

Technical Information

Proline Promag W 400

Electromagnetic flowmeter



Versatile standard flowmeter for the water and wastewater industry

Application

- The bidirectional measuring principle is virtually independent of pressure, density, temperature and viscosity
- Ideal for water measurement, e.g. drinking water, utility water and industrial/municipal wastewater

Device properties

- International drinking water approvals
- Degree of protection IP68 (Type 6P enclosure)
- Approved for custody transfer to MI-001/OIML R49
- Transmitter housing made of durable polycarbonate or aluminum
- WLAN access
- Integrated data logger: measured values monitoring

Your benefits

- Reliable measurement at constant accuracy with 0 x DN run without pressure loss
- Flexible engineering – sensors with fixed flanges or lap joint flanges
- Application suitability – corrosion protection according to EN ISO 12944 for buried or underwater installations
- Improved plant availability – sensor compliant with industry-specific requirements
- Safe operation – no need to open device
- Time-saving local operation without additional software and hardware – integrated web server
- Built-in verification and build-up detection – Heartbeat Technology

Table of contents

| | | | |
|----------------------------------------------|-----------|-----------------------------------------------|------------|
| About this document | 4 | Degree of protection | 47 |
| Symbols | 4 | Vibration- and shock-resistance | 47 |
| Function and system design | 5 | Mechanical load | 48 |
| Measuring principle | 5 | Electromagnetic compatibility (EMC) | 48 |
| Measuring system | 6 | Process | 48 |
| Equipment architecture | 7 | Medium temperature range | 48 |
| Safety | 7 | Conductivity | 49 |
| Input | 8 | Pressure/temperature ratings | 49 |
| Measured variable | 8 | Pressure tightness | 52 |
| Measuring range | 8 | Flow limit | 53 |
| Operable flow range | 12 | Pressure loss | 53 |
| Input signal | 13 | System pressure | 54 |
| Output | 13 | Vibrations | 54 |
| Output signal | 13 | Custody transfer | 55 |
| Signal on alarm | 15 | Mechanical construction | 55 |
| Low flow cut off | 17 | Dimensions in SI units | 55 |
| Galvanic isolation | 17 | Dimensions in US units | 75 |
| Protocol-specific data | 17 | Weight | 87 |
| Power supply | 19 | Measuring tube specification | 91 |
| Terminal assignment | 19 | Materials | 92 |
| Pin assignment, device plug | 22 | Fitted electrodes | 95 |
| Supply voltage | 23 | Process connections | 95 |
| Power consumption | 23 | Surface roughness | 95 |
| Current consumption | 23 | Display and user interface | 95 |
| Device fuse | 23 | Operation concept | 95 |
| Power supply failure | 23 | Languages | 95 |
| Overcurrent protection element | 23 | Onsite operation | 96 |
| Electrical connection | 24 | Remote operation | 96 |
| Potential equalization | 28 | Service interface | 98 |
| Terminals | 31 | Supported operating tools | 99 |
| Cable entries | 31 | HistoROM data management | 100 |
| Cable specification | 31 | Certificates and approvals | 101 |
| Overvoltage protection | 34 | CE mark | 102 |
| Performance characteristics | 34 | UKCA marking | 102 |
| Reference operating conditions | 34 | RCM marking | 102 |
| Maximum measured error | 34 | Ex-approval | 102 |
| Repeatability | 36 | Drinking water approval | 102 |
| Influence of ambient temperature | 36 | HART certification | 102 |
| Installation | 37 | Conformity PROFIBUS | 102 |
| Mounting location | 37 | Modbus RS485 certification | 102 |
| Orientation | 39 | EtherNet/IP certification | 102 |
| Inlet and outlet runs | 40 | Radio approval | 102 |
| Adapters | 42 | Measuring instrument approval | 102 |
| Length of connecting cable | 43 | External standards and guidelines | 103 |
| Special installation instructions | 43 | Ordering information | 103 |
| Mounting the transmitter housing | 45 | Application packages | 103 |
| Environment | 46 | Cleaning | 104 |
| Ambient temperature range | 46 | Diagnostics functions | 104 |
| Storage temperature | 46 | Heartbeat Technology | 104 |
| Atmosphere | 47 | | |

| | |
|--------------------------------------------------------|------------|
| Accessories | 104 |
| Device-specific accessories | 104 |
| Communication-specific accessories | 105 |
| Service-specific accessories | 106 |
| System components | 107 |
| | |
| Supplementary documentation | 107 |
| Standard documentation | 107 |
| Supplementary device-dependent documentation | 107 |
| | |
| Registered trademarks | 108 |

About this document

Symbols

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) Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: <ul style="list-style-type: none"> ▪ Interior ground terminal: protective earth is connected to the mains supply. ▪ Exterior ground terminal: device is connected to the plant grounding system. |

Communication-specific symbols

| Symbol | Meaning |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
|  | Wireless Local Area Network (WLAN) Communication via a wireless, local area network |
|  | Bluetooth Wireless data transmission between devices over a short distance via radio technology |
|  | LED LED is off. |
|  | LED LED is on. |
|  | LED LED 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 |

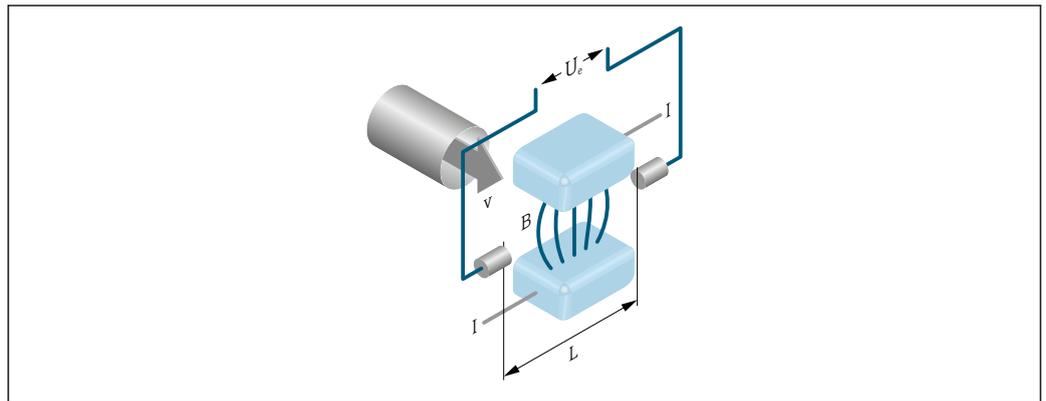
Symbols in graphics

| 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

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



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

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

Formulae for calculation

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

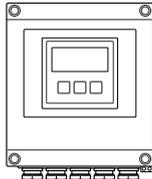
Measuring system

The device consists of a transmitter and a sensor.

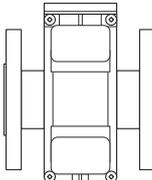
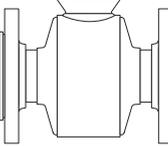
Two device versions are available:

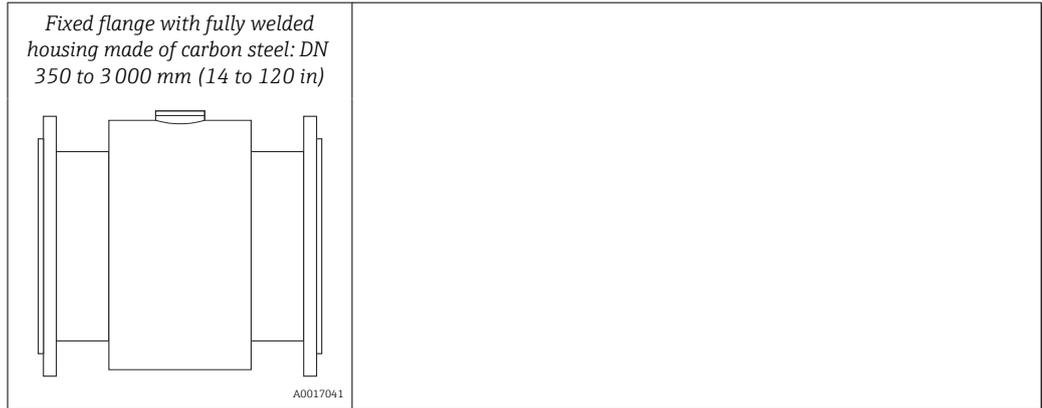
- Compact version - transmitter and sensor form a mechanical unit.
- Remote version - transmitter and sensor are mounted in separate locations.

Transmitter

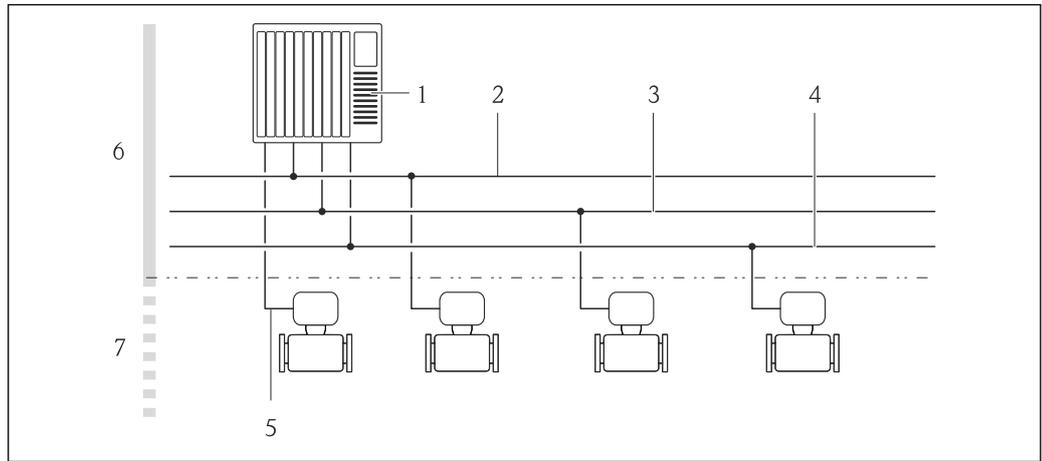
| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Proline 400</p>  <p style="text-align: right; font-size: small;">A0045222</p> | <p>Device versions and materials:</p> <ul style="list-style-type: none"> ■ Compact version: compact housing <ul style="list-style-type: none"> ■ Polycarbonate plastic ■ Aluminum, AlSi10Mg, coated ■ Remote version: wall-mount housing <ul style="list-style-type: none"> ■ Polycarbonate plastic ■ Aluminum, AlSi10Mg, coated <p>Configuration:</p> <ul style="list-style-type: none"> ■ External operation via four-line, illuminated local display with touch control and guided menus ("Make-it-run" wizards) for applications ■ Via operating tools (e.g. FieldCare) ■ Via Web browser (e.g. Microsoft Internet Explorer) ■ Also for device version with EtherNet/IP output: <ul style="list-style-type: none"> ■ Via Add-on Profile Level 3 for automation system from Rockwell Automation ■ Via Electronic Data Sheet (EDS) ■ Also for device version with PROFIBUS DP output: <ul style="list-style-type: none"> ■ Via PDM driver for Siemens automation system |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Sensor

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <p>Promag W</p> <p><i>Lap joint flange, lap joint flange, stamped plate or fixed flange with aluminum half-shell housing: DN 25 to 300 mm (1 to 12 in)</i></p>  <p style="text-align: right; font-size: small;">A0017040</p> | <ul style="list-style-type: none"> ■ Nominal diameter range: DN 25 to 3 000 mm (1 to 120 in) ■ Materials → 92 |
| <p><i>Fixed flange with fully welded housing made of carbon steel: DN 25 to 300 mm (1 to 12 in)</i></p>  <p style="text-align: right; font-size: small;">A0022673</p> | |



Equipment architecture



1 Possibilities for integrating measuring devices into a system

- 1 Control system (e.g. PLC)
- 2 EtherNet/IP
- 3 PROFIBUS DP
- 4 Modbus RS485
- 5 4 to 20 mA HART, pulse/frequency/switch output
- 6 Non-hazardous area
- 7 Non-hazardous area and Zone 2/Div. 2

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.

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.

User-specific access code

Write access to the device parameters via the local display 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.

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 plug).

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 → 107

Input

Measured variable

Direct measured variables

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



In custody transfer: only volume flow

Calculated measured variables

Mass flow

Measuring range

Typically $v = 0.01$ to 10 m/s (0.03 to 33 ft/s) with the specified accuracy

Electrical conductivity: ≥ 5 $\mu\text{S}/\text{cm}$ for liquids in general

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

| Nominal diameter | | Recommended flow min./max. full scale value ($v \sim 0.3 \dots 10$ m/s) [dm ³ /min] | Factory settings | | |
|------------------|------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------|
| [mm] | [in] | | Full scale value current output ($v \sim 2.5$ m/s) [dm ³ /min] | Pulse value (~ 2 Pulse/s at $v \sim 2.5$ m/s) [dm ³] | Low flow cut off ($v \sim 0.04$ m/s) [dm ³ /min] |
| 25 | 1 | 9 to 300 | 75 | 0.5 | 1 |
| 32 | - | 15 to 500 | 125 | 1 | 2 |

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.3...10 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|--------------------------------------------------|------------------------------------------|------------------------------------|
| [mm] | [in] | | Full scale value current output (v ~ 2.5 m/s) | Pulse value (~ 2 Pulse/s at v ~ 2.5 m/s) | Low flow cut off (v ~ 0.04 m/s) |
| | | [dm ³ /min] | [dm ³ /min] | [dm ³] | [dm ³ /min] |
| 40 | 1 ½ | 25 to 700 | 200 | 1.5 | 3 |
| 50 | 2 | 35 to 1100 | 300 | 2.5 | 5 |
| 65 | – | 60 to 2 000 | 500 | 5 | 8 |
| 80 | 3 | 90 to 3 000 | 750 | 5 | 12 |
| 100 | 4 | 145 to 4 700 | 1200 | 10 | 20 |
| 125 | – | 220 to 7 500 | 1850 | 15 | 30 |

Flow characteristic values in SI units: DN 150 to 3 000 mm (6 to 120 in)

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.3...10 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|--------------------------------------------------|------------------------------------------|------------------------------------|
| [mm] | [in] | | Full scale value current output (v ~ 2.5 m/s) | Pulse value (~ 2 Pulse/s at v ~ 2.5 m/s) | Low flow cut off (v ~ 0.04 m/s) |
| | | [m ³ /h] | [m ³ /h] | [m ³] | [m ³ /h] |
| 150 | 6 | 20 to 600 | 150 | 0.025 | 2.5 |
| 200 | 8 | 35 to 1100 | 300 | 0.05 | 5 |
| 250 | 10 | 55 to 1700 | 500 | 0.05 | 7.5 |
| 300 | 12 | 80 to 2 400 | 750 | 0.1 | 10 |
| 350 | 14 | 110 to 3 300 | 1000 | 0.1 | 15 |
| 375 | 15 | 140 to 4 200 | 1200 | 0.15 | 20 |
| 400 | 16 | 140 to 4 200 | 1200 | 0.15 | 20 |
| 450 | 18 | 180 to 5 400 | 1500 | 0.25 | 25 |
| 500 | 20 | 220 to 6 600 | 2000 | 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 | 4000 | 0.5 | 60 |
| 800 | 32 | 550 to 18 000 | 4 500 | 0.75 | 75 |
| 900 | 36 | 690 to 22 500 | 6000 | 0.75 | 100 |
| 1000 | 40 | 850 to 28 000 | 7000 | 1 | 125 |
| – | 42 | 950 to 30 000 | 8000 | 1 | 125 |
| 1200 | 48 | 1 250 to 40 000 | 10 000 | 1.5 | 150 |
| – | 54 | 1 550 to 50 000 | 13 000 | 1.5 | 200 |
| 1400 | – | 1 700 to 55 000 | 14 000 | 2 | 225 |
| – | 60 | 1 950 to 60 000 | 16 000 | 2 | 250 |
| 1600 | – | 2 200 to 70 000 | 18 000 | 2.5 | 300 |
| – | 66 | 2 500 to 80 000 | 20 500 | 2.5 | 325 |
| 1800 | 72 | 2 800 to 90 000 | 23 000 | 3 | 350 |
| – | 78 | 3 300 to 100 000 | 28 500 | 3.5 | 450 |
| 2000 | – | 3 400 to 110 000 | 28 500 | 3.5 | 450 |

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.3...10 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------|
| [mm] | [in] | | Full scale value current output (v ~ 2.5 m/s) [m ³ /h] | Pulse value (~ 2 Pulse/s at v ~ 2.5 m/s) [m ³] | Low flow cut off (v ~ 0.04 m/s) [m ³ /h] |
| - | 84 | 3 700 to 125 000 | 31 000 | 4.5 | 500 |
| 2200 | - | 4 100 to 136 000 | 34 000 | 4.5 | 540 |
| - | 90 | 4 300 to 143 000 | 36 000 | 5 | 570 |
| 2400 | - | 4 800 to 162 000 | 40 000 | 5.5 | 650 |
| - | 96 | 5 000 to 168 000 | 42 000 | 6 | 675 |
| - | 102 | 5 700 to 190 000 | 47 500 | 7 | 750 |
| 2600 | - | 5 700 to 191 000 | 48 000 | 7 | 775 |
| - | 108 | 6 500 to 210 000 | 55 000 | 7 | 850 |
| 2800 | - | 6 700 to 222 000 | 55 500 | 8 | 875 |
| - | 114 | 7 100 to 237 000 | 59 500 | 8 | 950 |
| 3000 | - | 7 600 to 254 000 | 63 500 | 9 | 1025 |
| - | 120 | 7 900 to 263 000 | 65 500 | 9 | 1050 |

Flow characteristic values in SI units: DN 50 to 200 mm (2 to 8 in) for order code for "Design", option C "Fixed flange, constricted measuring tube, 0 x DN inlet/outlet runs"

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.12...5 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------|
| [mm] | [in] | | Full scale value current output (v ~ 2.5 m/s) [dm ³ /min] | Pulse value (~ 4 Pulse/s at v ~ 2.5 m/s) [dm ³] | Low flow cut off (v ~ 0.01 m/s) [dm ³ /min] |
| 50 | 2 | 15 to 600 | 300 | 1.25 | 1.25 |
| 65 | - | 25 to 1 000 | 500 | 2 | 2 |
| 80 | 3 | 35 to 1 500 | 750 | 3 | 3.25 |
| 100 | 4 | 60 to 2 400 | 1 200 | 5 | 4.75 |
| 125 | - | 90 to 3 700 | 1 850 | 8 | 7.5 |
| 150 | 6 | 145 to 5 400 | 2 500 | 10 | 11 |
| 200 | 8 | 220 to 9 400 | 5 000 | 20 | 19 |

Flow characteristic values in SI units: DN 250 to 300 mm (10 to 12 in) for order code for "Design", option C "Fixed flange, constricted measuring tube, 0 x DN inlet/outlet runs"

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.12...5 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------|
| [mm] | [in] | | Full scale value current output (v ~ 2.5 m/s) [m ³ /h] | Pulse value (~ 4 Pulse/s at v ~ 2.5 m/s) [m ³] | Low flow cut off (v ~ 0.01 m/s) [m ³ /h] |
| 250 | 10 | 20 to 850 | 500 | 0.03 | 1.75 |
| 300 | 12 | 35 to 1 300 | 750 | 0.05 | 2.75 |

Flow characteristic values in US units: DN 1 to 48 in (25 to 1200 mm)

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.3...10 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------|------------------------------------|
| [in] | [mm] | | Full scale value current output (v ~ 2.5 m/s) | Pulse value (~ 2 Pulse/s at v ~ 2.5 m/s) | Low flow cut off (v ~ 0.04 m/s) |
| | | [gal/min] | [gal/min] | [gal] | [gal/min] |
| 1 | 25 | 2.5 to 80 | 18 | 0.2 | 0.25 |
| - | 32 | 4 to 130 | 30 | 0.2 | 0.5 |
| 1 ½ | 40 | 7 to 185 | 50 | 0.5 | 0.75 |
| 2 | 50 | 10 to 300 | 75 | 0.5 | 1.25 |
| - | 65 | 16 to 500 | 130 | 1 | 2 |
| 3 | 80 | 24 to 800 | 200 | 2 | 2.5 |
| 4 | 100 | 40 to 1250 | 300 | 2 | 4 |
| - | 125 | 60 to 1950 | 450 | 5 | 7 |
| 6 | 150 | 90 to 2 650 | 600 | 5 | 12 |
| 8 | 200 | 155 to 4 850 | 1200 | 10 | 15 |
| 10 | 250 | 250 to 7 500 | 1500 | 15 | 30 |
| 12 | 300 | 350 to 10 600 | 2400 | 25 | 45 |
| 14 | 350 | 500 to 15 000 | 3600 | 30 | 60 |
| 15 | 375 | 600 to 19 000 | 4800 | 50 | 60 |
| 16 | 400 | 600 to 19 000 | 4800 | 50 | 60 |
| 18 | 450 | 800 to 24 000 | 6000 | 50 | 90 |
| 20 | 500 | 1000 to 30 000 | 7500 | 75 | 120 |
| 24 | 600 | 1400 to 44 000 | 10 500 | 100 | 180 |
| 28 | 700 | 1 900 to 60 000 | 13 500 | 125 | 210 |
| 30 | 750 | 2 150 to 67 000 | 16 500 | 150 | 270 |
| 32 | 800 | 2 450 to 80 000 | 19 500 | 200 | 300 |
| 36 | 900 | 3 100 to 100 000 | 24 000 | 225 | 360 |
| 40 | 1000 | 3 800 to 125 000 | 30 000 | 250 | 480 |
| 42 | - | 4 200 to 135 000 | 33 000 | 250 | 600 |
| 48 | 1200 | 5 500 to 175 000 | 42 000 | 400 | 600 |

Flow characteristic values in US units: DN 54 to 120 in (1400 to 3000 mm)

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.3...10 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------|------------------------------------|
| [in] | [mm] | | Full scale value current output (v ~ 2.5 m/s) | Pulse value (~ 2 Pulse/s at v ~ 2.5 m/s) | Low flow cut off (v ~ 0.04 m/s) |
| | | [Mgal/d] | [Mgal/d] | [Mgal] | [Mgal/d] |
| 54 | - | 9 to 300 | 75 | 0.0005 | 1.3 |
| - | 1400 | 10 to 340 | 85 | 0.0005 | 1.3 |
| 60 | - | 12 to 380 | 95 | 0.0005 | 1.3 |
| - | 1600 | 13 to 450 | 110 | 0.0008 | 1.7 |
| 66 | - | 14 to 500 | 120 | 0.0008 | 2.2 |
| 72 | 1800 | 16 to 570 | 140 | 0.0008 | 2.6 |

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.3...10 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------|------------------------------------|
| [in] | [mm] | | Full scale value current output (v ~ 2.5 m/s) | Pulse value (~ 2 Pulse/s at v ~ 2.5 m/s) | Low flow cut off (v ~ 0.04 m/s) |
| | | [Mgal/d] | [Mgal/d] | [Mgal] | [Mgal/d] |
| 78 | - | 18 to 650 | 175 | 0.0010 | 3.0 |
| - | 2000 | 20 to 700 | 175 | 0.0010 | 2.9 |
| 84 | - | 24 to 800 | 190 | 0.0011 | 3.2 |
| - | 2200 | 26 to 870 | 210 | 0.0012 | 3.4 |
| 90 | - | 27 to 910 | 220 | 0.0013 | 3.6 |
| - | 2400 | 31 to 1030 | 245 | 0.0014 | 4.0 |
| 96 | - | 32 to 1066 | 265 | 0.0015 | 4.0 |
| 102 | - | 34 to 1203 | 300 | 0.0017 | 5.0 |
| - | 2600 | 34 to 1212 | 305 | 0.0018 | 5.0 |
| 108 | - | 35 to 1300 | 340 | 0.0020 | 5.0 |
| - | 2800 | 42 to 1405 | 350 | 0.0020 | 6.0 |
| 114 | - | 45 to 1503 | 375 | 0.0022 | 6.0 |
| - | 3000 | 48 to 1613 | 405 | 0.0023 | 6.0 |
| 120 | - | 50 to 1665 | 415 | 0.0024 | 7.0 |

Flow characteristic values in US units: DN 2 to 12 in (50 to 300 mm) for order code for "Design", option C "Fixed flange, constricted measuring tube, 0 x DN inlet/outlet runs"

| Nominal diameter | | Recommended flow min./max. full scale value (v ~ 0.12...5 m/s) | Factory settings | | |
|------------------|------|----------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------|------------------------------------|
| [in] | [mm] | | Full scale value current output (v ~ 2.5 m/s) | Pulse value (~ 4 Pulse/s at v ~ 2.5 m/s) | Low flow cut off (v ~ 0.01 m/s) |
| | | [gal/min] | [gal/min] | [gal] | [gal/min] |
| 2 | 50 | 4 to 160 | 75 | 0.3 | 0.35 |
| - | 65 | 7 to 260 | 130 | 0.5 | 0.6 |
| 3 | 80 | 10 to 400 | 200 | 0.8 | 0.8 |
| 4 | 100 | 16 to 650 | 300 | 1.2 | 1.25 |
| - | 125 | 24 to 1000 | 450 | 1.8 | 2 |
| 6 | 150 | 40 to 1400 | 600 | 2.5 | 3 |
| 8 | 200 | 60 to 2500 | 1200 | 5 | 5 |
| 10 | 250 | 90 to 3700 | 1500 | 6 | 8 |
| 12 | 300 | 155 to 5700 | 2400 | 9 | 12 |

Recommended measuring range

 Flow limit →  53

 For custody transfer, the applicable approval determines the permitted measuring range, the pulse value and the low flow cut off.

Operable flow range

Over 1000 : 1

 For custody transfer, the operable flow range is 100 : 1 to 630 : 1, depending on the nominal diameter. Further details are specified by the applicable approval.

Input signal

External measured values

 Various pressure transmitters and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section →  107

It is recommended to read in external measured values to calculate the following measured variables:
Mass 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

Digital communication

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

- PROFIBUS DP
- Modbus RS485
- EtherNet/IP

Status input

| | |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum input values | <ul style="list-style-type: none"> ■ DC 30 V ■ 6 mA |
| Response time | Configurable: 5 to 200 ms |
| Input signal level | <ul style="list-style-type: none"> ■ Low signal (low): DC -3 to +5 V ■ High signal (high): DC 12 to 30 V |
| Assignable functions | <ul style="list-style-type: none"> ■ Off ■ Reset totalizers 1-3 separately ■ Reset all totalizers ■ Flow override |

Output

Output signal

Current output

| | |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Current output | Can be set as: <ul style="list-style-type: none"> ■ 4 to 20 mA NAMUR ■ 4 to 20 mA US ■ 4 to 20 mA HART ■ 0 to 20 mA |
| Maximum output values | <ul style="list-style-type: none"> ■ DC 24 V (when idle) ■ 22.5 mA |
| Load | 0 to 700 Ω |
| Resolution | 0.5 μA |

| | |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Damping | Configurable: 0.07 to 999 s |
| Assignable measured variables | <ul style="list-style-type: none"> ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ¹⁾ ▪ Corrected conductivity ¹⁾ ▪ Electronics temperature ▪ Reference electrode potential ¹⁾ ▪ Coil current rise time ¹⁾ ▪ Noise ¹⁾ ▪ Buildup measured value ¹⁾ ▪ Test points 1-3 |

1) Visible depending on order options or device settings

Pulse/frequency/switch output

| | |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Function | <ul style="list-style-type: none"> ▪ With the order code for "Output; Input", option H: output 2 can be set as a pulse or frequency output ▪ With the order code for "Output; Input", option I: output 2 and 3 can be set as a pulse, frequency or switch output ▪ With the order code for "Output; Input", option J: output 2 firmly assigned as certified pulse output |
| Version | Passive, open collector |
| Maximum input values | <ul style="list-style-type: none"> ▪ DC 30 V ▪ 250 mA |
| Voltage drop | At 25 mA: ≤ DC 2 V |
| Pulse output | |
| Pulse width | Configurable: 0.05 to 2 000 ms |
| Maximum pulse rate | 10 000 Impulse/s |
| Pulse value | Configurable |
| Assignable measured variables | <ul style="list-style-type: none"> ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow |
| Frequency output | |
| Output frequency | Configurable: 0 to 12 500 Hz |
| Damping | Configurable: 0 to 999 s |
| Pulse/pause ratio | 1:1 |
| Assignable measured variables | <ul style="list-style-type: none"> ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ¹⁾ ▪ Corrected conductivity ¹⁾ ▪ Electronics temperature ▪ Noise ¹⁾ ▪ Coil current rise time ¹⁾ ▪ Reference electrode potential ¹⁾ ▪ Buildup measured value ¹⁾ ▪ Test points 1-3 |
| Switch output | |
| Switching behavior | Binary, conductive or non-conductive |
| Switching delay | Configurable: 0 to 100 s |

| | |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of switching cycles | Unlimited |
| Assignable functions | <ul style="list-style-type: none"> ▪ Off ▪ On ▪ Diagnostic behavior ▪ Limit value: <ul style="list-style-type: none"> ▪ Off ▪ Volume flow ▪ Corrected volume flow ▪ Mass flow ▪ Flow velocity ▪ Conductivity ¹⁾ ▪ Corrected conductivity ¹⁾ ▪ Totalizer 1-3 ▪ Electronics temperature ▪ Flow direction monitoring ▪ Status: <ul style="list-style-type: none"> ▪ Empty pipe detection ▪ Low flow cut off ▪ Buildup limit value ¹⁾ |

1) Visible depending on order options or device settings

PROFIBUS DP

| | |
|--------------------------|----------------------|
| Signal encoding | NRZ code |
| Data transmission | 9.6 kBaud...12 MBaud |

Modbus RS485

| | |
|-----------------------------|-----------------------------------------------------------------------------------|
| Physical interface | In accordance with EIA/TIA-485-A standard |
| Terminating resistor | Integrated, can be activated via DIP switch on the transmitter electronics module |

Ethernet/IP

| | |
|------------------|-------------------------------|
| Standards | In accordance with IEEE 802.3 |
|------------------|-------------------------------|

Signal on alarm

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

Current output 4 to 20 mA

4 to 20 mA

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

0 to 20 mA

| | |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Failure mode | Choose from: <ul style="list-style-type: none"> ▪ Max. alarm: 22 mA ▪ Definable value between: 0 to 22.5 mA |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|

HART current output

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

Pulse/frequency/switch output

| Pulse output | |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Fault mode | Choose from: <ul style="list-style-type: none"> ▪ Actual value ▪ No pulses |
| Frequency output | |
| Fault mode | Choose from: <ul style="list-style-type: none"> ▪ Actual value ▪ 0 Hz ▪ Definable value between: 0 to 12 500 Hz |
| Switch output | |
| Fault mode | Choose from: <ul style="list-style-type: none"> ▪ Current status ▪ Open ▪ Closed |

Modbus RS485

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

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 |
|--------------------|----------------------------------------------------|

Local display

| | |
|--------------------|-------------------------------------------------|
| Plain text display | With information on cause and remedial measures |
| Backlight | Red lighting indicates a device error. |



