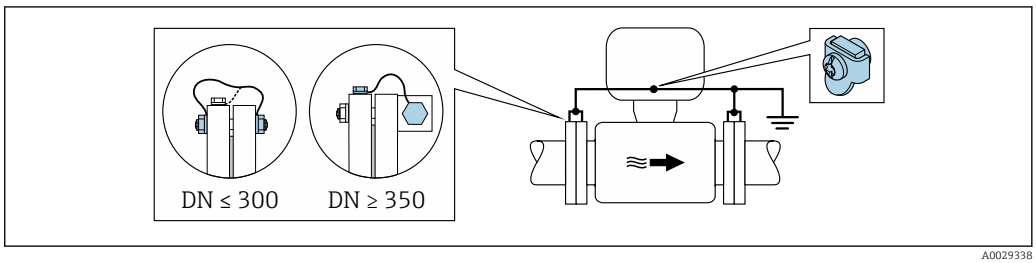
20 *Potential equalization via measuring tube*

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 mm² (0.0093 in²)



21 *Potential equalization via ground terminal and pipe flanges*

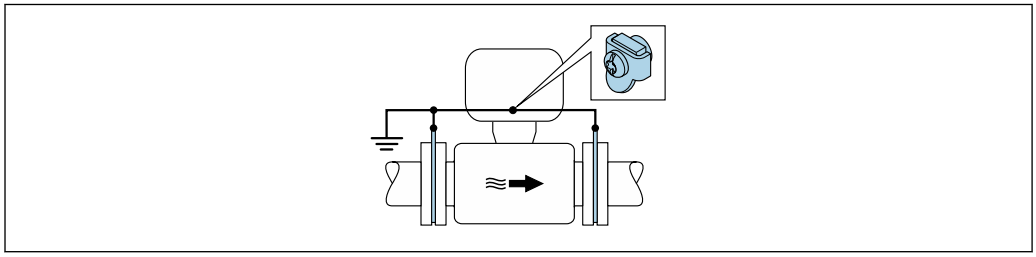
Note the following when installing:
- Connect both sensor flanges to the pipe flange via a ground cable and ground them.
- Connect the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for the purpose. To mount the ground cable:
  - If DN ≤ 300 (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.

You can order the necessary ground cable from Endress+Hauser: → 110.

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 mm² (0.0093 in²)



22 *Potential equalization via ground terminal and ground disks*

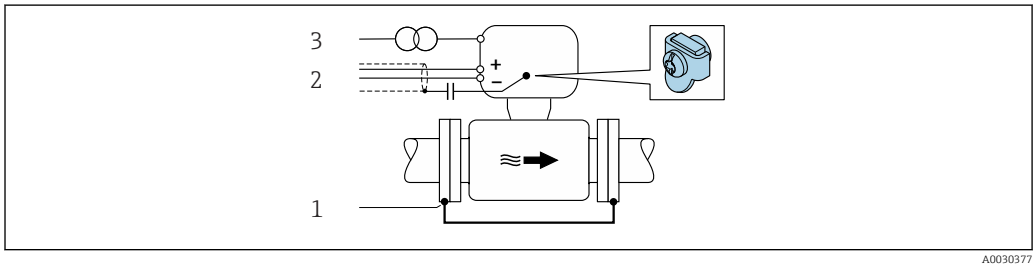
Note the following when installing:
The ground disks must be connected to the ground terminal via the ground cable and be connected to ground potential.

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 mm² (0.0093 in²)



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: → 110.

terminals

Spring-loaded terminals: Suitable for strands and strands with ferrules.
Conductor cross-section 0.2 to 2.5 mm² (24 to 12 AWG).

Cable entries

- Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT ½"
  - G ½"
  - M20
- Device plug for digital communication: M12
  Only available for certain device versions → 🖹 28.

Cable specification

Permitted temperature range

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

Power supply cable

Standard installation cable is sufficient.

Protective ground cable

Cable ≥2.08 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 networks see:

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

PROFIBUS DP

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

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 mm² (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.

For further information on planning and installing PROFIBUS networks see:

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

EtherNet/IP

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

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

PROFINET

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

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

FOUNDATION Fieldbus

Twisted, shielded two-wire cable.

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

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

Modbus RS485

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

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.

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

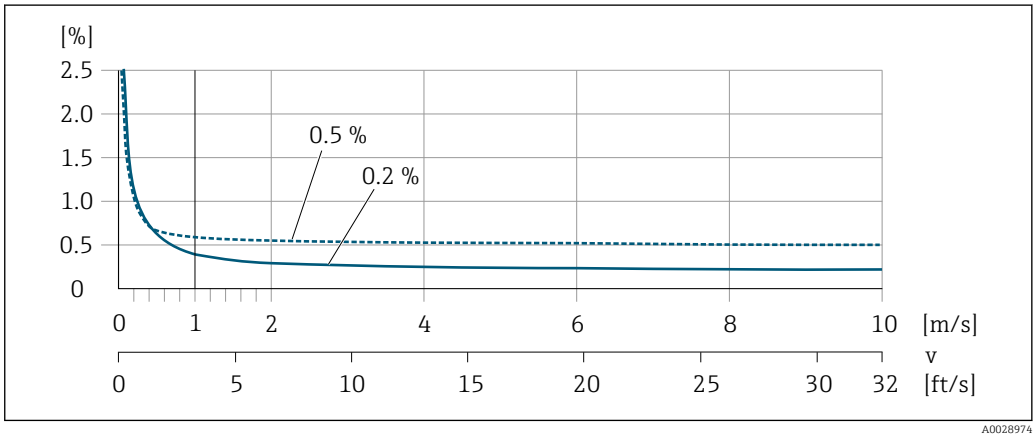
Error limits under reference operating conditions

o.r. = of reading

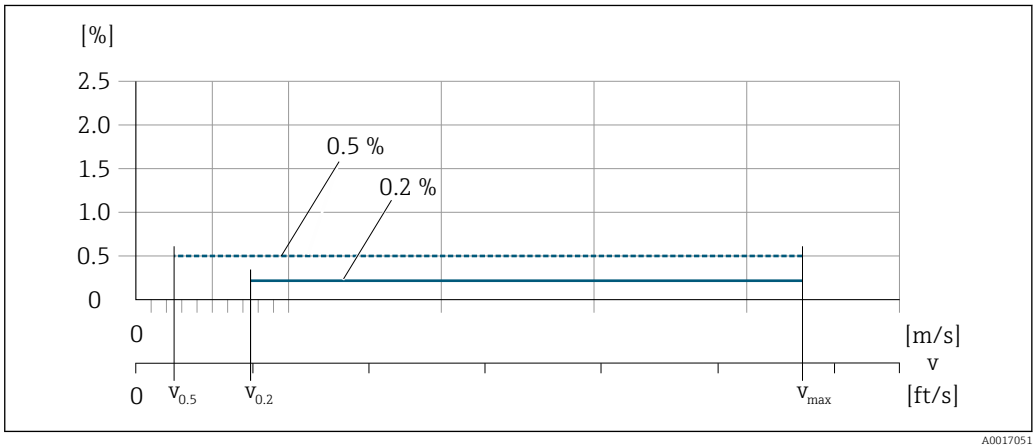
Volume flow

- ±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.



23 *Maximum measured error in % o.r.*



24 *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	±5 µA

Pulse/frequency output

o.r. = of reading

Accuracy	Max. ±50 ppm o.r. (over the entire ambient temperature range)

Repeatability

o.r. = of reading

Volume flow
Max. ±0.1 % o.r. ± 0.5 mm/s (0.02 in/s)

Electrical conductivity
Max. ±5 % o.r.

Influence of ambient temperature

Current output

Temperature coefficient	Max. 1 µA/°C

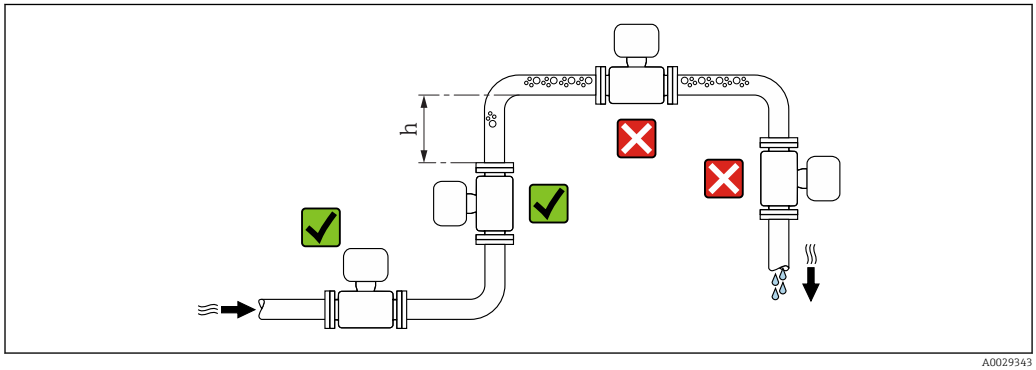
Pulse/frequency output

Temperature coefficient	No additional effect. Included in accuracy.

Installation

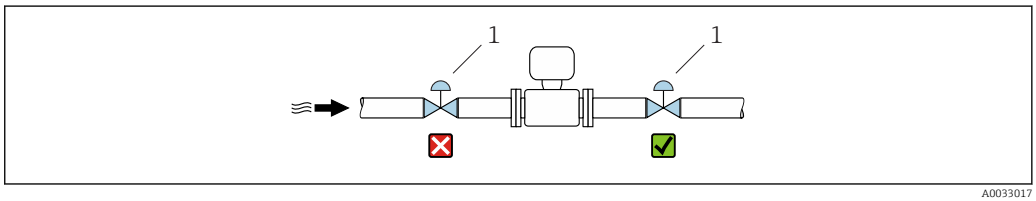
No special measures such as supports etc. are necessary. External forces are absorbed by the construction of the device.

Mounting location



Preferably install the sensor in an ascending pipe, and ensure a sufficient distance to the next pipe elbow: h ≥ 2 × DN

Not necessary in the case of order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

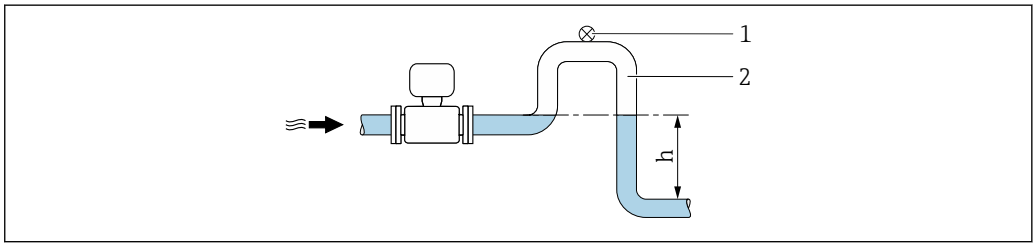


25 *Installation of the sensor after a control valve is not recommended*

1 Control valve

Installation in down pipes

Install a siphon with a vent valve downstream of the sensor in down pipes whose length h ≥ 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.

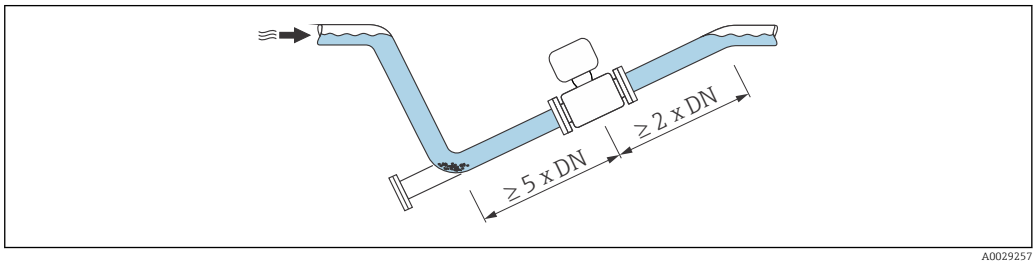


26 *Installation in a down pipe*

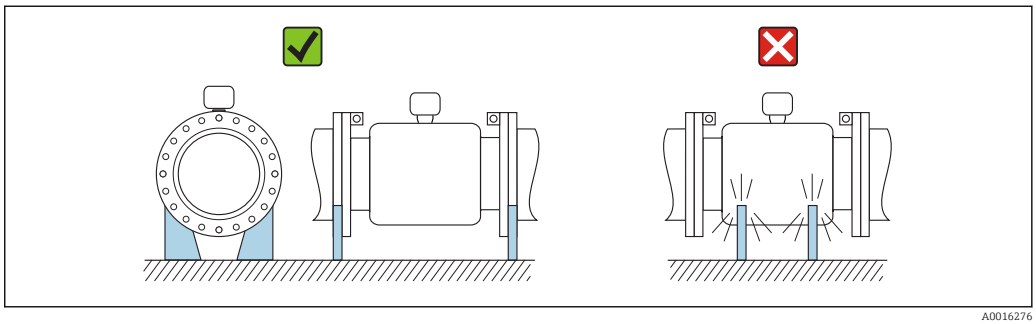
1 Vent valve
2 Pipe siphon
h Length of down pipe

Installation in partially filled pipes

A partially filled pipe with a gradient necessitates a drain-type configuration.

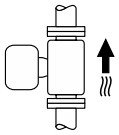
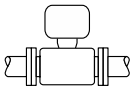
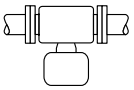
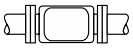


For heavy sensors DN ≥ 350 (14")



Orientation

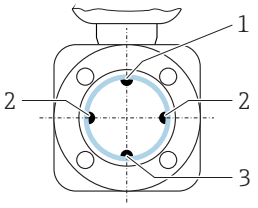
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

Orientation			Recommendation
A	Vertical orientation	 A0015591	✓✓
B	Horizontal orientation, transmitter at top	 A0015589	✓✓ 1)
C	Horizontal orientation, transmitter at bottom	 A0015590	✓✓ 2) 3)
D	Horizontal orientation, transmitter at side	 A0015592	✗

1) Applications with low process temperatures may decrease the ambient temperature. To maintain the minimum ambient temperature for the transmitter, this orientation is recommended.
2) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.
3) To prevent the electronics module from overheating in the case of a sharp rise in temperature (e.g. CIP or SIP processes), install the device with the transmitter component pointing downwards.

Horizontal

- 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.



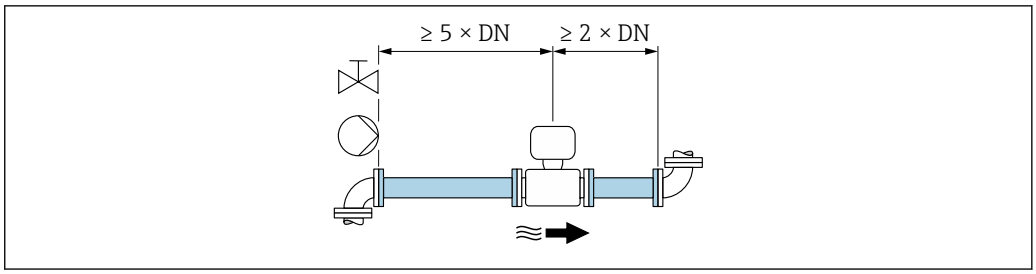
A0029344

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

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:



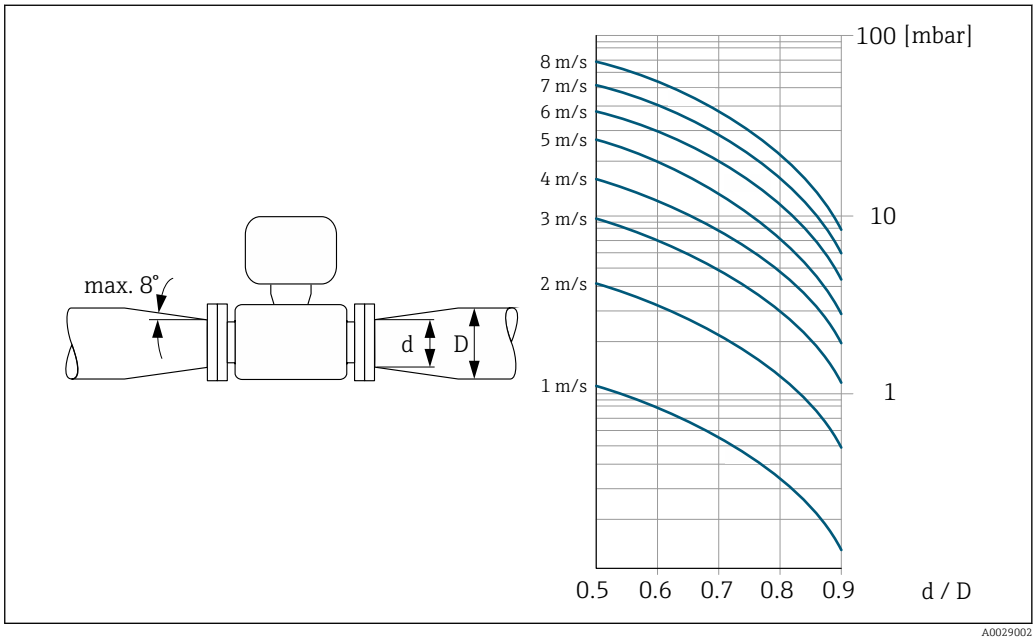
27 *Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"*

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.

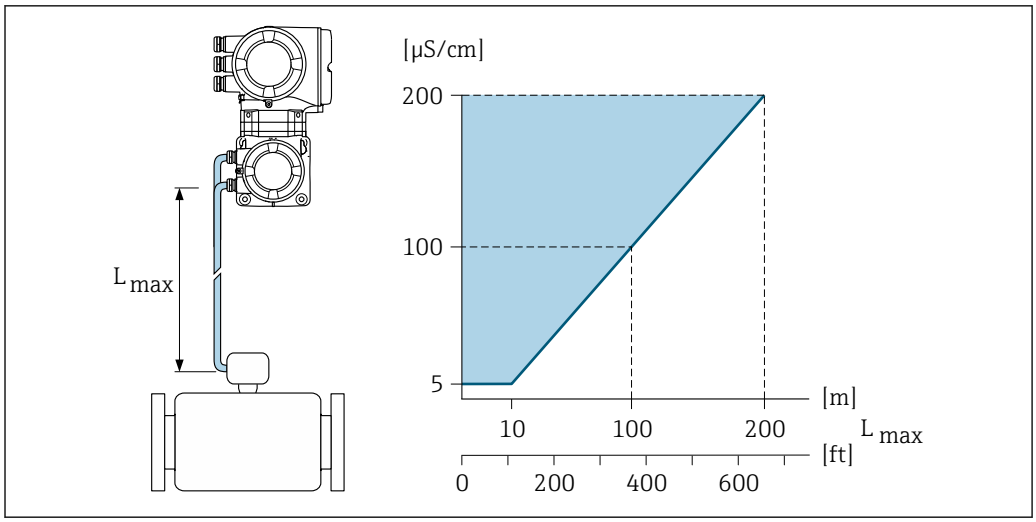
The nomogram only applies to liquids with a viscosity similar to that of water.