Status signal as per NAMUR recommendation NE 107

Interface/protocol

- Via digital communication:
 - HART protocol
 - PROFIBUS DP
 - Modbus RS485
 - EtherNet/IP
- Via service interface
 - CDI-RJ45 service interface
 - WLAN interface

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

 Additional information on remote operation →  96

Web browser

| | |
|--------------------|-------------------------------------------------|
| 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: <ul style="list-style-type: none"> ▪ Supply voltage active ▪ Data transmission active ▪ Device alarm/error has occurred ▪ EtherNet/IP network available ▪ EtherNet/IP connection established |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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

Galvanic isolation The following connections are galvanically isolated from each other:

- Inputs
- Outputs
- Power supply

Protocol-specific data

HART

| | |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manufacturer ID | 0x11 |
| Device type ID | 0x1169 |
| HART protocol revision | 7 |
| Device description files (DTM, DD) | Information and files available at: www.endress.com |
| HART load | Min. 250 Ω |
| Dynamic variables PV, SV, TV, QV | <ul style="list-style-type: none"> ▪ Read out the dynamic variables via HART command 3 ▪ The measured variables can be freely assigned to the dynamic variables |
| Device variables | <ul style="list-style-type: none"> ▪ Read out the device variables via HART command 9 ▪ The measured variables can be freely assigned ▪ A maximum of 8 device variables can be transmitted |
| System integration | Operating Instructions for the device →  107 |

PROFIBUS DP

| | |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manufacturer ID | 0x11 |
| Ident number | 0x1562 |
| Profile version | 3.02 |
| Device description files (GSD, DTM, DD) | Information and files available at: <ul style="list-style-type: none"> ▪ www.endress.com ▪ www.profibus.org |
| Output values | Output values (from the measuring device to the automation system) <ul style="list-style-type: none"> ▪ 4 Analog input ▪ 2 Digital input ▪ 3 Totalizer |

| | |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input values | Input values (from the automation system to the measuring device) <ul style="list-style-type: none"> ▪ 2 Analog output (fixed assignment) ▪ 2 Digital output (fixed assignment) ▪ 3 Totalizer |
| Device address configuration options | Configuration of the device address <ul style="list-style-type: none"> ▪ Hardware: DIP switches on the I/O electronics module ▪ Software: Via operating tools (e.g. FieldCare) |
| Supported functions | <ul style="list-style-type: none"> ▪ Identification & Maintenance: Simple device identification via control system and nameplate ▪ PROFIBUS upload/download: Reading and writing parameters is up to ten times faster with PROFIBUS upload/download ▪ Condensed status: Simple, self-explanatory diagnostic information through categorization of diagnostic messages that appear |
| System integration | Operating Instructions for the device →  107 |

Modbus RS485

| | |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protocol | Modbus Applications Protocol Specification V1.1 |
| Device type | Slave |
| Slave address range | 1 to 247 |
| Broadcast address range | 0 |
| Function codes | <ul style="list-style-type: none"> ▪ 03: Read holding register ▪ 04: Read input register ▪ 06: Write single registers ▪ 08: Diagnostics ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers |
| Broadcast messages | Supported by the following function codes: <ul style="list-style-type: none"> ▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers |
| Supported baud rate | <ul style="list-style-type: none"> ▪ 1 200 BAUD ▪ 2 400 BAUD ▪ 4 800 BAUD ▪ 9 600 BAUD ▪ 19 200 BAUD ▪ 38 400 BAUD ▪ 57 600 BAUD ▪ 115 200 BAUD |
| Data transmission mode | <ul style="list-style-type: none"> ▪ ASCII ▪ RTU |
| Data access | Each device parameter can be accessed via Modbus RS485.  For detailed information on the "Modbus RS485 register information", see the Description of Device Parameters. →  107 |
| System integration | Operating Instructions for the device →  107 |

Ethernet/IP

| | |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protocol | <ul style="list-style-type: none"> ▪ The CIP Networks Library Volume 1: Common Industrial Protocol ▪ The CIP Networks Library Volume 2: Ethernet/IP Adaptation of CIP |
| Communication type | <ul style="list-style-type: none"> ▪ 10Base-T ▪ 100Base-TX |
| Device profile | Generic device (product type: 0x2B) |
| Manufacturer ID | 0x49E |

| | |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Device type ID | 0x1069 |
| 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. 5 connections |
| I/O connections | Max. 6 connections (scanner) |
| Configuration options for measuring device | Configuration options for measuring device <ul style="list-style-type: none"> ▪ DIP switches on the electronics module for IP addressing ▪ Manufacturer-specific software (FieldCare) ▪ Custom Add-on Profile for Rockwell Automation control systems ▪ Web browser ▪ Electronic Data Sheet (EDS) integrated in the measuring device |
| Ethernet interface configuration options | Configuration of the Ethernet interface <ul style="list-style-type: none"> ▪ Speed: 10 MBit, 100 MBit, auto (factory setting) ▪ Duplex: half-duplex, full-duplex, auto (factory setting) |
| Device address configuration options | Configuration of the device address <ul style="list-style-type: none"> ▪ DIP switches on the electronics module for IP addressing (last octet) ▪ DHCP ▪ Manufacturer-specific software (FieldCare) ▪ Custom Add-on Profile for Rockwell Automation control systems ▪ Web browser ▪ Ethernet/IP tools, e.g. RSLinx (Rockwell Automation) |
| Device Level Ring (DLR) | No |
| Assembly | <ul style="list-style-type: none"> ▪ Legacy Input Assembly Fix (Assem 100) ▪ Legacy Input Assembly Configurable (Assem 101) ▪ Legacy Output Assembly Fix (Assem 102) ▪ Legacy Configuration Assembly (Assem 104) ▪ Input Assembly Fix (Assem 120) ▪ Input Assembly Configurable (Assem 121) ▪ Output Assembly Fix (Assem 122) ▪ Configuration Assembly (Assem 124) ▪ Volume Flow Extended Fix Input (Assem 126) ▪ Volume Flow Universal Fix Input (Assem 127) ▪ Dummy Output Assembly Fix (Assem 199) |
| Requested Packet Interval (RPI) | 5 ms to 10 s (factory setting: 20 ms) |
| System integration | Operating Instructions for the device →  107 |

Power supply

Terminal assignment

Transmitter: 0 to 20 mA/4 to 20 mA HART

The sensor can be ordered with terminals.

| Connection methods available | | Possible options for order code "Electrical connection" |
|------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outputs | Power supply | |
| Terminals | Terminals | <ul style="list-style-type: none"> ▪ Option A: coupling M20x1 ▪ Option B: thread M20x1 ▪ Option C: thread G ½" ▪ Option D: thread NPT ½" |

Supply voltage

| Order code "Power supply" | Terminal numbers | terminal voltage | | Frequency range |
|-------------------------------------|--------------------|------------------|-------------|-----------------|
| | | | | |
| Option L (wide range power unit) | 1 (L+/L), 2 (L-/N) | DC 24 V | ±25% | – |
| | | AC 24 V | ±25% | 50/60 Hz, ±4 Hz |
| | | AC 100 to 240 V | –15 to +10% | 50/60 Hz, ±4 Hz |

Signal transmission current output 0 to 20 mA/4 to 20 mA HART and additional outputs and inputs

| Order code for "Output" and "Input" | Terminal numbers | | | | | | | |
|-------------------------------------------|-----------------------------------------------------------------------|--------|----------------------------------------------------------|--------|-----------------------------------------|--------|--------------|--------|
| | Output 1 | | Output 2 | | Output 3 | | Input | |
| | 26 (+) | 27 (-) | 24 (+) | 25 (-) | 22 (+) | 23 (-) | 20 (+) | 21 (-) |
| Option H | Current output ▪ 4 to 20 mA HART (active) ▪ 0 to 20 mA (active) | | Pulse/frequency output (passive) | | Switch output (passive) | | – | |
| Option I | Current output ▪ 4 to 20 mA HART (active) ▪ 0 to 20 mA (active) | | Pulse/frequency/switch output (passive) | | Pulse/frequency/switch output (passive) | | Status input | |
| Option J | Current output ▪ 4 to 20 mA HART (active) ▪ 0 to 20 mA (active) | | Permanently assigned: Pulse output adjusted (passive) | | Switch output | | Status input | |

Transmitter: PROFIBUS DP

The sensor can be ordered with terminals.

| Connection methods available | | Possible options for order code "Electrical connection" |
|------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outputs | Power supply | |
| Terminals | Terminals | <ul style="list-style-type: none"> ▪ Option A: coupling M20x1 ▪ Option B: thread M20x1 ▪ Option C: thread G ½" ▪ Option D: thread NPT ½" |

Supply voltage

| Order code "Power supply" | Terminal numbers | terminal voltage | | Frequency range |
|-------------------------------------|--------------------|------------------|-------------|-----------------|
| | | | | |
| Option L (wide range power unit) | 1 (L+/L), 2 (L-/N) | DC 24 V | ±25% | – |
| | | AC 24 V | ±25% | 50/60 Hz, ±4 Hz |
| | | AC 100 to 240 V | –15 to +10% | 50/60 Hz, ±4 Hz |

PROFIBUS DP signal transmission

| Order code for "Output" and "Input" | Terminal numbers | |
|-----------------------------------------------------------------------------------------------------|------------------|----------------|
| | 26 (RxD/TxD-P) | 27 (RxD/TxD-N) |
| Option L | B | A |
| Order code for "Output": Option L: PROFIBUS DP, for use in non-hazardous areas and Zone 2/div. 2 | | |

Transmitter: Modbus RS485

The sensor can be ordered with terminals.

| Connection methods available | | Possible options for order code "Electrical connection" |
|------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outputs | Power supply | |
| Terminals | Terminals | <ul style="list-style-type: none"> ■ Option A: coupling M20x1 ■ Option B: thread M20x1 ■ Option C: thread G ½" ■ Option D: thread NPT ½" |

Supply voltage

| Order code "Power supply" | Terminal numbers | terminal voltage | | Frequency range |
|----------------------------------|--------------------|------------------|-------------|-----------------|
| | | | | |
| Option L (wide range power unit) | 1 (L+/L), 2 (L-/N) | DC 24 V | ±25% | – |
| | | AC 24 V | ±25% | 50/60 Hz, ±4 Hz |
| | | AC 100 to 240 V | –15 to +10% | 50/60 Hz, ±4 Hz |

Signal transmission Modbus RS485 and additional outputs

| Order code for "Output" and "Input" | Terminal numbers | | | | | | | |
|-------------------------------------|---------------------------------------|--------|------------------------------------------------|--------|------------------------------------------------|--------|-----------------|--------|
| | 26 (+) | 27 (-) | 24 (+) | 25 (-) | 22 (+) | 23 (-) | 20 (+) | 21 (-) |
| Option M | Modbus B A | | - | | - | | - | |
| Option O | Current output 4 to 20 mA (active) | | Pulse/frequency/ switch output (passive) | | Pulse/frequency/ switch output (passive) | | Modbus B A | |
| Option P | Current output 4 to 20 mA (active) | | Pulse output adjusted (passive) | | Pulse/frequency/ switch output (passive) | | Modbus B A | |

Transmitter: Ethernet/IP

The transmitter can be ordered with terminals or a device plug.

| Connection methods available | | Possible options for order code "Electrical connection" |
|------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outputs | Power supply | |
| Ethernet/IP (RJ45 plug) | Terminals | Option D: thread NPT ½" |
| Connectors → 22 | Terminals | <ul style="list-style-type: none"> ■ Option L: plug M12x1 + thread NPT ½" ■ Option N: plug M12x1 + coupling M20 ■ Option P: plug M12x1 + thread G ½" ■ Option U: plug M12x1 + thread M20 |

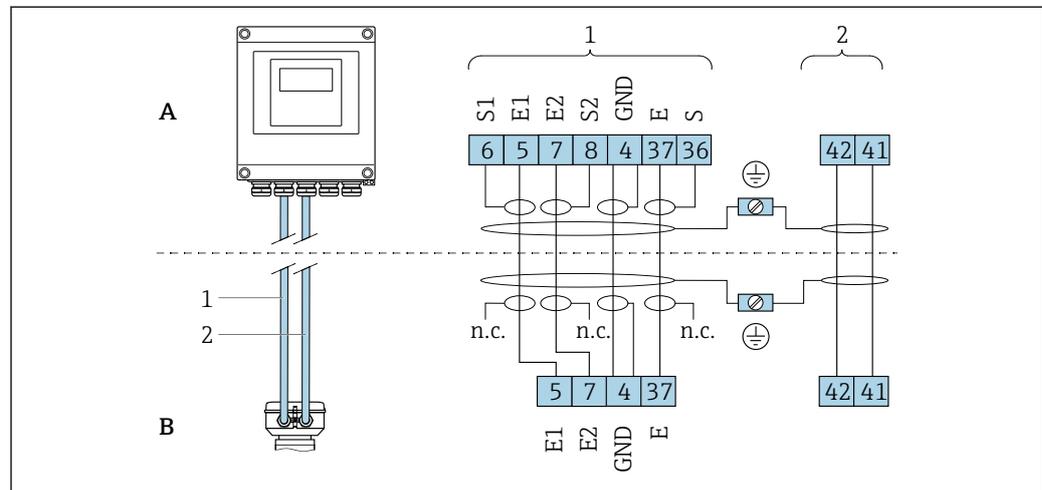
Supply voltage

| Order code "Power supply" | Terminal numbers | terminal voltage | | Frequency range |
|----------------------------------|--------------------|------------------|-------------|-----------------|
| | | | | |
| Option L (wide range power unit) | 1 (L+/L), 2 (L-/N) | DC 24 V | ±25% | – |
| | | AC 24 V | ±25% | 50/60 Hz, ±4 Hz |
| | | AC 100 to 240 V | –15 to +10% | 50/60 Hz, ±4 Hz |

Ethernet/IP signal transmission

| Order code for "Output" | Connection via |
|-------------------------|------------------------------------|
| Option N | Ethernet/IP: RJ45 or M12 connector |

Remote version



A0032059

2 Remote version terminal assignment

- A Transmitter wall-mount housing
- B Sensor connection housing
- 1 Electrode cable
- 2 Coil current cable
- n.c. Not connected, insulated cable shields

Terminal No. and cable colors: 6/5 = brown; 7/8 = white; 4 = green; 36/37 = yellow

Pin assignment, device plug

i Order codes for the M12x1 connectors; see the "Order code for electrical connection" column: Ethernet/IP → 21

Ethernet/IP

Device plug for signal transmission (device side)

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

- i** Recommended plug:
 - Binder, series 825, part no. 99 3729 810 04
 - Phoenix, part no. 1543223 SACC-M12MSD-4Q
 - The device plug is not permitted in the hazardous area, Class I Division 2. The device plug may only be used in the non-hazardous area (General Purpose).

Supply voltage

Transmitter

| Order code for "Power supply" | terminal voltage | | Frequency range |
|-------------------------------|------------------|-------------|-----------------|
| Option L | DC 24 V | ±25% | – |
| | AC 24 V | ±25% | 50/60 Hz, ±4 Hz |
| | AC 100 to 240 V | –15 to +10% | 50/60 Hz, ±4 Hz |

Power consumption

| Order code for "Output" | Maximum power consumption |
|---------------------------------------------------------------------------------------|---------------------------|
| Option H: 4-20mA HART, pulse/frequency output, switch output | 30 VA/8 W |
| Option I: 4-20mA HART, 2 x pulse/frequency/switch output, status input | 30 VA/8 W |
| Option J: 4-20mA HART, certified pulse output, switch output, status input | 30 VA/8 W |
| Option L: PROFIBUS DP | 30 VA/8 W |
| Option M: Modbus RS485 | 30 VA/8 W |
| Option O: Modbus RS485, 4-20mA, 2 x pulse/frequency/switch output | 30 VA/8 W |
| Option P: Modbus RS485, 4-20mA, certified pulse output, pulse/frequency/switch output | 30 VA/8 W |
| Option N: Ethernet/IP | 30 VA/8 W |

Current consumption

Transmitter

| Order code for "Power supply" | Maximum Current consumption | Maximum switch-on current |
|-------------------------------|-----------------------------|---------------------------|
| Option L: AC 100 to 240 V | 145 mA | 25 A (< 5 ms) |
| Option L: AC/DC 24 V | 350 mA | 27 A (< 5 ms) |

Device fuse

Fine-wire fuse (slow-blow):

- DC 24 V: T1A
- AC 100 to 240 V: T1A

Power supply failure

- Totalizers stop at the last value measured.
- Depending on the device version, the configuration is retained in the device memory or in the pluggable data memory (HistoROM DAT).
- Error messages (incl. total operated hours) are stored.

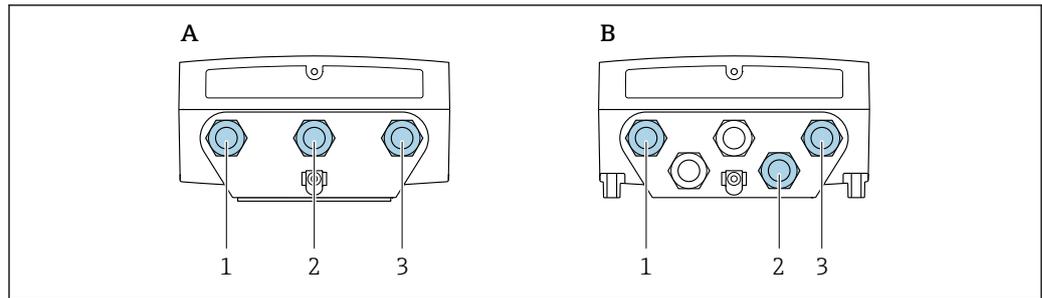
Overcurrent protection element

The device must be operated with a dedicated circuit breaker, as it does not have an ON/OFF switch of its own.

- The circuit breaker must be easy to reach and labeled accordingly.
- Permitted nominal current of the circuit breaker: 2 A up to maximum 10 A.

Electrical connection

Terminal connection for transmitter



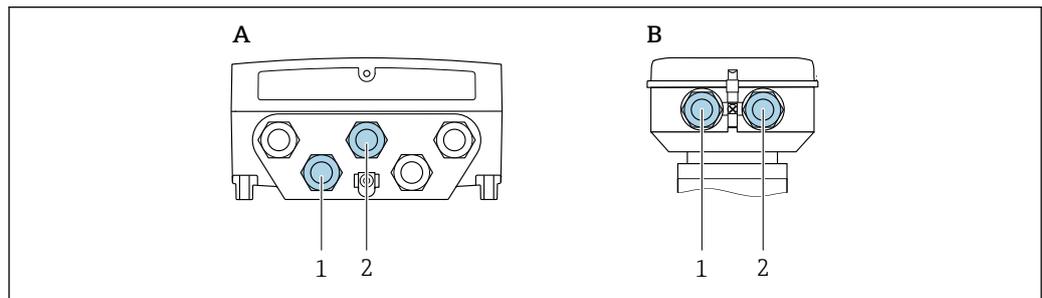
A0032041

■ 3 Supply voltage and signal transmission connection

- A Compact version
 B Remote version wall-mount housing
 1 Cable entry for supply voltage
 2 Cable entry for signal transmission
 3 Cable entry for signal transmission

Remote version connection

Connecting cable



A0032042

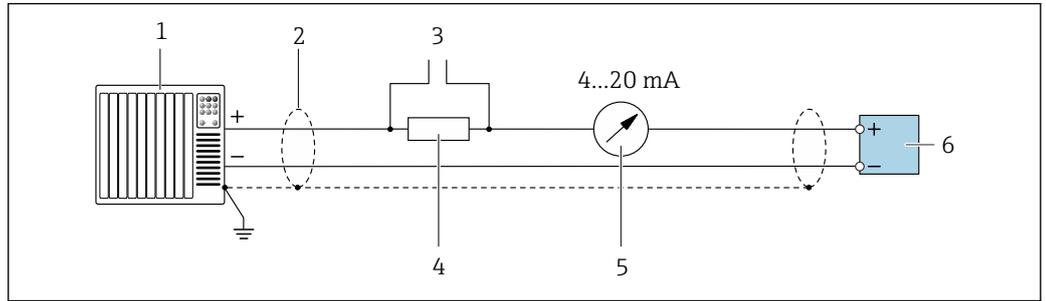
■ 4 Connecting cable connection: electrode and coil current cable

- A Transmitter wall-mount housing
 B Sensor connection housing
 1 Electrode cable
 2 Coil current cable

- Fix the cable run or route it in an armored conduit.
Cable movements can influence the measuring signal especially in the case of low fluid conductivities.
- Route the cable well clear of electrical machines and switching elements.
- Ensure potential equalization between the sensor and transmitter → 28.

Connection examples

Current output 4 to 20 mA HART

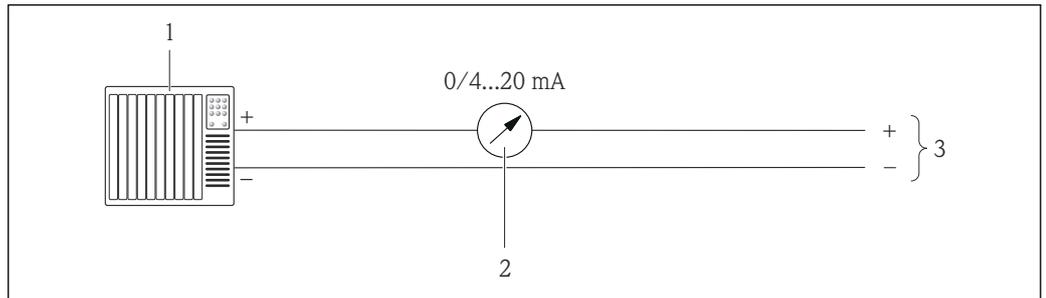


A0029055

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

- 1 Automation system with current input (e.g. PLC)
- 2 Ground cable shield at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 3 Connection for HART operating devices → 96
- 4 Resistor for HART communication ($\geq 250 \Omega$); observe maximum load → 13
- 5 Analog display unit: observe maximum load → 13
- 6 Transmitter

Current output 4 to 20 mA

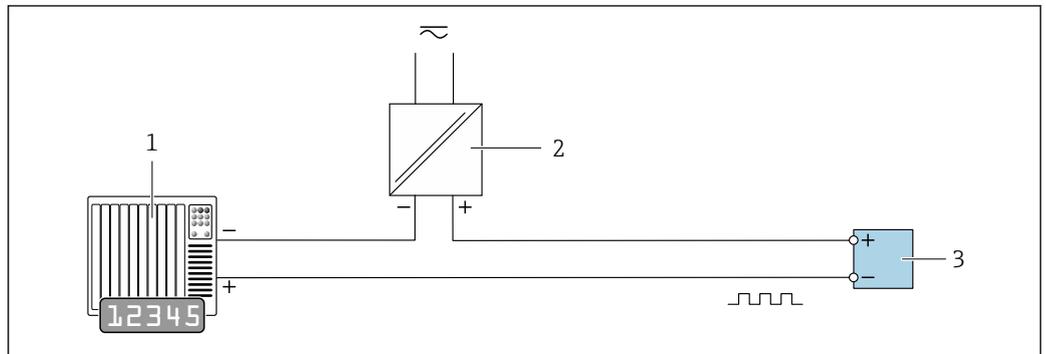


A0017162

6 Connection example for 0 to 20 mA (active) and 4 to 20 mA (active) current output

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

Pulse/frequency output

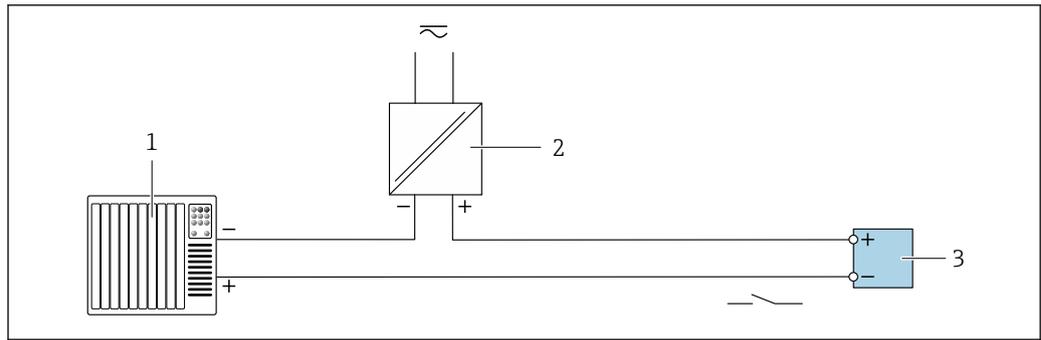


A0028761

7 Connection example for pulse/frequency output (passive)

- 1 Automation system with pulse/frequency input (e.g. PLC with 10 k Ω pull-up or pull-down resistor)
- 2 Power supply
- 3 Transmitter: observe input values → 14

Switch output

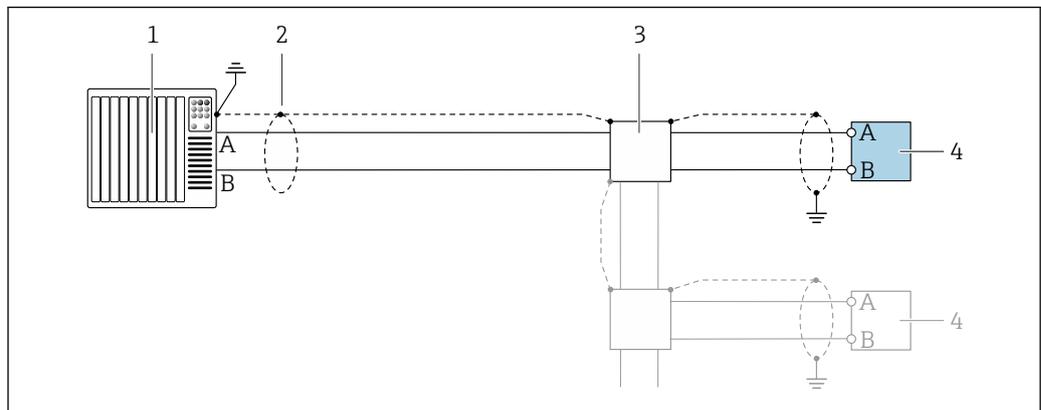


A0028760

8 Connection example for switch output (passive)

- 1 Automation system with switch input (e.g. PLC with a 10 kΩ pull-up or pull-down resistor)
- 2 Power supply
- 3 Transmitter: observe input values → 14

PROFIBUS DP



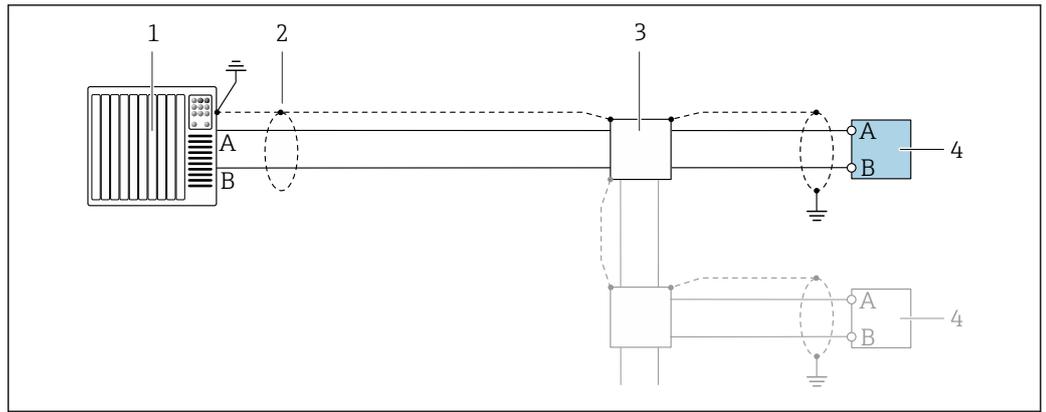
A0028765

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

- 1 Control system (e.g. PLC)
- 2 Cable shield provided at one end. 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.

Modbus RS485

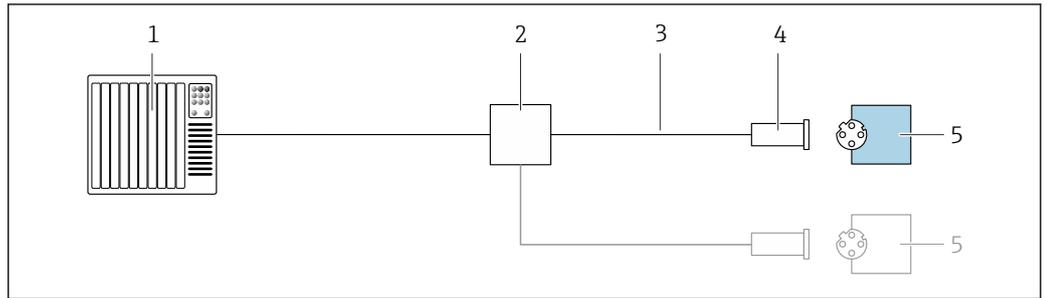


A0028765

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

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

EtherNet/IP

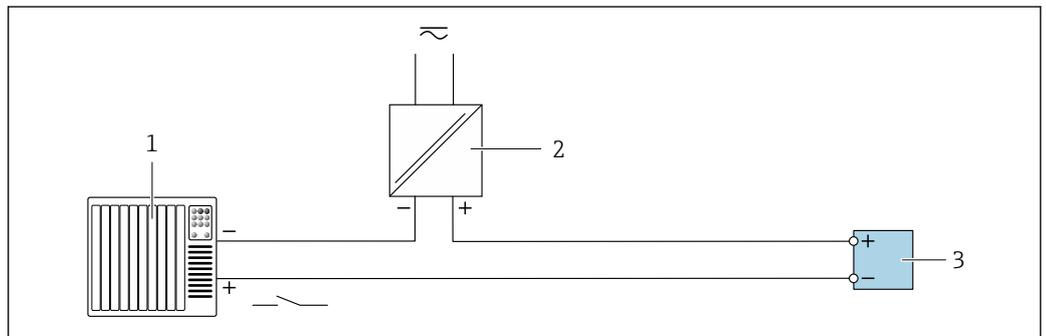


A0028767

11 Connection example for EtherNet/IP

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

Status input



A0028764

12 Connection example for status input

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

Potential equalization

Introduction

Correct potential equalization (equipotential bonding) is a prerequisite for stable and reliable flow measurement. Inadequate or incorrect potential equalization can result in device failure and present a safety hazard.

The following requirements must be observed to ensure correct, trouble-free measurement:

- The principle that the medium, the sensor and the transmitter must be at the same electrical potential applies.
- Take in-company grounding guidelines, materials and the grounding conditions and potential conditions of the pipe into consideration.
- The necessary potential equalization connections must be established using a ground cable with a minimum cross-section of 6 mm² (0.0093 in²) and a cable lug.
- In the case of remote device versions, the ground terminal in the example always refers to the sensor and not to the transmitter.



You can order accessories such as ground cables and ground disks directly from Endress+Hauser
→ 104

Abbreviations used

- PE (Protective Earth): potential at the protective earth terminals of the device
- P_P (Potential Pipe): potential of the pipe, measured at the flanges
- P_M (Potential Medium): potential of the medium

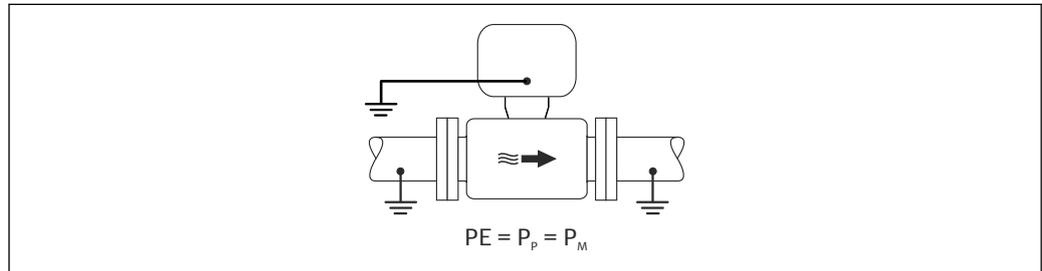
Connection examples for standard situations

Unlined and grounded metal pipe

- Potential equalization is via the measuring pipe.
- The medium is set to ground potential.

Starting conditions:

- Pipes are correctly grounded on both sides.
- Pipes are conductive and at the same electrical potential as the medium



A0044854

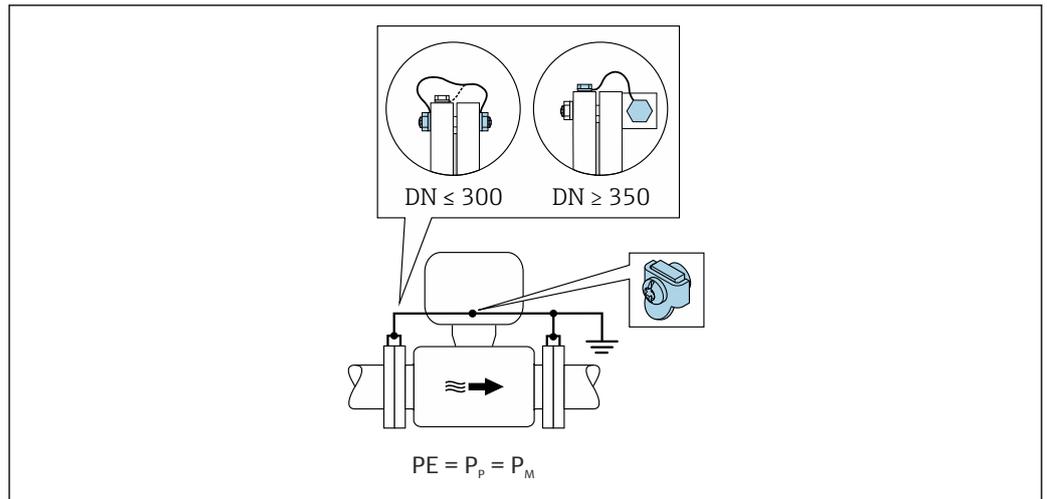
- ▶ Attach the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for this purpose.

Promag L, W: Metal pipe without liner

- Potential equalization is via the ground terminal and pipe flanges.
- The medium is set to ground potential.

Starting conditions:

- Pipes are not sufficiently grounded.
- Pipes are conductive and at the same electrical potential as the medium



A0042089

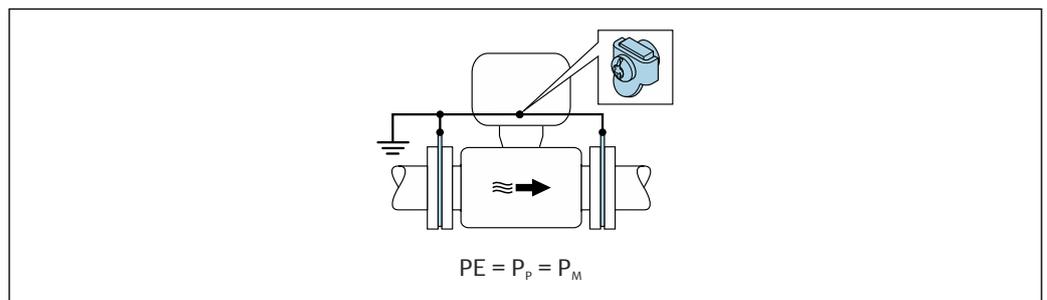
1. Connect both sensor flanges to the pipe flange via a ground cable and ground them.
2. Attach the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for this purpose.
3. For $DN \leq 300$ (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws.
4. For $DN \geq 350$ (14"): Mount the ground cable directly on the metal transport bracket. Observe the screw tightening torques: see the Brief Operating Instructions for the sensor.

Plastic pipe or pipe with insulating liner

- Potential equalization is via the ground terminal and ground disks.
- The medium is set to ground potential.

Starting conditions:

- The pipe has an insulating effect.
- Low-impedance medium grounding close to the sensor is not guaranteed.
- Equalizing currents through the medium cannot be ruled out.



A0044856

1. Connect the ground disks to the ground terminal of the transmitter or sensor connection housing via the ground cable.
2. Connect the connection to ground potential.

Connection example with the potential of medium not equal to protective ground

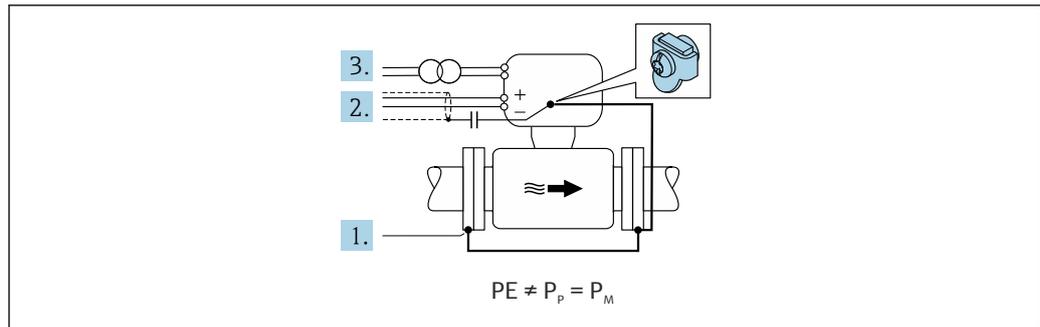
In these cases, the medium potential can differ from the potential of the device.

Metal, ungrounded pipe

The sensor and transmitter are installed in a way that provides electrical insulation from PE, e.g. applications for electrolytic processes or systems with cathodic protection.

Starting conditions:

- Unlined metal pipe
- Pipes with an electrically conductive liner



A0042253

1. Connect the pipe flanges and transmitter via the ground cable.
2. Route the shielding of the signal lines via a capacitor (recommended value $1.5\mu\text{F}/50\text{V}$).
3. Device connected to power supply such that it is floating in relation to the protective earth (isolation transformer). This measure is not required in the case of 24V DC supply voltage without PE (= SELV power unit).

Connection examples with the potential of medium not equal to protective ground with the "Floating measurement" option

In these cases, the medium potential can differ from the potential of the device.

Introduction

The "Floating measurement" option enables the galvanic isolation of the measuring system from the device potential. This minimizes harmful equalizing currents caused by differences in potential between the medium and the device. The "Floating measurement" is optionally available: order code for "Sensor option", option CV

Operating conditions for the use of the "Floating measurement" option

| | |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Device version | Compact version and remote version (length of connecting cable ≤ 10 m) |
| Differences in voltage between medium potential and device potential | As small as possible, usually in the mV range |
| Alternating voltage frequencies in the medium or at ground potential (PE) | Below typical power line frequency in the country |

i To achieve the specified conductivity measurement accuracy, a conductivity calibration is recommended when the device is installed.

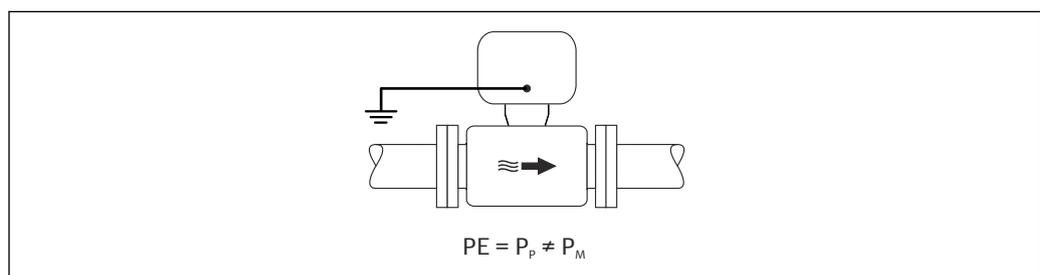
A full pipe adjustment is recommended when the device is installed.

Plastic pipe

Sensor and transmitter are correctly grounded. A difference in potential can occur between the medium and protective earth. Potential equalization between P_M and PE via the reference electrode is minimized with the "Floating measurement" option.

Starting conditions:

- The pipe has an insulating effect.
- Equalizing currents through the medium cannot be ruled out.



A0044855

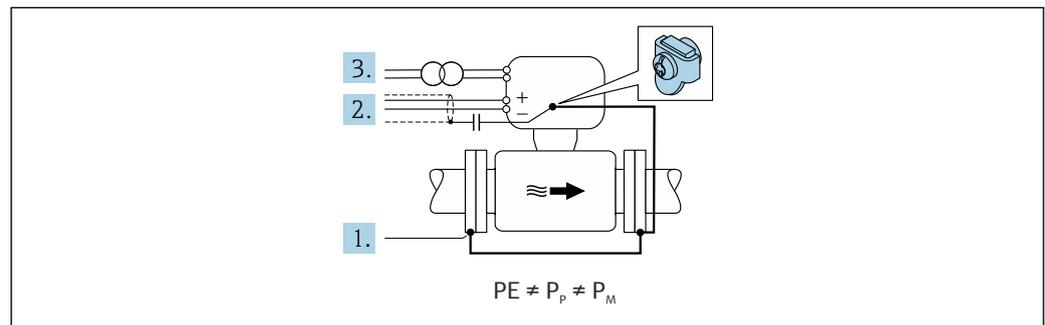
1. Use the "Floating measurement" option, while also observing the operating conditions for floating measurement.
2. Attach the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for this purpose.

Metal, ungrounded pipe with insulating liner

The sensor and transmitter are installed in a way that provides electrical insulation from PE. The medium and pipe have different potentials. The "Floating measurement" option minimizes harmful equalizing currents between P_M and P_P via the reference electrode.

Starting conditions:

- Metal pipe with insulating liner
- Equalizing currents through the medium cannot be ruled out.



A0044857

1. Connect the pipe flanges and transmitter via the ground cable.
2. Route the shielding of the signal cables via a capacitor (recommended value $1.5\mu\text{F}/50\text{V}$).
3. Device connected to power supply such that it is floating in relation to the protective earth (isolation transformer). This measure is not required in the case of 24V DC supply voltage without PE (= SELV power unit).
4. Use the "Floating measurement" option, while also observing the operating conditions for floating measurement.

Terminals

Transmitter

- Supply voltage cable: plug-in spring terminals for wire cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)
- Signal cable: plug-in spring terminals for wire cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)
- Electrode cable: spring terminals for wire cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)
- Coil current cable: spring terminals for wire cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)

Sensor connection housing

Spring terminals for wire cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)

Cable entries

Cable entry thread

- M20 x 1.5
- Via adapter:
 - NPT $\frac{1}{2}$ "
 - G $\frac{1}{2}$ "

Cable gland

- For standard cable: M20 x 1.5 with cable ϕ 6 to 12 mm (0.24 to 0.47 in)
- For armored cable: M20 x 1.5 with cable ϕ 9.5 to 16 mm (0.37 to 0.63 in)

 If metal cable entries are used, use a grounding plate.

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 (incl. conductor for the inner ground terminal)

Standard installation cable is sufficient.

Signal cable

Current output 0/4 to 20 mA

Standard installation cable is sufficient.

Current output 4 to 20 mA HART

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

Pulse /frequency /switch output

Standard installation cable is sufficient.

Status input

Standard installation cable is sufficient.

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 mm ² (22 AWG) |
| Cable type | Twisted pairs |
| Loop resistance | \leq 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)

Modbus RS485

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

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

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

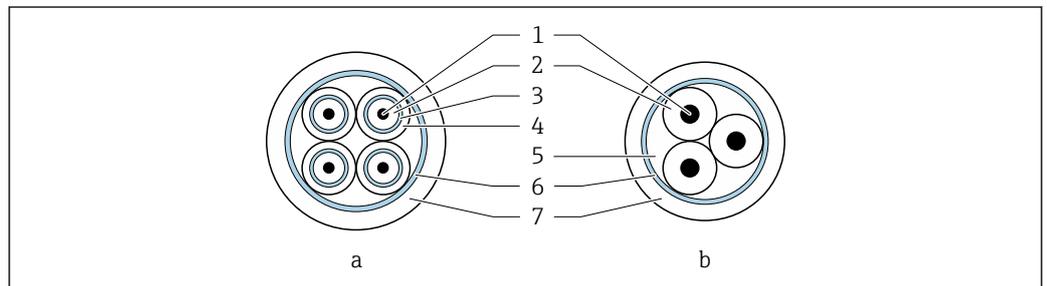
Connecting cable for remote version

Electrode cable

| | |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Standard cable | 3 × 0.38 mm ² (20 AWG) with common, braided copper shield (ϕ ~9.5 mm (0.37 in)) and individual shielded cores |
| Cable for empty pipe detection (EPD) | 4 × 0.38 mm ² (20 AWG) with common, braided copper shield (ϕ ~9.5 mm (0.37 in)) and individual shielded cores |
| Conductor resistance | ≤ 50 Ω/km (0.015 Ω/ft) |
| Capacitance: core/shield | ≤ 420 pF/m (128 pF/ft) |
| Continuous operating temperature | -20 to +80 °C (-4 to +176 °F) |

Coil current cable

| | |
|------------------------------------------------|------------------------------------------------------------------------------------------|
| Standard cable | 3 × 0.75 mm ² (18 AWG) with common, braided copper shield (ϕ ~9 mm (0.35 in)) |
| Conductor resistance | ≤ 37 Ω/km (0.011 Ω/ft) |
| Capacitance: core/core, shield grounded | ≤ 120 pF/m (37 pF/ft) |
| Continuous operating temperature | -20 to +80 °C (-4 to +176 °F) |
| Test voltage for cable insulation | ≤ AC 1433 V rms 50/60 Hz or ≥ DC 2026 V |



13 Cable cross-section

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

- i** A connecting cable can be ordered from Endress+Hauser for IP68:
 - Pre-terminated cables that are already connected to the sensor
 - Pre-terminated cables, where the cables are connected by the customer onsite (incl. tools for sealing the connection compartment)

Armored connecting cable

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

- When laying the cable directly in the ground
- Where there is a risk of damage from rodents
- Use in accordance with IP68 protection

i Armored connecting cables with an additional, reinforcing metal braid can be ordered from Endress+Hauser →  104.

Operation in environments with strong electrical interference

The measuring system meets the general safety requirements (→  103) and EMC specifications (→  48).

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

Overvoltage protection

| | |
|------------------------------------------|----------------------------------------------------------------------------------------|
| Mains voltage fluctuations | →  23 |
| Overvoltage category | Overvoltage category II |
| Short-term, temporary overvoltage | Between cable and ground up to 1200 V, for max. 5 s |
| Long-term, temporary overvoltage | Between cable and ground up to 500 V |

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

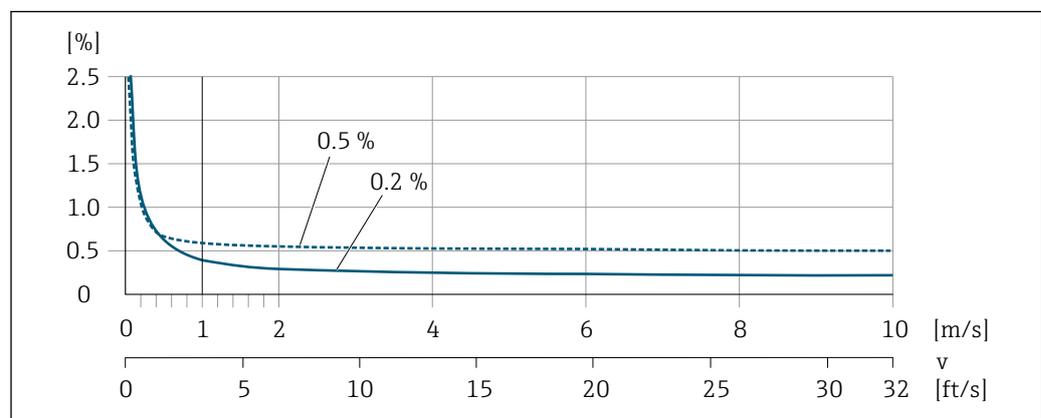
Maximum measured error

Error limits under reference operating conditions

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)

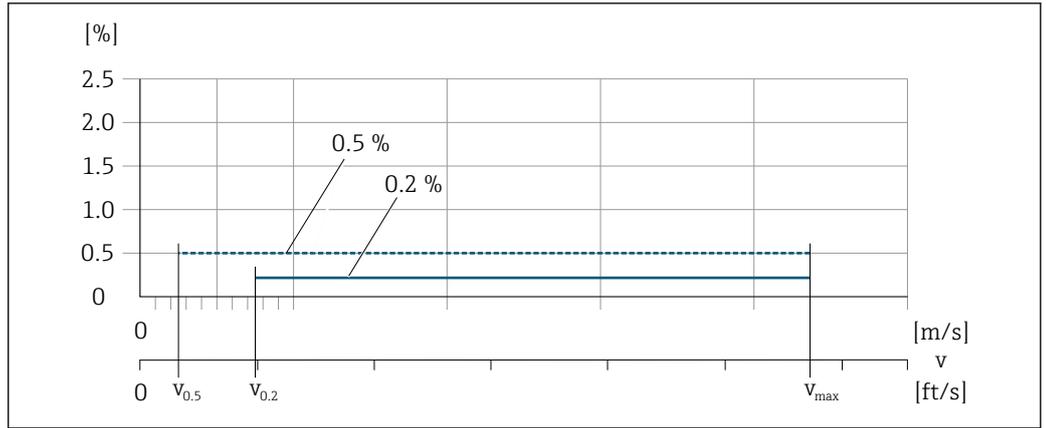
i Fluctuations in the supply voltage do not have any effect within the specified range.



 14 Maximum measured error in % o.r.

Flat Spec

For Flat Spec in the range $v_{0.5}$ ($v_{0.2}$) up to v_{max} the measured error is constant.



15 Flat Spec in % o.r.

Flat Spec flow values 0.5 %

| Nominal diameter | | v _{0.5} | | v _{max} | |
|-------------------------|---------|------------------|--------|------------------|--------|
| [mm] | [in] | [m/s] | [ft/s] | [m/s] | [ft/s] |
| 25 to 600 | 1 to 24 | 0.5 | 1.64 | 10 | 32 |
| 50 to 300 ¹⁾ | 2 to 12 | 0.25 | 0.82 | 5 | 16 |

1) Order code for "Design", option C

Flat Spec flow values 0.2 %

| Nominal diameter | | v _{0.2} | | v _{max} | |
|-------------------------|---------|------------------|--------|------------------|--------|
| [mm] | [in] | [m/s] | [ft/s] | [m/s] | [ft/s] |
| 25 to 600 | 1 to 24 | 1.5 | 4.92 | 10 | 32 |
| 50 to 300 ¹⁾ | 2 to 12 | 0.6 | 1.97 | 4 | 13 |

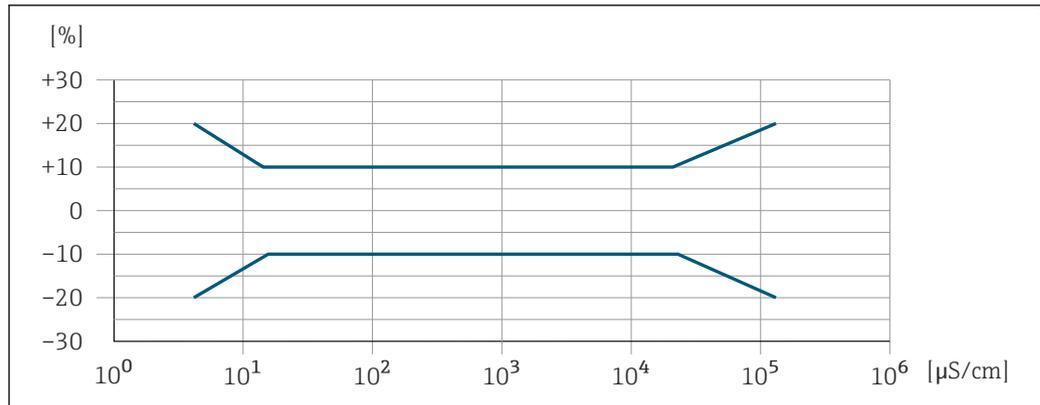
1) Order code for "Design", option C

Electrical conductivity

The values apply for:

- Measurements at a reference temperature of 25 °C (77 °F)
At different temperatures, attention must be paid to the temperature coefficient of the medium (typically 2.1 %/K)
- Device version: compact version - transmitter and sensor form a mechanical unit
- Devices installed in a metal pipe or in a non-metal pipe with ground disks
- Devices whose potential equalization was performed according to the instructions in the associated Operating Instructions

| Conductivity [µS/cm] | Measured error [%] o. r. |
|----------------------|--------------------------|
| 5 to 20 | ± 20% |
| 20 to 20000 | ± 10% |
| 20000 to 100000 | ± 20% |



A0042279

16 Measured error

Accuracy of outputs

The outputs have the following base accuracy specifications.

Current output

| | |
|----------|--------------------------|
| Accuracy | Max. $\pm 5 \mu\text{A}$ |
|----------|--------------------------|

Pulse/frequency output

o.r. = of reading

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

Repeatability

o.r. = of reading

Volume flow

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

Electrical conductivity

Max. $\pm 5 \% \text{ o.r.}$

Influence of ambient temperature

Current output

o.r. = of reading

| | |
|-------------------------|-------------------------------------------------|
| Temperature coefficient | Max. $\pm 0.005 \% \text{ o.r./}^\circ\text{C}$ |
|-------------------------|-------------------------------------------------|

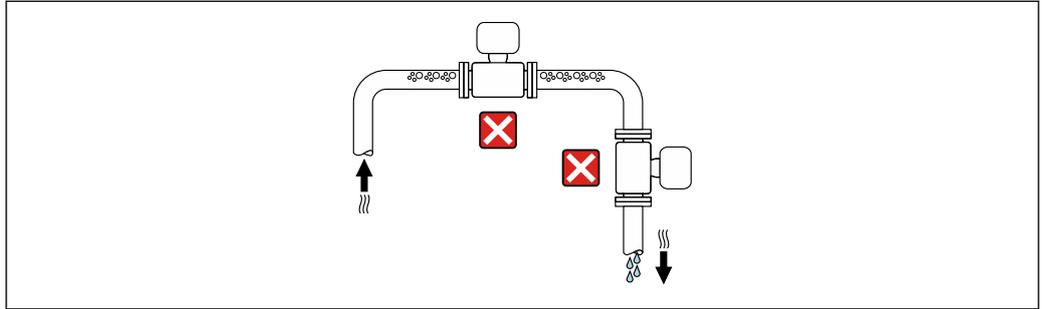
Pulse/frequency output

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

Installation

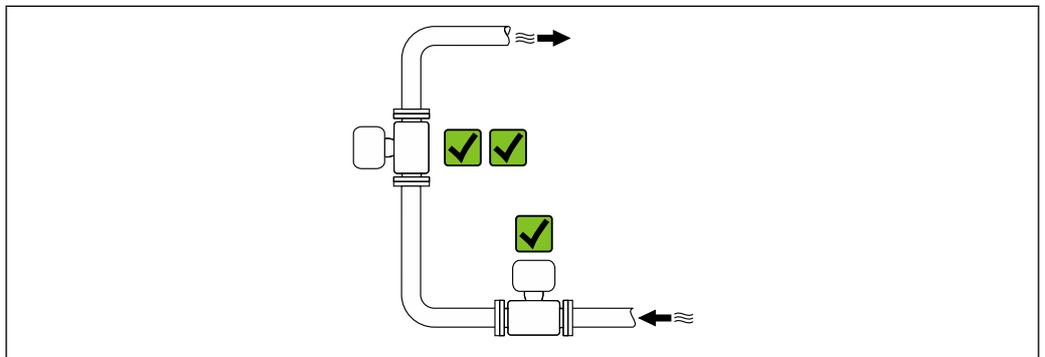
Mounting location

- Do not install the device at the highest point of the pipe.
- Do not install the device upstream from a free pipe outlet in a down pipe.



A0042131

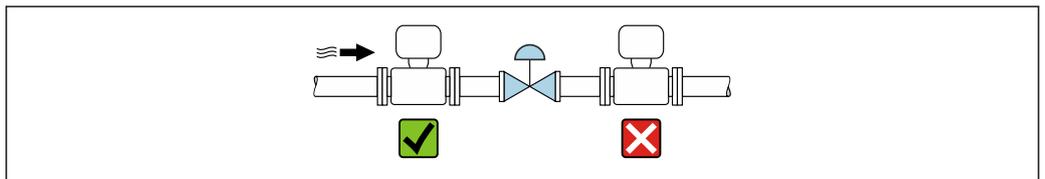
The device should ideally be installed in an ascending pipe.



A0042317

Installation near valves

Install the device in the direction of flow upstream from the valve.



A0041091

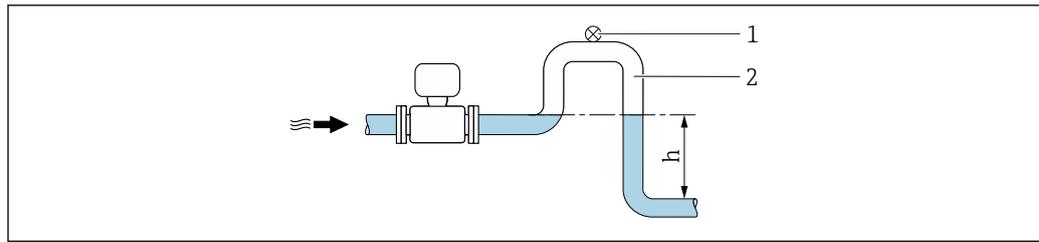
Installation upstream from a down pipe

NOTICE

Negative pressure in the measuring pipe can damage the liner!

- If installing upstream of down pipes whose length $h \geq 5$ m (16.4 ft): install a siphon with a vent valve downstream of the device.

 This arrangement prevents the flow of liquid stopping in the pipe and air entrainment.

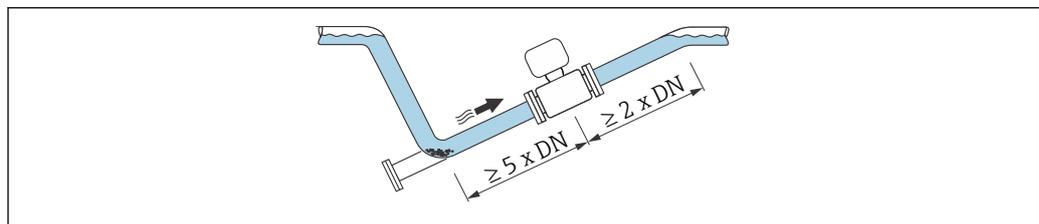


A0028961

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

Installation with partially filled pipes

- Partially filled pipes with a gradient require a drain-type configuration.
- The installation of a cleaning valve is recommended.



A0041088

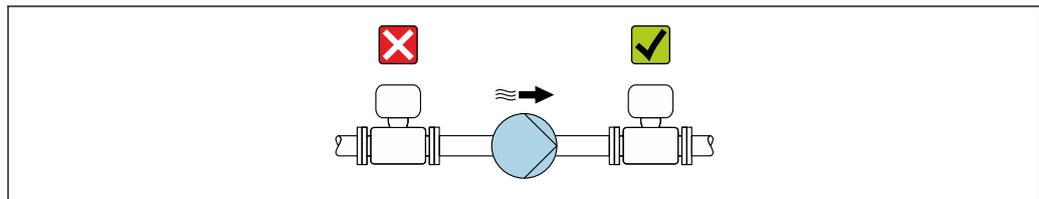
i No inlet and outlet runs for devices with the order code for "Design": Option C, H, I, J or K.

Installation near pumps

NOTICE

Negative pressure in the measuring pipe can damage the liner!

- In order to maintain the system pressure, install the device in the flow direction downstream from the pump.
- Install pulsation dampers if reciprocating, diaphragm or peristaltic pumps are used.



A0041083

- i** Information on the liner's resistance to partial vacuum → 52
Information on the measuring system's resistance to vibration and shock → 47

Installation of very heavy devices

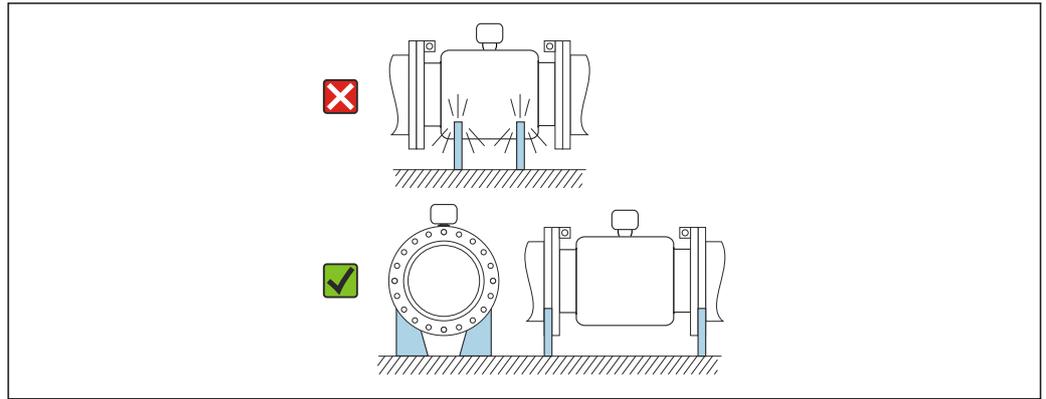
Support required for nominal diameters of DN \geq 350 mm (14 in).

NOTICE

Damage to the device!

If incorrect support is provided, the sensor housing could buckle and the internal magnetic coils could be damaged.

- Only provide supports at the pipe flanges.