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 µS/cm

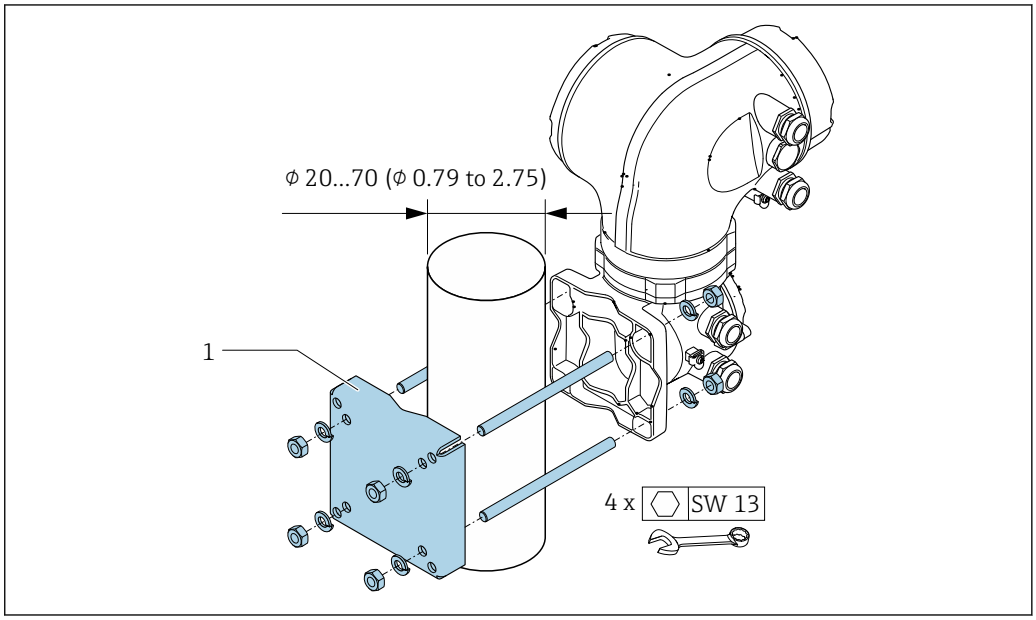


28 *Permitted length of connecting cable*

Colored area = permitted range
L_{max} = length of connecting cable in [m] ([ft])
[µS/cm] = fluid conductivity

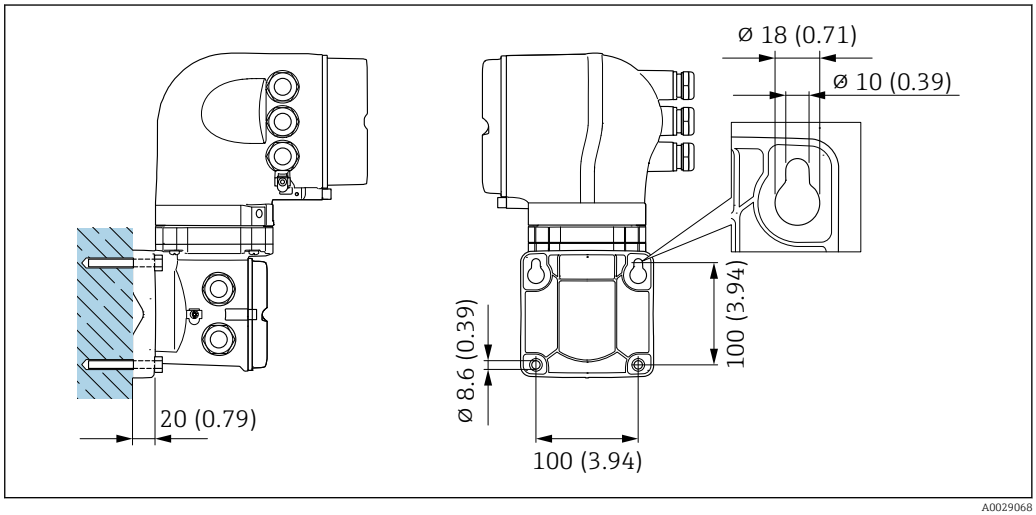
Mounting the transmitter housing

Post mounting



29 *Engineering unit mm (in)*

Wall mounting

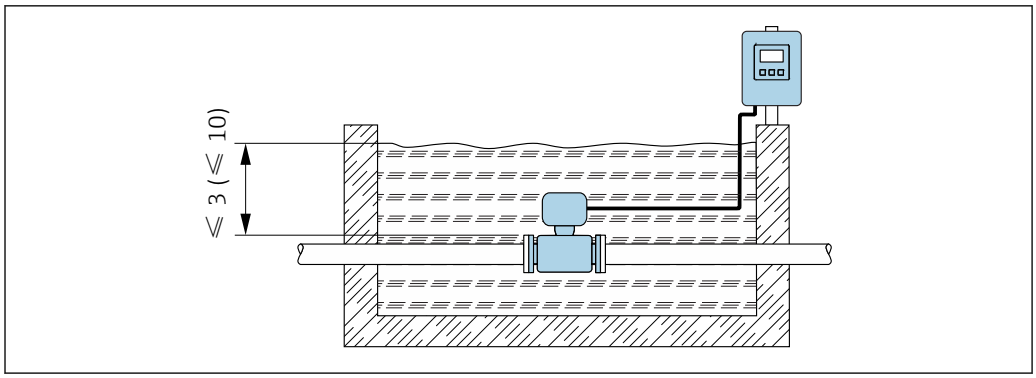


30 *Engineering unit mm (in)*

Special mounting instructions

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.



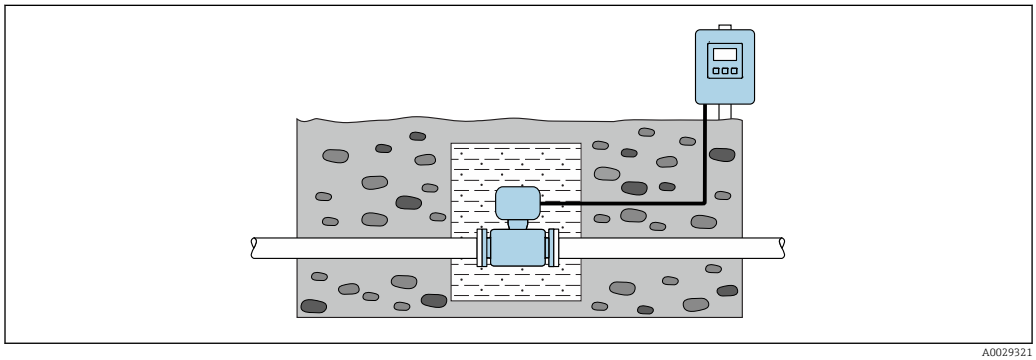
A0029320

31 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	▪ 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	▪ 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) Mount the transmitter separately from the sensor if both the ambient and fluid temperatures are high.
Liner	Do not exceed or fall below the permitted temperature range of the liner .

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

Storage temperature

The storage temperature corresponds to the operating temperature range of the transmitter and the sensor → 🖹 52.

- 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

- Vibration, sinusoidal according to IEC 60068-2-6
  - 2 to 8.4 Hz, 7.5 mm peak
  - 8.4 to 2 000 Hz, 2 g peak
- Vibration broad-band random, according to IEC 60068-2-64
  - 10 to 200 Hz, 0.01 g^2/Hz
  - 200 to 2 000 Hz, 0.003 g^2/Hz
  - Total: 2.70 g rms

Shock resistance

Shock, half-sine according to IEC 60068-2-27
6 ms 50 g

Shock resistance

Shock due to rough handling following IEC 60068-2-31

Mechanical load

- 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)
- Device version with PROFIBUS DP: Complies with emission limits for industry as per EN 50170 Volume 2, IEC 61784

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

Details are provided in the Declaration of Conformity.

Process

Medium temperature range

- 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

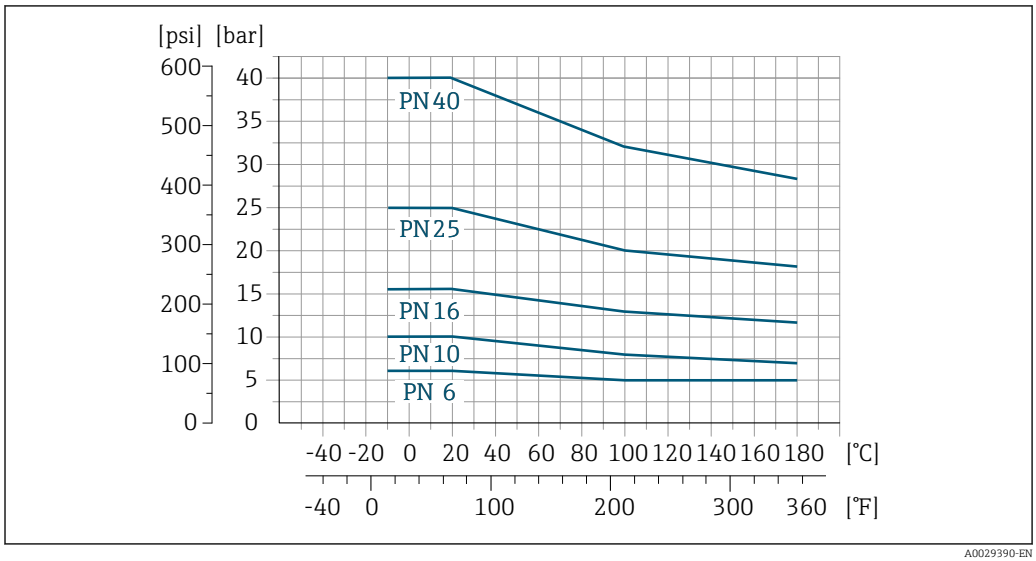
≥ 5 µS/cm for liquids in general. Stronger filter damping is required for very low conductivity values.

Proline 500
The necessary minimum conductivity also depends on the cable length → 49.

Pressure-temperature ratings

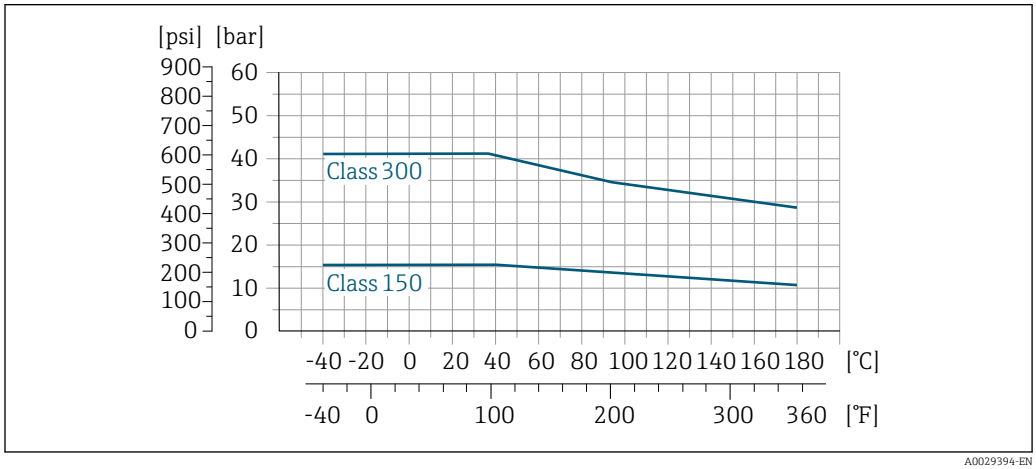
The following pressure/temperature diagrams apply to all pressure-bearing parts of the device and not just the process connection. The diagrams show the maximum permissible medium pressure depending on the specific medium temperature.

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

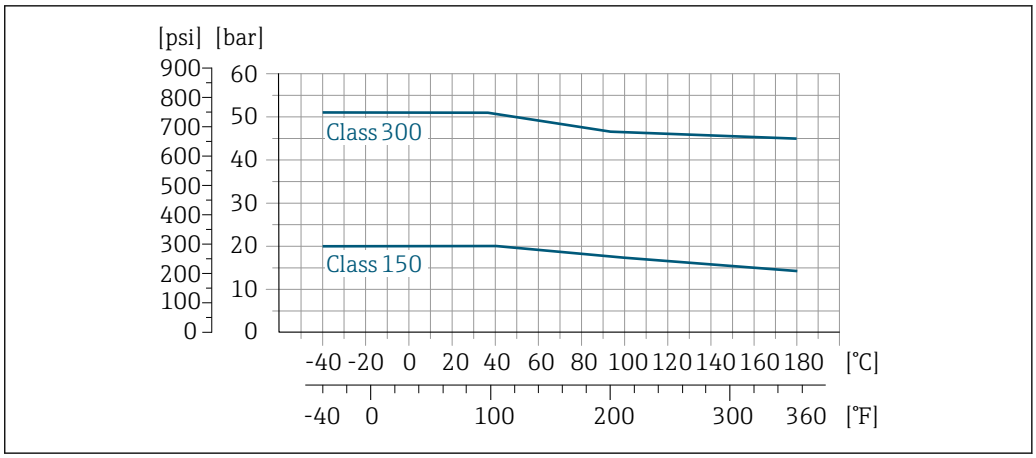


32 *Process connection material: stainless steel, 1.4404/1.4571/F316L; carbon steel, A105/FE410WB/P250GH/S235JRG2/S235JR+N*

Process connection: fixed flange according to ASME B16.5

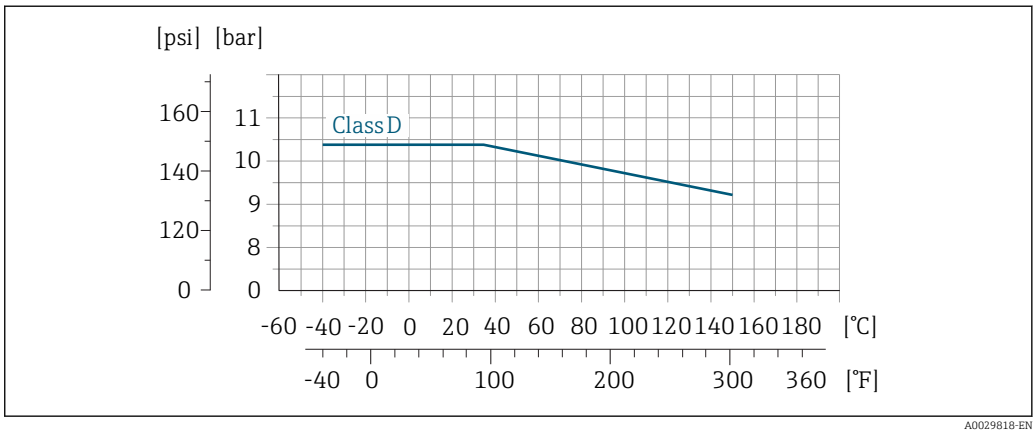


33 *Process connection material: stainless steel, F316L similar to 1.4404*



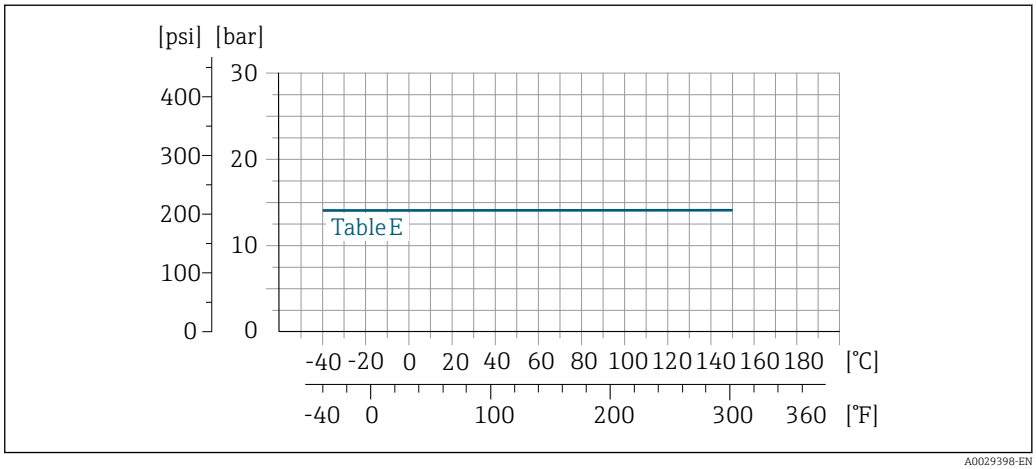
34 *Process connection material: carbon steel, A105/A515(70)*

Process connection: fixed flange according to AWWA C207



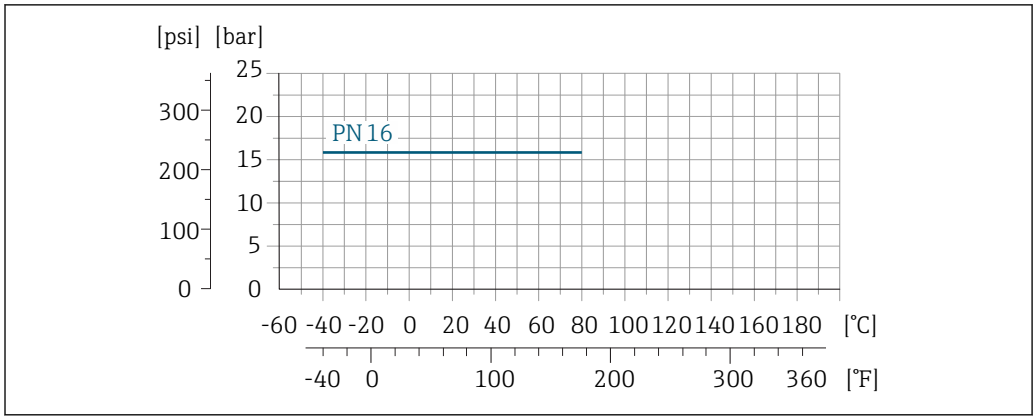
35 *Process connection material: carbon steel, A105/A181/P265GH/S275JR*

Process connection: fixed flange according to AS 2129



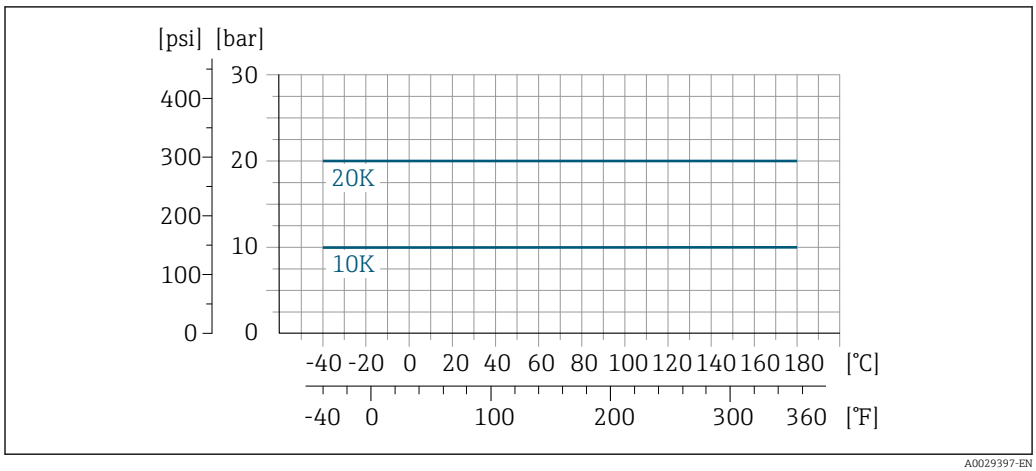
36 *Process connection material: carbon steel, A105/FE410WB/P235GH/P265GH/S235JRG2*

Process connection: fixed flange according to AS 4087



37 *Process connection material: carbon steel, A105/P265GH/S275JR*

Process connection: fixed flange according to JIS B2220



38 *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 medium 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 medium temperatures:	
[mm]	[in]	+25 °C (+77 °F)	+50 °C (+122 °F)
25...1200	1...48	0 (0)	0 (0)

Flow limit

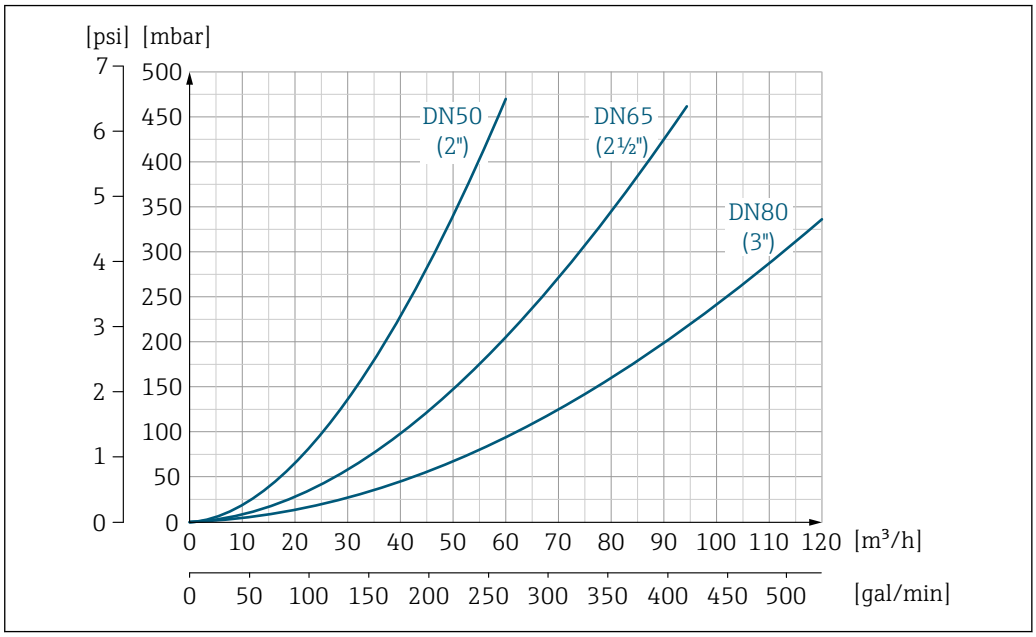
The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum velocity of flow is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the fluid:
- v < 2 m/s (6.56 ft/s): for abrasive fluids (e.g. potter's clay, lime milk, ore slurry)
- v > 2 m/s (6.56 ft/s): for fluids producing buildup (e.g. wastewater sludge)

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

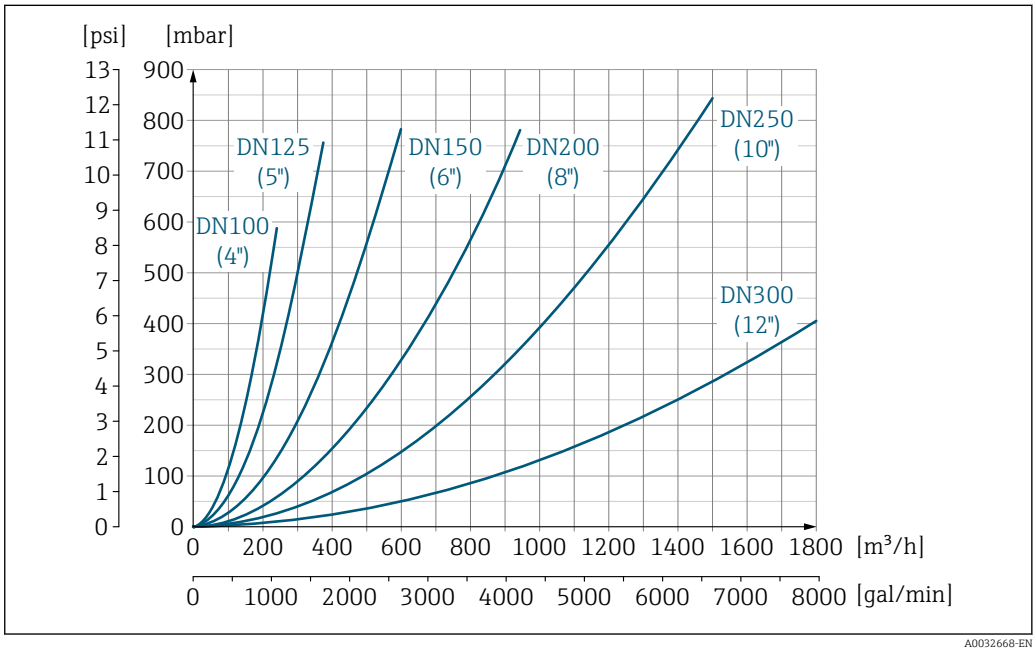
For an overview of the full scale values for the measuring range, see the "Measuring range" section → 10

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 → 49

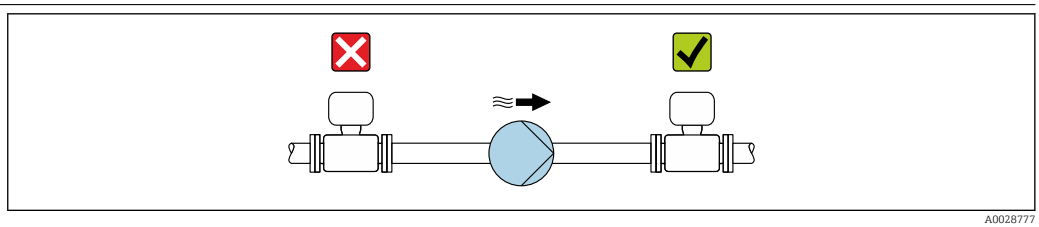


39 *Pressure loss DN 50 to 80 (2 to 3") in the case of order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"*



40 *Pressure loss DN 100 to 300 (4 to 12") in the case of order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"*

System pressure

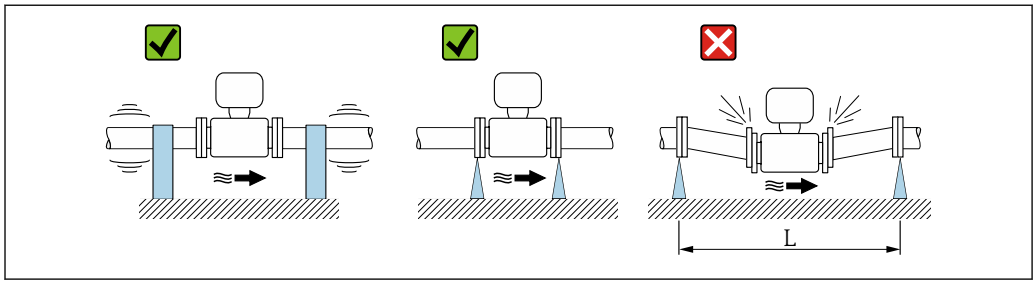


Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.

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

- Information on the liner's resistance to partial vacuum → 56
- Information on the shock resistance of the measuring system → 53
- Information on the vibration resistance of the measuring system → 53

Vibrations



41 *Measures to avoid device vibrations (L > 10 m (33 ft))*

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.

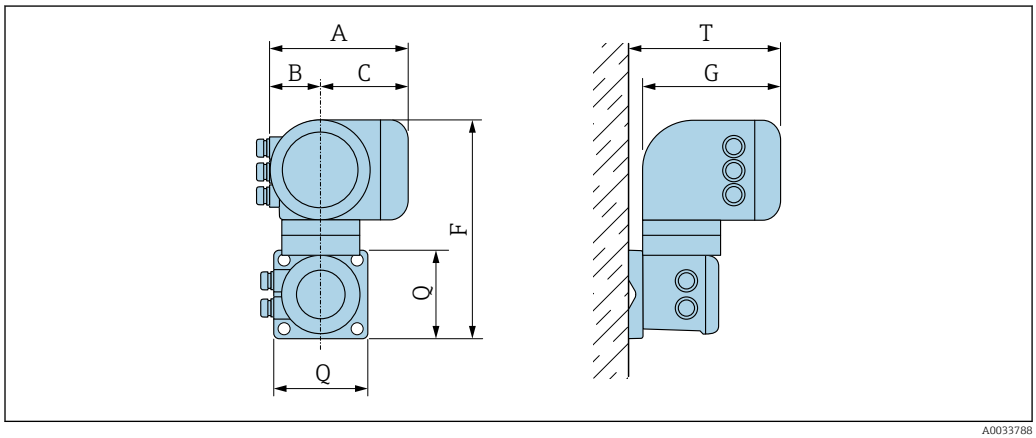
- Information on the shock resistance of the measuring system → 53
- Information on the vibration resistance of the measuring system → 53

Mechanical construction

Dimensions in SI units

Housing of Proline 500 transmitter

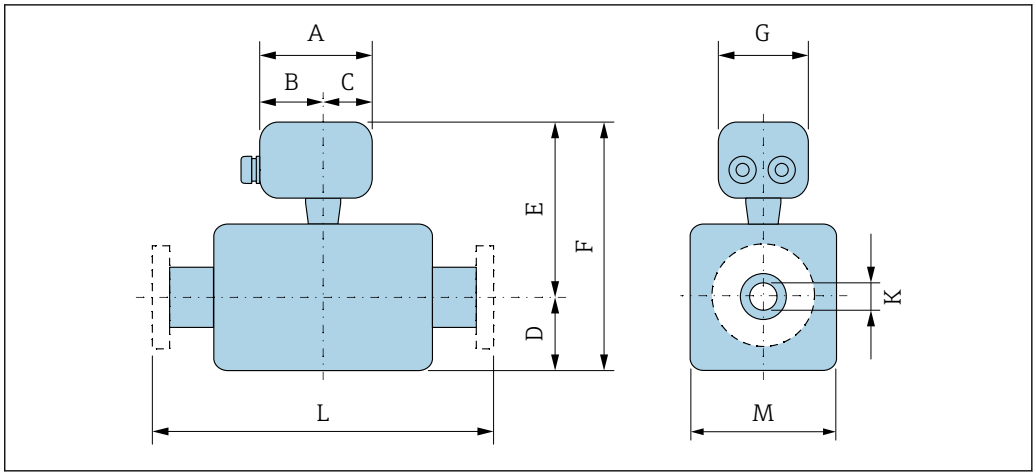
Hazardous area: Zone 2; Class I, Division 2 or Zone 1; Class I, Division 1



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

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

Sensor connection housing



A0033784

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

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [1] [mm]	F [1] [mm]	G [mm]	K [mm]	L [mm]	M [mm]
25	148	94	54	84	207	291	136	[2]	[3]	120
32	148	94	54	84	207	291	136	[2]	[3]	120
40	148	94	54	84	207	291	136	[2]	[3]	120
50	148	94	54	84	207	291	136	[2]	[3]	120
65	148	94	54	109	232	341	136	[2]	[3]	180
80	148	94	54	109	232	341	136	[2]	[3]	180
100	148	94	54	109	232	341	136	[2]	[3]	180
125	148	94	54	150	272	422	136	[2]	[3]	260
150	148	94	54	150	272	422	136	[2]	[3]	260
200	148	94	54	180	297	477	136	[2]	[3]	324
250	148	94	54	205	322	527	136	[2]	[3]	400
300	148	94	54	230	347	577	136	[2]	[3]	460
350	148	94	54	282	407	689	136	[2]	[3]	564
375	148	94	54	308	433	741	136	[2]	[3]	616
400	148	94	54	308	433	741	136	[2]	[3]	616
450	148	94	54	333	458	791	136	[2]	[3]	666
500	148	94	54	359	483	842	136	[2]	[3]	717
600	148	94	54	411	535	946	136	[2]	[3]	821
700	148	94	54	512	637	1149	136	[2]	[3]	1024
750	148	94	54	512	637	1149	136	[2]	[3]	1024
800	148	94	54	534	658	1192	136	[2]	[3]	1065
900	148	94	54	610	735	1345	136	[2]	[3]	1218
1000	148	94	54	686	811	1497	136	[2]	[3]	1370
1050	148	94	54	712	837	1549	136	[2]	[3]	1420
1200	148	94	54	811	936	1747	136	[2]	[3]	1620
1350	148	94	54	912	1037	1949	136	[2]	[3]	1820
1400	148	94	54	987	1112	2099	136	[2]	[3]	1970

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [1)] [mm]	F [1)] [mm]	G [mm]	K [mm]	L [mm]	M [mm]
1500	148	94	54	1011	1136	2147	136	[2)]	[3)]	2018
1600	148	94	54	1056	1181	2237	136	[2)]	[3)]	2108
1650	148	94	54	1093	1218	2311	136	[2)]	[3)]	2180
1800	148	94	54	1188	1313	2501	136	[2)]	[3)]	2370
2000	148	94	54	1238	1363	2601	136	[2)]	[3)]	2470

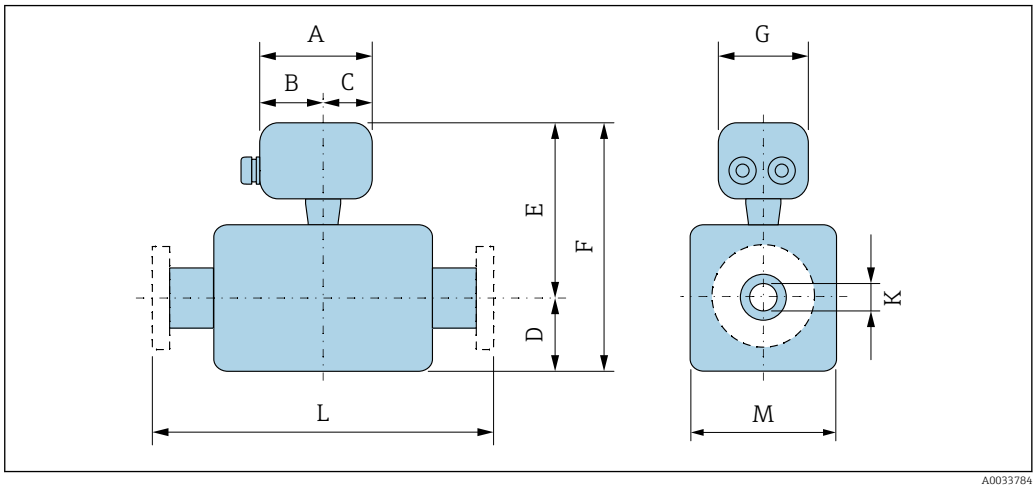
1) With order code for "Sensor option", option CG "Sensor extended neck for insulation": values + 110 mm
2) Depends on the liner
3) Total length is independent of the process connections.→ 🖹 65

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

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	K [mm]	L [mm]	M [mm]
25	113	62	51	84	207	291	112	[1)]	[2)]	120
32	113	62	51	84	207	291	112	[1)]	[2)]	120
40	113	62	51	84	207	291	112	[1)]	[2)]	120
50	113	62	51	84	207	291	112	[1)]	[2)]	120
65	113	62	51	109	232	341	112	[1)]	[2)]	180
80	113	62	51	109	232	341	112	[1)]	[2)]	180
100	113	62	51	109	232	341	112	[1)]	[2)]	180
125	113	62	51	150	272	422	112	[1)]	[2)]	260
150	113	62	51	150	272	422	112	[1)]	[2)]	260
200	113	62	51	180	297	477	112	[1)]	[2)]	324
250	113	62	51	205	322	527	112	[1)]	[2)]	400
300	113	62	51	230	347	577	112	[1)]	[2)]	460
350	113	62	51	282	407	689	112	[1)]	[2)]	564
375	113	62	51	308	433	741	112	[1)]	[2)]	616
400	113	62	51	308	433	741	112	[1)]	[2)]	616
450	113	62	51	333	458	791	112	[1)]	[2)]	666
500	113	62	51	359	483	842	112	[1)]	[2)]	717
600	113	62	51	411	535	946	112	[1)]	[2)]	821
700	113	62	51	512	637	1149	112	[1)]	[2)]	1024
750	113	62	51	512	637	1149	112	[1)]	[2)]	1024
800	113	62	51	534	658	1192	112	[1)]	[2)]	1065
900	113	62	51	610	735	1345	112	[1)]	[2)]	1218
1000	113	62	51	686	811	1497	112	[1)]	[2)]	1370
1050	113	62	51	712	837	1549	112	[1)]	[2)]	1420
1200	113	62	51	811	936	1747	112	[1)]	[2)]	1620
1350	113	62	51	912	1037	1949	112	[1)]	[2)]	1820
1400	113	62	51	987	1112	2099	112	[1)]	[2)]	1970
1500	113	62	51	1011	1136	2147	112	[1)]	[2)]	2018
1600	113	62	51	1056	1181	2237	112	[1)]	[2)]	2108
1650	113	62	51	1093	1218	2311	112	[1)]	[2)]	2180

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	K [mm]	L [mm]	M [mm]
1800	113	62	51	1188	1313	2501	112	1)	2)	2370
2000	113	62	51	1238	1363	2601	112	1)	2)	2470

1) Depends on the liner
2) Total length is independent of the process connections.→ 🖹 65



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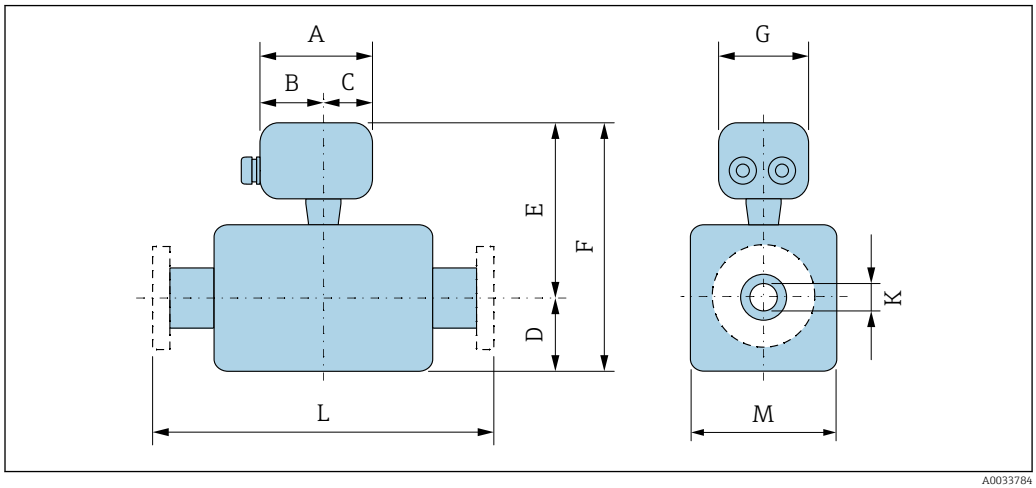
Order code for "Design", option A "Insertion length short"

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	K [mm]	L [mm]	M [mm]
350	148	94	54	282	350	632	136	1)	2)	564
375	148	94	54	308	375	683	136	1)	2)	616
400	148	94	54	308	375	683	136	1)	2)	616
450	148	94	54	333	403	736	136	1)	2)	666
500	148	94	54	359	428	787	136	1)	2)	717
600	148	94	54	410	479	889	136	1)	2)	821
700	148	94	54	512	540	1052	136	1)	2)	1024
750	148	94	54	512	578	1090	136	1)	2)	1024
800	148	94	54	532	597	1129	136	1)	2)	1065
900	148	94	54	609	647	1256	136	1)	2)	1218
1000	148	94	54	685	697	1382	136	1)	2)	1370
1050	148	94	54	710	733	1443	136	1)	2)	1420
1200	148	94	54	810	811	1621	136	1)	2)	1620
1350	148	94	54	910	924	1834	136	1)	2)	1820
1400	148	94	54	985	924	1909	136	1)	2)	1970
1500	148	94	54	1009	1024	2033	136	1)	2)	2018
1600	148	94	54	1054	1024	2078	136	1)	2)	2108
1650	148	94	54	1090	1075	2165	136	1)	2)	2180

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	K [mm]	L [mm]	M [mm]
1800	148	94	54	1 185	1 131	2 316	136	1)	2)	2 370
2000	148	94	54	1 235	1 243	2 478	136	1)	2)	2 470

1) Depends on the liner
2) Total length is independent of the process connections.→ 🖹 65

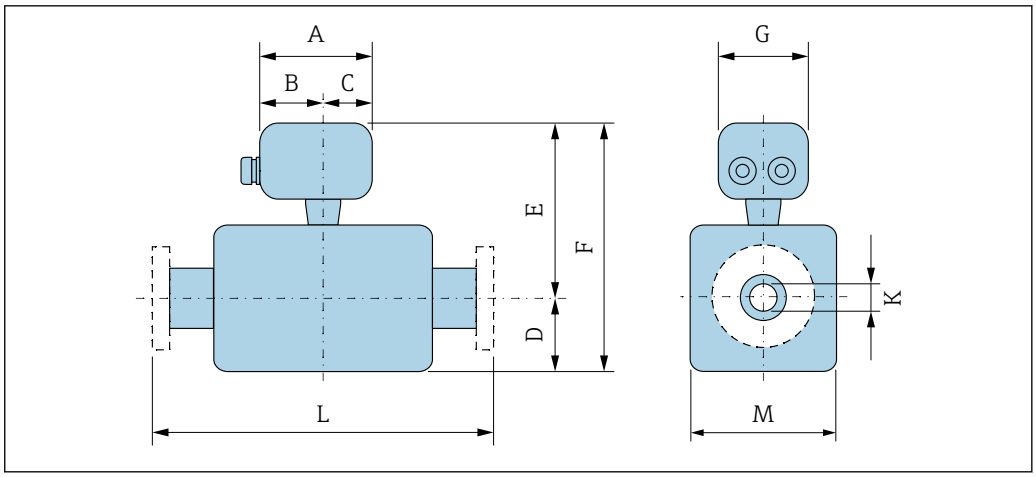


Order code for "Sensor option", option CB...CE "Corrosion protection"

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]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	K [mm]	L [mm]	M [mm]
25	113	62	51	70	193	263	112	1)	2)	140
32	113	62	51	70	193	263	112	1)	2)	140
40	113	62	51	70	193	263	112	1)	2)	140
50	113	62	51	70	193	263	112	1)	2)	140
65	113	62	51	83	205	288	112	1)	2)	165
80	113	62	51	88	210	298	112	1)	2)	175
100	113	62	51	100	223	323	112	1)	2)	200
125	113	62	51	113	236	349	112	1)	2)	226
150	113	62	51	135	257	392	112	1)	2)	269
200	113	62	51	160	283	443	112	1)	2)	320
250	113	62	51	194	316	510	112	1)	2)	387
300	113	62	51	219	341	560	112	1)	2)	437

1) Depends on the liner
2) Total length is independent of the process connections.→ 🖹 65



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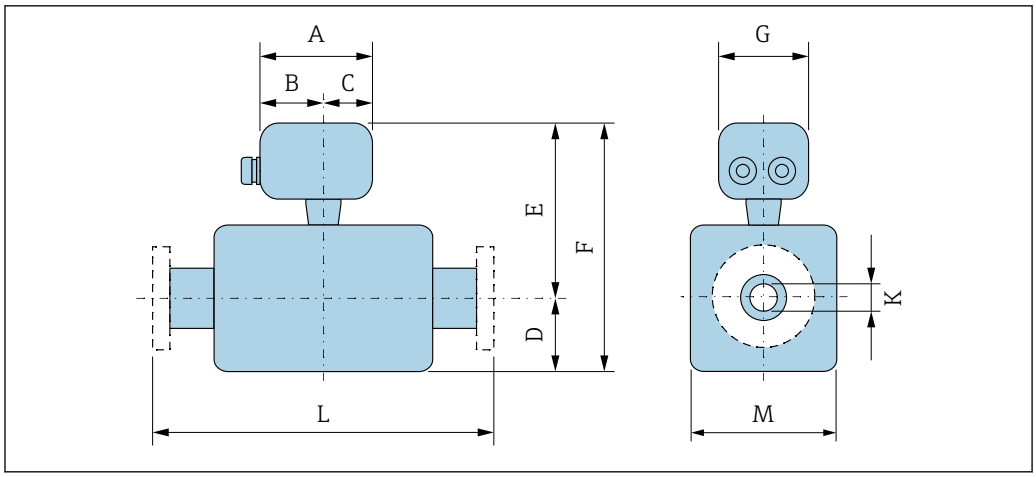
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	K [mm]	L [mm]	M [mm]
350	113	62	51	282	395	677	112	1)	2)	564
375	113	62	51	308	421	729	112	1)	2)	616
400	113	62	51	308	421	729	112	1)	2)	616
450	113	62	51	333	446	779	112	1)	2)	666
500	113	62	51	359	472	831	112	1)	2)	717
600	113	62	51	411	524	935	112	1)	2)	821
700	113	62	51	512	625	1137	112	1)	2)	1024
750	113	62	51	512	625	1137	112	1)	2)	1024
800	113	62	51	534	647	1181	112	1)	2)	1065
900	113	62	51	610	723	1333	112	1)	2)	1218
1000	113	62	51	686	799	1485	112	1)	2)	1370
1050	113	62	51	712	825	1537	112	1)	2)	1420
1200	113	62	51	811	924	1735	112	1)	2)	1620
1350	113	62	51	912	1025	1937	112	1)	2)	1820
1400	113	62	51	987	1100	2087	112	1)	2)	1970
1500	113	62	51	1011	1124	2135	112	1)	2)	2018
1600	113	62	51	1056	1169	2225	112	1)	2)	2108
1650	113	62	51	1093	1206	2299	112	1)	2)	2180
1800	113	62	51	1188	1301	2489	112	1)	2)	2370
2000	113	62	51	1238	1351	2589	112	1)	2)	2470