A0041087

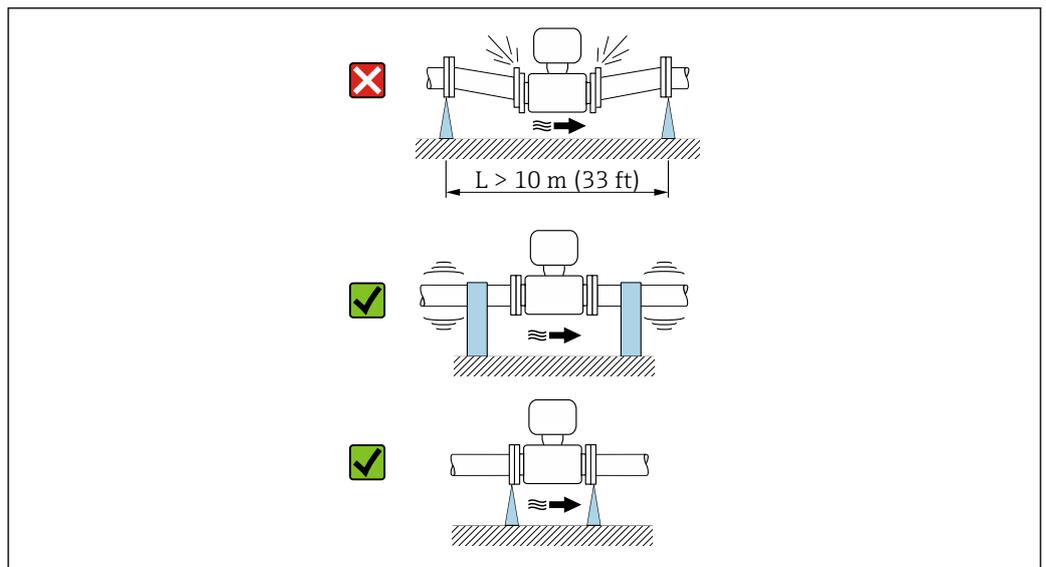
Installation in event of pipe vibrations

A remote version is recommended in the event of strong pipe vibrations.

NOTICE

Pipe vibrations can damage the device!

- ▶ Do not expose the device to strong vibrations.
- ▶ Support the pipe and fix it in place.
- ▶ Support the device and fix it in place.
- ▶ Mount the sensor and transmitter separately.

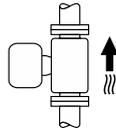
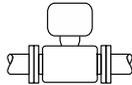
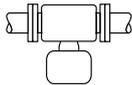


A0041092

 Information on the measuring system's resistance to vibration and shock →  47

Orientation

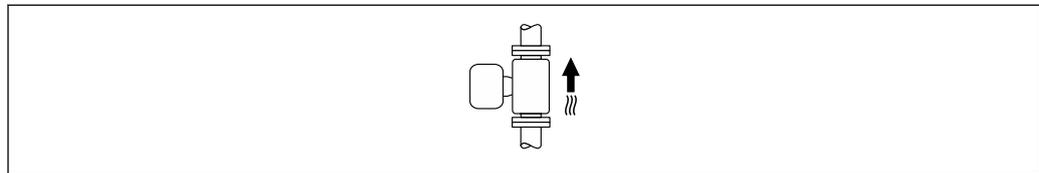
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

| Orientation | | Recommendation |
|-----------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------|
| Vertical orientation |  A0015591 | ✓✓ |
| Horizontal orientation, transmitter at top |  A0015589 | ✓✓ ¹⁾ |
| Horizontal orientation, transmitter at bottom |  A0015590 | ✓✓ ^{2) 3)} ✗ ⁴⁾ |
| 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.
- 4) With the empty pipe detection function switched on: empty pipe detection only works if the transmitter housing is pointing upwards.

Vertical

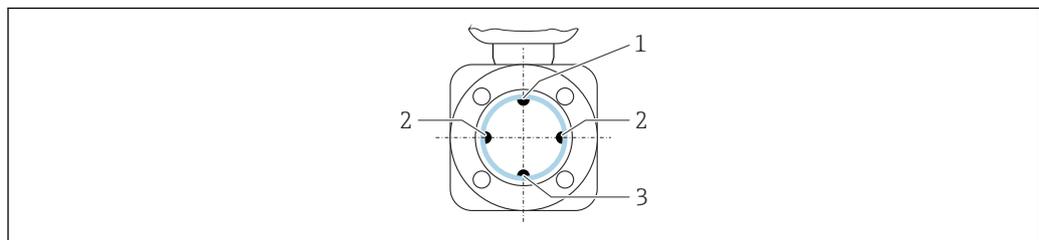
Optimum for self-emptying pipe systems and for use in conjunction with empty pipe detection.



A0015591

Horizontal

- Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of the 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

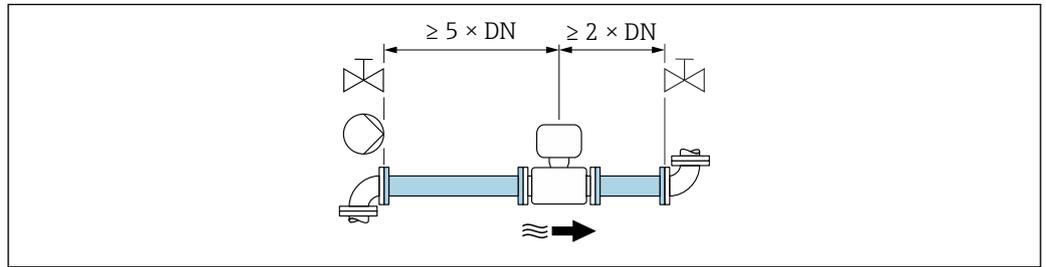
Inlet and outlet runs

Installation with inlet and outlet runs

Installation is carried out with inlet and outlet runs.

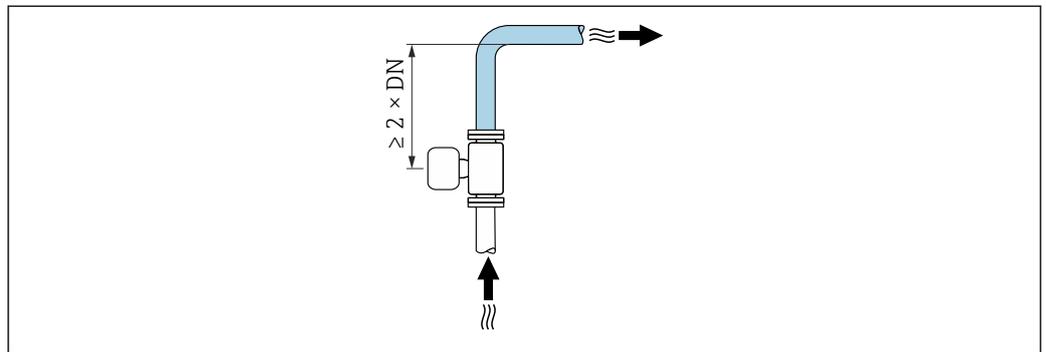
Maintain straight, unimpeded inlet and outlet runs.

To avoid a vacuum and to maintain the specified level of measurement accuracy, if possible install the device upstream from assemblies that produce turbulence (e.g. valves, T-sections) and downstream from pumps.



A0028997

Keep a sufficient distance to the next pipe elbow.



A0042132

Installation without inlet and outlet runs

Depending on the device design and installation location, the inlet and outlet runs can be reduced or omitted entirely.

i Maximum measurement error

When the device is installed with the inlet and outlet runs described, a maximum measurement error of $\pm 0.5\%$ of measured value $\pm 1 \text{ mm/s}$ (0.04 in/s) (optional: $\pm 0.2\%$ of measured value $\pm 2 \text{ mm/s}$ (0.08 in/s)) can be ensured.

Devices and possible order options

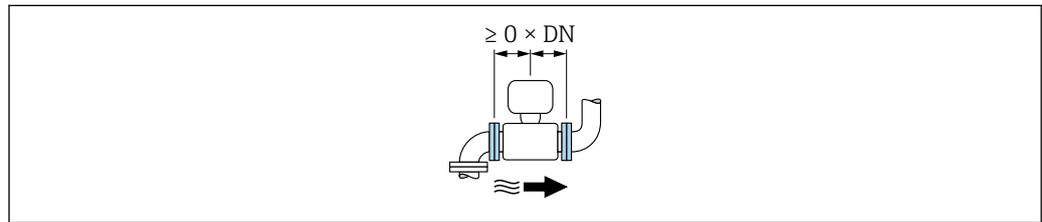
| Order code for "Design" | | |
|-------------------------|--------------------------------------------------------------------|------------------------------------------|
| Option | Description | Design |
| C | Fixed flange, constricted measuring tube, 0 x DN inlet/outlet runs | Constricted measuring tube ¹⁾ |
| H | Lap joint flange, 0 x DN inlet/outlet runs | 0 x DN full-bore design ²⁾ |
| I | Fixed flange, 0 x DN inlet/outlet runs | |
| J | Fixed flange, short installed length, 0 x DN inlet/outlet runs | |
| K | Fixed flange, long installed length, 0 x DN inlet/outlet runs | |

1) "Constricted measuring tube" stands for a reduction of the internal diameter of the measuring tube. The reduced internal diameter causes a higher flow velocity inside the measuring tube.

2) "Full-bore" indicates a measuring tube cross-section corresponding to the nominal diameter without constriction. This means there is no pressure loss.

Installation before or after bends

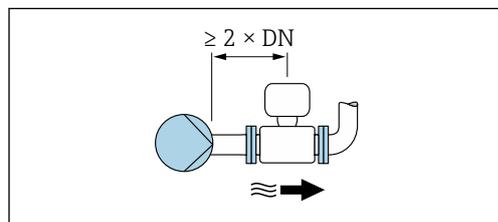
Installation without inlet and outlet runs is possible.



A0032859

Installation downstream of pumps

Installation without inlet and outlet runs is possible.



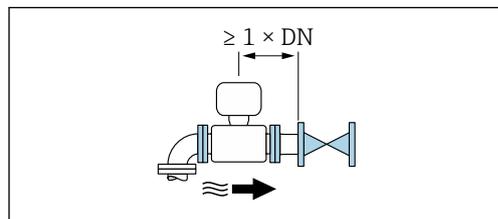
A0045530



An inlet run of $\geq 2 \times DN$ is recommended.

Installation upstream of valves

Installation without inlet and outlet runs is possible.



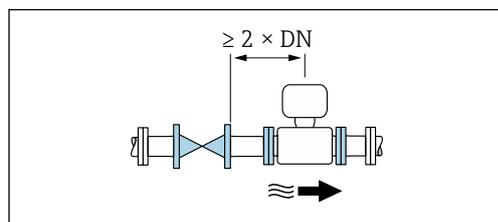
A0045531



An outlet run of $\geq 1 \times DN$ is recommended.

Installation downstream of valves

The device can be installed without inlet and outlet runs if the valve is 100% open during operation.



A0045786



An inlet run of $\geq 2 \times DN$ is recommended if the valve is 100% open during operation.

Adapters

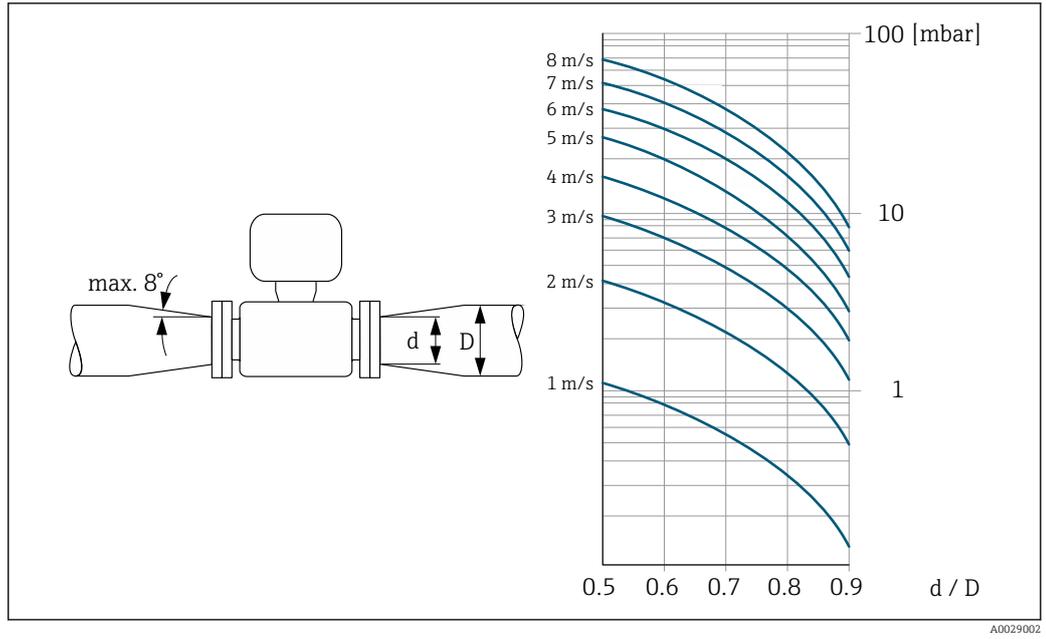
Suitable adapters to DIN EN 545 (double-flange reducers) can be used to install the sensor in larger-diameter pipes. The resulting increase in the flow velocity improves measurement accuracy for very slow-moving fluids.

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.



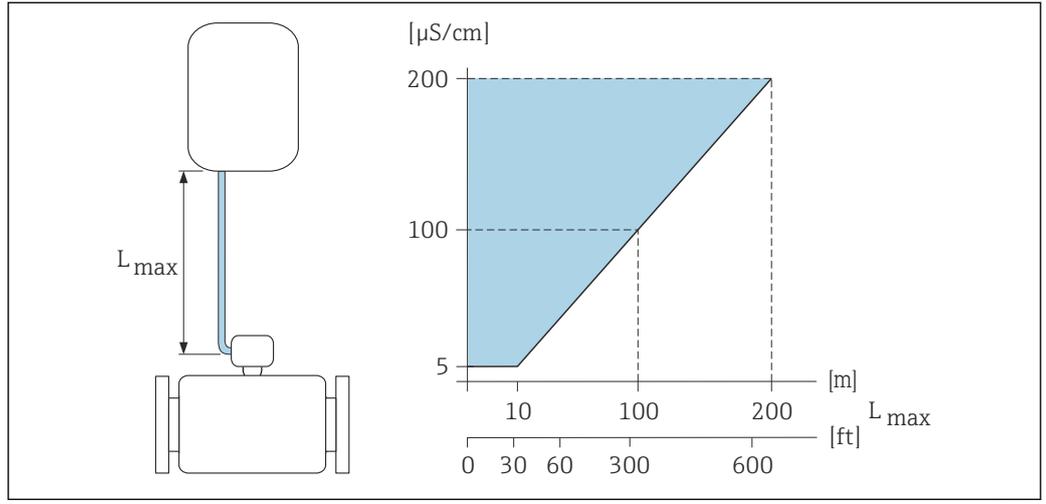
The nomogram only applies to liquids with a viscosity similar to that of water.



A0029002

Length of connecting cable

To obtain correct measurement results, observe the permitted connecting cable length of L_{max} . This length is determined by the conductivity of the medium. If measuring liquids in general: $5 \mu S/cm$



A0016539

17 Permitted length of connecting cable

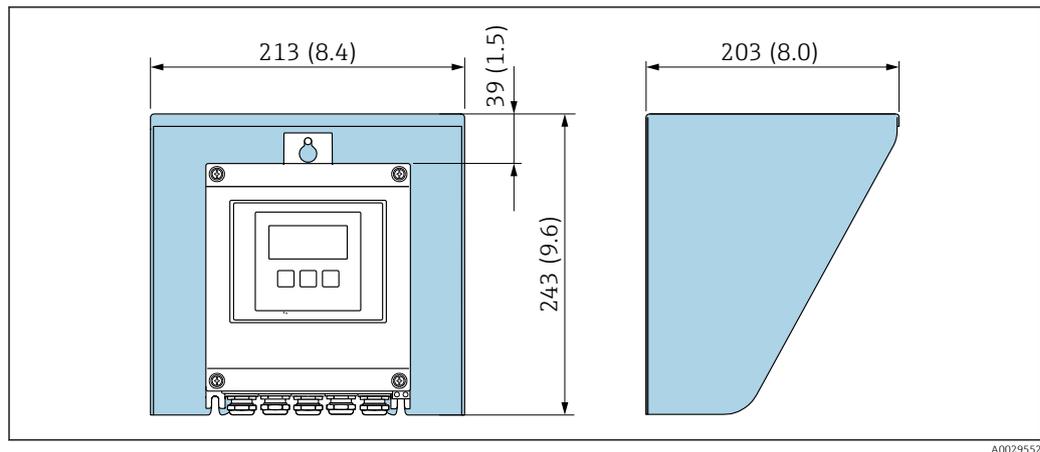
Colored area = permitted range
 L_{max} = length of connecting cable in [m] ([ft])
 $[\mu S/cm]$ = medium conductivity

Special installation instructions

Display guard

To ensure that the optional display guard can be easily opened, maintain the following minimum head clearance: 350 mm (13.8 in)

Weather protection cover



18 Weather protection cover; engineering unit mm (in)

Immersion in water

- i** Only the remote version of the device with IP68 protection, Type 6P is suitable for underwater use: order code for "Sensor option", options CB, CC, CD, CE and CQ.
- Pay attention to regional installation instructions.

NOTICE

If the maximum water depth and operating duration is exceeded, this can damage the device!

- Observe the maximum water depth and operating duration.

Order code for "Sensor option", options CB, CC

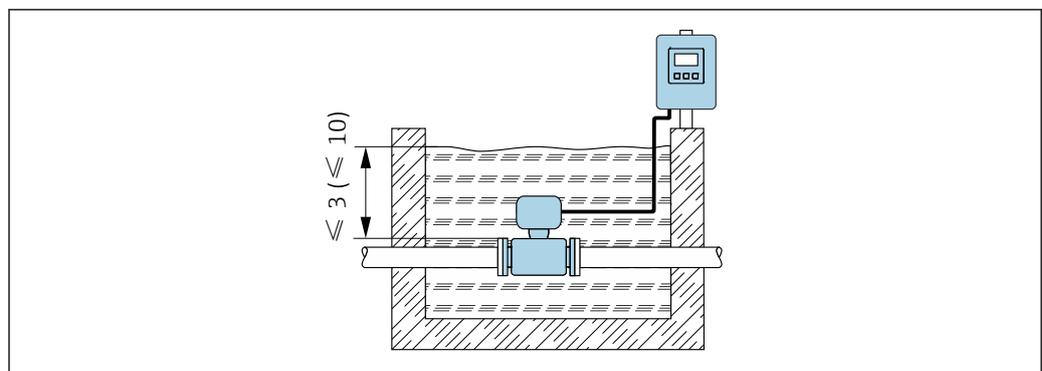
- For the operation of the device under water
- Operating duration at a maximum depth of:
 - 3 m (10 ft): permanent use
 - 10 m (30 ft): maximum 48 hours

Order code for "Sensor option", option CQ "IP68, Type 6P, factory-potted"

- For permanent operation of the device under rain or surface water
- Operation at a maximum depth of 3 m (10 ft)

Order code for "Sensor option", options CD, CE

- For the operation of the device under water and in saline water
- Operating duration at a maximum depth of:
 - 3 m (10 ft): permanent use
 - 10 m (30 ft): maximum 48 hours



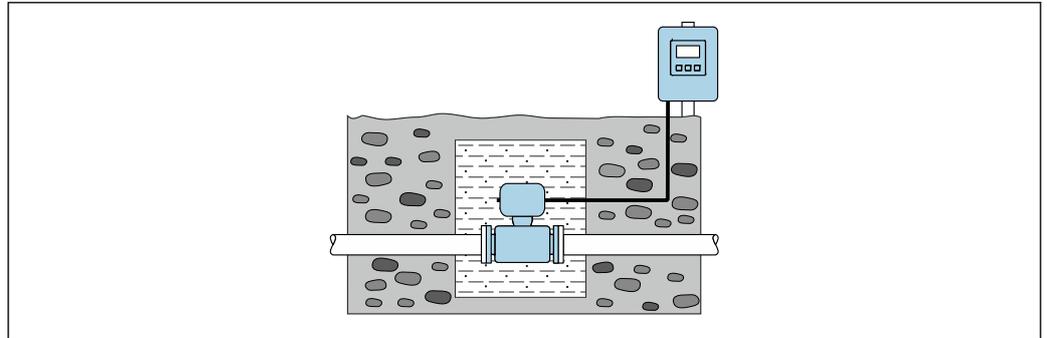
A0042412

Use in buried applications

- i
 - Only the remote version of the device with IP68 protection is suitable for use in buried applications: order code for "Sensor option", options CD and CE.
 - Pay attention to regional installation instructions.

Order code for "Sensor option", options CD, CE

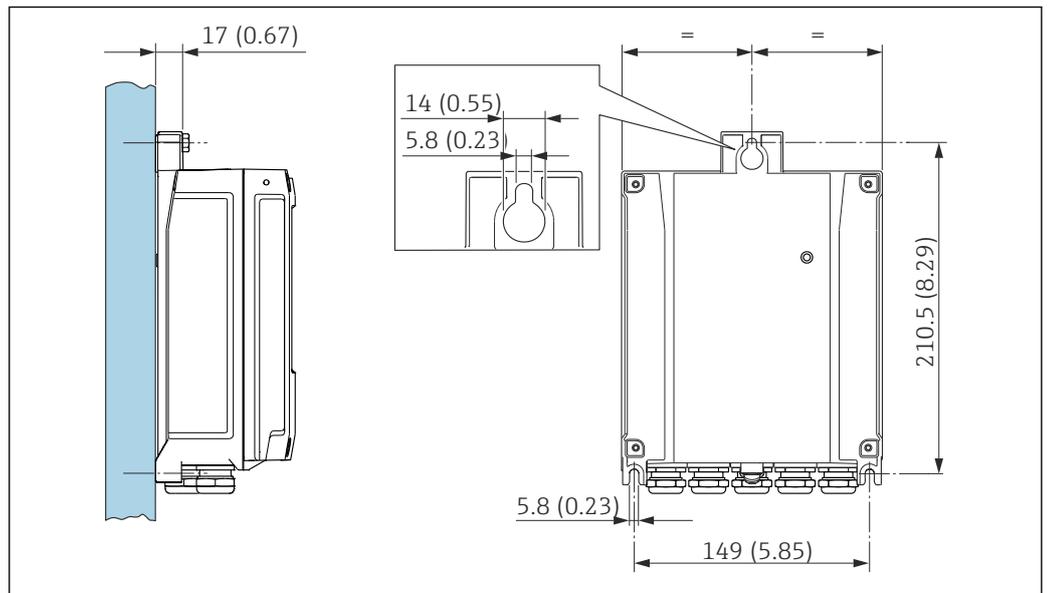
For the use of the device in buried applications.



A0042646

Mounting the transmitter housing

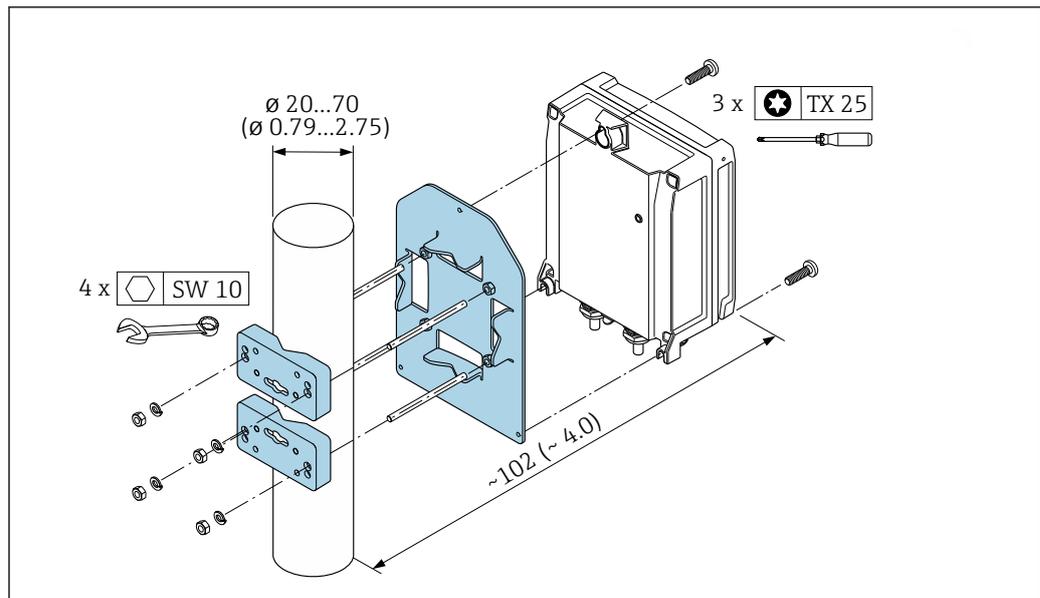
Wall mounting



A0020523

19 Engineering unit mm (in)

Post mounting



A0029051

20 Engineering unit mm (in)

Environment

Ambient temperature range

| | |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmitter | -40 to +60 °C (-40 to +140 °F) |
| Local display | -20 to +60 °C (-4 to +140 °F), the legibility of the local display may be impaired at temperatures outside the temperature range. |
| Sensor | <ul style="list-style-type: none"> ■ Process connection material, carbon steel: -10 to +60 °C (+14 to +140 °F) ■ Process connection material, stainless steel: -40 to +60 °C (-40 to +140 °F) <p>If both the ambient and the medium temperatures are high, mount the sensor separately from the transmitter.</p> |
| Liner | Do not exceed or fall below the permitted temperature range of the liner → 48. |

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.
- If the compact version of the device is insulated at low temperatures, the insulation must also include the device neck.
- Protect the display against impact.
- Protect the display from abrasion, e.g. caused by sand in desert areas.

Display guard available as an accessory → 104.

Temperature tables

Observe the interdependencies between the permitted ambient and fluid temperatures when operating the device in hazardous areas.

For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

Storage temperature

The storage temperature corresponds to the operating temperature range of the transmitter and the sensor → 46.

- 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.

Atmosphere

If a plastic transmitter housing is permanently exposed to certain steam and air mixtures, this can damage the housing.



In cases of doubt, please contact the Sales Center.

Degree of protection

Transmitter

- IP66/67, type 4X enclosure, suitable for pollution degree 4
- When the housing is open: IP20, type 1 enclosure, suitable for pollution degree 2
- Display module: IP20, type 1 enclosure, suitable for pollution degree 2

Sensor

Compact and remote version

IP66/67, type 4X enclosure, suitable for pollution degree 4

Optionally available for compact and remote version:

Order code for "Sensor option", option CA, C3

- IP66/67, type 4X enclosure
- Fully welded, with protective coating as per EN ISO 12944 C5-M
- For the operation of the device in corrosive environments

Optionally available for remote version:

Order code for "Sensor option", option CB, CC

- IP68, type 6P enclosure
- Fully welded, with protective coating as per EN ISO 12944 C5-M/Im1 and EN 60529
- For the operation of the device under water
- Operating duration at a maximum depth of:
 - 3 m (10 ft): permanent use
 - 10 m (30 ft): maximum 48 hours

Order code for "Sensor option", option CQ

- IP68, type 6P, factory encapsulation
- Sensor with aluminum half-shell housing
- For permanent use of device under rain or surface water
- Use at a maximum water depth of 3 m (10 ft)

Order code for "Sensor option", option CD, CE

- IP68, type 6P enclosure
- Fully welded, with protective coating as per EN ISO 12944 Im2/Im3 and EN 60529
- For the operation of the device in buried applications
- For the operation of the device under water and in saline water
- Operating duration at a maximum depth of:
 - 3 m (10 ft): permanent use
 - 10 m (30 ft): maximum 48 hours

Vibration- and shock-resistance

Sinusoidal vibration according to IEC 60068-2-6

Compact version; order code for "Housing", option A "Compact, aluminum, coated"

- 2 to 8.4 Hz, 3.5 mm peak
- 8.4 to 2 000 Hz, 1 g peak

Compact version; order code for "Housing", option M "Compact, polycarbonate"

- 2 to 8.4 Hz, 7.5 mm peak
- 8.4 to 2 000 Hz, 2 g peak

Remote version; order code for "Housing", option N "Remote, polycarbonate" and option P "Remote, aluminum, coated"

- 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

Compact version; order code for "Housing", option A "Compact, aluminum, coated"

- 10 to 200 Hz, 0.003 g²/Hz
- 200 to 2 000 Hz, 0.001 g²/Hz
- Total: 1.54 g rms

Compact version; order code for "Housing", option M "Compact, polycarbonate"

- 10 to 200 Hz, 0.01 g²/Hz
- 200 to 2 000 Hz, 0.003 g²/Hz
- Total: 2.70 g rms

Remote version; order code for "Housing", option N "Remote, polycarbonate" and option P "Remote, aluminum, coated"

- 10 to 200 Hz, 0.01 g²/Hz
- 200 to 2 000 Hz, 0.003 g²/Hz
- Total: 2.70 g rms

Shock half-sine, according to IEC 60068-2-27

- Compact version; order code for "Housing", option A "Compact, aluminum, coated"
6 ms 30 g
- Compact version; order code for "Housing", option M "Compact, polycarbonate"
6 ms 50 g
- Remote version; order code for "Housing", option N "Remote, polycarbonate" and option P "Remote, aluminum, coated"
6 ms 50 g

Rough handling shocks according to 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)
- As per IEC/EN 61000-6-2 and IEC/EN 61000-6-4
- Complies with emission limits for industry as per EN 55011 (Class A)
- 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.

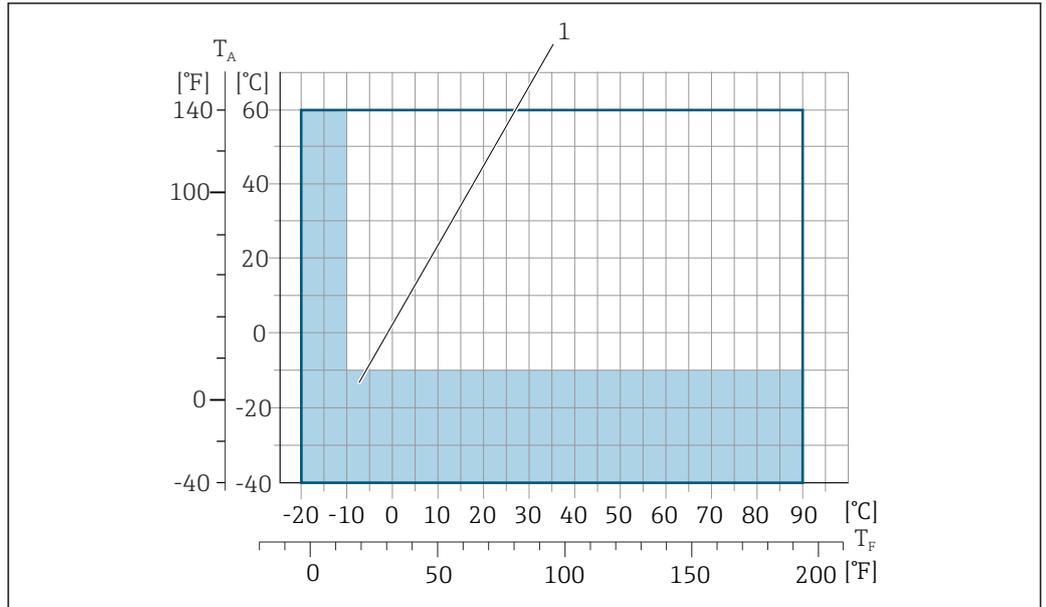


This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

Process

Medium temperature range

- 0 to +80 °C (+32 to +176 °F) for hard rubber, DN 50 to 3000 (2 to 120")
- -20 to +50 °C (-4 to +122 °F) for polyurethane, DN 25 to 1200 (1 to 48")
- -20 to +90 °C (-4 to +194 °F) for PTFE, DN 25 to 300 (1 to 12")



A0038130

T_A Ambient temperature

T_F Medium temperature

1 Colored area: The ambient temperature range of -10 to -40 °C (+14 to -40 °F) and the medium temperature range of -10 to -20 °C (+14 to -4 °F) only apply for stainless flanges

The permitted fluid temperature in custody transfer is 0 to +50 °C (+32 to +122 °F).