1) Depends on the liner
2) Total length is independent of the process connections.→ 🖹 65



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

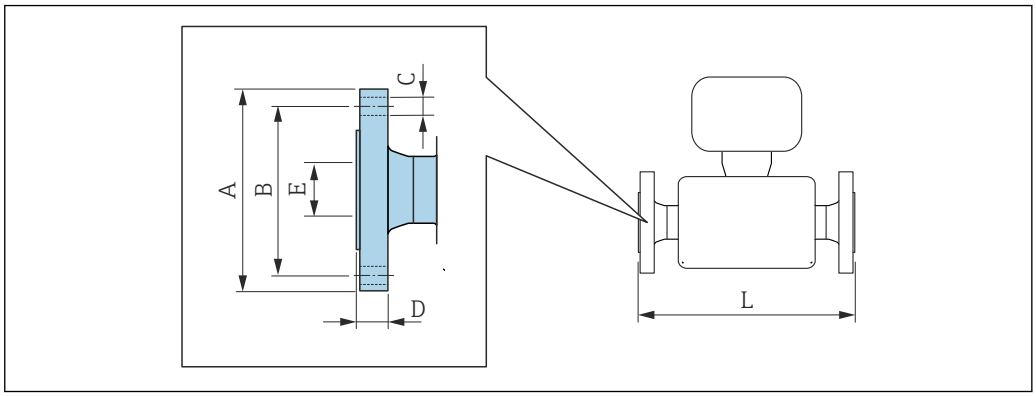
Option	Description
CB	IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted;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

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	K [mm]	L [mm]	M [mm]
350	113	62	51	238	353	591	112	1)	2)	475
375	113	62	51	263	379	642	112	1)	2)	525
400	113	62	51	263	379	642	112	1)	2)	525
450	113	62	51	290	407	697	112	1)	2)	580
500	113	62	51	315	432	747	112	1)	2)	630
600	113	62	51	365	483	848	112	1)	2)	730
700	113	62	51	426	544	970	112	1)	2)	851
750	113	62	51	463	582	1045	112	1)	2)	926
800	113	62	51	482	601	1083	112	1)	2)	964
900	113	62	51	532	651	1183	112	1)	2)	1064
1000	113	62	51	582	701	1283	112	1)	2)	1164
1050	113	62	51	618	737	1355	112	1)	2)	1236
1200	113	62	51	696	815	1511	112	1)	2)	1392
1350	113	62	51	807	927	1734	112	1)	2)	1614
1400	113	62	51	807	927	1734	112	1)	2)	1614
1500	113	62	51	907	1027	1934	112	1)	2)	1814
1600	113	62	51	907	1027	1934	112	1)	2)	1814
1650	113	62	51	957	1077	2034	112	1)	2)	1914
1800	113	62	51	1014	1133	2147	112	1)	2)	2027
2000	113	62	51	1125	1244	2369	112	1)	2)	2249

1) Depends on the liner
2) Total length is independent of the process connections.→ 🖹 65

Flange connections

Flange



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Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 6 **P245GH (1.0352):** *order code for "Process connection", option* **D1K** **1.4404 (F316/F316L):** *order code for "Process connection", option* **D1S**						
DN [mm]	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**E [mm]**	**L [mm]**
350	490	445	12 × Ø22	22	346	550 [1]/550
400	540	495	16 × Ø22	22	396	600 [1]/600
500	645	600	20 × Ø22	24	498	600 [1]/650
600	755	705	20 × Ø26	30	600	600 [1]/780
700	860	810	24 × Ø26	30	703	700 [1]/910
800	975	920	24 × Ø30	30	805	800 [1]/1040
900	1075	1020	24 × Ø30	34	906	900 [1]/1170
1000	1175	1120	28 × Ø30	38	1008	1000 [1]/1300
1200	1405	1340	32 × Ø33	42	1214	1200 [1]/1560
1400	1630	1560	36 × Ø36	56	1416	1400 [1]/1820
1600	1830	1760	40 × Ø36	63	1614	1600 [1]/2080
1800	2045	1970	44 × Ø39	69	1816	1800 [1]/2340
2000	2265	2180	48 × Ø42	74	2012	2000 [1]/2600
Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm						

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

Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 10 **P245GH (1.0352):** *order code for "Process connection", option* **D2K** **1.4404 (F316/F316L):** *order code for "Process connection", option* **D2S**						
DN [mm]	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**E [mm]**	**L [mm]**
200	340	295	8 × Ø22	26	220.9	350
250	395	350	12 × Ø22	28	275.5	450
300	445	400	12 × Ø22	28	326.5	500
350	505	460	16 × Ø22	26	346	550 [1]/550
400	565	515	16 × Ø26	26	396	600 [1]/600
500	670	620	20 × Ø26	28	498	600 [1]/650

Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 10 **P245GH (1.0352):** *order code for "Process connection", option* **D2K** **1.4404 (F316/F316L):** *order code for "Process connection", option* **D2S**						
DN [mm]	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**E [mm]**	**L [mm]**
600	780	725	20 × Ø30	30	600	600 [1]/780
700	895	840	24 × Ø30	35	707	700 [1]/910
800	1015	950	24 × Ø33	38	805	800 [1]/1040
900	1115	1050	28 × Ø33	38	910	900 [1]/1170
1000	1230	1160	28 × Ø36	44	1012	1000 [1]/1300
1200	1455	1380	32 × Ø39	55	1216	1200 [1]/1560
1400	1675	1590	36 × Ø42	65	1414	1400 [1]/1820
1600	1915	1820	40 × Ø48	75	1614	1600 [1]/2080
1800	2115	2020	44 × Ø48	85	1816	1800 [1]/2340
2000	2325	2230	48 × Ø48	90	2018	2000 [1]/2600
Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm						

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

Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 16 **P245GH (1.0352):** *order code for "Process connection", option* **D3K** **1.4404 (F316/F316L):** *order code for "Process connection", option* **D3S**						
DN [mm]	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**E [mm]**	**L [mm]**
65	185	145	8 × Ø18	20	77.1	200
80	200	160	8 × Ø18	20	89.9	200
100	220	180	8 × Ø18	22	115.3	250
125	250	210	8 × Ø18	24	141.3	250
150	285	240	8 × Ø22	24	170.2	300
200	340	295	12 × Ø22	26	220.9	350
250	405	355	12 × Ø26	32	275.7	450
300	460	410	12 × Ø26	32	326.5	500
350	520	470	16 × Ø26	30	346	550 [1]/550
400	580	525	16 × Ø30	32	396	600 [1]/600
450	640	585	20 × Ø30	34	447	600 [1]/650
500	715	650	20 × Ø33	36	498	600 [1]/650
600	840	770	20 × Ø36	40	600	600 [1]/780
700	910	840	24 × Ø36	40	703	700 [1]/910
800	1025	950	24 × Ø39	41	805	800 [1]/1040
900	1125	1050	28 × Ø39	48	906	900 [1]/1170
1000	1255	1170	28 × Ø42	59	1008	1000 [1]/1300
1200	1485	1390	32 × Ø48	78	1210	1200 [1]/1560
1400	1685	1590	36 × Ø48	84	1410	1400 [1]/1820
1600	1930	1820	40 × Ø56	102	1610	1600 [1]/2080
1800	2130	2020	44 × Ø56	110	1810	1800 [1]/2340

Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 16
P245GH (1.0352): *order code for "Process connection", option* **D3K**
1.4404 (F316/F316L): *order code for "Process connection", option* **D3S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2000	2 345	2 230	48 × Ø62	124	2 012	2 000 [1)]/2 600
Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm						

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

Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 25
P245GH (1.0352): *order code for "Process connection", option* **D4K**
1.4404 (F316/F316L): *order code for "Process connection", option* **D4S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
200	360	310	12 × Ø26	32	220.9	350
250	425	370	12 × Ø30	36	275.7	450
300	485	430	16 × Ø30	40	326.5	500
350	555	490	16 × Ø33	38	346	550 [1)]/550
400	620	550	16 × Ø36	40	396	600 [1)]600
450	670	600	20 × Ø36	46	447	600 [1)]/650
500	730	660	20 × Ø36	48	498	600 [1)]/650
600	845	770	20 × Ø39	48	600	600 [1)]/780
700	960	875	24 × Ø42	50	701	700 [1)]/910
800	1085	990	24 × Ø48	53	807	800 [1)]/1040
900	1185	1090	28 × Ø48	57	906	900 [1)]/1170
1000	1320	1210	28 × Ø56	63	1014	1000 [1)]/1300
Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm						

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

Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 40
P245GH (1.0352): *order code for "Process connection", option* **D5K**
1.4404 (F316/F316L): *order code for "Process connection", option* **D5S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
25	115	85	4 × Ø14	16	34.2	200
32	140	100	4 × Ø18	18	43	200
40	150	110	4 × Ø18	18	49.1	200
50	165	125	4 × Ø18	20	61.3	200
65	185	145	8 × Ø18	24	77.1	200
80	200	160	8 × Ø18	26	89.9	200
100	235	190	8 × Ø22	26	115.3	250
125	270	220	8 × Ø26	28	141.3	250
150	300	250	8 × Ø26	30	170.2	300
Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm						

Flange according to ASME B16.5, Class 150
A 105: *order code for "Process connection", option* **A1K**
1.4404 (F316/F316L): *order code for "Process connection", option* **A1S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
25	108	79.2	4 × Ø16	12.6	34.2	200
40	127	98.6	4 × Ø16	15.9	49.1	200
50	152.4	120.7	4 × Ø19.1	17.5	61.3	200
80	190.5	152.4	4 × Ø19.1	22.3	89.9	200
100	228.6	190.5	8 × Ø19.1	22.3	115.3	250
150	279.4	241.3	8 × Ø22.4	23.8	170.2	300
200	342.9	298.5	8 × Ø22.4	26.8	220.9	350
250	406.4	362	12 × Ø25.4	29.6	275.7	350
300	482.6	431.8	12 × Ø25.4	30.2	326.5	500
350	535	476.3	12 × Ø28.6	35.4	346	550 [1]/550
400	595	539.8	16 × Ø28.6	37	396	600 [1]/600
450	635	577.9	16 × Ø31.8	40.1	447	600 [1]/650
500	700	635	20 × Ø31.8	43.3	498	600 [1]/650
600	815	749.3	20 × Ø34.9	48.1	600	600 [1]/780
Surface roughness (flange): Ra 6.3 to 12.5 µm						

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

Flange according to ASME B16.5, Class 300
A 105: *order code for "Process connection", option* **A2K**
1.4404 (F316/F316L): *order code for "Process connection", option* **A2S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
25	123.9	88.9	4 × Ø19.1	15.9	34.2	200
40	155.4	114.3	4 × Ø22.4	19	49.1	200
50	165.1	127	8 × Ø19.1	20.8	61.3	200
80	209.6	168.1	8 × Ø22.4	26.8	89.9	200
100	254	200.2	8 × Ø22.4	30.2	115.3	250
150	317.5	269.7	12 × Ø22.4	35	170.2	300
Surface roughness (flange): Ra 6.3 to 12.5 µm						

Flange according to JIS B2220, 10K
A 105/A350LF2: *order code for "Process connection", option* **N3K**
1.4404 (F316L): *order code for "Process connection", option* **N3S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
50	155	120	4 × Ø19	16	61.1	200
65	175	140	4 × Ø19	18	77.1	200
80	185	150	8 × Ø19	18	90	200
100	210	175	8 × Ø19	18	115.4	250
125	250	210	8 × Ø23	20	141.2	250
150	280	240	8 × Ø23	22	169	300

Flange according to JIS B2220, 10K
A 105/A350LF2: *order code for "Process connection", option* **N3K**
1.4404 (F316L): *order code for "Process connection", option* **N3S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
200	330	290	12 × Ø23	22	220	350
250	400	355	12 × Ø25	24	274	450
300	445	400	16 × Ø25	24	325	500
Surface roughness (flange): Ra 6.3 to 12.5 µm						

Flange according to JIS B2220, 20K
A 105/A350LF2: *order code for "Process connection", option* **N4K**
1.4404 (F316L): *order code for "Process connection", option* **N4S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
25	125	90	4 × Ø19	16	34.5	200
32	135	100	4 × Ø19	18	43.2	200
40	140	105	4 × Ø19	18	49.1	200
50	155	120	8 × Ø19	18	61.1	200
65	175	140	8 × Ø19	20	77.1	200
80	200	160	8 × Ø23	22	90	200
100	225	185	8 × Ø23	24	115.4	250
125	270	225	8 × Ø25	26	141.2	250
150	305	260	12 × Ø25	28	169	300
200	350	305	12 × Ø25	30	220	350
250	430	380	12 × Ø27	34	274	450
300	480	430	16 × Ø27	36	325	500
Surface roughness (flange): Ra 6.3 to 12.5 µm						

Flange according to AWWA, Cl. D
A 105: *order code for "Process connection", option* **W1K**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
700	927	863.6	28 × Ø35	33.4	714	700 [1)]/910
750	984	914.4	28 × Ø35	35	765	750 [1)]/975
800	1060	977.9	28 × Ø42	38.1	816	800 [1)]/1040
900	1168	1085.9	32 × Ø42	41.3	917	900 [1)]/1170
1000	1289	1200.2	36 × Ø42	41.3	1019	1000 [1)]/1300
1050	1346	1257.3	36 × Ø42	44.5	1070	1050 [1)]/1365
1200	1511	1422.4	44 × Ø42	47.7	1223	1200 [1)]/1560
1350	1683	1593.9	44 × Ø48	54	1376	1350 [1)]/1755
1500	1855	1759	52 × Ø48	57.2	1529	1500 [1)]/1950
1600	2032	1930.4	52 × Ø48	63.5	1681	1650 [1)]/2145
1800	2197	2095.5	60 × Ø48	66.7	1825	1800 [1)]/2340

Flange according to AWWA, Cl. D **A 105:** *order code for "Process connection", option* **W1K**						
DN [mm]	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**E [mm]**	**L [mm]**
2000	2 362	2 260.6	64 × Ø54	69.9	2 025	2 000/2 600
Surface roughness (flange): Ra 6.3 to 12.5 µm						

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

Flange according to AS 2129, Tab. E **A 105:** *order code for "Process connection", option* **M2K**						
DN [mm]	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**E [mm]**	**L [mm]**
80	185	146	4 × Ø18	12	90	200
100	215	178	8 × Ø18	13	115	250
150	280	235	8 × Ø22	17	169	300
200	335	292	8 × Ø22	19	220	350
250	405	356	12 × Ø22	22	274	450
300	455	406	12 × Ø26	25	325	500
350	525	470	12 × Ø26	30	358	550 [1]/550
400	580	521	12 × Ø26	32	408	600 [1]600
450	640	584	16 × Ø26	35	459	600 [1]/650
500	705	641	16 × Ø26	38	510	600 [1]/650
600	825	756	16 × Ø33	48	613	600 [1]/780
700	910	845	20 × Ø33	51	714	700 [1]/910
750	995	927	20 × Ø36	54	765	750/975
800	1 060	984	20 × Ø36	54	816	800/1 040
900	1 175	1 092	24 × Ø36	64	917	900/1 170
1000	1 255	1 175	24 × Ø39	67	1 019	1 000/1 300
1200	1 490	1 410	32 × Ø39	79	1 223	1 200/1 560
Surface roughness (flange): Ra 6.3 to 12.5 µm						

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

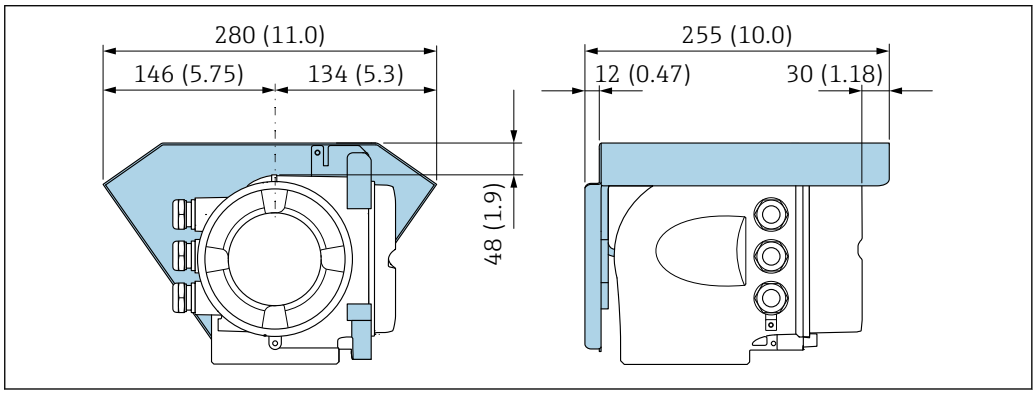
Flange according to AS 4087, PN16 **A 105:** *order code for "Process connection", option* **M3K**						
DN [mm]	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**E [mm]**	**L [mm]**
80	185	146	4 × Ø18	12	90	200
100	215	178	4 × Ø18	13	115	250
150	280	235	8 × Ø18	13	169	300
200	335	292	8 × Ø18	19	220	350
250	405	356	8 × Ø22	19	274	450
300	455	406	12 × Ø22	23	325	500
350	525	470	12 × Ø26	30	358	550 [1]/550
375	550	495	12 × Ø26	30	408	600 [1]600
400	580	521	12 × Ø26	32	408	600 [1]/600

Flange according to AS 4087, PN16 **A 105:** *order code for "Process connection", option* **M3K**						
DN [mm]	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**E [mm]**	**L [mm]**
450	640	584	12 × Ø26	30	459	600 [1]/650
500	705	641	16 × Ø26	38	510	600 [1]/650
600	825	756	16 × Ø30	48	613	600 [1]/780
700	910	845	20 × Ø30	56	714	700 [1]/910
750	995	927	20 × Ø33	56	765	750 [1]/975
800	1060	984	20 × Ø36	56	816	800 [1]/1040
900	1175	1092	24 × Ø36	66	917	900 [1]/1170
1000	1255	1175	24 × Ø36	66	1019	1000 [1]/1300
1200	1490	1410	32 × Ø36	76	1223	1200 [1]/1560
Surface roughness (flange): Ra 6.3 to 12.5 µm						

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

Accessories

Protective cover

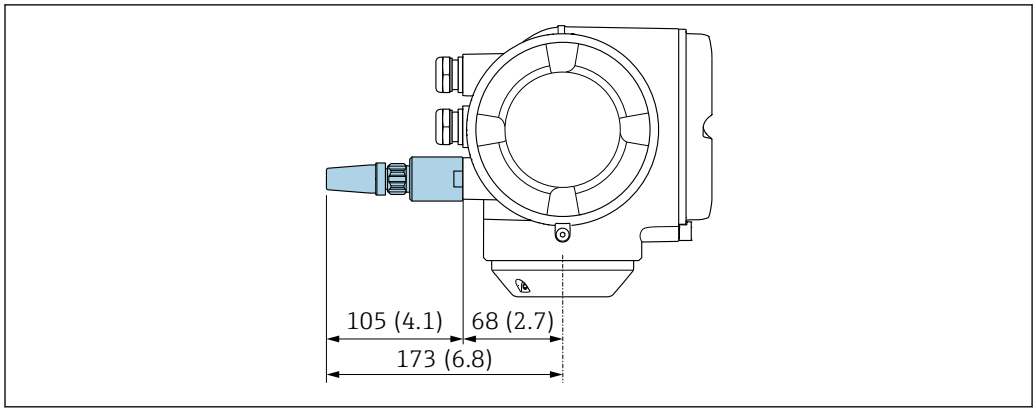


42 *Weather protection cover for Proline 500*

External WLAN antenna

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

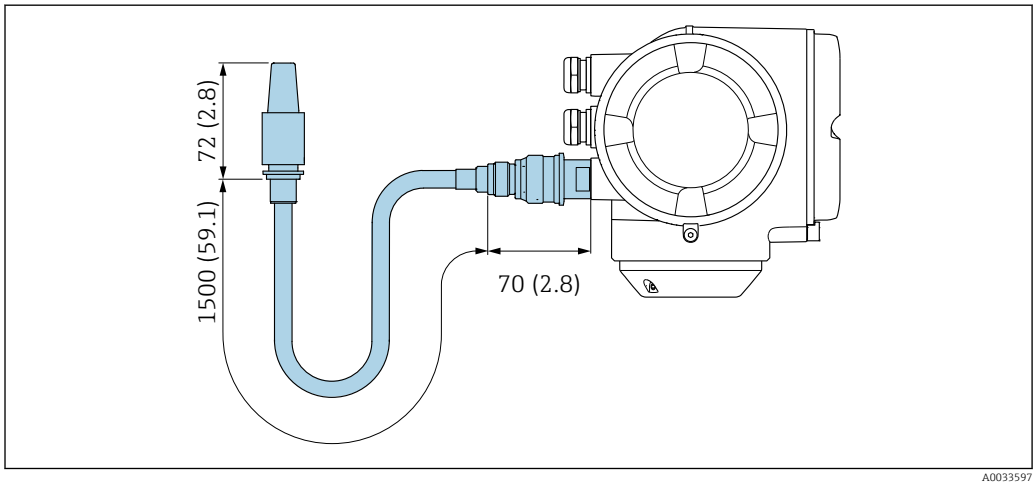
External WLAN antenna mounted on device



43 Engineering unit mm (in)

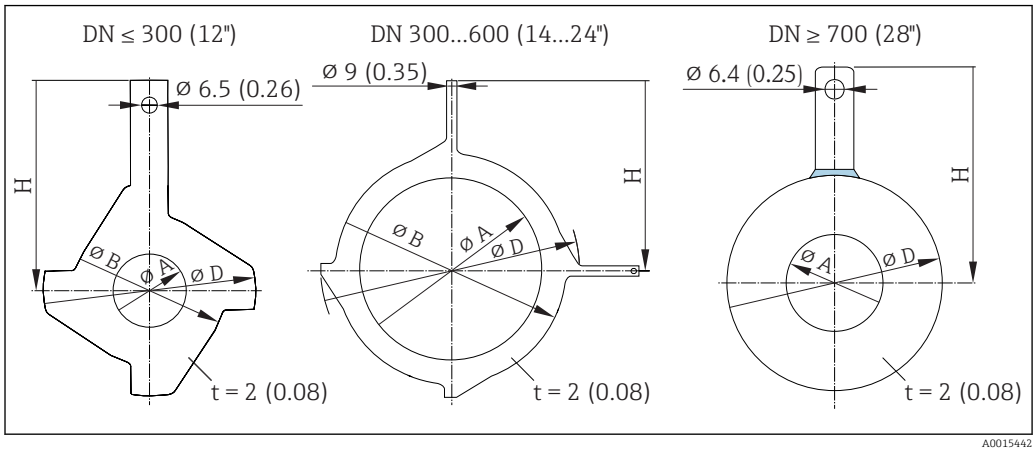
External WLAN antenna mounted with cable

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



44 Engineering unit mm (in)

Ground disks for flange connections



45 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
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

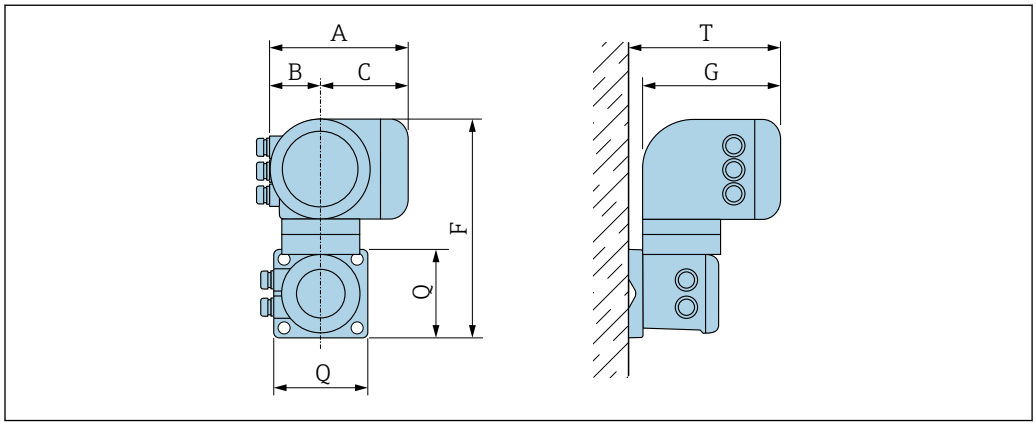
DN [mm]	Pressure rating	A [mm]	B [mm]	D [mm]	H [mm]
900	AWWA, Class D	893	–	1048	615
1000	DIN, PN 6	999	–	1093	620
1000	DIN, PN 10	995	–	1127	650
1000	AS, PN 16	988	–	1131	660
1000	AWWA, Class D	995	–	1163	675
1050	AWWA, Class D	1044	–	1220	704
1200	DIN, PN 6	1203	–	1310	733

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

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

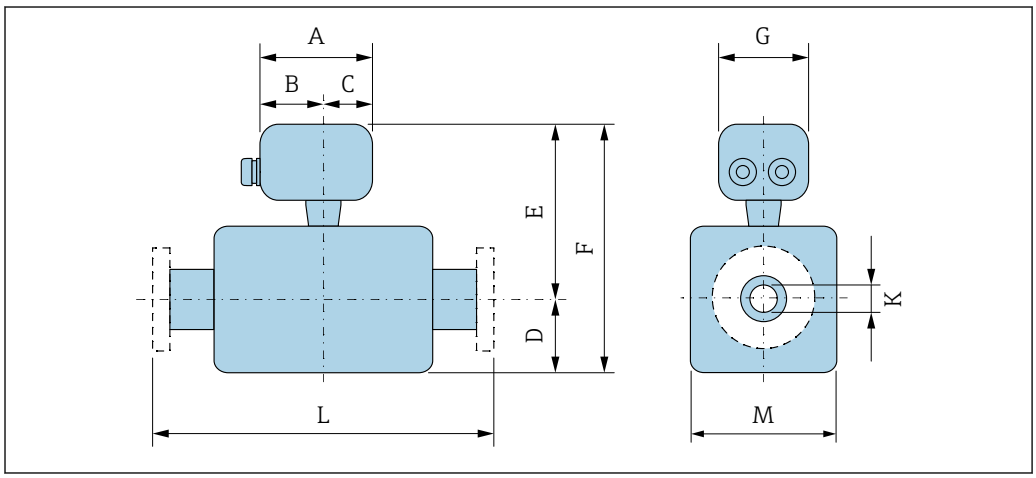


A0033788

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

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

Sensor connection housing



A0033784

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

DN [in]	A [in]	B [in]	C [in]	D [in]	E [1] [in]	F [1] [in]	G [in]	K [in]	L [in]	M [in]
1	5.83	3.70	2.13	3.31	8.15	11.5	5.35	[2]	[3]	4.72
1 ½	5.83	3.70	2.13	3.31	8.15	11.5	5.35	[2]	[3]	4.72
2	5.83	3.70	2.13	3.31	8.15	11.5	5.35	[2]	[3]	4.72
3	5.83	3.70	2.13	4.29	9.13	13.4	5.35	[2]	[3]	7.09
4	5.83	3.70	2.13	4.29	9.13	13.4	5.35	[2]	[3]	7.09
6	5.83	3.70	2.13	5.91	10.7	16.6	5.35	[2]	[3]	10.2
8	5.83	3.70	2.13	7.09	11.7	18.8	5.35	[2]	[3]	12.8
10	5.83	3.70	2.13	8.07	12.7	20.8	5.35	[2]	[3]	15.8
12	5.83	3.70	2.13	9.06	13.7	22.8	5.35	[2]	[3]	18.1
14	5.83	3.70	2.13	11.1	16.0	29.3	5.35	[2]	[3]	22.2
15	5.83	3.70	2.13	12.1	17.0	31.3	5.35	[2]	[3]	24.2
16	5.83	3.70	2.13	12.1	17.0	31.3	5.35	[2]	[3]	24.2
18	5.83	3.70	2.13	13.1	18.0	33.3	5.35	[2]	[3]	26.2
20	5.83	3.70	2.13	14.1	19.0	35.3	5.35	[2]	[3]	28.2
24	5.83	3.70	2.13	16.2	21.1	39.4	5.35	[2]	[3]	32.3
28	5.83	3.70	2.13	20.1	25.1	45.2	5.35	[2]	[3]	40.3
30	5.83	3.70	2.13	20.1	25.1	45.2	5.35	[2]	[3]	40.3
32	5.83	3.70	2.13	21.0	25.9	46.9	5.35	[2]	[3]	41.9
36	5.83	3.70	2.13	24.0	28.9	52.9	5.35	[2]	[3]	48.0
40	5.83	3.70	2.13	27.0	31.9	58.9	5.35	[2]	[3]	54.0
42	5.83	3.70	2.13	28.0	32.9	60.9	5.35	[2]	[3]	56.0
48	5.83	3.70	2.13	31.9	36.8	68.7	5.35	[2]	[3]	63.8
54	5.83	3.70	2.13	35.9	40.8	76.7	5.35	[2]	[3]	71.7
60	5.83	3.70	2.13	39.8	44.7	84.5	5.35	[2]	[3]	79.5
66	5.83	3.70	2.13	43.0	47.9	91.0	5.35	[2]	[3]	85.8
72	5.83	3.70	2.13	46.8	51.7	98.4	5.35	[2]	[3]	93.3
78	5.83	3.70	2.13	48.7	53.6	102.4	5.35	[2]	[3]	97.2

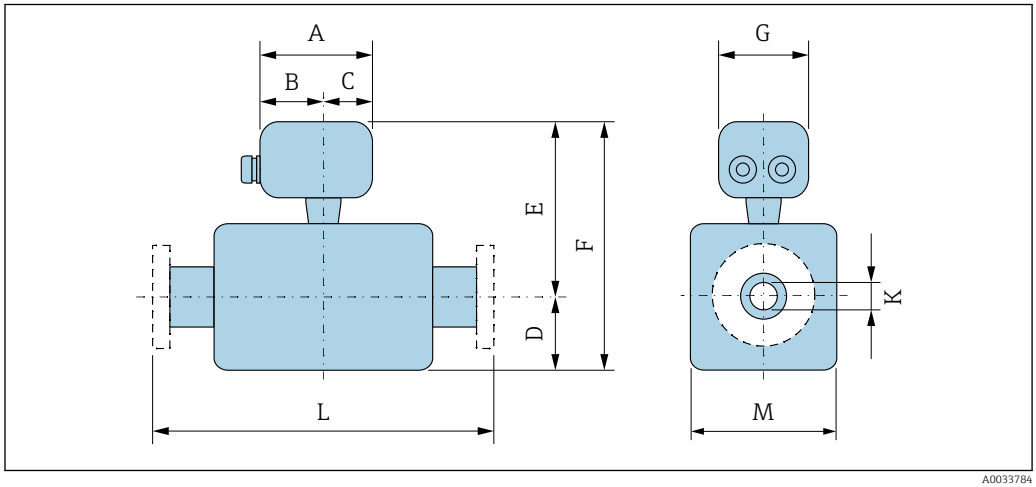
1) With order code for "Sensor option", option CG "Sensor extended neck for insulation": values + 4.33 in
2) Depends on the liner
3) Total length is independent of the process connections.→ 🖹 81

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

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
1	4.45	2.44	2.01	3.31	8.15	11.5	4.41	[1]	[2]	4.72
1 ½	4.45	2.44	2.01	3.31	8.15	11.5	4.41	[1]	[2]	4.72
2	4.45	2.44	2.01	3.31	8.15	11.5	4.41	[1]	[2]	4.72
3	4.45	2.44	2.01	4.29	9.13	13.4	4.41	[1]	[2]	7.09
4	4.45	2.44	2.01	4.29	9.13	13.4	4.41	[1]	[2]	7.09
6	4.45	2.44	2.01	5.91	10.7	16.6	4.41	[1]	[2]	10.2
8	4.45	2.44	2.01	7.09	11.7	18.8	4.41	[1]	[2]	12.8

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
10	4.45	2.44	2.01	8.07	12.7	20.8	4.41	1)	2)	15.8
12	4.45	2.44	2.01	9.06	13.7	22.8	4.41	1)	2)	18.1
14	4.45	2.44	2.01	11.1	16.0	29.3	4.41	1)	2)	22.2
15	4.45	2.44	2.01	12.1	17.0	31.3	4.41	1)	2)	24.2
16	4.45	2.44	2.01	12.1	17.0	31.3	4.41	1)	2)	24.2
18	4.45	2.44	2.01	13.1	18.0	33.3	4.41	1)	2)	26.2
20	4.45	2.44	2.01	14.1	19.0	35.3	4.41	1)	2)	28.2
24	4.45	2.44	2.01	16.2	21.1	39.4	4.41	1)	2)	32.3
28	4.45	2.44	2.01	20.1	25.1	45.2	4.41	1)	2)	40.3
30	4.45	2.44	2.01	20.1	25.1	45.2	4.41	1)	2)	40.3
32	4.45	2.44	2.01	21.0	25.9	46.9	4.41	1)	2)	41.9
36	4.45	2.44	2.01	24.0	28.9	52.9	4.41	1)	2)	48.0
40	4.45	2.44	2.01	27.0	31.9	58.9	4.41	1)	2)	54.0
42	4.45	2.44	2.01	28.0	32.9	60.9	4.41	1)	2)	56.0
48	4.45	2.44	2.01	31.9	36.8	68.7	4.41	1)	2)	63.8
54	4.45	2.44	2.01	35.9	40.8	76.7	4.41	1)	2)	71.7
60	4.45	2.44	2.01	39.8	44.7	84.5	4.41	1)	2)	79.5
66	4.45	2.44	2.01	43.0	47.9	91.0	4.41	1)	2)	85.8
72	4.45	2.44	2.01	46.8	51.7	98.4	4.41	1)	2)	93.3
78	4.45	2.44	2.01	48.7	53.6	102.4	4.41	1)	2)	97.2

1) Depends on the liner
2) Total length is independent of the process connections.→ 81



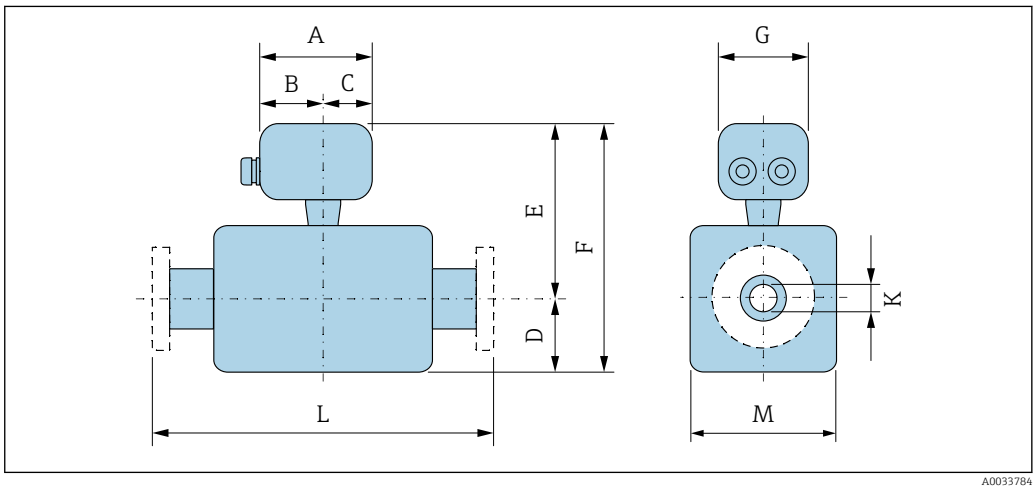
A0033784

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

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
14	5.83	3.70	2.13	11.1	13.8	24.9	5.35	1)	2)	22.2
15	5.83	3.70	2.13	12.1	14.8	26.9	5.35	1)	2)	24.2
16	5.83	3.70	2.13	12.1	14.8	26.9	5.35	1)	2)	24.2

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
18	5.83	3.70	2.13	13.1	15.9	29.0	5.35	1)	2)	26.2
20	5.83	3.70	2.13	14.1	16.9	31.0	5.35	1)	2)	28.2
24	5.83	3.70	2.13	16.1	18.9	35.0	5.35	1)	2)	32.3
28	5.83	3.70	2.13	20.2	21.2	41.4	5.35	1)	2)	40.3
30	5.83	3.70	2.13	20.1	22.8	42.9	5.35	1)	2)	40.3
32	5.83	3.70	2.13	21.0	23.5	44.5	5.35	1)	2)	41.9
36	5.83	3.70	2.13	24.0	25.5	49.5	5.35	1)	2)	48.0
40	5.83	3.70	2.13	27.0	27.4	54.4	5.35	1)	2)	54.0
42	5.83	3.70	2.13	27.9	28.9	56.8	5.35	1)	2)	56.0
48	5.83	3.70	2.13	31.9	31.9	63.8	5.35	1)	2)	63.8
54	5.83	3.70	2.13	35.8	36.4	72.2	5.35	1)	2)	71.7
60	5.83	3.70	2.13	39.7	40.3	80.0	5.35	1)	2)	79.5
66	5.83	3.70	2.13	42.9	42.3	85.2	5.35	1)	2)	85.8
72	5.83	3.70	2.13	46.7	44.5	91.2	5.35	1)	2)	93.3
78	5.83	3.70	2.13	48.6	48.9	97.5	5.35	1)	2)	97.2

1) Depends on the liner
2) Total length is independent of the process connections.→ 81



A0033784

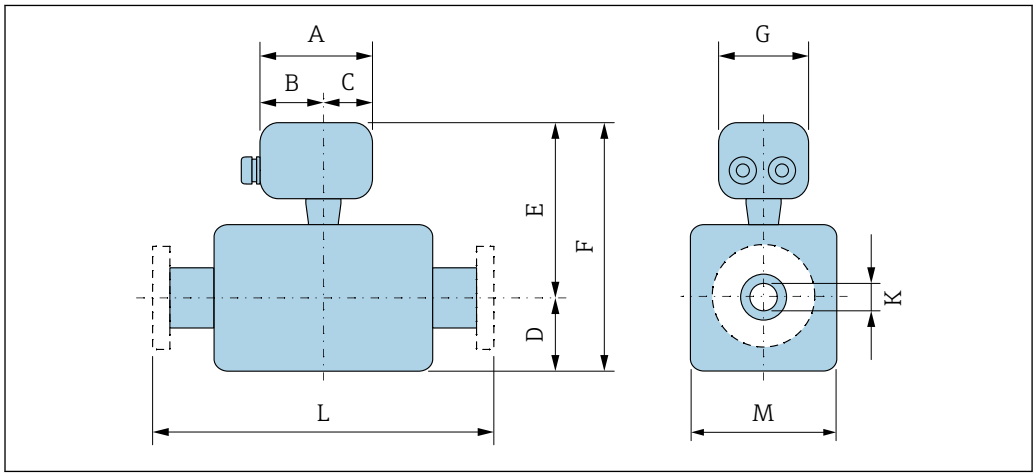
Order code for "Sensor option", option CB...CE "Corrosion protection"

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]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
1	4.45	2.44	2.01	2.76	7.60	10.4	4.41	1)	2)	5.51
2	4.45	2.44	2.01	2.76	7.60	10.4	4.41	1)	2)	5.51

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
3	4.45	2.44	2.01	3.46	8.27	11.7	4.41	1)	2)	6.89
4	4.45	2.44	2.01	3.94	8.78	12.7	4.41	1)	2)	7.87
6	4.45	2.44	2.01	5.31	10.1	15.4	4.41	1)	2)	10.6
8	4.45	2.44	2.01	6.30	11.1	17.4	4.41	1)	2)	12.6
10	4.45	2.44	2.01	7.64	12.4	20.1	4.41	1)	2)	15.2
12	4.45	2.44	2.01	8.62	13.4	22.1	4.41	1)	2)	17.2

1) Depends on the liner
2) Total length is independent of the process connections.→ 81