Conductivity

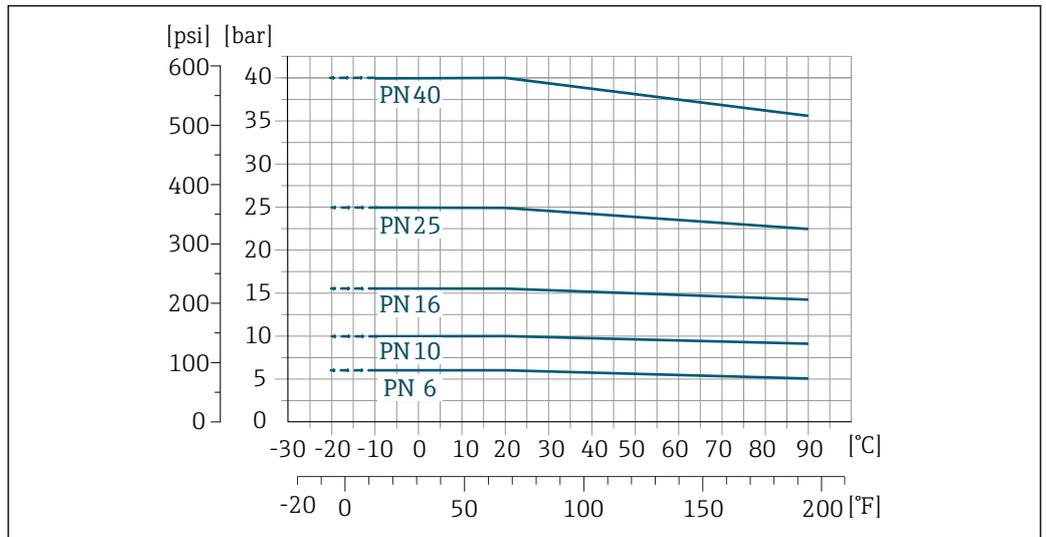
≥5 μS/cm for liquids in general.

- Note that in the case of the remote version, the requisite minimum conductivity additionally depends on the length of the connecting cable → 43.
- Maximum measured error for electrical conductivity → 35.

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.

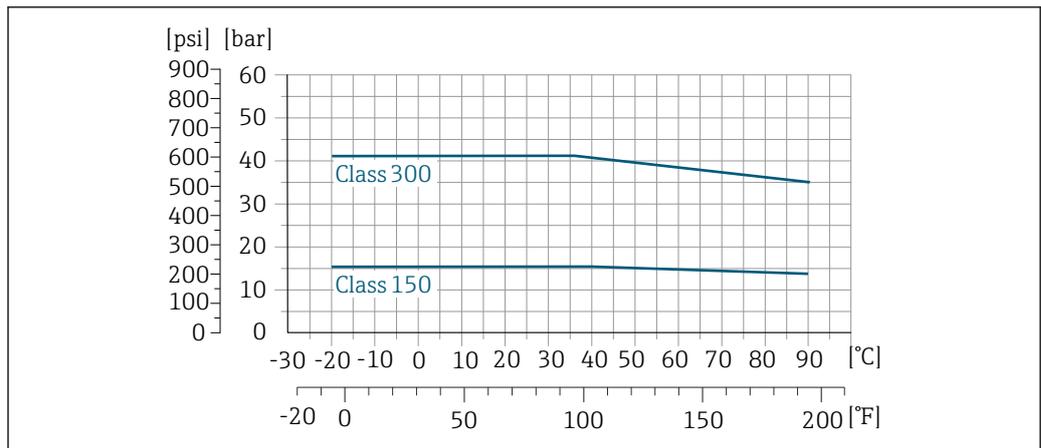
Process connection: fixed flange according to EN 1092-1 (DIN 2501)



A0038122-EN

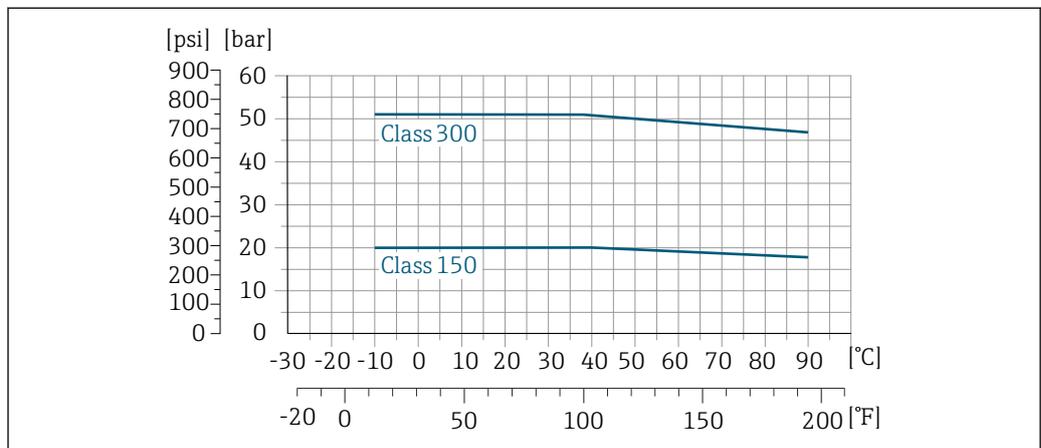
21 Process connection material: stainless steel (-20 °C (-4 °F)); carbon steel (-10 °C (14 °F))

Process connection: fixed flange according to ASME B16.5



A0038123-EN

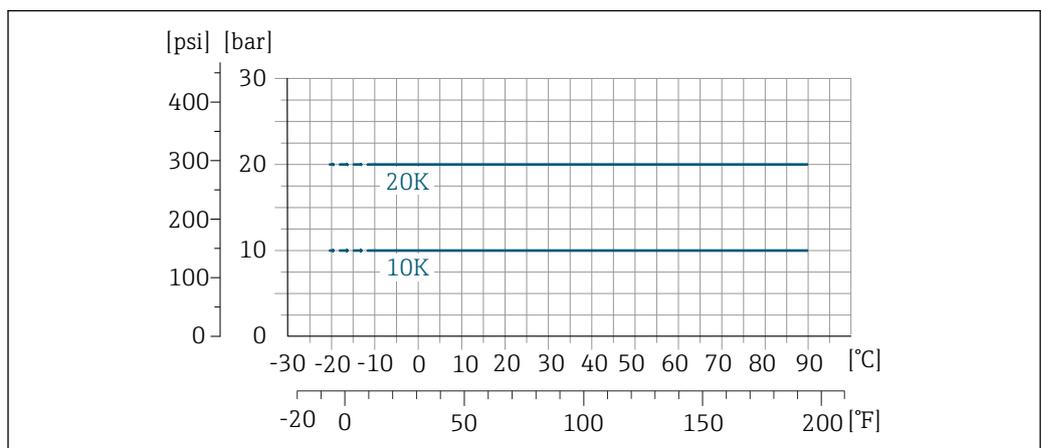
22 Process connection material: stainless steel



A0038121-EN

23 Process connection material: carbon steel

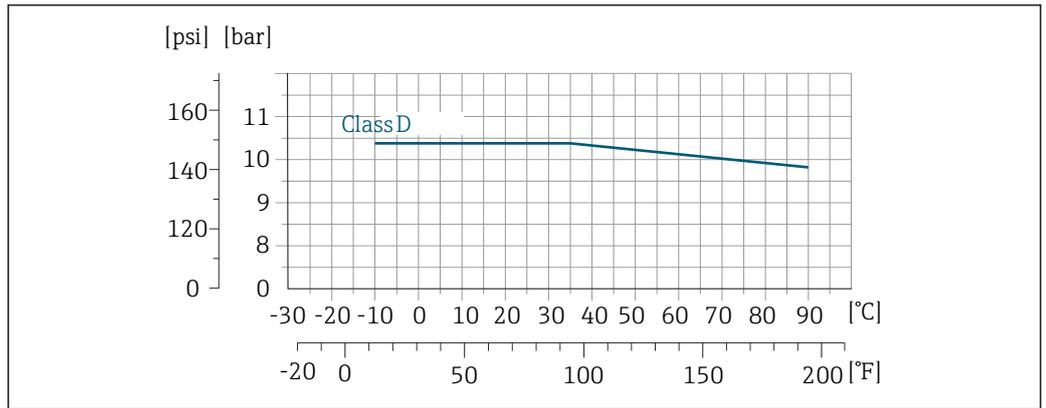
Process connection: fixed flange according to JIS B2220



A0038124-EN

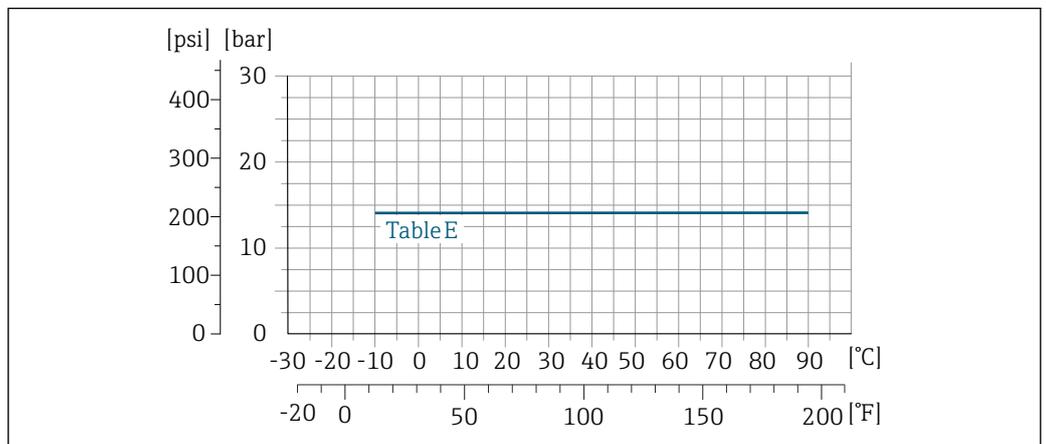
24 Process connection material: stainless steel (-20 °C (-4 °F)); carbon steel (-10 °C (14 °F))

Process connection: fixed flange according to AWWA C207



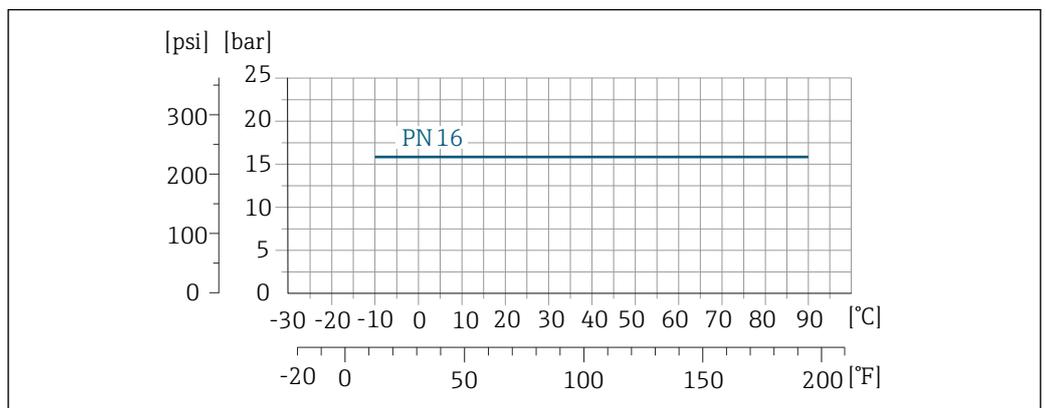
25 Process connection material: carbon steel

Process connection: fixed flange according to AS 2129



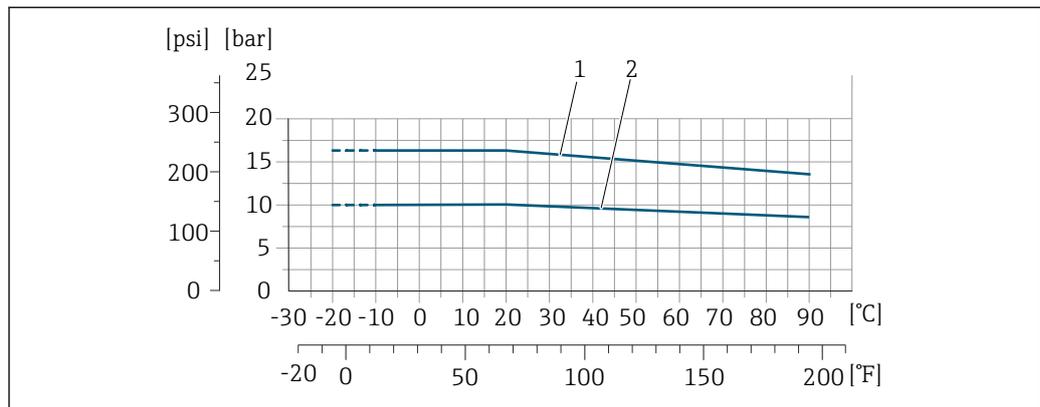
26 Process connection material: carbon steel

Process connection: fixed flange according to AS 4087



27 Process connection material: carbon steel

Process connection: lap joint flange/lap joint flange, stamped plate according to EN 1092-1 (DIN 2501) and ASME B16.5; DN 25 to 300 (1 to 12")



A0038129-EN

28 Process connection material: stainless steel (-20 °C (-4 °F)); carbon steel (-10 °C (14 °F))

1 Lap joint flange PN16/ Class150

2 Lap joint flange, stamped plate PN10, lap joint flange PN10

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 ... 3000 | 2 ... 120 | 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) |

Liner: PTFE

| Nominal diameter | | Limit values for absolute pressure in [mbar] ([psi]) for medium temperatures: | |
|------------------|------|-------------------------------------------------------------------------------|------------------|
| [mm] | [in] | +25 °C (+77 °F) | +90 °C (+194 °F) |
| 25 | 1 | 0 (0) | 0 (0) |
| 40 | 2 | 0 (0) | 0 (0) |
| 50 | 2 | 0 (0) | 0 (0) |
| 65 | 2 ½ | 0 (0) | 40 (0.58) |
| 80 | 3 | 0 (0) | 40 (0.58) |
| 100 | 4 | 0 (0) | 135 (2.0) |
| 125 | 5 | 135 (2.0) | 240 (3.5) |
| 150 | 6 | 135 (2.0) | 240 (3.5) |
| 200 | 8 | 200 (2.9) | 290 (4.2) |
| 250 | 10 | 330 (4.8) | 400 (5.8) |
| 300 | 12 | 400 (5.8) | 500 (7.3) |

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 medium:

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

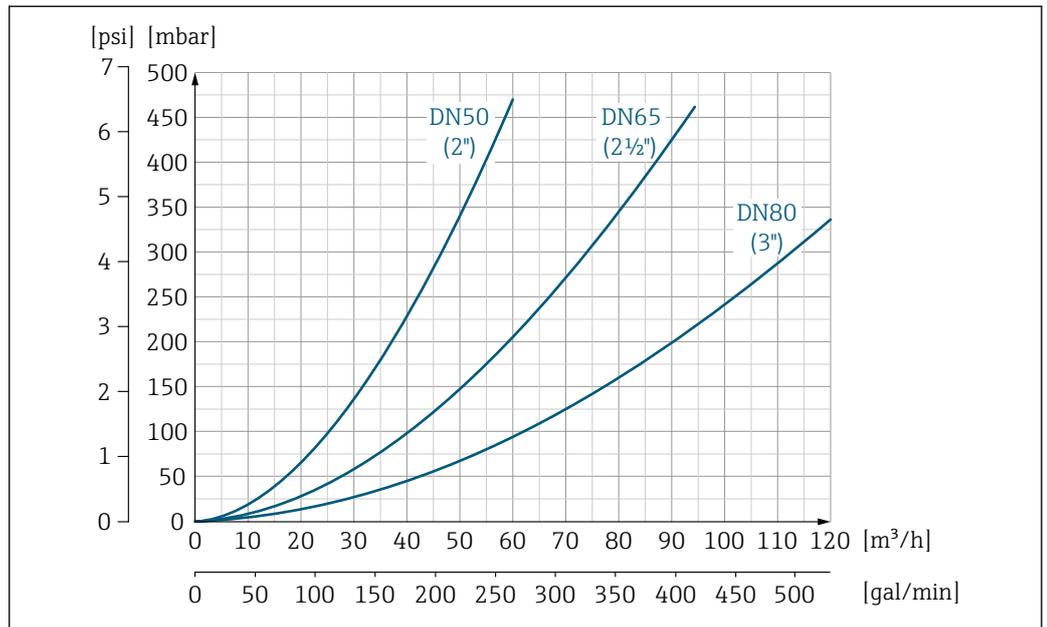
i A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter.

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

i For custody transfer, the applicable approval determines the permitted measuring range.

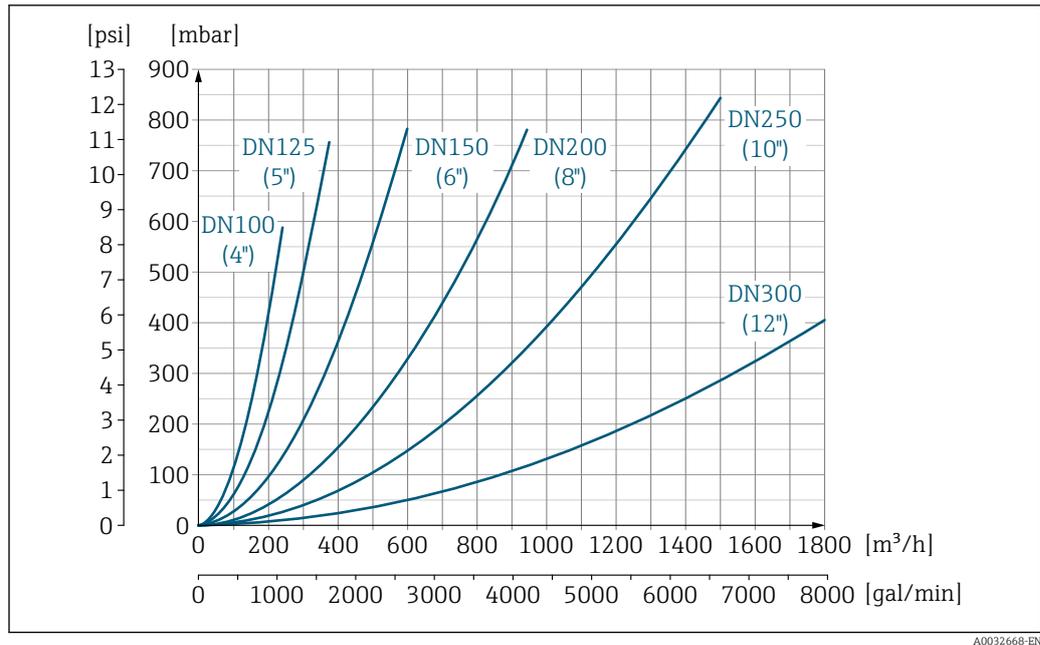
Pressure loss

- 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 →  42



 29 Pressure loss DN 50 to 80 (2 to 3") for order code for "Design", option C "Fixed flange, constricted measuring tube", 0 x DN inlet/outlet runs"

A0032667-EN



30 Pressure loss DN 100 to 300 (4 to 12") for order code for "Design", option C "Fixed flange, constricted measuring tube", 0 x DN inlet/outlet runs"

System pressure

Installation near pumps → 38

Vibrations

Installation in event of pipe vibrations → 39

Custody transfer

The measuring device is optionally tested in accordance with OIML R49 and has an EU type-examination certificate according to Measuring Instruments Directive 2014/32/EU for service subject to legal metrological control ("custody transfer") for cold water (Annex III).

The permitted medium temperature in these applications is 0 to +50 °C (+32 to +122 °F).

The device is used with a legally controlled totalizer display on the local display and optionally with outputs subject to legal metrological control.

Measuring devices subject to legal metrological control totalize in both directions, i.e. all the outputs consider flow components in the positive (forward) and negative (reverse) flow direction.

Generally a measuring device subject to legal metrological control is secured against tampering by seals on the transmitter or sensor. These seals may normally only be opened by a representative of the competent authority for legal metrology controls.

After putting the device into circulation or after sealing the device, operation is only possible to a limited extent.

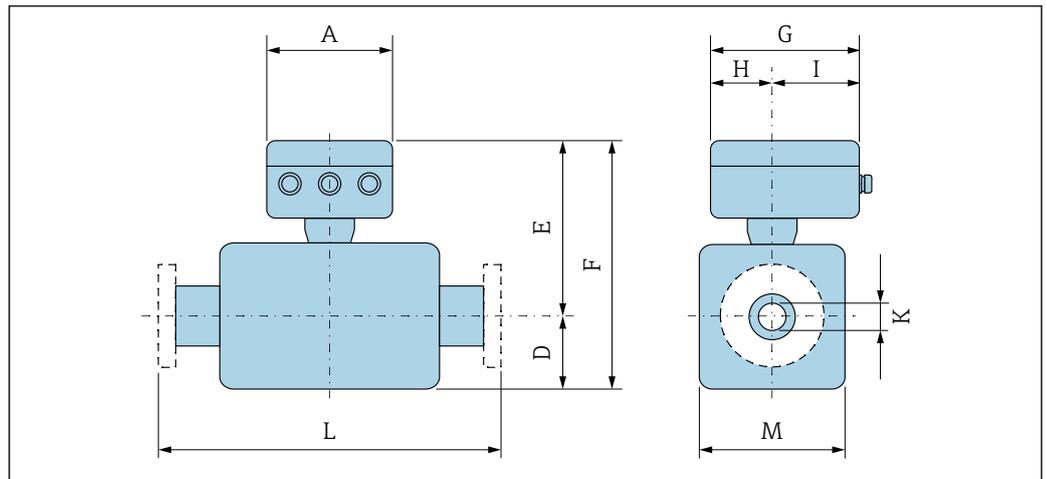
Detailed ordering information is available from your local Endress+Hauser sales center for national approvals (outside Europe) as cold water meters based on OIML R49.

Mechanical construction

Dimensions in SI units

Compact version

Order code for "Housing", option A "Compact, aluminum, coated" or option M "Compact, polycarbonate"



A0033790

| A [mm] | G ¹⁾ [mm] | H [mm] | I ¹⁾ [mm] |
|-----------|-------------------------|-----------|-------------------------|
| 167 | 193 | 90 | 103 |

1) Depending on the cable gland used: values up to + 30 mm

DN 25 to 300 mm (1 to 12 in): Sensor with aluminum half-shell housing

| DN | | Order code for "Design" | | | | | | | | K | L |
|------|------|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|------|
| [mm] | [in] | Options D, E, H, I | | | | Option C | | | | | |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | [mm] | [mm] |
| 25 | 1 | 84 | 201 | 285 | 120 | - | - | - | - | ²⁾ | 200 |
| 32 | - | 84 | 201 | 285 | 120 | - | - | - | - | ²⁾ | 200 |
| 40 | 1 ½ | 84 | 201 | 285 | 120 | - | - | - | - | ²⁾ | 200 |
| 50 | 2 | 84 | 201 | 285 | 120 | 84 | 201 | 285 | 120 | ²⁾ | 200 |
| 65 | - | 109 | 226 | 335 | 180 | 84 | 201 | 285 | 120 | ²⁾ | 200 |
| 80 | 3 | 109 | 226 | 335 | 180 | 84 | 201 | 285 | 120 | ²⁾ | 200 |
| 100 | 4 | 109 | 226 | 335 | 180 | 109 | 226 | 335 | 180 | ²⁾ | 250 |
| 125 | - | 150 | 266 | 416 | 260 | 109 | 226 | 335 | 180 | ²⁾ | 250 |
| 150 | 6 | 150 | 266 | 416 | 260 | 109 | 226 | 335 | 180 | ²⁾ | 300 |
| 200 | 8 | 180 | 291 | 471 | 324 | 150 | 266 | 416 | 260 | ²⁾ | 350 |
| 250 | 10 | 205 | 316 | 521 | 400 | 150 | 266 | 416 | 260 | ²⁾ | 450 |
| 300 | 12 | 230 | 341 | 571 | 460 | 180 | 291 | 471 | 324 | ²⁾ | 500 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
 2) Depends on the liner → 91

DN 350 to 400 mm (14 to 16 in)

| DN | | Order code for "Design" | | | | K | L |
|------|------|-------------------------|-----------------|-----------------|-----------------|---------------|------|
| [mm] | [in] | Options E, I | | | | | |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | [mm] | [mm] |
| 350 | 14 | 282 | 379 | 679 | 564 | ²⁾ | 550 |
| 375 | 15 | 308 | 423 | 731 | 616 | ²⁾ | 600 |
| 400 | 16 | 308 | 423 | 731 | 616 | ²⁾ | 600 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
 2) Depends on the liner → 91

DN 450 to 900 mm (18 to 36 in)

| DN | | Order code for "Design" | | | | | | | | K | L | |
|------|------|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|-------------------|-------------------|
| [mm] | [in] | Options F, J | | | | Options G, K | | | | | [mm] | [mm] |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | | | |
| 450 | 18 | 290 | 405 | 695 | 580 | 333 | 448 | 781 | 666 | ²⁾ | 600 ³⁾ | 650 ⁴⁾ |
| 500 | 20 | 315 | 430 | 745 | 630 | 359 | 474 | 833 | 717 | ²⁾ | 600 ³⁾ | 650 ⁴⁾ |
| 600 | 24 | 365 | 480 | 845 | 730 | 411 | 526 | 937 | 821 | ²⁾ | 600 ³⁾ | 780 ⁴⁾ |
| 700 | 28 | 426 | 541 | 967 | 851 | 512 | 627 | 1139 | 1024 | ²⁾ | 700 ³⁾ | 910 ⁴⁾ |
| 750 | 30 | 463 | 578 | 1041 | 926 | 512 | 627 | 1139 | 1024 | ²⁾ | 750 ³⁾ | 975 ⁴⁾ |

| DN | | Order code for "Design" | | | | | | | | K | L | |
|------|------|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|-------------------|--------------------|
| | | Options F, J | | | | Options G, K | | | | | | |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | | | |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | |
| 800 | 32 | 482 | 597 | 1079 | 964 | 534 | 649 | 1183 | 1065 | ²⁾ | 800 ³⁾ | 1040 ⁴⁾ |
| 900 | 36 | 532 | 647 | 1179 | 1064 | 610 | 725 | 1335 | 1218 | ²⁾ | 900 ³⁾ | 1170 ⁴⁾ |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Depends on the liner → 91
- 3) Order code for "Design", option F "Fixed flange, short installed length" and option J "Fixed flange, short installed length, 0 x DN inlet/outlet runs"
- 4) Order code for "Design", option G "Fixed flange, long installed length" and option K "Fixed flange, long installed length 0 x DN inlet/outlet runs"

DN 1000 to 2000 mm (40 to 78 in)

| DN | | Order code for "Design" | | | | K | L | |
|------|------|-------------------------|-----------------|-----------------|-----------------|---------------|--------------------|--------------------|
| | | Options F, G, J, K | | | | | | |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | | | |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | |
| 1000 | 40 | 582 | 697 | 1279 | 1164 | ²⁾ | 1000 ³⁾ | 1300 ⁴⁾ |
| - | 42 | 618 | 733 | 1351 | 1236 | ²⁾ | 1050 ³⁾ | 1365 ⁴⁾ |
| 1200 | 48 | 696 | 811 | 1507 | 1392 | ²⁾ | 1200 ³⁾ | 1560 ⁴⁾ |
| - | 54 | 809 | 924 | 1733 | 1617 | ²⁾ | 1350 ³⁾ | 1755 ⁴⁾ |
| 1400 | - | 809 | 924 | 1733 | 1617 | ²⁾ | 1400 ³⁾ | 1820 ⁴⁾ |
| - | 60 | 909 | 1024 | 1933 | 1817 | ²⁾ | 1500 ³⁾ | 1950 ⁴⁾ |
| 1600 | - | 909 | 1024 | 1933 | 1817 | ²⁾ | 1600 ³⁾ | 2080 ⁴⁾ |
| - | 66 | 960 | 1075 | 2035 | 1919 | ²⁾ | 1650 ³⁾ | 2145 ⁴⁾ |
| 1800 | 72 | 1016 | 1131 | 2147 | 2032 | ²⁾ | 1800 ³⁾ | 2340 ⁴⁾ |
| - | 78 | 1127 | 1242 | 2369 | 2254 | ²⁾ | 2000 ³⁾ | 2600 ⁴⁾ |
| 2000 | - | 1127 | 1242 | 2369 | 2254 | ²⁾ | 2000 ³⁾ | 2600 ⁴⁾ |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Depends on the liner → 91
- 3) Order code for "Design", option F "Fixed flange, short installed length" and option J "Fixed flange, short installed length, 0 x DN inlet/outlet runs"
- 4) Order code for "Design", option G "Fixed flange, long installed length" and option K "Fixed flange, long installed length 0 x DN inlet/outlet runs"

DN 2200 to 3000 mm (84 to 120 in)

| DN | | Order code for "Design" | | | | K | L |
|------|------|-------------------------|-----------------|-----------------|-----------------|---------------|------|
| | | Option F, J | | | | | |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | | |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| - | 84 | 1227 | 1342 | 2569 | 2454 | ²⁾ | 2200 |
| 2200 | - | 1227 | 1342 | 2569 | 2454 | ²⁾ | 2200 |
| - | 90 | 1332 | 1447 | 2779 | 2664 | ²⁾ | 2400 |
| 2400 | - | 1332 | 1447 | 2783 | 2664 | ²⁾ | 2400 |
| - | 96 | 1431 | 1546 | 2977 | 2861 | ²⁾ | 2450 |

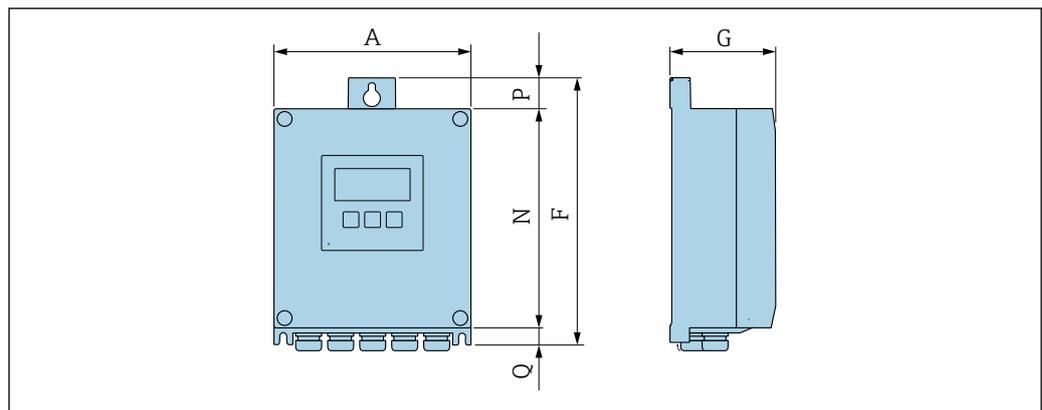
| DN | | Order code for "Design" | | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|-------|---|
| | | Option F, J | | | | | | |
| [mm] | [in] | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | [mm] | [mm] | |
| - | 102 | 1516 | 1631 | 3 147 | 3 032 | ²⁾ | 2 600 | |
| 2600 | - | 1442 | 1557 | 2 999 | 2 883 | ²⁾ | 2 600 | |
| - | 108 | 1602 | 1718 | 3 320 | 3 204 | ²⁾ | 2 750 | |
| 2800 | - | 1547 | 1662 | 3 209 | 3 093 | ²⁾ | 2 800 | |
| - | 114 | 1688 | 1803 | 3 491 | 3 375 | ²⁾ | 2 900 | |
| 3000 | - | 1647 | 1762 | 3 409 | 3 293 | ²⁾ | 3 000 | |
| - | 120 | 1774 | 1889 | 3 663 | 3 547 | ²⁾ | 3 050 | |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
 2) Depends on the liner → 91

Remote version

Transmitter remote version

Order code for "Housing", option N "Remote, polycarbonate" or option P "Remote, aluminum coated"



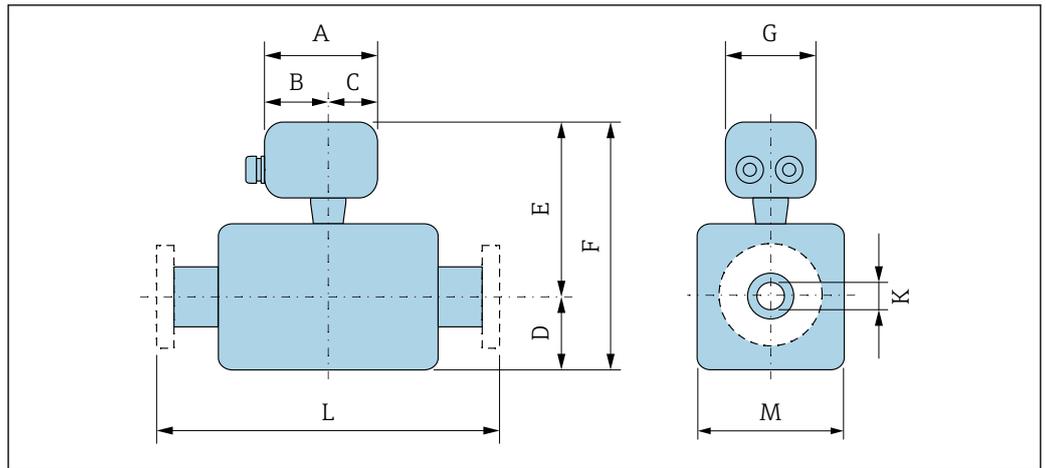
Order code for "Transmitter housing", option P "Remote, aluminum, coated"

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

Order code for "Transmitter housing", option N "Remote, polycarbonate"

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

Sensor connection housing



A0033784

Aluminum, coated

| A [mm] | B [mm] | C [mm] | G [mm] |
|-----------|-----------|-----------|-----------|
| 148 | 94 | 54 | 136 |

Polycarbonate (only in conjunction with order code for "Sensor option", options CA...CE)

| A [mm] | B [mm] | C [mm] | G [mm] |
|-----------|-----------|-----------|-----------|
| 113 | 62 | 51 | 112 |

DN 25 to 300 mm (1 to 12 in): Sensor with aluminum half-shell housing

| DN | | Order code for "Design" | | | | | | | | K [mm] | L [mm] |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|-----------|
| [mm] | [in] | Options D, E, H, I | | | | Option C | | | | | |
| | | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | | |
| 25 | 1 | 84 | 200 | 284 | 120 | - | - | - | - | ²⁾ | 200 |
| 32 | - | 84 | 200 | 284 | 120 | - | - | - | - | ²⁾ | 200 |
| 40 | 1 ½ | 84 | 200 | 284 | 120 | - | - | - | - | ²⁾ | 200 |
| 50 | 2 | 84 | 200 | 284 | 120 | 84 | 200 | 284 | 120 | ²⁾ | 200 |
| 65 | - | 109 | 225 | 334 | 180 | 84 | 200 | 284 | 120 | ²⁾ | 200 |
| 80 | 3 | 109 | 225 | 334 | 180 | 84 | 200 | 284 | 120 | ²⁾ | 200 |
| 100 | 4 | 109 | 225 | 334 | 180 | 109 | 225 | 334 | 180 | ²⁾ | 250 |
| 125 | - | 150 | 265 | 415 | 260 | 109 | 225 | 334 | 180 | ²⁾ | 250 |
| 150 | 6 | 150 | 265 | 415 | 260 | 109 | 225 | 334 | 180 | ²⁾ | 300 |
| 200 | 8 | 180 | 290 | 470 | 324 | 150 | 265 | 415 | 260 | ²⁾ | 350 |
| 250 | 10 | 205 | 315 | 520 | 400 | 150 | 265 | 415 | 260 | ²⁾ | 450 |
| 300 | 12 | 230 | 340 | 570 | 460 | 180 | 290 | 470 | 324 | ²⁾ | 500 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Depends on the liner → 91

DN 25 to 300 mm (1 to 12 in): Sensor with fully welded carbon steel housing

| DN | | Order code for "Design" | | | | | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|------|
| | | Option E | | | | Option C | | | | | |
| [mm] | [in] | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | [mm] | [mm] |
| 25 | 1 | 70 | 200 | 270 | 140 | – | – | – | – | ²⁾ | 200 |
| 32 | – | 70 | 200 | 270 | 140 | – | – | – | – | ²⁾ | 200 |
| 40 | 1 ½ | 70 | 200 | 270 | 140 | – | – | – | – | ²⁾ | 200 |
| 50 | 2 | 70 | 200 | 270 | 140 | 70 | 200 | 270 | 140 | ²⁾ | 200 |
| 65 | – | 82 | 225 | 307 | 165 | 70 | 200 | 270 | 140 | ²⁾ | 200 |
| 80 | 3 | 87 | 225 | 312 | 175 | 70 | 200 | 270 | 140 | ²⁾ | 200 |
| 100 | 4 | 100 | 225 | 325 | 200 | 82 | 225 | 307 | 165 | ²⁾ | 250 |
| 125 | – | 113 | 265 | 378 | 226 | 87 | 225 | 312 | 175 | ²⁾ | 250 |
| 150 | 6 | 134 | 265 | 399 | 269 | 100 | 225 | 325 | 200 | ²⁾ | 300 |
| 200 | 8 | 160 | 290 | 450 | 320 | 113 | 265 | 378 | 226 | ²⁾ | 350 |
| 250 | 10 | 193 | 315 | 508 | 387 | 134 | 265 | 399 | 269 | ²⁾ | 450 |
| 300 | 12 | 218 | 340 | 558 | 437 | 160 | 290 | 450 | 320 | ²⁾ | 500 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
 2) Depends on the liner → 91

DN 350 to 400 mm (14 to 16 in)

| DN | | Order code for "Design" | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|------|
| | | Options E, I | | | | | |
| [mm] | [in] | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | [mm] | [mm] |
| 350 | 14 | 282 | 379 | 679 | 564 | ²⁾ | 550 |
| 375 | 15 | 308 | 423 | 731 | 616 | ²⁾ | 550 |
| 400 | 16 | 308 | 423 | 731 | 616 | ²⁾ | 600 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
 2) Depends on the liner → 91

DN 450 to 900 mm (18 to 36 in)

| DN | | Order code for "Design" | | | | | | | | K | L | |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|-------------------|-------------------|
| | | Options F, J | | | | Options G, K | | | | | | |
| [mm] | [in] | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | [mm] | [mm] | [mm] |
| 450 | 18 | 290 | 405 | 695 | 580 | 333 | 448 | 781 | 666 | ²⁾ | 600 ³⁾ | 650 ⁴⁾ |
| 500 | 20 | 315 | 430 | 745 | 630 | 359 | 474 | 833 | 717 | ²⁾ | 600 ³⁾ | 650 ⁴⁾ |
| 600 | 24 | 365 | 480 | 845 | 730 | 411 | 526 | 937 | 821 | ²⁾ | 600 ³⁾ | 780 ⁴⁾ |
| 700 | 28 | 426 | 541 | 967 | 851 | 512 | 627 | 1139 | 1024 | ²⁾ | 700 ³⁾ | 910 ⁴⁾ |
| 750 | 30 | 463 | 578 | 1041 | 926 | 512 | 627 | 1139 | 1024 | ²⁾ | 750 ³⁾ | 975 ⁴⁾ |

| DN | | Order code for "Design" | | | | | | | | K | L | |
|------|------|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|-------------------|--------------------|
| | | Options F, J | | | | Options G, K | | | | | | |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | | | |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | |
| 800 | 32 | 482 | 597 | 1079 | 964 | 534 | 649 | 1183 | 1065 | ²⁾ | 800 ³⁾ | 1040 ⁴⁾ |
| 900 | 36 | 532 | 647 | 1179 | 1064 | 610 | 725 | 1335 | 1218 | ²⁾ | 900 ³⁾ | 1170 ⁴⁾ |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Depends on the liner → 91
- 3) Order code for "Design", option F "Fixed flange, short installed length" and option J "Fixed flange, short installed length, 0 x DN inlet/outlet runs"
- 4) Order code for "Design", option G "Fixed flange, long installed length" and option K "Fixed flange, long installed length 0 x DN inlet/outlet runs"

DN 1000 to 2000 mm (40 to 78 in)

| DN | | Order code for "Design" | | | | K | L | |
|------|------|-------------------------|-----------------|-----------------|-----------------|---------------|--------------------|--------------------|
| | | Options F, G, J, K | | | | | | |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | | | |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | |
| 1000 | 40 | 582 | 697 | 1279 | 1164 | ²⁾ | 1000 ³⁾ | 1300 ⁴⁾ |
| - | 42 | 618 | 733 | 1351 | 1236 | ²⁾ | 1050 ³⁾ | 1365 ⁴⁾ |
| 1200 | 48 | 696 | 811 | 1507 | 1392 | ²⁾ | 1200 ³⁾ | 1560 ⁴⁾ |
| - | 54 | 809 | 924 | 1733 | 1617 | ²⁾ | 1350 ³⁾ | 1755 ⁴⁾ |
| 1400 | - | 809 | 924 | 1733 | 1617 | ²⁾ | 1400 ³⁾ | 1820 ⁴⁾ |
| - | 60 | 909 | 1024 | 1933 | 1817 | ²⁾ | 1500 ³⁾ | 1950 ⁴⁾ |
| 1600 | - | 909 | 1024 | 1933 | 1817 | ²⁾ | 1600 ³⁾ | 2080 ⁴⁾ |
| - | 66 | 960 | 1075 | 2035 | 1919 | ²⁾ | 1650 ³⁾ | 2145 ⁴⁾ |
| 1800 | 72 | 1016 | 1131 | 2147 | 2032 | ²⁾ | 1800 ³⁾ | 2340 ⁴⁾ |
| - | 78 | 1127 | 1242 | 2369 | 2254 | ²⁾ | 2000 ³⁾ | 2600 ⁴⁾ |
| 2000 | - | 1127 | 1242 | 2369 | 2254 | ²⁾ | 2000 ³⁾ | 2600 ⁴⁾ |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Internal diameter depends on the liner, see the measuring tube specification → 91
- 3) Order code for "Design", option F "Fixed flange, short installed length" and option J "Fixed flange, short installed length, 0 x DN inlet/outlet runs"
- 4) Order code for "Design", option G "Fixed flange, long installed length" and option K "Fixed flange, long installed length 0 x DN inlet/outlet runs"

DN 2200 to 3000 mm (84 to 120 in)

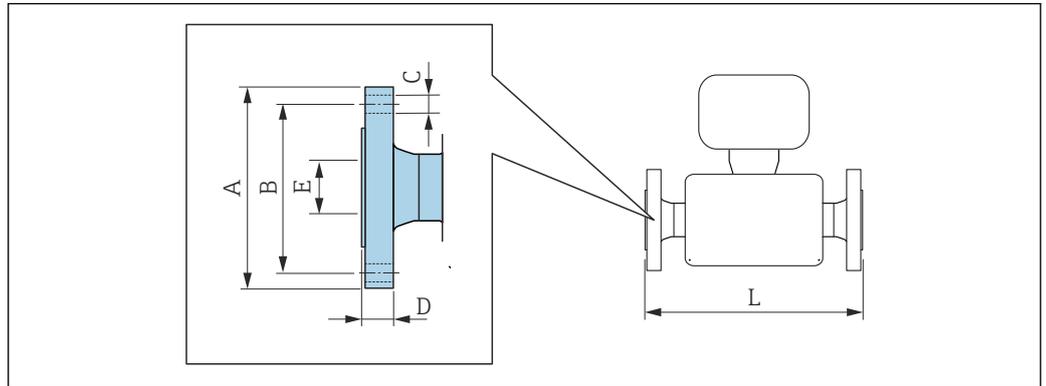
| DN | | Order code for "Design" | | | | K | L |
|------|------|-------------------------|-----------------|-----------------|-----------------|---------------|------|
| | | Option F, J | | | | | |
| | | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | | |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| - | 84 | 1227 | 1342 | 2569 | 2454 | ²⁾ | 2200 |
| 2200 | - | 1227 | 1342 | 2569 | 2454 | ²⁾ | 2200 |
| - | 90 | 1332 | 1447 | 2779 | 2664 | ²⁾ | 2400 |
| 2400 | - | 1332 | 1447 | 2783 | 2664 | ²⁾ | 2400 |
| - | 96 | 1431 | 1546 | 2977 | 2861 | ²⁾ | 2450 |

| DN | | Order code for "Design" | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|-------|
| | | Option F, J | | | | | |
| [mm] | [in] | D ¹⁾ [mm] | E ¹⁾ [mm] | F ¹⁾ [mm] | M ¹⁾ [mm] | [mm] | [mm] |
| - | 102 | 1516 | 1631 | 3 147 | 3 032 | ²⁾ | 2 600 |
| 2600 | - | 1442 | 1557 | 2 999 | 2 883 | ²⁾ | 2 600 |
| - | 108 | 1602 | 1718 | 3 320 | 3 204 | ²⁾ | 2 750 |
| 2800 | - | 1547 | 1662 | 3 209 | 3 093 | ²⁾ | 2 800 |
| - | 114 | 1688 | 1803 | 3 491 | 3 375 | ²⁾ | 2 900 |
| 3000 | - | 1647 | 1762 | 3 409 | 3 293 | ²⁾ | 3 000 |
| - | 120 | 1774 | 1889 | 3 663 | 3 547 | ²⁾ | 3 050 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Internal diameter depends on the liner, see the measuring tube specification →  91

Flange connections

Fixed flange



A0015621

Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 6

Carbon steel: order code for "Process connection", option D1K

Stainless steel: 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 | 1) | 2) |
| 400 | 540 | 495 | 16 × Ø22 | 22 | | |
| 450 | 595 | 565 | 20 × Ø26 | 26 | | |
| 500 | 645 | 600 | 20 × Ø22 | 24 | | |
| 600 | 755 | 705 | 20 × Ø26 | 30 | | |
| 700 | 860 | 810 | 24 × Ø26 | 30 | | |
| 800 | 975 | 920 | 24 × Ø30 | 30 | | |
| 900 | 1075 | 1020 | 24 × Ø30 | 34 | | |
| 1000 | 1175 | 1120 | 28 × Ø30 | 38 | | |
| 1200 | 1405 | 1340 | 32 × Ø33 | 42 | | |
| 1400 | 1630 | 1560 | 36 × Ø36 | 56 | | |
| 1600 | 1830 | 1760 | 40 × Ø36 | 63 | | |
| 1800 | 2045 | 1970 | 44 × Ø39 | 69 | | |
| 2000 | 2265 | 2180 | 48 × Ø42 | 74 | | |
| 2200 | 2475 | 2390 | 52 × Ø42 | 81 | | |
| 2400 | 2685 | 2600 | 56 × Ø42 | 87 | | |
| 2600 | 2905 | 2810 | 60 × Ø48 | 91 | | |
| 2800 | 3115 | 3020 | 64 × Ø48 | 101 | | |
| 3000 | 3315 | 3220 | 68 × Ø48 | 102 | | |

Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm

1) Depends on the liner → 91

2) Total installed length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → 55 (compact version) → 59 (remote version)

| Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 10 | | | | | | |
|--------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Carbon steel: order code for "Process connection", option D2K | | | | | | |
| Stainless steel: 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 | 1) | 2) |
| 250 | 395 | 350 | 12 × Ø22 | 28 | | |
| 300 | 445 | 400 | 12 × Ø22 | 28 | | |
| 350 | 505 | 460 | 16 × Ø22 | 26 | | |
| 400 | 565 | 515 | 16 × Ø26 | 26 | | |
| 450 | 615 | 565 | 20 × Ø26 | 26 | | |
| 500 | 670 | 620 | 20 × Ø26 | 28 | | |
| 600 | 780 | 725 | 20 × Ø30 | 30 | | |
| 700 | 895 | 840 | 24 × Ø30 | 35 | | |
| 800 | 1015 | 950 | 24 × Ø33 | 38 | | |
| 900 | 1115 | 1050 | 28 × Ø33 | 38 | | |
| 1000 | 1230 | 1160 | 28 × Ø36 | 44 | | |
| 1200 | 1455 | 1380 | 32 × Ø39 | 55 | | |
| 1400 | 1675 | 1590 | 36 × Ø42 | 65 | | |
| 1600 | 1915 | 1820 | 40 × Ø48 | 75 | | |
| 1800 | 2115 | 2020 | 44 × Ø48 | 85 | | |
| 2000 | 2325 | 2230 | 48 × Ø48 | 90 | | |
| 2200 | 2550 | 2440 | 52 × Ø56 | 100 | | |
| 2400 | 2760 | 2650 | 56 × Ø56 | 110 | | |
| 2600 | 2960 | 2850 | 60 × Ø56 | 110 | | |
| 2800 | 3180 | 3070 | 64 × Ø56 | 124 | | |
| 3000 | 3405 | 3290 | 68 × Ø62 | 132 | | |

Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm

- 1) Depends on the liner → 91
 2) Total installed length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → 55 (compact version) → 59 (remote version)

| Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 16 | | | | | | |
|--------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Carbon steel: order code for "Process connection", option D3K | | | | | | |
| Stainless steel: 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 | 1) | 2) |
| 80 | 200 | 160 | 8 × Ø18 | 20 | | |
| 100 | 220 | 180 | 8 × Ø18 | 22 | | |
| 125 | 250 | 210 | 8 × Ø18 | 24 | | |
| 150 | 285 | 240 | 8 × Ø22 | 24 | | |
| 200 | 340 | 295 | 12 × Ø22 | 26 | | |
| 250 | 405 | 355 | 12 × Ø26 | 32 | | |
| 300 | 460 | 410 | 12 × Ø26 | 32 | | |

| Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 16 | | | | | | |
|------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Carbon steel: order code for "Process connection", option D3K | | | | | | |
| Stainless steel: order code for "Process connection", option D3S | | | | | | |
| DN [mm] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | L [mm] |
| 350 | 520 | 470 | 16 × Ø26 | 30 | | |
| 400 | 580 | 525 | 16 × Ø30 | 32 | | |
| 450 | 640 | 585 | 20 × Ø30 | 34 | | |
| 500 | 715 | 650 | 20 × Ø33 | 36 | | |
| 600 | 840 | 770 | 20 × Ø36 | 40 | | |
| 700 | 910 | 840 | 24 × Ø36 | 40 | | |
| 800 | 1025 | 950 | 24 × Ø39 | 41 | | |
| 900 | 1125 | 1050 | 28 × Ø39 | 48 | | |
| 1000 | 1255 | 1170 | 28 × Ø42 | 59 | | |
| 1200 | 1485 | 1390 | 32 × Ø48 | 78 | | |
| 1400 | 1685 | 1590 | 36 × Ø48 | 84 | | |
| 1600 | 1930 | 1820 | 40 × Ø56 | 102 | | |
| 1800 | 2130 | 2020 | 44 × Ø56 | 110 | | |
| 2000 | 2345 | 2230 | 48 × Ø62 | 124 | | |
| Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm | | | | | | |

- 1) Depends on the liner → ☞ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☞ 55 (compact version) → ☞ 59 (remote version)

| Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 25 | | | | | | |
|------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Carbon steel: order code for "Process connection", option D4K | | | | | | |
| Stainless steel: 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 | 1) | 2) |
| 250 | 425 | 370 | 12 × Ø30 | 36 | | |
| 300 | 485 | 430 | 16 × Ø30 | 40 | | |
| 350 | 555 | 490 | 16 × Ø33 | 38 | | |
| 400 | 620 | 550 | 16 × Ø36 | 40 | | |
| 450 | 670 | 600 | 20 × Ø36 | 46 | | |
| 500 | 730 | 660 | 20 × Ø36 | 48 | | |
| 600 | 845 | 770 | 20 × Ø39 | 48 | | |
| 700 | 960 | 875 | 24 × Ø42 | 50 | | |
| 800 | 1085 | 990 | 24 × Ø48 | 53 | | |
| 900 | 1185 | 1090 | 28 × Ø48 | 57 | | |
| 1000 | 1320 | 1210 | 28 × Ø56 | 63 | | |
| Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm | | | | | | |

- 1) Depends on the liner → ☞ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☞ 55 (compact version) → ☞ 59 (remote version)

| Flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 40 | | | | | | |
|------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Carbon steel: order code for "Process connection", option D5K | | | | | | |
| Stainless steel: 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 | 1) | 2) |
| 32 | 140 | 100 | 4 × Ø18 | 18 | | |
| 40 | 150 | 110 | 4 × Ø18 | 18 | | |
| 50 | 165 | 125 | 4 × Ø18 | 20 | | |
| 65 | 185 | 145 | 8 × Ø18 | 24 | | |
| 80 | 200 | 160 | 8 × Ø18 | 26 | | |
| 100 | 235 | 190 | 8 × Ø22 | 26 | | |
| 125 | 270 | 220 | 8 × Ø26 | 28 | | |
| 150 | 300 | 250 | 8 × Ø26 | 30 | | |
| Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 6.3 to 12.5 µm | | | | | | |

1) Depends on the liner → 91

2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → 55 (compact version) → 59 (remote version)

| Flange according to ASME B16.5, Class 150 | | | | | | | |
|-------------------------------------------------------------------------|------|-------|-------|------------|------|------|------|
| Carbon steel: order code for "Process connection", option A1K | | | | | | | |
| Stainless steel: order code for "Process connection", option A1S | | | | | | | |
| DN | | A | B | C | D | E | L |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 25 | 1 | 108 | 79.2 | 4 × Ø16 | 12.6 | 1) | 2) |
| 40 | 1 ½ | 127 | 98.6 | 4 × Ø16 | 15.9 | | |
| 50 | 2 | 152.4 | 120.7 | 4 × Ø19.1 | 17.5 | | |
| 80 | 3 | 190.5 | 152.4 | 4 × Ø19.1 | 22.3 | | |
| 100 | 4 | 228.6 | 190.5 | 8 × Ø19.1 | 22.3 | | |
| 150 | 6 | 279.4 | 241.3 | 8 × Ø22.4 | 23.8 | | |
| 200 | 8 | 342.9 | 298.5 | 8 × Ø22.4 | 26.8 | | |
| 250 | 10 | 406.4 | 362 | 12 × Ø25.4 | 29.6 | | |
| 300 | 12 | 482.6 | 431.8 | 12 × Ø25.4 | 30.2 | | |
| 350 | 14 | 535 | 476.3 | 12 × Ø28.6 | 35.4 | | |
| 400 | 16 | 595 | 539.8 | 16 × Ø28.6 | 37 | | |
| 450 | 18 | 635 | 577.9 | 16 × Ø31.8 | 40.1 | | |
| 500 | 20 | 700 | 635 | 20 × Ø31.8 | 43.3 | | |
| 600 | 24 | 815 | 749.3 | 20 × Ø34.9 | 48.1 | | |
| Surface roughness (flange): Ra 6.3 to 12.5 µm | | | | | | | |

1) Depends on the liner → 91

2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → 55 (compact version) → 59 (remote version)

Flange according to ASME B16.5, Class 300
Carbon steel: order code for "Process connection", option A2K
Stainless steel: order code for "Process connection", option A2S

| DN | | A | B | C | D | E | L |
|------|------|-------|-------|------------|------|------|------|
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 25 | 1 | 123.9 | 88.9 | 4 × Ø19.1 | 15.9 | 1) | 2) |
| 40 | 1 ½ | 155.4 | 114.3 | 4 × Ø22.4 | 19 | | |
| 50 | 2 | 165.1 | 127 | 8 × Ø19.1 | 20.8 | | |
| 80 | 3 | 209.6 | 168.1 | 8 × Ø22.4 | 26.8 | | |
| 100 | 4 | 254 | 200.2 | 8 × Ø22.4 | 30.2 | | |
| 150 | 6 | 317.5 | 269.7 | 12 × Ø22.4 | 35 | | |

Surface roughness (flange): Ra 6.3 to 12.5 µm

- 1) Depends on the liner → ☰ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☰ 55 (compact version) → ☰ 59 (remote version)

Flange according to JIS B2220, 10K
Carbon steel: order code for "Process connection", option N3K
Stainless steel: 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 | 1) | 2) |
| 65 | 175 | 140 | 4 × Ø19 | 18 | | |
| 80 | 185 | 150 | 8 × Ø19 | 18 | | |
| 100 | 210 | 175 | 8 × Ø19 | 18 | | |
| 125 | 250 | 210 | 8 × Ø23 | 20 | | |
| 150 | 280 | 240 | 8 × Ø23 | 22 | | |
| 200 | 330 | 290 | 12 × Ø23 | 22 | | |
| 250 | 400 | 355 | 12 × Ø25 | 24 | | |
| 300 | 445 | 400 | 16 × Ø25 | 24 | | |

Surface roughness (flange): Ra 6.3 to 12.5 µm

- 1) Depends on the liner → ☰ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☰ 55 (compact version) → ☰ 59 (remote version)

Flange according to JIS B2220, 20K
Carbon steel: order code for "Process connection", option N4K
Stainless steel: 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 | 1) | 2) |
| 32 | 135 | 100 | 4 × Ø19 | 18 | | |
| 40 | 140 | 105 | 4 × Ø19 | 18 | | |
| 50 | 155 | 120 | 8 × Ø19 | 18 | | |
| 65 | 175 | 140 | 8 × Ø19 | 20 | | |
| 80 | 200 | 160 | 8 × Ø23 | 22 | | |
| 100 | 225 | 185 | 8 × Ø23 | 24 | | |

| Flange according to JIS B2220, 20K | | | | | | |
|-------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Carbon steel: order code for "Process connection", option N4K | | | | | | |
| Stainless steel: order code for "Process connection", option N4S | | | | | | |
| DN [mm] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | L [mm] |
| 125 | 270 | 225 | 8 × Ø25 | 26 | | |
| 150 | 305 | 260 | 12 × Ø25 | 28 | | |
| 200 | 350 | 305 | 12 × Ø25 | 30 | | |
| 250 | 430 | 380 | 12 × Ø27 | 34 | | |
| 300 | 480 | 430 | 16 × Ø27 | 36 | | |
| Surface roughness (flange): Ra 6.3 to 12.5 µm | | | | | | |

- 1) Depends on the liner → ☰ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☰ 55 (compact version) → ☰ 59 (remote version)

| Flange according to AWWA, Class D | | | | | | | |
|--------------------------------------------------------|------|------|--------|------------|-------|------|------|
| Order code for "Process connection", option W1K | | | | | | | |
| DN | | A | B | C | D | E | L |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 700 | 28 | 927 | 863.6 | 28 × Ø35 | 33.4 | 1) | 2) |
| 750 | 30 | 984 | 914.4 | 28 × Ø35 | 35.0 | | |
| 800 | 32 | 1060 | 977.9 | 28 × Ø42 | 38.1 | | |
| 900 | 36 | 1168 | 1085.9 | 32 × Ø42 | 41.3 | | |
| 1000 | 40 | 1289 | 1200.2 | 36 × Ø42 | 41.3 | | |
| - | 42 | 1346 | 1257.3 | 36 × Ø42 | 44.5 | | |
| 1200 | 48 | 1511 | 1422.4 | 44 × Ø42 | 47.7 | | |
| - | 54 | 1683 | 1593.9 | 44 × Ø48 | 54.0 | | |
| - | 60 | 1855 | 1759.0 | 52 × Ø48 | 57.2 | | |
| - | 66 | 2032 | 1930.4 | 52 × Ø48 | 63.5 | | |
| 1800 | 72 | 2197 | 2095.5 | 60 × Ø48 | 66.7 | | |
| - | 78 | 2362 | 2260.6 | 64 × Ø54 | 69.9 | | |
| - | 84 | 2535 | 2425.7 | 64 × Ø54 | 73.1 | | |
| - | 90 | 2705 | 2717.8 | 68 × Ø60 | 76.2 | | |
| - | 96 | 2877 | 2755.9 | 68 × Ø60.3 | 82.55 | | |
| - | 102 | 3048 | 2908.3 | 68 × Ø66.7 | 82.55 | | |
| - | 108 | 3219 | 3067.0 | 68 × Ø66.7 | 85.73 | | |
| - | 114 | 3391 | 3219.5 | 68 × Ø73 | 88.90 | | |
| - | 120 | 3562 | 3371.8 | 68 × Ø73 | 88.90 | | |
| Surface roughness (flange): Ra 6.3 to 12.5 µm | | | | | | | |