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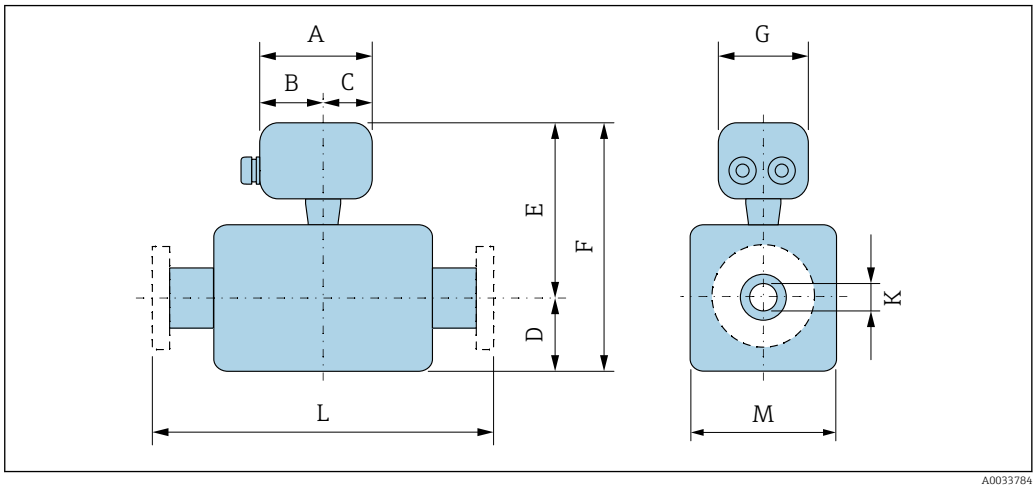
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
14	4.45	2.44	2.01	11.1	15.6	26.7	4.41	1)	2)	22.2
15	4.45	2.44	2.01	12.1	16.6	28.7	4.41	1)	2)	24.3
16	4.45	2.44	2.01	12.1	16.6	28.7	4.41	1)	2)	24.3
18	4.45	2.44	2.01	13.1	17.6	30.7	4.41	1)	2)	26.2
20	4.45	2.44	2.01	14.1	18.6	32.7	4.41	1)	2)	28.2
24	4.45	2.44	2.01	16.2	20.6	36.8	4.41	1)	2)	32.3
28	4.45	2.44	2.01	20.1	24.6	44.8	4.41	1)	2)	40.3
30	4.45	2.44	2.01	20.1	24.6	44.8	4.41	1)	2)	40.3
32	4.45	2.44	2.01	21.0	25.5	46.5	4.41	1)	2)	41.9
36	4.45	2.44	2.01	24.0	28.5	52.5	4.41	1)	2)	48.0
40	4.45	2.44	2.01	27.0	31.5	58.5	4.41	1)	2)	53.9
42	4.45	2.44	2.01	28.0	32.5	60.5	4.41	1)	2)	55.9
48	4.45	2.44	2.01	31.9	36.4	68.3	4.41	1)	2)	63.8
54	4.45	2.44	2.01	35.9	40.4	76.3	4.41	1)	2)	71.7
60	4.45	2.44	2.01	39.8	44.3	84.1	4.41	1)	2)	79.5
66	4.45	2.44	2.01	43.0	47.5	90.5	4.41	1)	2)	85.8

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
72	4.45	2.44	2.01	46.8	51.2	98.0	4.41	1)	2)	93.3
78	4.45	2.44	2.01	48.7	53.2	101.9	4.41	1)	2)	97.2

1) Depends on the liner
2) Total length is independent of the process connections.→ 🖹 81



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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

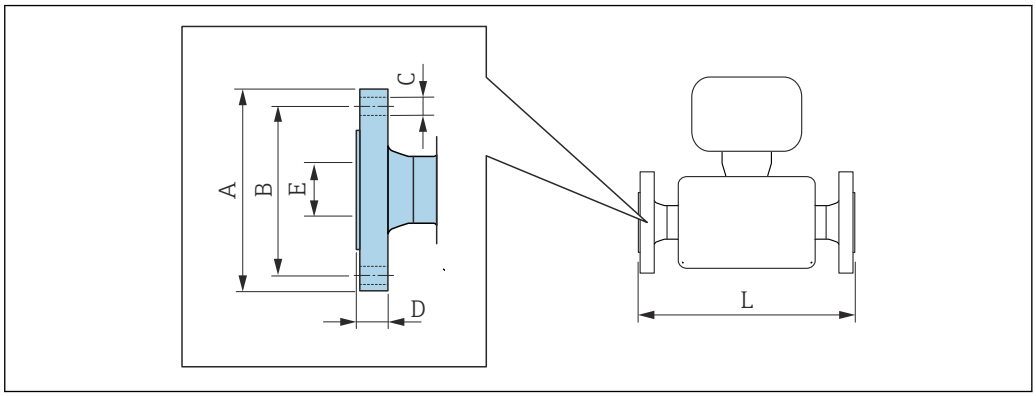
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
14	4.45	2.44	2.01	9.37	13.9	23.3	4.41	1)	2)	18.7
15	4.45	2.44	2.01	10.4	14.9	25.3	4.41	1)	2)	20.7
16	4.45	2.44	2.01	10.4	14.9	25.3	4.41	1)	2)	20.7
18	4.45	2.44	2.01	11.4	16.0	27.4	4.41	1)	2)	22.8
20	4.45	2.44	2.01	12.4	17.0	29.4	4.41	1)	2)	24.8
24	4.45	2.44	2.01	14.4	19.0	33.4	4.41	1)	2)	28.7
28	4.45	2.44	2.01	16.8	21.4	38.2	4.41	1)	2)	33.5
30	4.45	2.44	2.01	18.2	22.9	41.1	4.41	1)	2)	36.5
32	4.45	2.44	2.01	19.0	23.7	42.6	4.41	1)	2)	38.0
36	4.45	2.44	2.01	20.9	25.6	46.6	4.41	1)	2)	41.9
40	4.45	2.44	2.01	22.9	27.6	50.5	4.41	1)	2)	45.8
42	4.45	2.44	2.01	24.3	29.0	53.4	4.41	1)	2)	48.7
48	4.45	2.44	2.01	27.4	32.1	59.5	4.41	1)	2)	54.8
54	4.45	2.44	2.01	31.8	36.5	68.3	4.41	1)	2)	63.5

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	K [in]	L [in]	M [in]
60	4.45	2.44	2.01	35.7	40.4	76.1	4.41	1)	2)	71.4
66	4.45	2.44	2.01	37.7	42.4	80.1	4.41	1)	2)	75.4
72	4.45	2.44	2.01	39.9	44.6	84.5	4.41	1)	2)	79.8
78	4.45	2.44	2.01	44.3	49.0	93.3	4.41	1)	2)	88.5

1) Depends on the liner
2) Total length is independent of the process connections.→ 81

Flange connections

Flange



A0015621

Flange according to ASME B16.5, Class 150 **A 105:** *order code for "Process connection", option* **A1K** **1.4404 (F316/F316L):** *order code for "Process connection", option* **A1S**						
DN [in]	**A [in]**	**B [in]**	**C [in]**	**D [in]**	**E [in]**	**L [in]**
1	4.25	3.12	4 × Ø0.62	0.5	1.35	7.87
1½	5	3.88	4 × Ø0.62	0.63	1.93	7.87
2	6	4.75	4 × Ø0.75	0.69	2.41	7.87
3	7.5	6	4 × Ø0.75	0.88	3.54	7.87
4	9	7.5	8 × Ø0.75	0.88	4.54	9.84
6	11	9.5	8 × Ø0.88	0.94	6.7	11.81
8	13.5	11.75	8 × Ø0.88	1.06	8.7	13.78
10	16	14.25	12 × Ø1.0	1.17	10.85	13.78
12	19	17	12 × Ø1.0	1.19	12.85	19.69
14	21.06	18.75	12 × Ø1.12	1.39	13.62	21.65 [1]/21.65
16	23.43	21.25	16 × Ø1.12	1.46	15.59	23.62 [1]/23.62
18	25	22.75	16 × Ø1.25	1.58	17.6	23.62 [1]/25.59
20	27.56	25	20 × Ø1.25	1.7	19.61	23.62 [1]/25.59
24	32.09	29.5	20 × Ø1.37	1.89	23.62	23.62 [1]/30.71
Surface roughness (flange): Ra 6.3 to 12.5 µm						

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

Flange according to ASME B16.5, Class 300 **A 105:** *order code for "Process connection", option* **A2K** **1.4404 (F316/F316L):** *order code for "Process connection", option* **A2S**						
DN [in]	**A [in]**	**B [in]**	**C [in]**	**D [in]**	**E [in]**	**L [in]**
1	4.88	3.5	4 × Ø0.75	0.63	1.35	7.87
1½	6.12	4.5	4 × Ø0.88	0.75	1.93	7.87
2	6.5	5	8 × Ø0.75	0.82	2.41	7.87
3	8.25	6.62	8 × Ø0.88	1.06	3.54	7.87
4	10	7.88	8 × Ø0.88	1.19	4.54	9.84

Flange according to ASME B16.5, Class 300
A 105: *order code for "Process connection", option* **A2K**
1.4404 (F316/F316L): *order code for "Process connection", option* **A2S**

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
6	12.5	10.62	12 × Ø0.88	1.38	6.7	11.81
Surface roughness (flange): Ra 6.3 to 12.5 µm						

Flange according to AWWA, Cl. D
A 105: *order code for "Process connection", option* **W1K**

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
28	36.5	34	28 × Ø1.38	1.31	28.11	27.56 [1]/35.83
30	38.74	36	28 × Ø1.38	1.38	30.12	29.53 [1]/38.39
32	41.73	38.5	28 × Ø1.65	1.5	32.13	31.5 [1]/40.94
36	45.98	42.75	32 × Ø1.65	1.63	36.1	35.43 [1]/46.06
40	50.75	47.25	36 × Ø1.65	1.63	40.12	39.37 [1]/51.18
42	52.99	49.5	36 × Ø1.65	1.75	42.13	41.34 [1]/53.74
48	59.49	56	44 × Ø1.65	1.88	48.15	47.24 [1]/61.42
54	66.26	62.75	44 × Ø1.89	2.13	54.17	53.15 [1]/69.09
60	73.03	69.25	52 × Ø1.89	2.25	60.2	59.06 [1]/76.77
64	80	76	52 × Ø1.89	2.5	66.18	64.96 [1]/84.45
72	86.5	82.5	60 × Ø1.89	2.63	71.85	70.87 [1]/92.13
80	92.99	89	64 × Ø2.12	2.75	79.72	78.74 [1]/102.36
Surface roughness (flange): Ra 6.3 to 12.5 µm						

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

Flange according to AS 2129, Tab. E
A 105: *order code for "Process connection", option* **M2K**

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
3	7.28	5.75	4 × Ø0.71	0.47	3.54	7.87
4	8.46	7.01	8 × Ø0.71	0.51	4.53	9.84
6	11.02	9.25	8 × Ø0.87	0.67	6.65	11.81
8	13.19	11.5	8 × Ø0.87	0.75	8.66	13.78
10	15.94	14.02	12 × Ø0.87	0.87	10.79	17.72
12	17.91	15.98	12 × Ø1.02	0.98	12.8	19.69
14	20.67	18.5	12 × Ø1.02	1.18	14.09	21.65 [1]/21.65
16	22.83	20.51	12 × Ø1.02	1.26	16.06	23.62 [1]23.62
18	25.2	22.99	16 × Ø1.02	1.38	18.07	23.62 [1]/25.59
20	27.76	25.24	16 × Ø1.02	1.5	20.08	23.62 [1]/25.59
24	32.48	29.76	16 × Ø1.3	1.89	24.13	23.62 [1]/30.71
28	35.83	33.27	20 × Ø1.3	2.01	28.11	27.56 [1]/35.83
30	39.17	36.5	20 × Ø1.42	2.13	30.12	29.53 [1]/38.39
32	41.73	38.74	20 × Ø1.42	2.13	32.13	31.5 [1]/40.94
36	46.26	42.99	24 × Ø1.42	2.52	36.1	35.43 [1]/46.06

Flange according to AS 2129, Tab. E **A 105:** *order code for "Process connection", option* **M2K**						
DN [in]	**A [in]**	**B [in]**	**C [in]**	**D [in]**	**E [in]**	**L [in]**
40	49.41	46.26	24 × Ø1.54	2.64	40.12	39.37 [1)]/51.18
48	58.66	55.51	32 × Ø1.54	3.11	48.15	47.24 [1)]/61.42
Surface roughness (flange): Ra 6.3 to 12.5 µm						

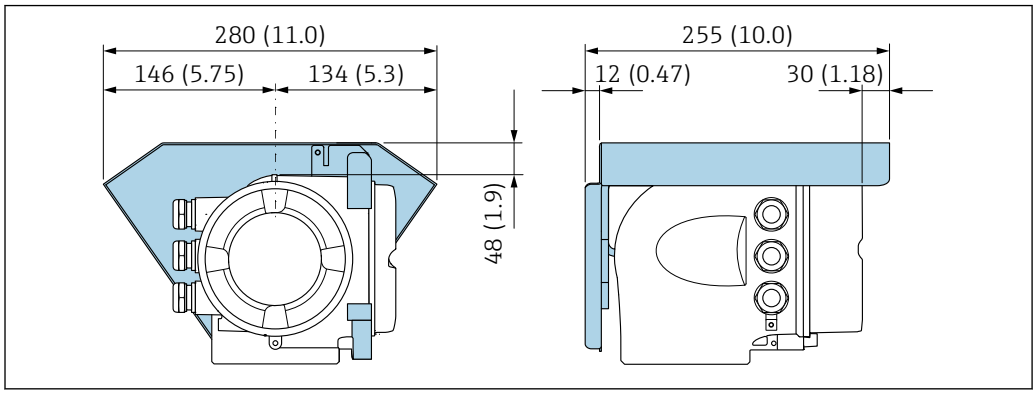
1) Order code for "Design", option A "Insertion length short"

Flange according to AS 4087, PN16 **A 105:** *order code for "Process connection", option* **M3K**						
DN [in]	**A [in]**	**B [in]**	**C [in]**	**D [in]**	**E [in]**	**L [in]**
3	7.28	5.75	4 × Ø0.71	0.47	3.54	7.87
4	8.46	7.01	4 × Ø0.71	0.51	4.53	9.84
6	11.02	9.25	8 × Ø0.71	0.51	6.65	11.81
8	13.19	11.5	8 × Ø0.71	0.75	8.66	13.78
10	15.94	14.02	8 × Ø0.87	0.75	10.79	17.72
12	17.91	15.98	12 × Ø0.87	0.91	12.8	19.69
14	20.67	18.5	12 × Ø1.02	1.18	14.09	21.65 [1)]/21.65
15	21.65	19.49	12 × Ø1.02	1.18	16.06	23.62 [1)]23.62
16	22.83	20.51	12 × Ø1.02	1.26	16.06	23.62 [1)]/23.62
18	25.2	22.99	12 × Ø1.02	1.18	18.07	23.62 [1)]/25.59
20	27.76	25.24	16 × Ø1.02	1.5	20.08	23.62 [1)]/25.59
24	32.48	29.76	16 × Ø1.18	1.89	24.13	23.62 [1)]/30.71
28	35.83	33.27	20 × Ø1.18	2.2	28.11	27.56 [1)]/35.83
30	39.17	36.5	20 × Ø1.3	2.2	30.12	29.53 [1)]/38.39
32	41.73	38.74	20 × Ø1.42	2.2	32.13	31.5 [1)]/40.94
36	46.26	42.99	24 × Ø1.42	2.6	36.1	35.43 [1)]/46.06
40	49.41	46.26	24 × Ø1.42	2.6	40.12	39.37 [1)]/51.18
42	58.66	55.51	32 × Ø1.42	2.99	48.15	47.24 [1)]/61.42
Surface roughness (flange): Ra 6.3 to 12.5 µm						

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

Accessories

Protective cover

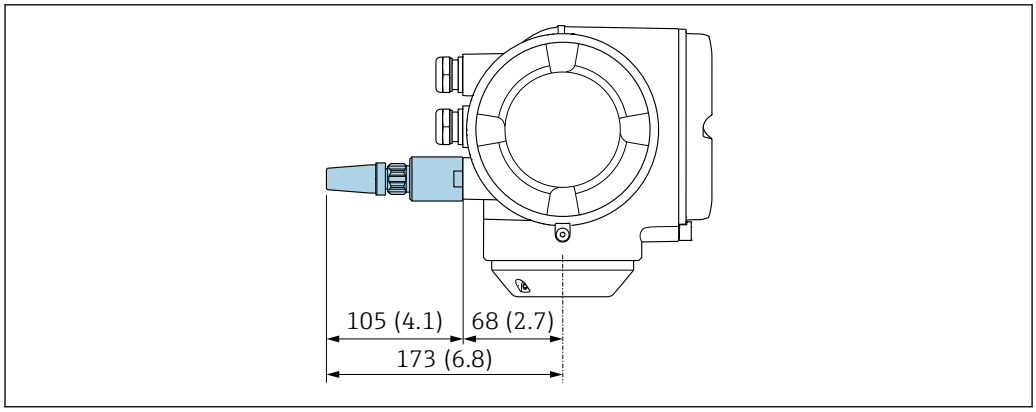


46 *Weather protection cover for Proline 500*

External WLAN antenna

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

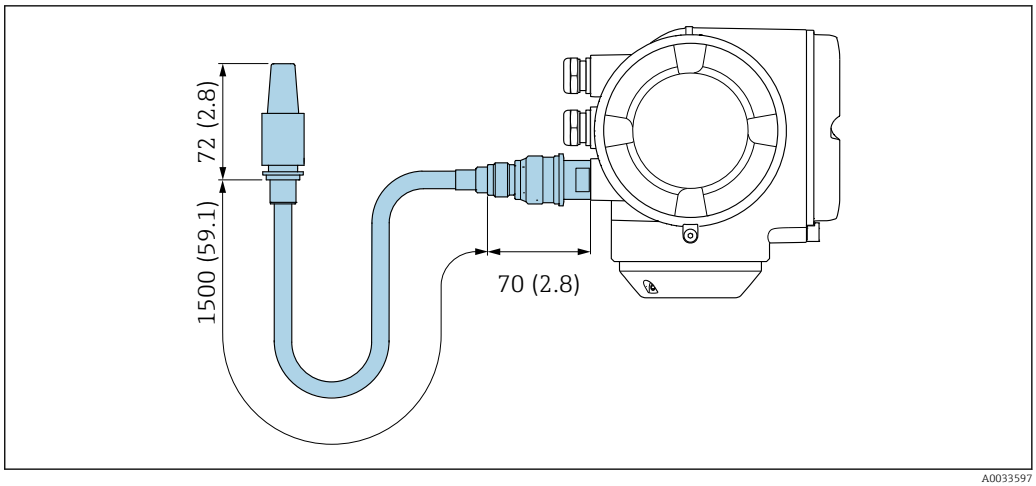
External WLAN antenna mounted on device



47 *Engineering unit mm (in)*

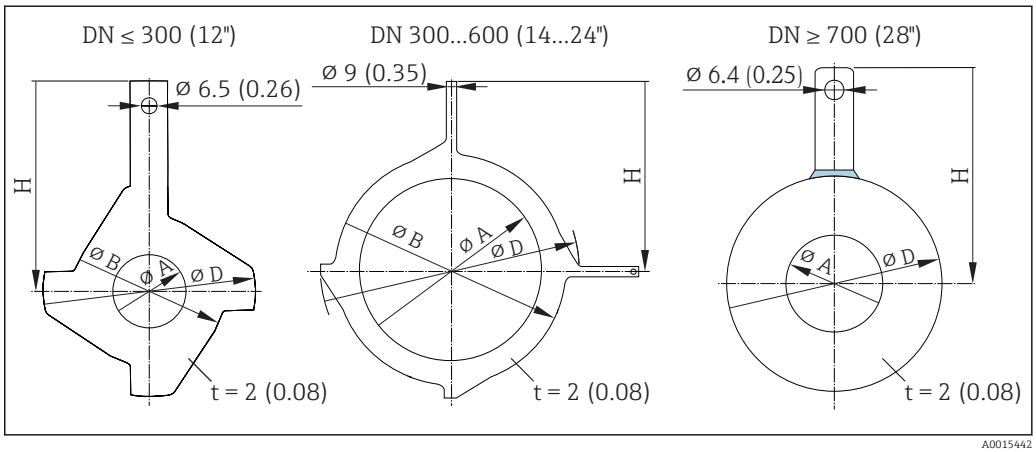
External WLAN antenna mounted with cable

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



48 *Engineering unit mm (in)*

Ground disks for flange connections



49 *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
14	DIN, PN 10	13.5	15.8	18.9	14.4

DN [in]	Pressure rating	A [in]	B [in]	D [in]	H [in]
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

All values (weight exclusive of packaging material) refer to devices for standard pressure ratings.

Transmitter

- Proline 500 aluminum: 6.5 kg (14.3 lbs)
- Proline 500 cast, stainless: 15.6 kg (34.4 lbs)

Sensor
Sensor with aluminum connection housing version: see the information in the following table

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	10K	79
375	15	PN 6	118	–	–
400	16	PN 6	118	10K	100
450	18	PN 6	159	10K	128
500	20	PN 6	154	10K	142
600	24	PN 6	206	10K	188
700	28	PN 6	302	10K	280
750	–	–	–	10K	331
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			
DN [mm]	Weight [kg]		
	PN 6	PN 10	PN 16
450	98	115	145
500	113	131	188

EN 1092-1			
DN [mm]	Weight [kg]		
	PN 6	PN 10	PN 16
600	154	166	274
700	198	253	307
800	262	343	416
900	345	431	525
1000	446	560	725
1200	639	837	1192
1400	1036	1348	1713
1600	1384	1985	2448
1800	1829	2570	3300
2000	2506	3178	4168

AS 2129, Table E	
DN [mm]	Weight [kg]
450	147
500	181
600	263
700	345
750	432
800	492
900	689
1000	786
1200	1246

AS 4087, PN 16	
DN [mm]	Weight [kg]
450	137
500	185
600	265
700	366
750	444
800	523
900	701
1000	784
1200	1228

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	1 010
800	32			Class D	1 208
900	36			Class D	1 760
1000	40			Class D	1 980
–	42			Class D	2 421
1200	48			Class D	3 083
–	54			Class D	4 847
–	60			Class D	5 949
–	66			Class D	8 154
1800	72			Class D	9 036
–	78			Class D	10 139

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	721

AWWA C207, Class D	
DN [in]	Weight [lbs]
28	606
30	740
32	881
36	1093
40	1463
42	1695
48	2277
54	3165
60	3930
66	5425
72	6295
78	7782

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 [1]	8	PN 10	Class 150	Table E, PN 16	10K	204	8.03	204	8.03
200 [2]	8	PN 16	Class 150	Table E, PN 16	10K	201	7.91	–	–
250 [1]	10	PN 10	Class 150	Table E, PN 16	10K	258	10.2	258	10.2
250 [2]	10	PN 16	Class 150	Table E, PN 16	10K	251	9.88	–	–
300 [1]	12	PN 10	Class 150	Table E, PN 16	10K	309	12.2	309	12.2
300 [2]	12	PN 16	Class 150	Table E, PN 16	10K	309	12.2	–	–
350	14	PN 6	Class 150	Table E, PN 16	10K	337	13.3	342	13.5
375	15	–	–	PN 16	10K	389	15.3	–	–
400	16	PN 6	Class 150	Table E, PN 16	10K	387	15.2	392	15.4
450	18	PN 6	Class 150	–	10K	436	17.1	437	17.2
500	20	PN 6	Class 150	Table E, PN 16	10K	487	19.1	492	19.4
600	24	PN 6	Class 150	Table E, PN 16	10K	585	23.0	594	23.4
700	28	PN 6	Class D	Table E, PN 16	10K	690	27.1	692	27.2
750	30	–	Class D	Table E, PN 16	10K	741	29.1	742	29.2
800	32	PN 6	Class D	Table E, PN 16	–	788	31.0	794	31.3

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]
900	36	PN 6	Class D	Table E, PN 16	–	889	35.0	891	35.1
1 000	40	PN 6	Class D	Table E, PN 16	–	991	39.0	994	39.1
–	42	–	Class D	–	–	1 043	41.1	1 043	41.1
1 200	48	PN 6	Class D	Table E, PN 16	–	1 191	46.9	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	–	–

1) Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"
2) Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Materials

Transmitter housing

Order code for "Transmitter housing":
Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated

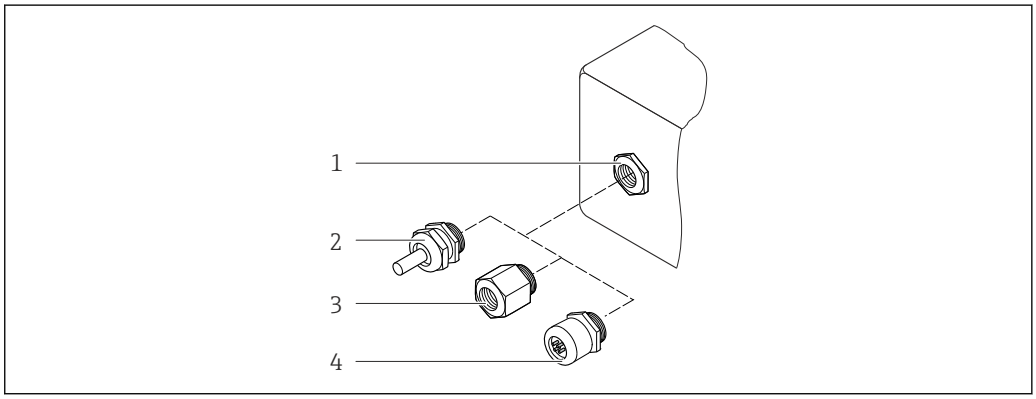
Window material

Order code for "Transmitter housing":
Option **A** "Aluminum, coated": glass

Sensor connection housing

Order code for "Sensor connection housing":
- Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated
- Option **D** "Polycarbonate": polycarbonate

Cable entries/cable glands



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50 Possible cable entries/cable glands

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

Cable entries and adapters	Material
Cable gland M20 × 1.5	Plastic
▪ Adapter for cable entry with internal thread G ½" ▪ Adapter for cable entry with internal thread NPT ½" Only available for certain device versions: ▪ Order code for "Transmitter housing": Option **A** "Aluminum, coated" ▪ Order code for "Sensor connection housing": Proline 500: Option **A** "Aluminum coated" Option **D** "Polycarbonate"	Nickel-plated brass
Adapter for device plug Device plug for digital communication: Only available for certain device versions → 🖹 28.	Stainless steel, 1.4404 (316L)
Device plugs	Plug M12 × 1 ▪ Socket: Stainless steel, 1.4404 (316L) ▪ Contact housing: Polyamide ▪ Contacts: Gold-plated brass

Device plug

Electrical connection	Material
Plug M12x1	▪ 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

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

Sensor housing

- DN 25 to 300 (1 to 12"):
  - Aluminum, AlSi10Mg, coated
  - Carbon steel with Al/Zn protective coating
- DN 25 to 300 (1 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 600 (1 to 24") [1]: stainless steel, 1.4301/1.4306/304/304L
- DN 700 to 2000 (28 to 78") [1]: stainless steel, 1.4301/304

Liner

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

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")

Electrodes

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

Process connections

EN 1092-1 (DIN 2501)

- DN 25 to 300 [1]:
  - Stainless steel, 1.4571/F316L
  - Carbon steel, S235JRG2/S235JR+N/P250GH/E250C
- DN 350 to 600 [1]:
  - Stainless steel, 1.4571/F316L
  - Carbon steel, P245GH
- >DN 600 [2]:
  - Stainless steel, 1.4404/F316L
  - Carbon steel, P245GH

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

AWWA C207

DN 48 to 78" [2]:
Carbon steel, P265GH/S275JR/A105/A181 Class 70/E250C

AS 2129

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

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

As per DIN EN 1514-1, form IBC

Accessories

Protective cover

Stainless steel, 1.4404 (316L)

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

External WLAN antenna

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

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

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 750: fixed flange (10K)
  - DN 25 to 600: fixed flange (20K)

For information on the different materials used in the process connections

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

Fast and safe commissioning
- Guided menus ("Make-it-run" wizards) for applications
- Menu guidance with brief descriptions of the individual parameter functions
- Device access via Web server or SmartBlue app → 112
- WLAN access to the device via mobile handheld terminal, tablet or smart phone

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"

Reliable operation
- Operation in local language → 95
- Uniform operating philosophy applied to device and operating tools
- If replacing electronic modules, transfer the device configuration via the integrated memory (HistoROM backup) which contains the process and measuring device data and the event logbook. No need to reconfigure.

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

Languages

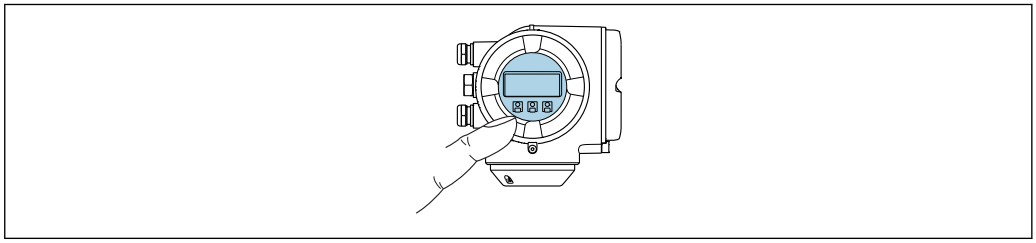
Can be operated in the following languages:
- Via local operation
  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Bahasa (Indonesian), Vietnamese, Czech, Swedish
- Via Web browser
  English, German, French, Spanish, Italian, Dutch,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

Local operation

Via display module

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

Information about WLAN interface → 101



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51 *Operation with touch control*

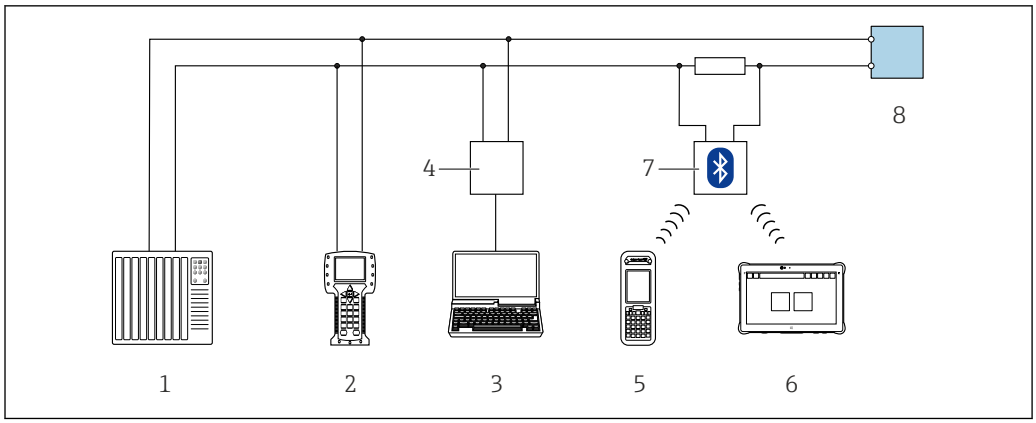
Display elements
- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: −20 to +60 °C (−4 to +140 °F)
  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 the various zones of the hazardous area

Remote operation

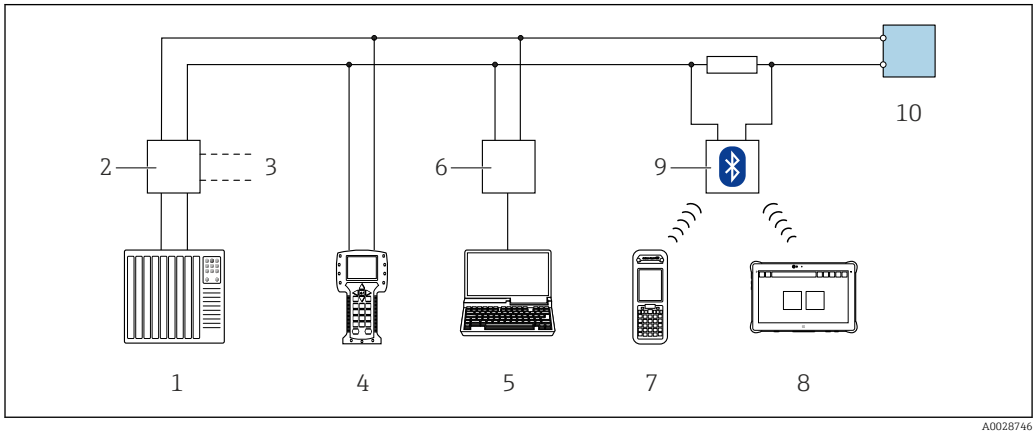
Via HART protocol

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



52 *Options for remote operation via HART protocol (active)*

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

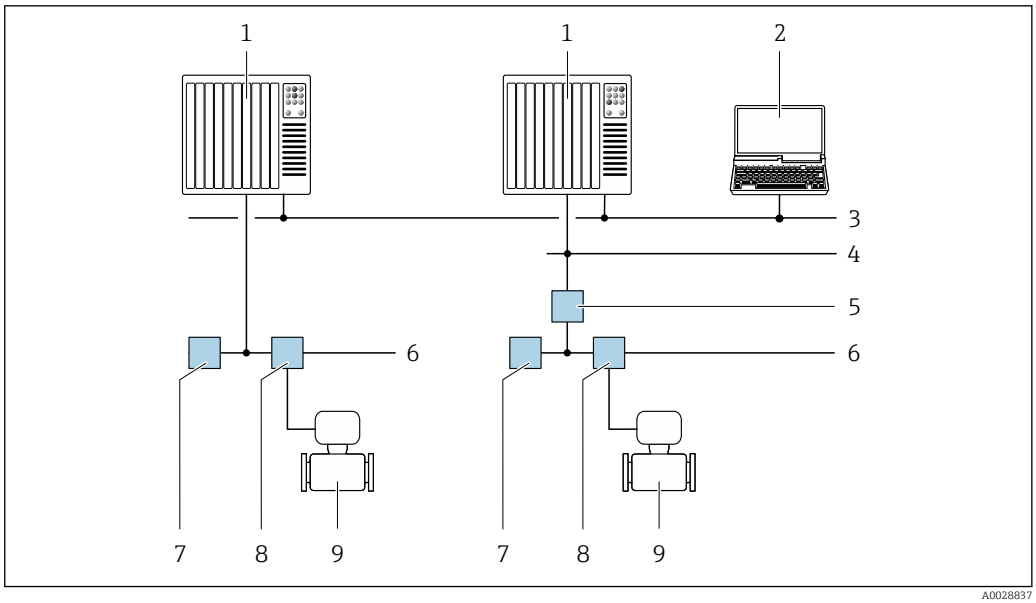


53 *Options for remote operation via HART protocol (passive)*

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

Via FOUNDATION Fieldbus network

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

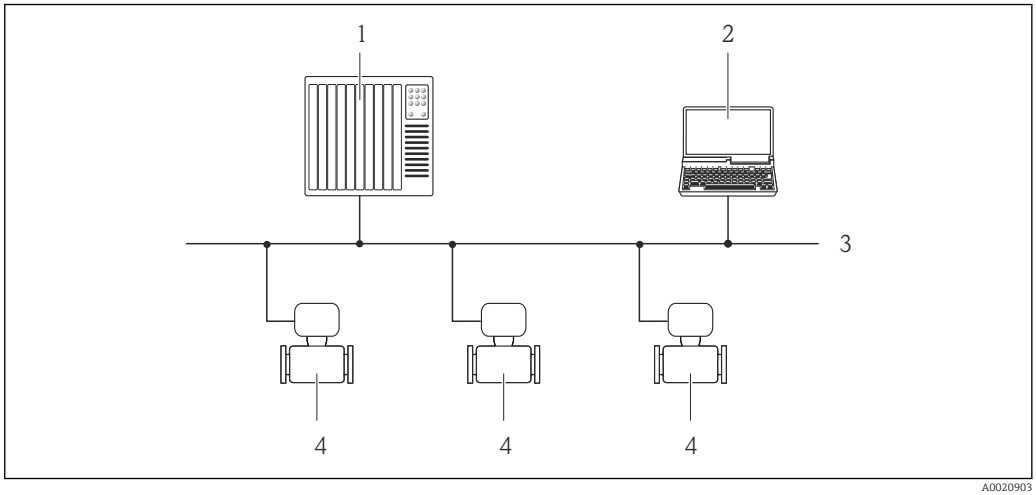


54 *Options for remote operation via FOUNDATION Fieldbus network*

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

Via PROFIBUS DP network

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

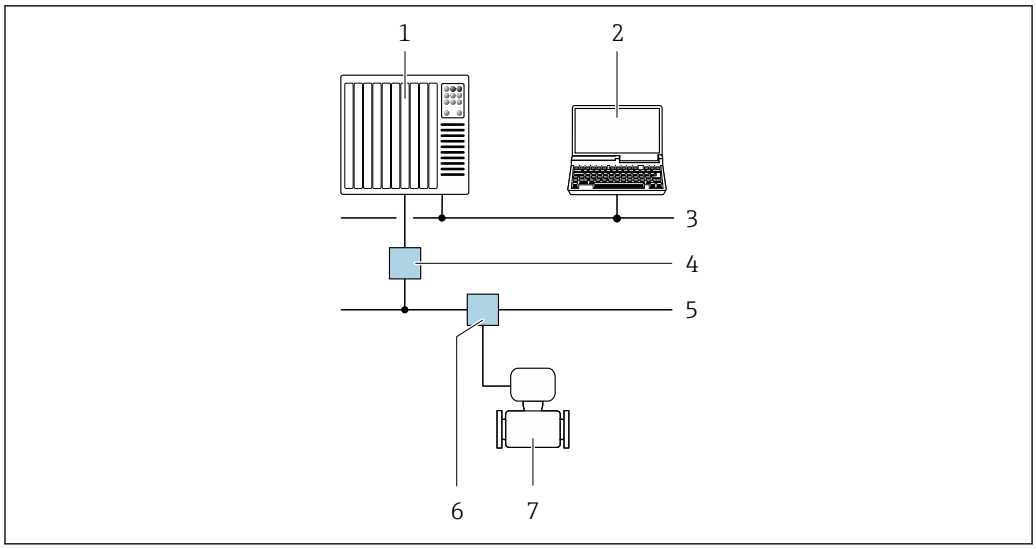


55 *Options for remote operation via PROFIBUS DP network*

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

Via PROFIBUS PA network

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

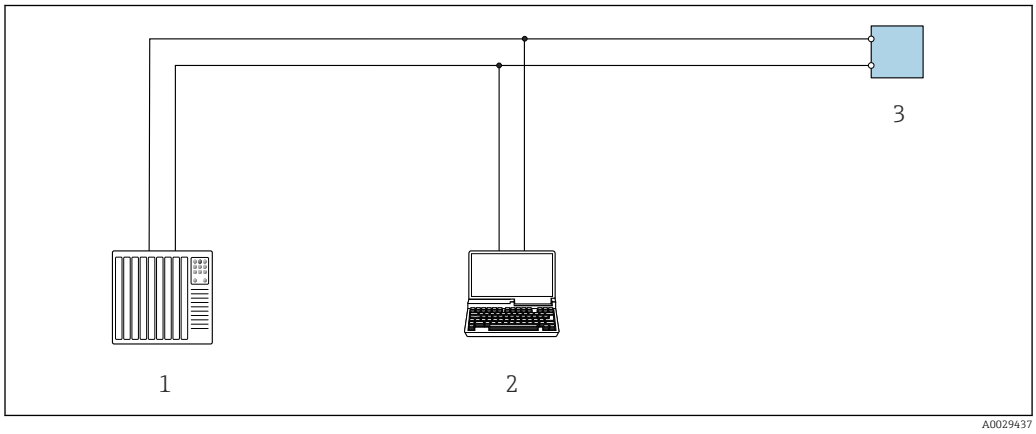


56 Options for remote operation via PROFIBUS PA network

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

Via Modbus RS485 protocol

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



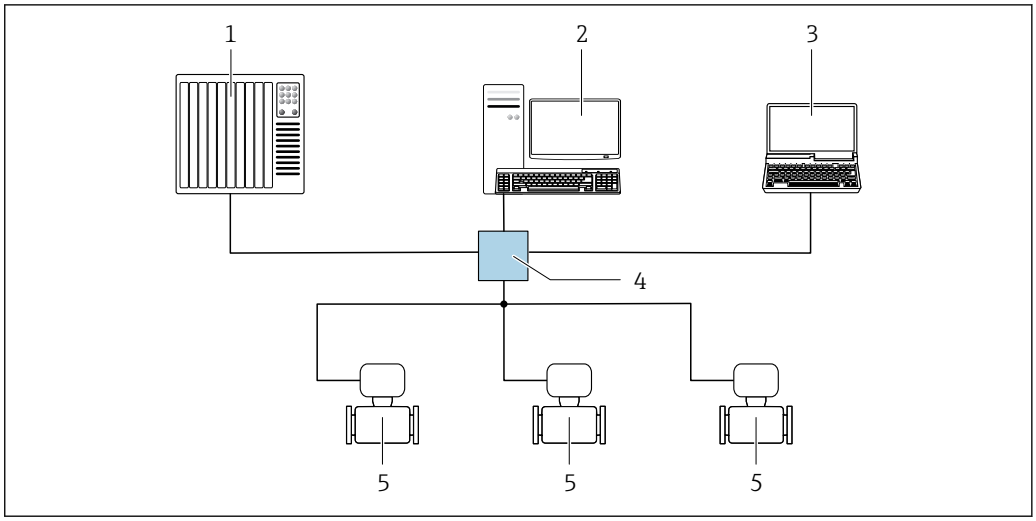
57 Options for remote operation via Modbus-RS485 protocol (active)

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

Via EtherNet/IP network

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

Star topology

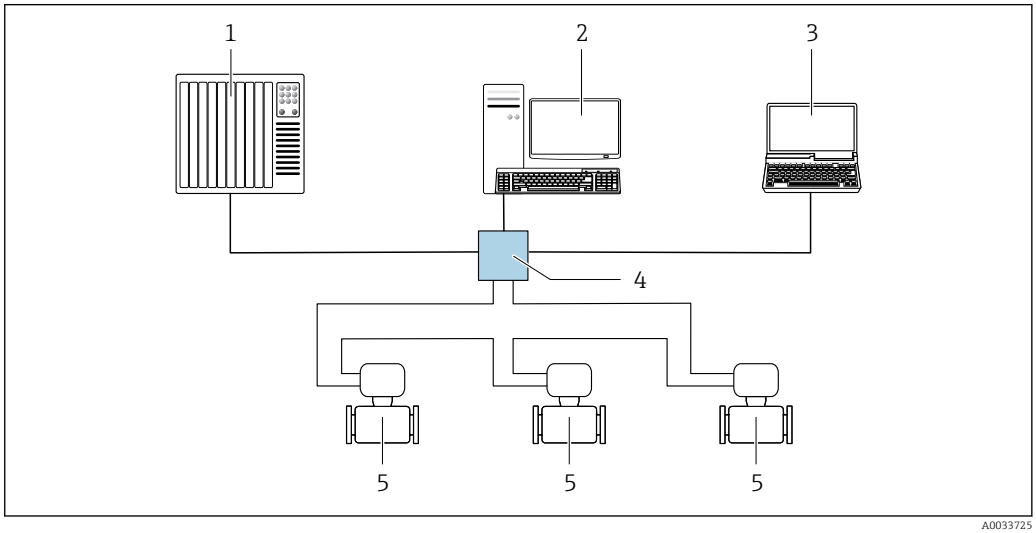


58 *Options for remote operation via EtherNet/IP network: star topology*

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

Ring topology

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



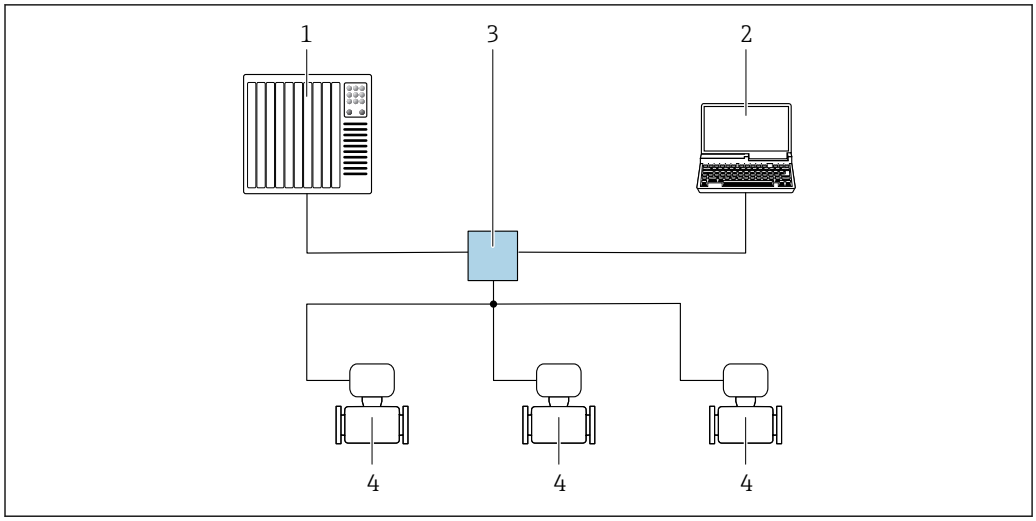
59 *Options for remote operation via EtherNet/IP network: ring topology*

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

Via PROFINET network

This communication interface is available in device versions with PROFINET.