- 1) Depends on the liner → ☰ 91
- 2) Total length is independent of the process connections. Installed length according to DVGW → ☰ 55 (compact version) → ☰ 59 (remote version)

| Flange according to AS 2129, Tab. E | | | | | | |
|--------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <i>Order code for "Process connection", option M2K</i> | | | | | | |
| DN [mm] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | L [mm] |
| 80 | 185 | 146 | 4 × Ø18 | 12 | 1) | 2) |
| 100 | 215 | 178 | 8 × Ø18 | 13 | | |
| 150 | 280 | 235 | 8 × Ø22 | 17 | | |
| 200 | 335 | 292 | 8 × Ø22 | 19 | | |
| 250 | 405 | 356 | 12 × Ø22 | 22 | | |
| 300 | 455 | 406 | 12 × Ø26 | 25 | | |
| 350 | 525 | 470 | 12 × Ø26 | 30 | | |
| 400 | 580 | 521 | 12 × Ø26 | 32 | | |
| 450 | 640 | 584 | 16 × Ø26 | 35 | | |
| 500 | 705 | 641 | 16 × Ø26 | 38 | | |
| 600 | 825 | 756 | 16 × Ø33 | 48 | | |
| 700 | 910 | 845 | 20 × Ø33 | 51 | | |
| 750 | 995 | 927 | 20 × Ø36 | 54 | | |
| 800 | 1060 | 984 | 20 × Ø36 | 54 | | |
| 900 | 1175 | 1092 | 24 × Ø36 | 64 | | |
| 1000 | 1255 | 1175 | 24 × Ø39 | 67 | | |
| 1200 | 1490 | 1410 | 32 × Ø39 | 79 | | |

Surface roughness (flange): Ra 6.3 to 12.5 µm

- 1) Depends on the liner → ☞ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☞ 55 (compact version) → ☞ 59 (remote version)

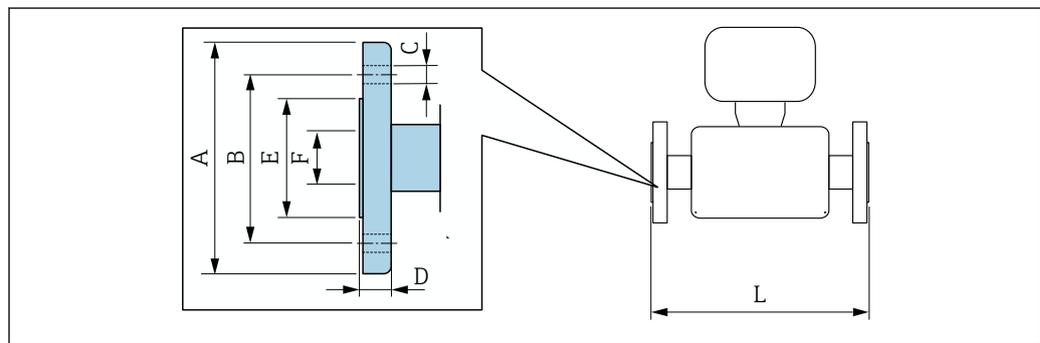
| Flange according to AS 4087, PN 16 | | | | | | |
|--------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <i>Order code for "Process connection", option M3K</i> | | | | | | |
| DN [mm] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | L [mm] |
| 80 | 185 | 146 | 4 × Ø18 | 12 | 1) | 2) |
| 100 | 215 | 178 | 4 × Ø18 | 13 | | |
| 150 | 280 | 235 | 8 × Ø18 | 13 | | |
| 200 | 335 | 292 | 8 × Ø18 | 19 | | |
| 250 | 405 | 356 | 8 × Ø22 | 19 | | |
| 300 | 455 | 406 | 12 × Ø22 | 23 | | |
| 350 | 525 | 470 | 12 × Ø26 | 30 | | |
| 375 | 550 | 495 | 12 × Ø26 | 30 | | |
| 400 | 580 | 521 | 12 × Ø26 | 32 | | |
| 450 | 640 | 584 | 12 × Ø26 | 30 | | |
| 500 | 705 | 641 | 16 × Ø26 | 38 | | |
| 600 | 825 | 756 | 16 × Ø30 | 48 | | |
| 700 | 910 | 845 | 20 × Ø30 | 56 | | |
| 750 | 995 | 927 | 20 × Ø33 | 56 | | |
| 800 | 1060 | 984 | 20 × Ø36 | 56 | | |

| Flange according to AS 4087, PN 16 | | | | | | |
|-------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Order code for "Process connection", option M3K | | | | | | |
| DN [mm] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | L [mm] |
| 900 | 1175 | 1092 | 24 × Ø36 | 66 | | |
| 1000 | 1255 | 1175 | 24 × Ø36 | 66 | | |
| 1200 | 1490 | 1410 | 32 × Ø36 | 76 | | |

Surface roughness (flange): Ra 6.3 to 12.5 µm

- 1) Depends on the liner → 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → 55 (compact version) → 59 (remote version)

Lap joint flange



A0037862

| Lap joint flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 10 | | | | | | | | |
|------------------------------------------------------------------------------------|------|------|------|----------|------|------|------|------|
| Carbon steel: order code for "Process connection", option D22 | | | | | | | | |
| Stainless steel: order code for "Process connection", option D24 | | | | | | | | |
| DN | A | B | C | D | E | F | L | |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 200 | 8 | 340 | 295 | 8 × Ø22 | 24 | 264 | 1) | 2) |
| 250 | 10 | 395 | 350 | 12 × Ø22 | 26 | 317 | | |
| 300 | 12 | 445 | 400 | 12 × Ø22 | 26 | 367 | | |

Surface roughness (flange): Ra 6.3 to 12.5 µm

- 1) Depends on the liner → 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → 55 (compact version) → 59 (remote version)

| Lap joint flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 16 | | | | | | | | |
|------------------------------------------------------------------------------------|------|------|------|---------|------|------|------|------|
| Carbon steel: order code for "Process connection", option D32 | | | | | | | | |
| Stainless steel: order code for "Process connection", option D34 | | | | | | | | |
| DN | A | B | C | D | E | F | L | |
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 25 | 1 | 115 | 85 | 4 × Ø14 | 16 | 49 | 1) | 2) |
| 32 | - | 140 | 100 | 4 × Ø18 | 18 | 65 | | |
| 40 | 1 ½ | 150 | 110 | 4 × Ø18 | 18 | 71 | | |
| 50 | 2 | 165 | 125 | 4 × Ø18 | 20 | 88 | | |
| 65 | - | 185 | 145 | 8 × Ø18 | 20 | 103 | | |
| 80 | 3 | 200 | 160 | 8 × Ø18 | 20 | 120 | | |

Lap joint flange in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 16
Carbon steel: order code for "Process connection", option D32
Stainless steel: order code for "Process connection", option D34

| DN | | A | B | C | D | E | F | L |
|------|------|------|------|----------|------|------|------|------|
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 100 | 4 | 220 | 180 | 8 × Ø18 | 22 | 148 | | |
| 125 | - | 250 | 210 | 8 × Ø18 | 22 | 177 | | |
| 150 | 6 | 285 | 240 | 8 × Ø22 | 24 | 209 | | |
| 200 | 8 | 340 | 295 | 12 × Ø22 | 26 | 264 | | |
| 250 | 10 | 405 | 355 | 12 × Ø26 | 29 | 317 | | |
| 300 | 12 | 460 | 410 | 12 × Ø26 | 32 | 367 | | |

Surface roughness (flange): Ra 6.3 to 12.5 µm

- 1) Depends on the liner → ☞ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☞ 55 (compact version) → ☞ 59 (remote version)

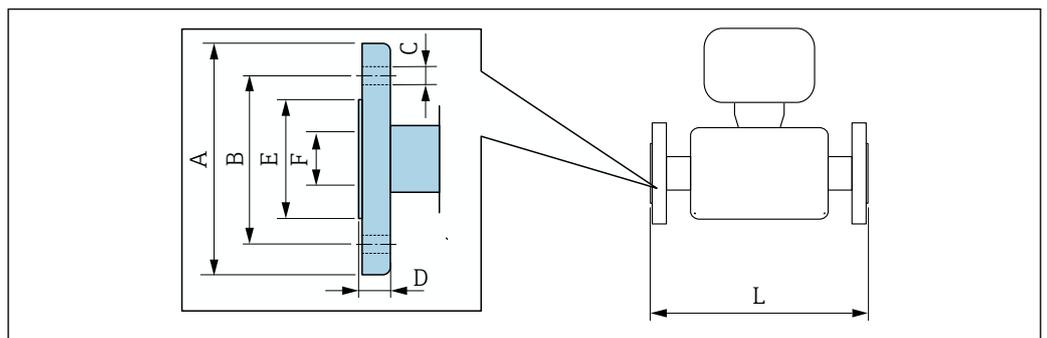
Lap joint flange according to ASME B16.5, Class 150
Carbon steel: order code for "Process connection", option A12
Stainless steel: order code for "Process connection", option A14

| DN | | A | B | C | D | E | F | L |
|------|------|------|------|----------|------|------|------|------|
| [mm] | [in] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 25 | 1 | 110 | 80 | 4 × Ø16 | 14 | 49 | 1) | 2) |
| 40 | 1 ½ | 125 | 98 | 4 × Ø16 | 17.5 | 71 | | |
| 50 | 2 | 150 | 121 | 4 × Ø19 | 19 | 88 | | |
| 80 | 3 | 190 | 152 | 4 × Ø19 | 24 | 120 | | |
| 100 | 4 | 230 | 190 | 8 × Ø19 | 24 | 148 | | |
| 150 | 6 | 280 | 241 | 8 × Ø23 | 25 | 209 | | |
| 200 | 8 | 345 | 298 | 8 × Ø23 | 29 | 264 | | |
| 250 | 10 | 405 | 362 | 12 × Ø25 | 30 | 317 | | |
| 300 | 12 | 485 | 432 | 12 × Ø25 | 32 | 378 | | |

Surface roughness (flange): Ra 6.3 to 12.5 µm

- 1) Depends on the liner → ☞ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☞ 55 (compact version) → ☞ 59 (remote version)

Lap joint flange, stamped plate



A0037862

Lap joint flange, stamped plate in accordance with EN 1092-1 (DIN 2501 / DIN 2512N): PN 10
Carbon steel: order code for "Process connection", option D21
Stainless steel: order code for "Process connection", option D23

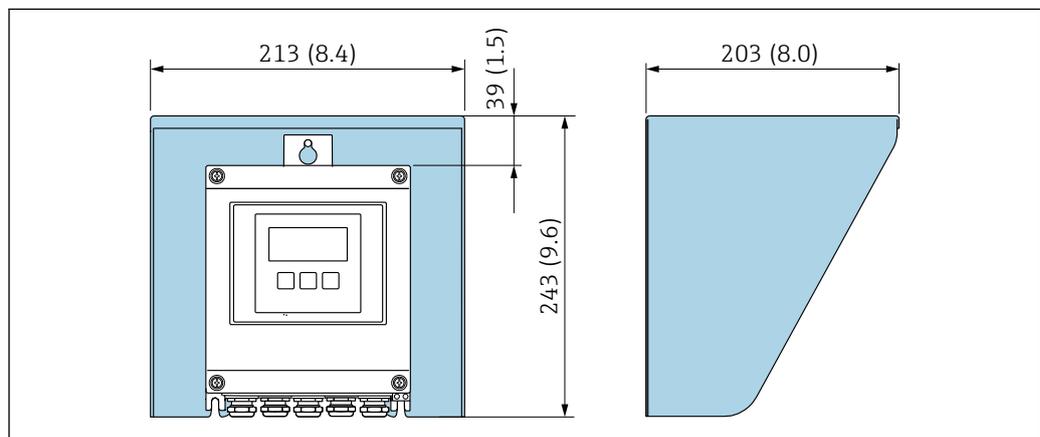
| DN [mm] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | L [mm] |
|------------|-----------|-----------|------------|-----------|-----------|-----------|-----------|
| 25 | 115 | 85 | 4 x Ø13.5 | 16.5 | 49 | 1) | 2) |
| 32 | 140 | 100 | 4 x Ø17.5 | 17 | 65 | | |
| 40 | 150 | 110 | 4 x Ø17.5 | 16.5 | 71 | | |
| 50 | 165 | 125 | 4 x Ø17.5 | 18.5 | 88 | | |
| 65 | 185 | 145 | 4 x Ø17.5 | 20 | 103 | | |
| 80 | 200 | 160 | 8 x Ø17.5 | 23.5 | 120 | | |
| 100 | 220 | 180 | 8 x Ø17.5 | 24.5 | 148 | | |
| 125 | 250 | 210 | 8 x Ø17.5 | 24 | 177 | | |
| 150 | 285 | 240 | 8 x Ø21.5 | 25 | 209 | | |
| 200 | 340 | 295 | 8 x Ø21.5 | 27.5 | 264 | | |
| 250 | 405 | 350 | 12 x Ø21.5 | 30.5 | 317 | | |
| 300 | 445 | 400 | 12 x Ø21.5 | 34.5 | 367 | | |

Surface roughness (flange): Ra 6.3 to 12.5 µm

- 1) Depends on the liner → ☰ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☰ 55 (compact version) → ☰ 59 (remote version)

Accessories

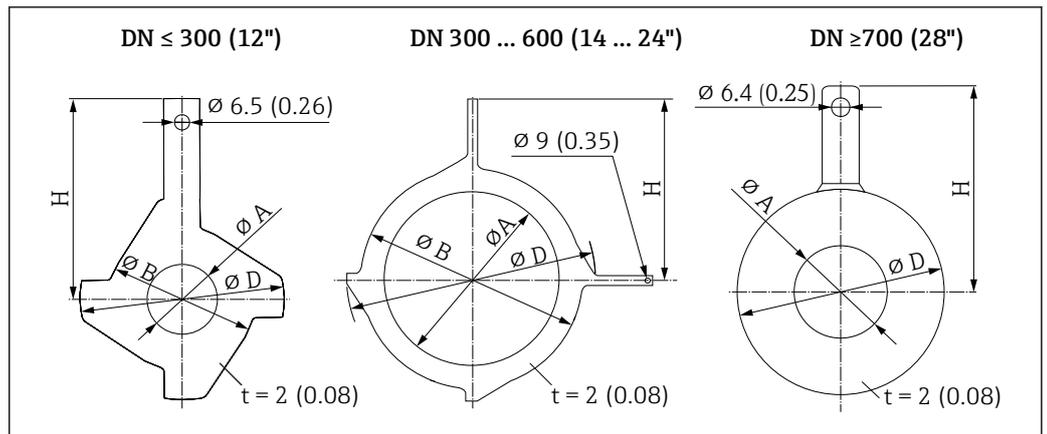
Weather protection cover



☰ 31 Weather protection cover; engineering unit mm (in)

A0029552

Ground disks for flange connections



A0015442

| DN | | Pressure rating | A | | B | | D | | H | |
|------|--------|-----------------------------|------|--------|------|--------|-------|--------|------|--------|
| [mm] | [inch] | | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] |
| 25 | 1" | 1) | 26 | 1.02 | 62 | 2.44 | 77.5 | 3.05 | 87.5 | 3.44 |
| 32 | 1 ¼" | 1) | 35 | 1.38 | 80 | 3.15 | 87.5 | 3.44 | 94.5 | 3.72 |
| 40 | 1 ½" | 1) | 41 | 1.61 | 82 | 3.23 | 101 | 3.98 | 103 | 4.06 |
| 50 | 2" | 1) | 52 | 2.05 | 101 | 3.98 | 115.5 | 4.55 | 108 | 4.25 |
| 65 | 2 ½" | 1) | 68 | 2.68 | 121 | 4.76 | 131.5 | 5.18 | 118 | 4.65 |
| 80 | 3" | 1) | 80 | 3.15 | 131 | 5.16 | 154.5 | 6.08 | 135 | 5.31 |
| 100 | 4" | 1) | 104 | 4.09 | 156 | 6.14 | 186.5 | 7.34 | 153 | 6.02 |
| 125 | 5" | 1) | 130 | 5.12 | 187 | 7.36 | 206.5 | 8.13 | 160 | 6.30 |
| 150 | 6" | 1) | 158 | 6.22 | 217 | 8.54 | 256 | 10.08 | 184 | 7.24 |
| 200 | 8" | 1) | 206 | 8.11 | 267 | 10.51 | 288 | 11.34 | 205 | 8.07 |
| 250 | 10" | 1) | 260 | 10.2 | 328 | 12.91 | 359 | 14.13 | 240 | 9.45 |
| 300 | 12" | PN 10 PN 16 Cl. 150 | 312 | 12.3 | 375 | 14.76 | 413 | 16.26 | 273 | 10.75 |
| | | PN 25 JIS 10K JIS 20K | 310 | 12.2 | 375 | 14.76 | 404 | 15.91 | 268 | 10.55 |
| 350 | 14" | PN 6 | 343 | 13.5 | 420 | 16.54 | 479 | 18.86 | 365 | 14.37 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |
| 375 | 15" | PN 16 | 393 | 15.5 | 461 | 18.2 | 523 | 20.6 | 395 | 15.6 |
| 400 | 16" | PN 6 | 393 | 15.5 | 470 | 18.50 | 542 | 21.34 | 395 | 15.55 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |
| 450 | 18" | PN 6 | 439 | 17.3 | 525 | 20.67 | 583 | 22.95 | 417 | 16.42 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |
| 500 | 20" | PN 6 | 493 | 19.4 | 575 | 22.64 | 650 | 25.59 | 460 | 18.11 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |

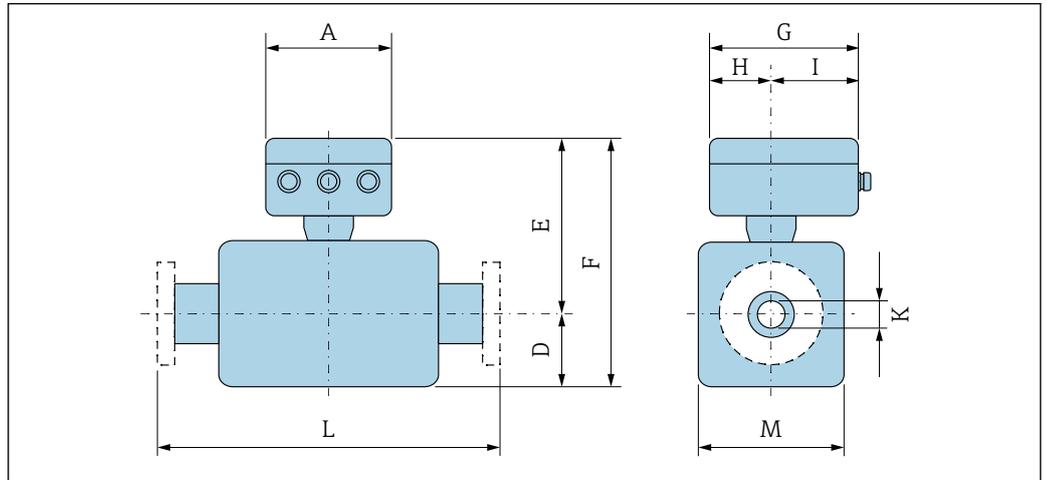
| DN | | Pressure rating | A | | B | | D | | H | |
|------|--------|-----------------|------|--------|------|--------|------|--------|------|--------|
| [mm] | [inch] | | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] |
| 600 | 24" | PN 6 | 593 | 23.3 | 676 | 26.61 | 766 | 30.16 | 522 | 20.55 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |
| 700 | 28" | PN 6 | 697 | 27.4 | - | - | 786 | 30.94 | 460 | 18.11 |
| | | PN10 | 693 | 27.3 | - | - | 813 | 32.01 | 480 | 18.9 |
| | | PN16 | 687 | 27.1 | - | - | 807 | 31.77 | 490 | 19.29 |
| | | Cl, D | 693 | 27.3 | - | - | 832 | 32.76 | 494 | 19.45 |
| 750 | 30" | Cl, D | 743 | 29.3 | - | - | 883 | 34.76 | 523 | 20.59 |
| 800 | 32" | PN 6 | 799 | 31.5 | - | - | 893 | 35.16 | 520 | 20.47 |
| | | PN 10 | 795 | 31.3 | - | - | 920 | 36.22 | 540 | 21.26 |
| | | PN 16 | 789 | 31.1 | - | - | 914 | 35.98 | 550 | 21.65 |
| | | Cl, D | 795 | 31.3 | - | - | 940 | 37.01 | 561 | 22.09 |
| 900 | 36" | PN 6 | 897 | 35.3 | - | - | 993 | 39.09 | 570 | 22.44 |
| | | PN 10 | 893 | 35.2 | - | - | 1020 | 40.16 | 590 | 23.23 |
| | | PN 16 | 886 | 34.9 | - | - | 1014 | 39.92 | 595 | 23.43 |
| | | Cl, D | 893 | 35.2 | - | - | 1048 | 41.26 | 615 | 24.21 |
| 1000 | 40" | PN 6 | 999 | 39.3 | - | - | 1093 | 43.03 | 620 | 24.41 |
| | | PN 10 | 995 | 39.2 | - | - | 1127 | 44.37 | 650 | 25.59 |
| | | PN 16 | 988 | 38.9 | - | - | 1131 | 44.53 | 660 | 25.98 |
| | | Cl, D | 995 | 39.2 | - | - | 1163 | 45.79 | 675 | 26.57 |
| - | 42" | Cl, D | 1044 | 41.1 | - | - | 1220 | 48.03 | 704 | 27.72 |
| 1200 | 48" | PN 6 | 1203 | 47.4 | - | - | 1310 | 51.57 | 733 | 28.86 |
| | | PN 10 | 1196 | 47.1 | - | - | 1344 | 52.91 | 760 | 29.92 |
| | | PN 16 | 1188 | 46.8 | - | - | 1345 | 52.95 | 775 | 30.51 |
| | | Cl, D | 1196 | 47.1 | - | - | 1385 | 54.53 | 786 | 30.94 |

- 1) In the case of DN 25 to 250, ground disks can be used for all the flange standards/pressure ratings which can be supplied in the standard version

Dimensions in US units

Compact version

Order code for "Housing", option A "Compact, aluminum, coated" or option M "Compact, polycarbonate"



A0033790

| A [in] | G ¹⁾ [in] | H [in] | I ¹⁾ [in] |
|-----------|-------------------------|-----------|-------------------------|
| 6.57 | 7.60 | 3.54 | 4.06 |

1) Depending on the cable gland used: values up to + 1.18 in

DN 1 to 12 in (25 to 300 mm): Sensor with aluminum half-shell housing

| DN | | Order code for "Design" | | | | | | | | | |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----|-------|
| | | Options D, E, H, I | | | | Option C | | | | K | L |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | | |
| 25 | 1 | 3.31 | 7.91 | 11.22 | 4.72 | - | - | - | - | 2) | 7.87 |
| 32 | - | 3.31 | 7.91 | 11.22 | 4.72 | - | - | - | - | 2) | 7.87 |
| 40 | 1 ½ | 3.31 | 7.91 | 11.22 | 4.72 | - | - | - | - | 2) | 7.87 |
| 50 | 2 | 3.31 | 7.91 | 11.22 | 4.72 | 3.31 | 7.91 | 11.22 | 4.72 | 2) | 7.87 |
| 65 | - | 4.29 | 8.9 | 13.19 | 7.09 | 3.31 | 7.91 | 11.22 | 4.72 | 2) | 7.87 |
| 80 | 3 | 4.29 | 8.9 | 13.19 | 7.09 | 3.31 | 7.91 | 11.22 | 4.72 | 2) | 7.87 |
| 100 | 4 | 4.29 | 8.9 | 13.19 | 7.09 | 4.29 | 8.9 | 13.19 | 7.09 | 2) | 9.84 |
| 125 | - | 5.91 | 10.47 | 16.38 | 10.24 | 4.29 | 8.9 | 13.19 | 7.09 | 2) | 9.84 |
| 150 | 6 | 5.91 | 10.47 | 16.38 | 10.24 | 4.29 | 8.9 | 13.19 | 7.09 | 2) | 11.81 |
| 200 | 8 | 7.09 | 11.46 | 18.54 | 12.76 | 5.91 | 10.47 | 16.38 | 10.24 | 2) | 13.78 |
| 250 | 10 | 8.07 | 12.44 | 20.51 | 15.75 | 5.91 | 10.47 | 16.38 | 10.24 | 2) | 17.72 |
| 300 | 12 | 9.06 | 13.43 | 22.48 | 18.11 | 7.09 | 11.46 | 18.54 | 12.76 | 2) | 19.69 |

1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.

2) Depends on the liner → 91

DN 14 to 16 in (350 to 400 mm)

| DN | | Order code for "Design" | | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|-------|---|
| | | Options E, I | | | | | | |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] | |
| 350 | 14 | 11.10 | 15.63 | 26.73 | 22.20 | ²⁾ | 21.65 | |
| 375 | 15 | 12.13 | 16.65 | 28.78 | 24.25 | ²⁾ | 23.62 | |
| 400 | 16 | 12.13 | 16.65 | 28.78 | 24.25 | ²⁾ | 23.62 | |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
 2) Depends on the liner → 91

DN 18 to 36 in (450 to 900 mm)

| DN | | Order code for "Design" | | | | | | | | K | L | |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|---------------------|---------------------|
| | | Options F, J | | | | Options G, K | | | | | | |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] | [in] |
| 450 | 18 | 11.42 | 15.94 | 27.36 | 22.83 | 13.11 | 17.64 | 30.75 | 26.22 | ²⁾ | 23.62 ³⁾ | 25.59 ⁴⁾ |
| 500 | 20 | 12.40 | 16.93 | 29.33 | 24.80 | 14.13 | 18.66 | 32.80 | 28.23 | ²⁾ | 23.62 ²⁾ | 25.59 ⁴⁾ |
| 600 | 24 | 14.37 | 18.90 | 33.27 | 28.74 | 16.18 | 20.71 | 36.89 | 32.32 | ²⁾ | 23.62 ²⁾ | 30.71 ⁴⁾ |
| 700 | 28 | 16.77 | 21.30 | 38.07 | 33.50 | 20.16 | 24.69 | 44.84 | 40.31 | ²⁾ | 27.56 ²⁾ | 35.83 ⁴⁾ |
| 750 | 30 | 18.23 | 22.76 | 40.98 | 36.46 | 20.16 | 24.69 | 44.84 | 40.31 | ²⁾ | 29.53 ²⁾ | 38.39 ⁴⁾ |
| 800 | 32 | 18.98 | 23.50 | 42.48 | 37.95 | 21.02 | 25.55 | 46.57 | 41.93 | ²⁾ | 31.5 ²⁾ | 40.94 ⁴⁾ |
| 900 | 36 | 20.94 | 25.47 | 46.42 | 41.89 | 24.02 | 28.54 | 52.56 | 47.95 | ²⁾ | 35.43 ²⁾ | 46.06 ⁴⁾ |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
 2) Depends on the liner → 91
 3) Order code for "Design", option F "Fixed flange, short installed length" and option J "Fixed flange, short installed length, 0 x DN inlet/outlet runs"
 4) Order code for "Design", option G "Fixed flange, long installed length" and option K "Fixed flange, long installed length 0 x DN inlet/outlet runs"

DN 40 to 78 in (1000 to 2000 mm)

| DN | | Order code for "Design" | | | | | K | L | |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|---------------------|---------------------|--|
| | | Options F, G, J, K | | | | | | | |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] | [in] | |
| 1000 | 40 | 22.91 | 27.44 | 50.35 | 45.83 | ²⁾ | 39.37 ³⁾ | 51.18 ⁴⁾ | |
| - | 42 | 24.33 | 28.86 | 53.19 | 48.66 | ²⁾ | 41.34 ³⁾ | 53.74 ⁴⁾ | |
| 1200 | 48 | 27.40 | 31.93 | 59.33 | 54.80 | ²⁾ | 47.24 ³⁾ | 61.42 ⁴⁾ | |
| - | 54 | 31.85 | 36.38 | 68.23 | 63.66 | ²⁾ | 53.15 ³⁾ | 69.09 ⁴⁾ | |
| 1400 | - | 31.85 | 36.38 | 68.23 | 63.66 | ²⁾ | 55.12 ³⁾ | 71.65 ⁴⁾ | |
| - | 60 | 35.79 | 40.31 | 76.10 | 71.54 | ²⁾ | 59.06 ³⁾ | 76.77 ⁴⁾ | |
| 1600 | - | 35.79 | 40.31 | 76.10 | 71.54 | ²⁾ | 62.99 ³⁾ | 81.89 ⁴⁾ | |
| - | 66 | 37.80 | 42.32 | 80.12 | 75.55 | ²⁾ | 64.96 ³⁾ | 84.45 ⁴⁾ | |
| 1800 | 72 | 40.00 | 44.53 | 84.53 | 80.00 | ²⁾ | 70.87 ³⁾ | 92.13 ⁴⁾ | |

| DN | | Order code for "Design" | | | | | K | L | |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|---------------------|----------------------|--|
| | | Options F, G, J, K | | | | | | | |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] | | |
| - | 78 | 44.37 | 48.90 | 93.27 | 88.74 | ²⁾ | 78.74 ³⁾ | 102.36 ⁴⁾ | |
| 2000 | - | 44.37 | 48.90 | 93.27 | 88.74 | ²⁾ | 78.74 ³⁾ | 102.36 ⁴⁾ | |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Depends on the liner → 91
- 3) Order code for "Design", option F "Fixed flange, short installed length" and option J "Fixed flange, short installed length, 0 x DN inlet/outlet runs"
- 4) Order code for "Design", option G "Fixed flange, long installed length" and option K "Fixed flange, long installed length 0 x DN inlet/outlet runs"

DN 84 to 120 in (2200 to 3000 mm)

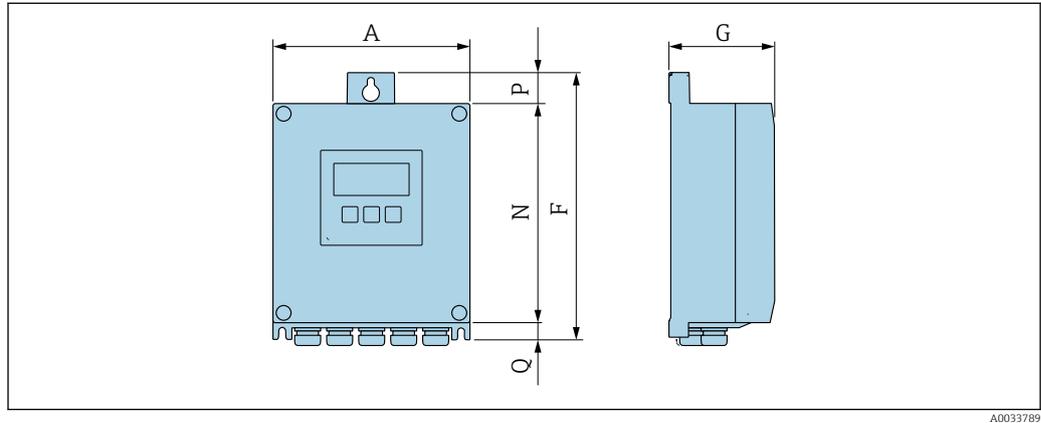
| DN | | Order code for "Design" | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|--------|
| | | Option F, J | | | | | |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] |
| - | 84 | 48.31 | 52.83 | 101.14 | 96.61 | ²⁾ | 86.61 |
| 2200 | - | 48.31 | 52.83 | 101.14 | 96.61 | ²⁾ | 86.61 |
| - | 90 | 52.44 | 56.97 | 109.41 | 104.88 | ²⁾ | 94.49 |
| 2400 | - | 52.44 | 56.97 | 109.57 | 104.88 | ²⁾ | 94.49 |
| - | 96 | 56.34 | 60.87 | 117.20 | 112.64 | ²⁾ | 96.46 |
| - | 102 | 59.69 | 64.21 | 123.90 | 119.37 | ²⁾ | 102.36 |
| 2600 | - | 56.77 | 61.30 | 118.07 | 113.50 | ²⁾ | 102.36 |
| - | 108 | 63.07 | 67.64 | 130.71 | 126.14 | ²⁾ | 108.27 |
| 2800 | - | 60.91 | 65.43 | 126.34 | 121.77 | ²⁾ | 110.24 |
| - | 114 | 66.46 | 70.98 | 137.44 | 132.87 | ²⁾ | 114.17 |
| 3000 | - | 64.84 | 69.37 | 134.21 | 129.65 | ²⁾ | 118.11 |
| - | 120 | 69.84 | 74.37 | 144.21 | 139.65 | ²⁾ | 120.08 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Depends on the liner → 91