Star topology

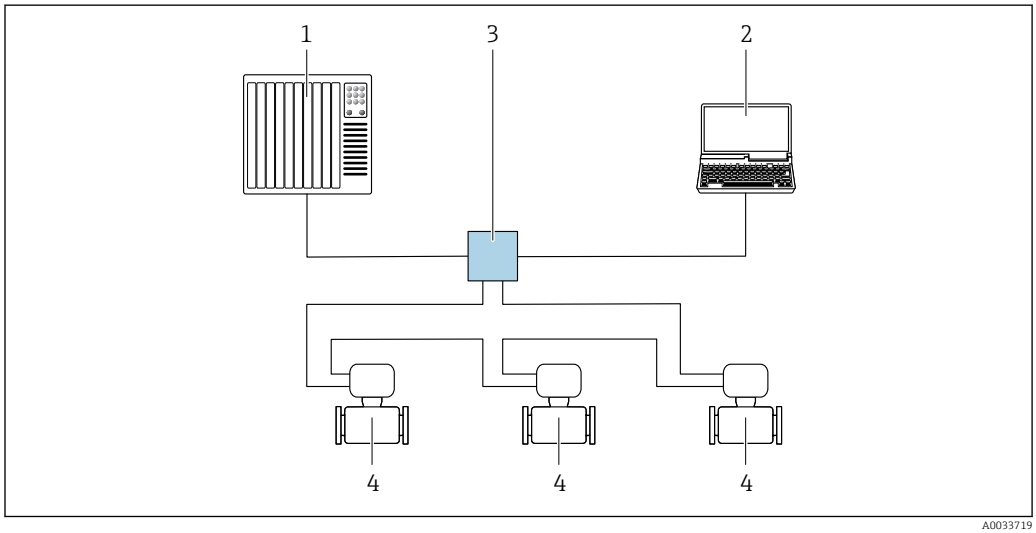


60 Options for remote operation via PROFINET network: star topology

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

Ring topology

This communication interface is available in device versions with PROFINET.



61 Options for remote operation via PROFINET network: ring topology

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

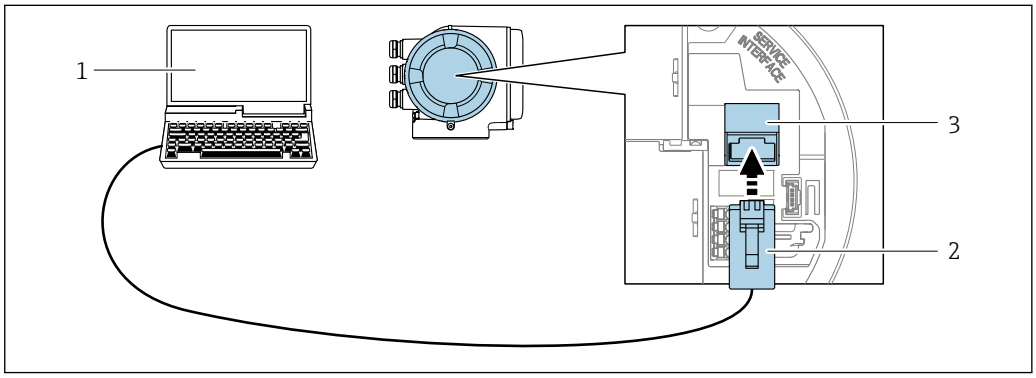
Service interface

Via service interface (CDI-RJ45)

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

An adapter for RJ45 and the M12 connector is optionally available:
Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"

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

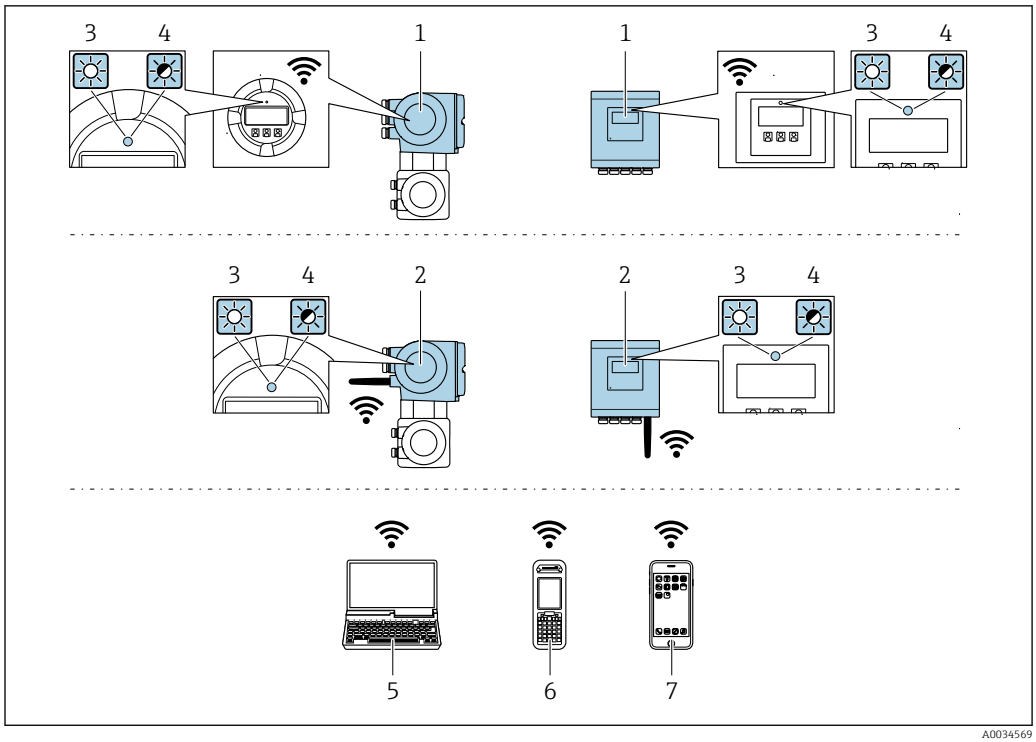


62 *Connection via service interface (CDI-RJ45)*

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

Via WLAN interface

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



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

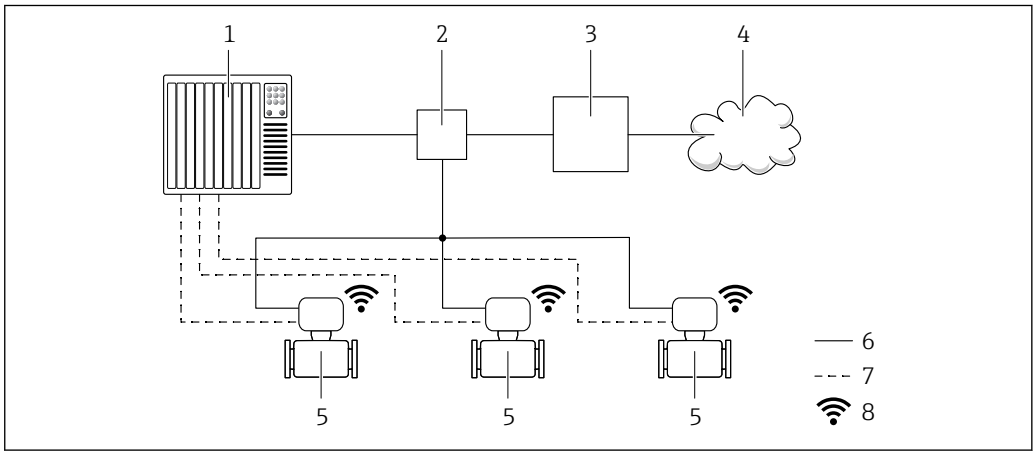
Function	WLAN: IEEE 802.11 b/g (2.4 GHz) ▪ Access point with DHCP server (default setting) ▪ Network
Encryption	WPA2-PSK AES-128 (in accordance with IEEE 802.11i)
Configurable WLAN channels	1 to 11
Degree of protection	IP67
Available antennas	▪ Internal antenna ▪ External antenna (optional) In the event of poor transmission/reception conditions at the place of installation. Available as an accessory → 🖹 110. Only one antenna active in each case!
Max. range	50 m (164 ft)
Materials: External WLAN antenna	▪ Antenna: ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel-plated brass ▪ Adapter: Stainless steel and nickel-plated brass ▪ Cable: Polyethylene ▪ Connector: Nickel-plated brass ▪ Angle bracket: Stainless steel

Network integration

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

For permanent access to device data and for device configuration via the Web server, the device is incorporated directly in a network via the service interface (CDI-RJ45). In this way, the device can be

accessed any time from the control station. The measured values are processed separately via the inputs and outputs through the automation system.



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

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

Special Documentation for the OPC-UA-Server application package → 114.

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	▪ CDI-RJ45 service interface ▪ WLAN interface ▪ Ethernet-based fieldbus (EtherNet/IP, PROFINET)	Special Documentation for device
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	▪ CDI-RJ45 service interface ▪ WLAN interface ▪ Fieldbus protocol	→ 112

Supported operating tools	Operating unit	Interface	Additional information
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	▪ CDI-RJ45 service interface ▪ WLAN interface ▪ Fieldbus protocol	→ 🖹 112
Device Xpert	Field Xpert SFX 100/350/370	HART and FOUNDATION Fieldbus fieldbus protocol	Operating Instructions BA01202S Device description files: Use update function of handheld terminal

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

- FactoryTalk AssetCentre (FTAC) by Rockwell Automation → www.rockwellautomation.com
- 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 via a WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is also displayed and allows the user to monitor the status of the device. Furthermore the device data can be managed and the network parameters can be configured.

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

Supported functions
Data exchange between the operating unit (such as a notebook for example) and the measuring device:
- Upload the configuration from the measuring device (XML format, configuration backup)
- Save the configuration to the measuring device (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file or PDF file, document the measuring point configuration)
- Export the Heartbeat verification log (PDF file, only available with the "Heartbeat Verification" application package)
- Flash firmware version for device firmware upgrade, for instance
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package → 🖹 109)

Web server special documentation → 🖹 114

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	▪ Event logbook such as diagnostic events for example ▪ Parameter data record backup ▪ Device firmware package ▪ Driver for system integration for exporting via Web server, e.g: – GSD for PROFIBUS DP – GSD for PROFIBUS PA – GSDML for PROFINET – EDS for EtherNet/IP – DD for FOUNDATION Fieldbus	▪ Measured value logging ("Extended HistoROM" order option) ▪ Current parameter data record (used by firmware at run time) ▪ Peakhold indicator (min/max values) ▪ Totalizer values	▪ Sensor data: nominal diameter etc. ▪ Serial number ▪ 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	Attachable to the user interface board in the connection compartment	In the sensor plug in the transmitter neck part

Data backup

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

Manual
Additional parameter data record (complete parameter settings) in the integrated device memory HistoROM backup for:
- Data backup function
  Backup and subsequent restoration of a device configuration in the device memory HistoROM backup
- Data comparison function
  Comparison of the current device configuration with the device configuration saved in the device memory HistoROM backup

Data transfer

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

Event list

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

Data logging

Manual
If the **Extended HistoROM** application package (order option) is enabled:
- Record up to 1 000 measured values via 1 to 4 channels
- User configurable recording interval
- Record up to 250 measured values via each of the 4 memory channels
- Export the measured value log via a variety of interfaces and operating tools e.g. FieldCare, DeviceCare or web server

Certificates and approvals

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

CE mark

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

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

C-Tick symbol

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

Ex approval

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

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

ATEX, IECEx

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

Ex db eb

Category	Type of protection	
	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

Pharmaceutical compatibility

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

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 6.2.0 (certificate available on request)
- Physical Layer Conformance Test
- The device can also be operated with certified devices of other manufacturers (interoperability)

Certification PROFIBUS

PROFIBUS interface

The measuring device is certified and registered by the PNO (PROFIBUS User Organization Organization). The measuring system meets all the requirements of the following specifications:
- Certified in accordance with PROFIBUS PA Profile 3.02
- The device can also be operated with certified devices of other manufacturers (interoperability)

EtherNet/IP certification

The measuring device is certified and registered by the ODVA (Open Device Vendor Association). The measuring system meets all the requirements of the following specifications:
- Certified in accordance with the ODVA Conformance Test
- EtherNet/IP Performance Test
- EtherNet/IP PlugFest compliance
- The device can also be operated with certified devices of other manufacturers (interoperability)

Certification PROFINET

PROFINET interface

The measuring device is certified and registered by the PNO (PROFIBUS User Organization Organization). The measuring system meets all the requirements of the following specifications:
- Certified according to:
  - Test specification for PROFINET devices
  - PROFINET Security Level 2 – Netload Class
- The device can also be operated with certified devices of other manufacturers (interoperability)

Radio approval

The measuring device has radio approval.

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

Other standards and guidelines

- EN 60529
  Degrees of protection provided by enclosures (IP code)
- EN 61010-1
  Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
- IEC/EN 61326
  Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements).
- NAMUR NE 21
  Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NAMUR NE 32
  Data retention in the event of a power failure in field and control instruments with microprocessors
- NAMUR NE 43
  Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53
  Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 105
  Specifications for integrating fieldbus devices in engineering tools for field devices
- NAMUR NE 107
  Self-monitoring and diagnosis of field devices
- NAMUR NE 131
  Requirements for field devices for standard applications

Ordering information

Detailed ordering information is available from the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

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

Application packages

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

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

Diagnostics functions

Package	Description
Extended HistoROM	Comprises extended functions concerning the event log and the activation of the measured value memory. Event log: Memory volume is extended from 20 message entries (standard version) to up to 100 entries. Data logging (line recorder): ▪ Memory capacity for up to 1000 measured values is activated. ▪ 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user. ▪ Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.

Heartbeat Technology

Package	Description
Heartbeat Verification +Monitoring	**Heartbeat Verification** Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment". ▪ Functional testing in the installed state without interrupting the process. ▪ Traceable verification results on request, including a report. ▪ Simple testing process via local operation or other operating interfaces. ▪ Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications. ▪ Extension of calibration intervals according to operator's risk assessment. **Heartbeat Monitoring** Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to: ▪ Draw conclusions - using these data and other information - about the impact process influences (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.

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).

OPC-UA server

Package	Description
OPC-UA-Server	The application package provides the user with an integrated OPC-UA server for comprehensive instrument services for IoT and SCADA applications. Special Documentation for the "OPC-UA-Server" application package → 114.

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	Transmitter for replacement or storage. Use the order code to define the following specifications: ▪ Approvals ▪ Output ▪ Input ▪ Display/operation ▪ Housing ▪ Software Order code: 5X5BXX-XXXXXXXXXB Proline 500 transmitter for replacement: It is essential to specify the serial number of the current transmitter when ordering. Based on the serial number, the device-specific data (e.g., calibration factors) of the replacement device can be used for the new transmitter. Installation Instructions EA01152
External WLAN antenna	External WLAN antenna with 1.5 m (59.1 in) connecting cable and two angle brackets. Order code for "Enclosed accessories", option P8 "Wireless antenna wide area". ▪ The external WLAN antenna is not suitable for use in hygienic applications. ▪ Further information on the WLAN interface → 101. Order number: 71351317 Installation Instructions EA01238D
Pipe mounting set	Pipe mounting set for transmitter. Order number: 71346428

Protective cover Transmitter Proline 500	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. Order number: 71343505 Installation Instructions EA01160
Ground cable	Set, consisting of two ground cables for potential equalization.
Connecting cable Sensor – Transmitter	The connecting cable can be ordered directly with the measuring device (order code for "Cable, sensor connection) or as an accessory (order number). The following cable lengths are available: order code for "Cable, sensor connection" ▪ 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) Reinforced connecting cable with an additional, reinforcing metal braid: ▪ Option 6: User configurable cable length (m) ▪ Option 7: User configurable cable length (ft) Possible cable length: depends on the medium conductivity, max. 200 m (660 ft)

For the sensor

Accessories	Description
Ground disks	Are used to ground the medium 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. Technical Information TI00404F
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values. ▪ Technical Information TI00429F ▪ Operating Instructions BA00371F
Fieldgate FXA320	Gateway for the remote monitoring of connected 4-20 mA measuring devices via a Web browser. Technical Information TI00025S Operating Instructions BA00053S
Fieldgate FXA520	Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser. Technical Information TI00025S 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 and can be used in non-hazardous areas. 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 and can be used in the non-hazardous area and in the hazardous area. Operating Instructions BA01202S
Field Xpert SMT70	The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in hazardous and non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress. This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle. ▪ Technical Information TI01342S ▪ Operating Instructions BA01709S ▪ Product page: www.endress.com/smt70

Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: ▪ 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: ▪ Via the Internet: https://portal.endress.com/webapp/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. Operating Instructions BA00027S and BA00059S
DeviceCare	Tool to connect and configure Endress+Hauser field devices. Innovation brochure IN01047S

System components

Accessories	Description
Memograph M graphic data manager	The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick. ▪ Technical Information TI00133R ▪ Operating Instructions BA00247R

Supplementary documentation

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

Standard documentation

Brief Operating Instructions

Brief Operating Instructions for the sensor

Measuring device	Documentation code
Proline Promag W	KA01266D

Brief Operating Instructions for transmitter

Measuring device	Documentation code						
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET
Proline 500	KA01312D	KA01293D	KA01231D	KA01387D	KA01316D	KA01342D	KA01348D

Operating Instructions

Measuring device	Documentation code						
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET
Promag W 500	BA01400D	BA01481D	BA01406D	BA01868D	BA01403D	BA01722D	BA01725D

Description of Device Parameters

Measuring device	Documentation code						
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	EtherNet/IP	PROFINET
Promag 500	GP01054D	GP01099D	GP01056D	GP01136D	GP01055D	GP01118D	GP01119D

Device-dependent additional documentation

Safety instructions

Safety instructions for electrical equipment for hazardous areas.

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
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
OPC-UA Server [1)]	SD02044D

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

Contents	Documentation code						
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	PROFINET	EtherNet/IP
Heartbeat Technology	SD01641D	SD01745D	SD01747D	SD02207D	SD01746D	SD01987D	SD01981D
Web server	SD01658D	SD01661D	SD01660D	SD02236D	SD01659D	SD01979D	SD01978D

Installation Instructions

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

Registered trademarks

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

PROFIBUS®
Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

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

Modbus®
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