Remote version

Transmitter remote version

Order code for "Housing", option N "Remote, polycarbonate" or option P "Remote, aluminum coated"



A0033789

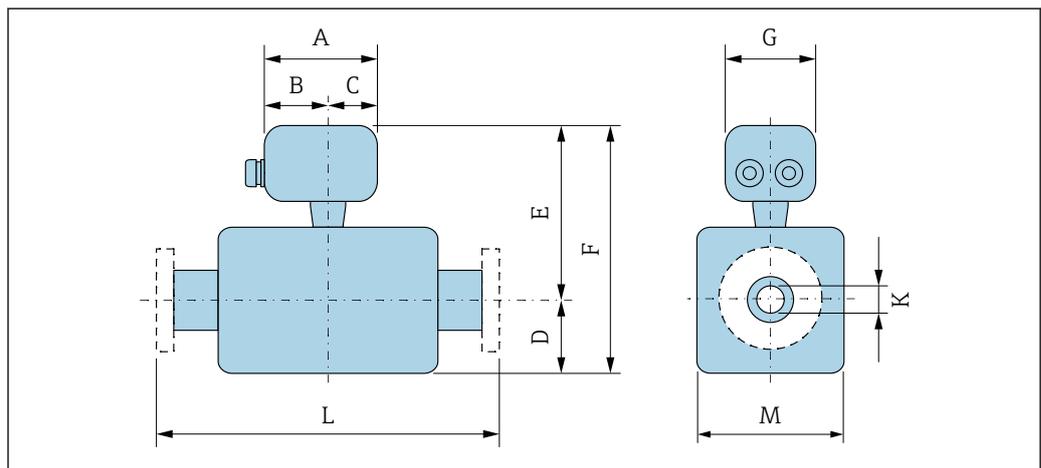
Order code for "Transmitter housing", option P "Remote, aluminum, coated"

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

Order code for "Transmitter housing", option N "Remote, polycarbonate"

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

Sensor connection housing



A0033784

Aluminum, coated

| A [in] | B [in] | C [in] | G [in] |
|--------|--------|--------|--------|
| 5.83 | 3.7 | 2.13 | 5.35 |

Polycarbonate (only in conjunction with order code for "Sensor option", options CA...CE)

| A [in] | B [in] | C [in] | G [in] |
|-----------|-----------|-----------|-----------|
| 4.45 | 2.44 | 2.01 | 4.41 |

DN 1 to 12 in (25 to 300 mm): Sensor with aluminum half-shell housing

| DN | | Order code for "Design" | | | | | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|-------|
| | | Options D, E, H, I | | | | Option C | | | | | |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] |
| 25 | 1 | 3.31 | 7.87 | 11.18 | 4.72 | - | - | - | - | ²⁾ | 7.87 |
| 32 | - | 3.31 | 7.87 | 11.18 | 4.72 | - | - | - | - | ²⁾ | 7.87 |
| 40 | 1 ½ | 3.31 | 7.87 | 11.18 | 4.72 | - | - | - | - | ²⁾ | 7.87 |
| 50 | 2 | 3.31 | 7.87 | 11.18 | 4.72 | 3.31 | 7.87 | 11.18 | 4.72 | ²⁾ | 7.87 |
| 65 | - | 4.29 | 8.86 | 13.15 | 7.09 | 3.31 | 7.87 | 11.18 | 4.72 | ²⁾ | 7.87 |
| 80 | 3 | 4.29 | 8.86 | 13.15 | 7.09 | 3.31 | 7.87 | 11.18 | 4.72 | ²⁾ | 7.87 |
| 100 | 4 | 4.29 | 8.86 | 13.15 | 7.09 | 4.29 | 8.86 | 13.15 | 7.09 | ²⁾ | 9.84 |
| 125 | - | 5.91 | 10.43 | 16.34 | 10.24 | 4.29 | 8.86 | 13.15 | 7.09 | ²⁾ | 9.84 |
| 150 | 6 | 5.91 | 10.43 | 16.34 | 10.24 | 4.29 | 8.86 | 13.15 | 7.09 | ²⁾ | 11.81 |
| 200 | 8 | 7.09 | 11.42 | 18.5 | 12.76 | 5.91 | 10.43 | 16.34 | 10.24 | ²⁾ | 13.78 |
| 250 | 10 | 8.07 | 12.4 | 20.47 | 15.75 | 5.91 | 10.43 | 16.34 | 10.24 | ²⁾ | 17.72 |
| 300 | 12 | 9.06 | 13.39 | 22.44 | 18.11 | 7.09 | 11.42 | 18.5 | 12.76 | ²⁾ | 19.69 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
 2) Depends on the liner → 91

DN 1 to 12 in (25 to 300 mm): Sensor with fully welded carbon steel housing

| DN | | Order code for "Design" | | | | | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|-------|
| | | Option E | | | | Option C | | | | | |
| [mm] | [in] | D ¹⁾ [mm] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] |
| 25 | 1 | 2.76 | 7.87 | 10.63 | 5.51 | - | - | - | - | ²⁾ | 7.87 |
| 32 | - | 2.76 | 7.87 | 10.63 | 5.51 | - | - | - | - | ²⁾ | 7.87 |
| 40 | 1 ½ | 2.76 | 7.87 | 10.63 | 5.51 | - | - | - | - | ²⁾ | 7.87 |
| 50 | 2 | 2.76 | 7.87 | 10.63 | 5.51 | 2.76 | 7.87 | 10.63 | 5.51 | ²⁾ | 7.87 |
| 65 | - | 3.23 | 8.86 | 12.09 | 6.5 | 2.76 | 7.87 | 10.63 | 5.51 | ²⁾ | 7.87 |
| 80 | 3 | 3.43 | 8.86 | 12.28 | 6.89 | 2.76 | 7.87 | 10.63 | 5.51 | ²⁾ | 7.87 |
| 100 | 4 | 3.94 | 8.86 | 12.8 | 7.87 | 3.23 | 8.86 | 12.09 | 6.5 | ²⁾ | 9.84 |
| 125 | - | 4.45 | 10.43 | 14.88 | 8.9 | 3.43 | 8.86 | 12.28 | 6.89 | ²⁾ | 9.84 |
| 150 | 6 | 5.28 | 10.43 | 15.71 | 10.59 | 3.94 | 8.86 | 12.8 | 7.87 | ²⁾ | 11.81 |
| 200 | 8 | 6.3 | 11.42 | 17.72 | 12.6 | 4.45 | 10.43 | 14.88 | 8.9 | ²⁾ | 13.78 |

| DN | | Order code for "Design" | | | | | | | | K | L |
|------|------|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|-------|
| | | Option E | | | | Option C | | | | | |
| [mm] | [in] | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | [in] | [in] |
| 250 | 10 | 7.6 | 12.4 | 20 | 15.24 | 5.28 | 10.43 | 15.71 | 10.59 | ²⁾ | 17.72 |
| 300 | 12 | 8.58 | 13.39 | 21.97 | 17.2 | 6.3 | 11.42 | 17.72 | 12.6 | ²⁾ | 19.69 |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
2) Depends on the liner → 91

DN 14 to 16 in (350 to 400 mm)

| DN | | Order code for "Design" | | | | | | K | L |
|------|------|-------------------------|-----------------|-----------------|-----------------|---------------|-------|------|------|
| | | Options E, I | | | | | | | |
| [mm] | [in] | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | [in] | [in] | [in] | [in] |
| 350 | 14 | 11.10 | 15.63 | 26.73 | 22.20 | ²⁾ | 21.65 | | |
| 375 | 15 | 12.13 | 16.65 | 28.78 | 24.25 | ²⁾ | 23.62 | | |
| 400 | 16 | 12.13 | 16.65 | 28.78 | 24.25 | ²⁾ | 23.62 | | |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
2) Depends on the liner → 91

DN 18 to 36 in (450 to 900 mm)

| DN | | Order code for "Design" | | | | | | | | K | L | |
|------|------|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|---------------------|---------------------|
| | | Options F, J | | | | Options G, K | | | | | | |
| [mm] | [in] | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | D ¹⁾ | E ¹⁾ | F ¹⁾ | M ¹⁾ | [in] | [in] | [in] |
| 450 | 18 | 11.42 | 15.94 | 27.36 | 22.83 | 13.11 | 17.64 | 30.75 | 26.22 | ²⁾ | 23.62 ³⁾ | 25.59 ⁴⁾ |
| 500 | 20 | 12.40 | 16.93 | 29.33 | 24.80 | 14.13 | 18.66 | 32.80 | 28.23 | ²⁾ | 23.62 ³⁾ | 25.59 ⁴⁾ |
| 600 | 24 | 14.37 | 18.90 | 33.27 | 28.74 | 16.18 | 20.71 | 36.89 | 32.32 | ²⁾ | 23.62 ³⁾ | 30.71 ⁴⁾ |
| 700 | 28 | 16.77 | 21.30 | 38.07 | 33.50 | 20.16 | 24.69 | 44.84 | 40.31 | ²⁾ | 27.56 ³⁾ | 35.83 ⁴⁾ |
| 750 | 30 | 18.23 | 22.76 | 40.98 | 36.46 | 20.16 | 24.69 | 44.84 | 40.31 | ²⁾ | 29.53 ³⁾ | 38.39 ⁴⁾ |
| 800 | 32 | 18.98 | 23.50 | 42.48 | 37.95 | 21.02 | 25.55 | 46.57 | 41.93 | ²⁾ | 31.5 ³⁾ | 40.94 ⁴⁾ |
| 900 | 36 | 20.94 | 25.47 | 46.42 | 41.89 | 24.02 | 28.54 | 52.56 | 47.95 | ²⁾ | 35.43 ³⁾ | 46.06 ⁴⁾ |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
2) Depends on the liner → 91
3) Order code for "Design", option F "Fixed flange, short installed length" and option J "Fixed flange, short installed length, 0 x DN inlet/outlet runs"
4) Order code for "Design", option G "Fixed flange, long installed length" and option K "Fixed flange, long installed length 0 x DN inlet/outlet runs"

DN 40 to 78 in (1000 to 2000 mm)

| DN | | Order code for "Design" | | | | | K | L | |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|---------------------|----------------------|--|
| | | Options F, G, J, K | | | | | | | |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] | | |
| 1000 | 40 | 22.91 | 27.44 | 50.35 | 45.83 | ²⁾ | 39.37 ³⁾ | 51.18 ⁴⁾ | |
| - | 42 | 24.33 | 28.86 | 53.19 | 48.66 | ²⁾ | 41.34 ³⁾ | 53.74 ⁴⁾ | |
| 1200 | 48 | 27.40 | 31.93 | 59.33 | 54.80 | ²⁾ | 47.24 ³⁾ | 61.42 ⁴⁾ | |
| - | 54 | 31.85 | 36.38 | 68.23 | 63.66 | ²⁾ | 53.15 ³⁾ | 69.09 ⁴⁾ | |
| 1400 | - | 31.85 | 36.38 | 68.23 | 63.66 | ²⁾ | 55.12 ³⁾ | 71.65 ⁴⁾ | |
| - | 60 | 35.79 | 40.31 | 76.10 | 71.54 | ²⁾ | 59.06 ³⁾ | 76.77 ⁴⁾ | |
| 1600 | - | 35.79 | 40.31 | 76.10 | 71.54 | ²⁾ | 62.99 ³⁾ | 81.89 ⁴⁾ | |
| - | 66 | 37.80 | 42.32 | 80.12 | 75.55 | ²⁾ | 64.96 ³⁾ | 84.45 ⁴⁾ | |
| 1800 | 72 | 40.00 | 44.53 | 84.53 | 80.00 | ²⁾ | 70.87 ³⁾ | 92.13 ⁴⁾ | |
| - | 78 | 44.37 | 48.90 | 93.27 | 88.74 | ²⁾ | 78.74 ³⁾ | 102.36 ⁴⁾ | |
| 2000 | - | 44.37 | 48.90 | 93.27 | 88.74 | ²⁾ | 78.74 ³⁾ | 102.36 ⁴⁾ | |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Internal diameter depends on the liner, see the measuring tube specification → 91
- 3) Order code for "Design", option F "Fixed flange, short installed length" and option J "Fixed flange, short installed length, 0 x DN inlet/outlet runs"
- 4) Order code for "Design", option G "Fixed flange, long installed length" and option K "Fixed flange, long installed length 0 x DN inlet/outlet runs"

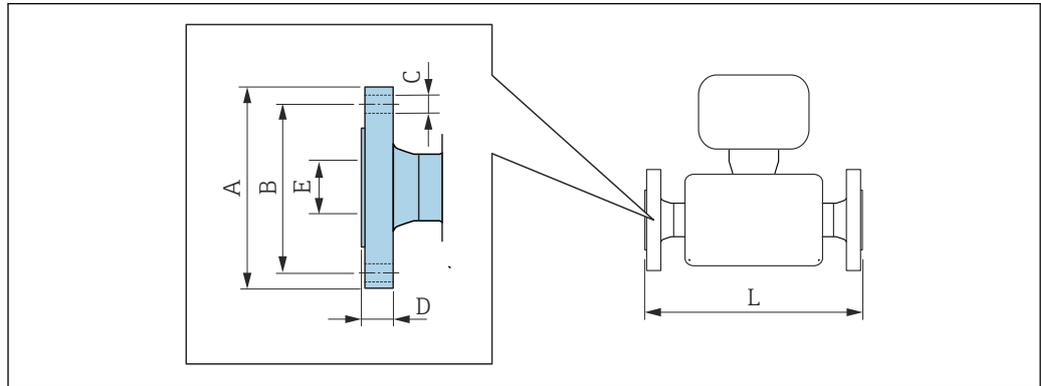
DN 84 to 120 in (2200 to 3000 mm)

| DN | | Order code for "Design" | | | | | K | L |
|------|------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|--------|---|
| | | Option F, J | | | | | | |
| [mm] | [in] | D ¹⁾ [in] | E ¹⁾ [in] | F ¹⁾ [in] | M ¹⁾ [in] | [in] | [in] | |
| - | 84 | 48.31 | 52.83 | 101.14 | 96.61 | ²⁾ | 86.61 | |
| 2200 | - | 48.31 | 52.83 | 101.14 | 96.61 | ²⁾ | 86.61 | |
| - | 90 | 52.44 | 56.97 | 109.41 | 104.88 | ²⁾ | 94.49 | |
| 2400 | - | 52.44 | 56.97 | 109.57 | 104.88 | ²⁾ | 94.49 | |
| - | 96 | 56.34 | 60.87 | 117.20 | 112.64 | ²⁾ | 96.46 | |
| - | 102 | 59.69 | 64.21 | 123.90 | 119.37 | ²⁾ | 102.36 | |
| 2600 | - | 56.77 | 61.30 | 118.07 | 113.50 | ²⁾ | 102.36 | |
| - | 108 | 63.07 | 67.64 | 130.71 | 126.14 | ²⁾ | 108.27 | |
| 2800 | - | 60.91 | 65.43 | 126.34 | 121.77 | ²⁾ | 110.24 | |
| - | 114 | 66.46 | 70.98 | 137.44 | 132.87 | ²⁾ | 114.17 | |
| 3000 | - | 64.84 | 69.37 | 134.21 | 129.65 | ²⁾ | 118.11 | |
| - | 120 | 69.84 | 74.37 | 144.21 | 139.65 | ²⁾ | 120.08 | |

- 1) The dimensions are reference values. They may vary depending on the pressure rating, design and order option.
- 2) Internal diameter depends on the liner, see the measuring tube specification → 91

Flange connections

Fixed flange



A0015621

| Flange according to ASME B16.5, Class 150 | | | | | | | |
|------------------------------------------------------------------|------|-------|-------|------------|------|------|------|
| Carbon steel: order code for "Process connection", option A1K | | | | | | | |
| Stainless steel: order code for "Process connection", option A1S | | | | | | | |
| DN | | A | B | C | D | E | L |
| [mm] | [in] | [in] | [in] | [in] | [in] | [in] | [in] |
| 25 | 1 | 4.25 | 3.12 | 4 × Ø0.63 | 0.5 | 1) | 2) |
| 40 | 1 ½ | 5 | 3.88 | 4 × Ø0.63 | 0.63 | | |
| 50 | 2 | 6 | 4.75 | 4 × Ø0.75 | 0.69 | | |
| 80 | 3 | 7.5 | 6 | 4 × Ø0.75 | 0.88 | | |
| 100 | 4 | 9 | 7.5 | 8 × Ø0.75 | 0.88 | | |
| 150 | 6 | 11 | 9.5 | 8 × Ø0.88 | 0.94 | | |
| 200 | 8 | 13.5 | 11.75 | 8 × Ø0.88 | 1.06 | | |
| 250 | 10 | 16 | 14.25 | 12 × Ø1 | 1.17 | | |
| 300 | 12 | 19 | 17 | 12 × Ø1 | 1.19 | | |
| 350 | 14 | 21.06 | 18.75 | 12 × Ø1.13 | 1.39 | | |
| 400 | 16 | 23.43 | 21.25 | 16 × Ø1.13 | 1.46 | | |
| 450 | 18 | 25 | 22.75 | 16 × Ø1.25 | 1.58 | | |
| 500 | 20 | 27.56 | 25 | 20 × Ø1.25 | 1.7 | | |
| 600 | 24 | 32.09 | 29.5 | 20 × Ø1.37 | 1.89 | | |

Surface roughness (flange): Ra 250 to 492 µm

- 1) Depends on the liner → ☰ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☰ 75 (compact version) → ☰ 78 (remote version)

| Flange according to ASME B16.5, Class 300 | | | | | | | |
|------------------------------------------------------------------|------|------|------|-----------|------|------|------|
| Carbon steel: order code for "Process connection", option A2K | | | | | | | |
| Stainless steel: order code for "Process connection", option A2S | | | | | | | |
| DN | | A | B | C | D | E | L |
| [in] | [mm] | [in] | [in] | [in] | [in] | [in] | [in] |
| 1 | 25 | 4.88 | 3.5 | 4 × Ø0.75 | 0.63 | 1) | 2) |
| 1 ½ | 40 | 6.12 | 4.5 | 4 × Ø0.88 | 0.75 | | |
| 2 | 50 | 6.5 | 5 | 8 × Ø0.75 | 0.82 | | |

| Flange according to ASME B16.5, Class 300 | | | | | | | |
|-------------------------------------------------------------------------|------|------|-------|------------|------|------|------|
| Carbon steel: order code for "Process connection", option A2K | | | | | | | |
| Stainless steel: order code for "Process connection", option A2S | | | | | | | |
| DN | | A | B | C | D | E | L |
| [in] | [mm] | [in] | [in] | [in] | [in] | [in] | [in] |
| 3 | 80 | 8.25 | 6.62 | 8 × Ø0.88 | 1.06 | | |
| 4 | 100 | 10 | 7.88 | 8 × Ø0.88 | 1.19 | | |
| 6 | 150 | 12.5 | 10.62 | 12 × Ø0.88 | 1.38 | | |

Surface roughness (flange): Ra 250 to 492 µm

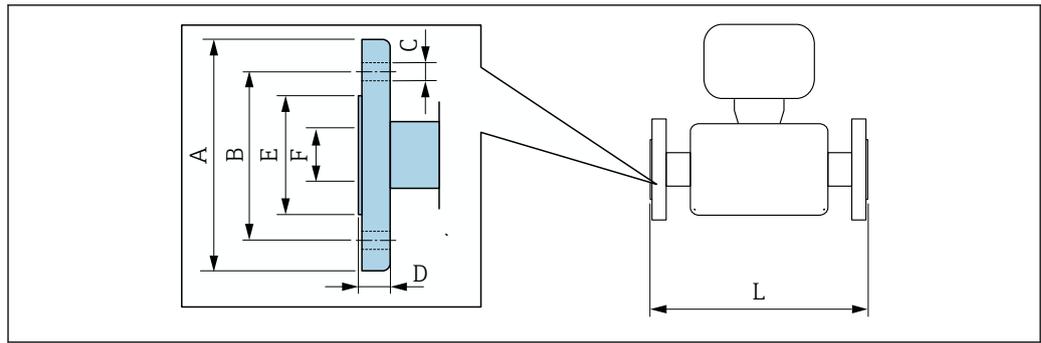
- 1) Depends on the liner → ☞ 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → ☞ 75 (compact version) → ☞ 78 (remote version)

| Flange according to AWWA, Cl. D | | | | | | | |
|--------------------------------------------------------|------|--------|--------|------------|------|------|------|
| Order code for "Process connection", option W1K | | | | | | | |
| DN | | A | B | C | D | E | L |
| [in] | [mm] | [in] | [in] | [in] | [in] | [in] | [in] |
| 28 | 700 | 36.50 | 34.00 | 28 × Ø1.38 | 1.31 | 1) | 2) |
| 30 | – | 38.74 | 36.00 | 28 × Ø1.38 | 1.38 | | |
| 32 | 800 | 41.73 | 38.50 | 28 × Ø1.65 | 1.50 | | |
| 36 | 900 | 45.98 | 42.75 | 32 × Ø1.65 | 1.63 | | |
| 40 | 1000 | 50.75 | 47.25 | 36 × Ø1.65 | 1.63 | | |
| 42 | – | 52.99 | 49.50 | 36 × Ø1.65 | 1.75 | | |
| 48 | 1200 | 59.49 | 56.00 | 44 × Ø1.65 | 1.88 | | |
| 54 | – | 66.26 | 62.75 | 44 × Ø1.89 | 2.13 | | |
| 60 | – | 73.03 | 69.25 | 52 × Ø1.89 | 2.25 | | |
| 66 | – | 80.00 | 76.00 | 52 × Ø1.89 | 2.50 | | |
| 72 | 1800 | 86.50 | 82.50 | 60 × Ø1.89 | 2.63 | | |
| 78 | – | 92.99 | 89.00 | 64 × Ø2.13 | 2.75 | | |
| 84 | – | 99.80 | 95.50 | 64 × Ø2.13 | 2.88 | | |
| 90 | – | 106.50 | 107.00 | 68 × Ø2.36 | 3.00 | | |
| 96 | – | 113.27 | 108.50 | 68 × Ø2.37 | 3.25 | | |
| 102 | – | 120.00 | 114.50 | 68 × Ø2.63 | 3.25 | | |
| 108 | – | 126.73 | 120.75 | 68 × Ø2.63 | 3.38 | | |
| 114 | – | 133.50 | 126.75 | 68 × Ø2.87 | 3.50 | | |
| 120 | – | 140.24 | 132.75 | 68 × Ø2.87 | 3.50 | | |

Surface roughness (flange): Ra 250 to 492 µm

- 1) Depends on the liner → ☞ 91
- 2) Total length is independent of the process connections. Installed length according to DVGW → ☞ 75 (compact version) → ☞ 78 (remote version)

Lap joint flange



A0037862

Lap joint flange according to ASME B16.5, Class 150
Carbon steel: order code for "Process connection", option A12
Stainless steel: order code for "Process connection", option A14

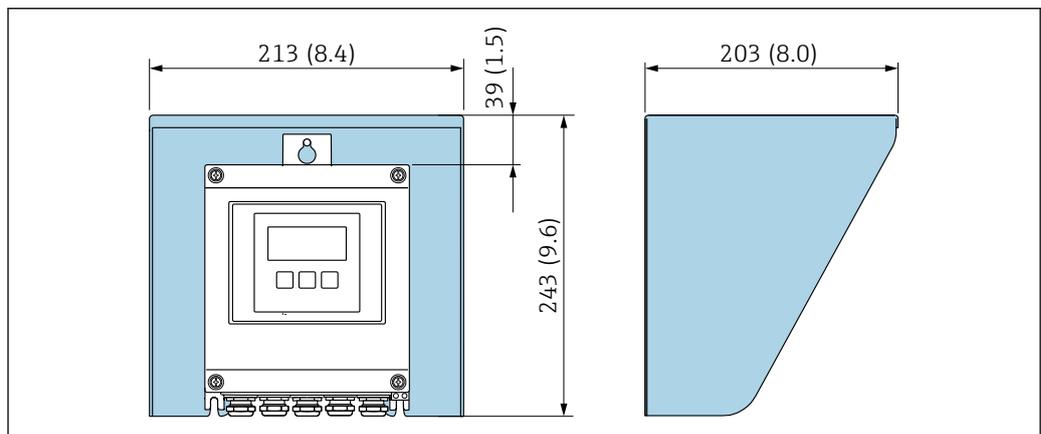
| DN | | A | B | C | D | E | F | L |
|------|------|-------|-------|------------|------|-------|------|------|
| [mm] | [in] | [in] | [in] | [in] | [in] | [in] | [in] | [in] |
| 25 | 1 | 4.33 | 3.15 | 4 × Ø0.63 | 0.55 | 1.93 | 1) | 2) |
| 40 | 1 ½ | 4.92 | 3.86 | 4 × Ø0.63 | 0.69 | 2.8 | | |
| 50 | 2 | 5.91 | 4.76 | 4 × Ø0.75 | 0.75 | 3.46 | | |
| 80 | 3 | 7.48 | 5.98 | 4 × Ø0.75 | 0.94 | 4.72 | | |
| 100 | 4 | 9.06 | 7.48 | 8 × Ø0.75 | 0.94 | 5.83 | | |
| 150 | 6 | 11.02 | 9.49 | 8 × Ø0.91 | 0.98 | 8.23 | | |
| 200 | 8 | 13.58 | 11.73 | 8 × Ø0.91 | 1.14 | 10.39 | | |
| 250 | 10 | 15.94 | 14.25 | 12 × Ø0.98 | 1.18 | 12.48 | | |
| 300 | 12 | 19.09 | 17.01 | 12 × Ø0.98 | 1.26 | 14.88 | | |

Surface roughness (flange): Ra 248 to 492 µin

- 1) Depends on the liner → 91
- 2) Total length is independent of the process connections. Length according to DVGW (German Technical and Scientific Association for Gas and Water) → 75 (compact version) → 78 (remote version)

Accessories

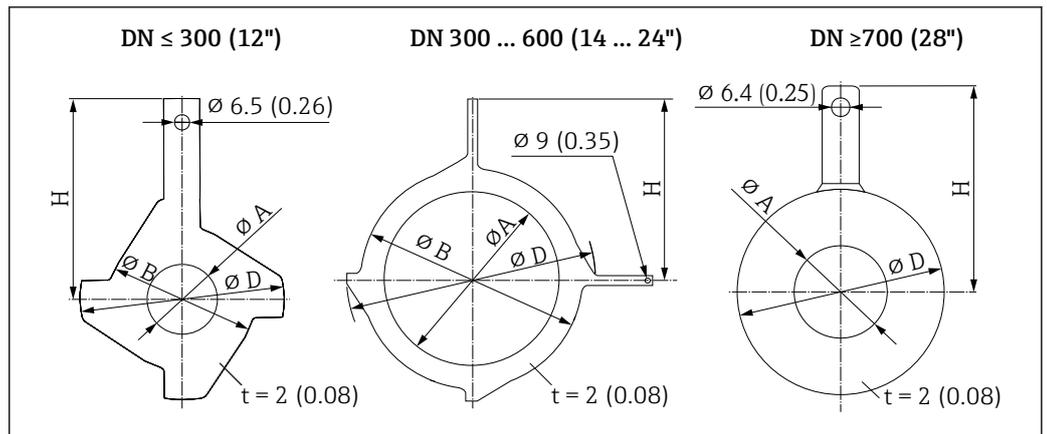
Weather protection cover



A0029552

32 Weather protection cover; engineering unit mm (in)

Ground disks for flange connections



A0015442

| DN | | Pressure rating | A | | B | | D | | H | |
|------|--------|-----------------------------|------|--------|------|--------|-------|--------|------|--------|
| [mm] | [inch] | | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] |
| 25 | 1" | 1) | 26 | 1.02 | 62 | 2.44 | 77.5 | 3.05 | 87.5 | 3.44 |
| 32 | 1 ¼" | 1) | 35 | 1.38 | 80 | 3.15 | 87.5 | 3.44 | 94.5 | 3.72 |
| 40 | 1 ½" | 1) | 41 | 1.61 | 82 | 3.23 | 101 | 3.98 | 103 | 4.06 |
| 50 | 2" | 1) | 52 | 2.05 | 101 | 3.98 | 115.5 | 4.55 | 108 | 4.25 |
| 65 | 2 ½" | 1) | 68 | 2.68 | 121 | 4.76 | 131.5 | 5.18 | 118 | 4.65 |
| 80 | 3" | 1) | 80 | 3.15 | 131 | 5.16 | 154.5 | 6.08 | 135 | 5.31 |
| 100 | 4" | 1) | 104 | 4.09 | 156 | 6.14 | 186.5 | 7.34 | 153 | 6.02 |
| 125 | 5" | 1) | 130 | 5.12 | 187 | 7.36 | 206.5 | 8.13 | 160 | 6.30 |
| 150 | 6" | 1) | 158 | 6.22 | 217 | 8.54 | 256 | 10.08 | 184 | 7.24 |
| 200 | 8" | 1) | 206 | 8.11 | 267 | 10.51 | 288 | 11.34 | 205 | 8.07 |
| 250 | 10" | 1) | 260 | 10.2 | 328 | 12.91 | 359 | 14.13 | 240 | 9.45 |
| 300 | 12" | PN 10 PN 16 Cl. 150 | 312 | 12.3 | 375 | 14.76 | 413 | 16.26 | 273 | 10.75 |
| | | PN 25 JIS 10K JIS 20K | 310 | 12.2 | 375 | 14.76 | 404 | 15.91 | 268 | 10.55 |
| 350 | 14" | PN 6 | 343 | 13.5 | 420 | 16.54 | 479 | 18.86 | 365 | 14.37 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |
| 375 | 15" | PN 16 | 393 | 15.5 | 461 | 18.2 | 523 | 20.6 | 395 | 15.6 |
| 400 | 16" | PN 6 | 393 | 15.5 | 470 | 18.50 | 542 | 21.34 | 395 | 15.55 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |
| 450 | 18" | PN 6 | 439 | 17.3 | 525 | 20.67 | 583 | 22.95 | 417 | 16.42 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |
| 500 | 20" | PN 6 | 493 | 19.4 | 575 | 22.64 | 650 | 25.59 | 460 | 18.11 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |

| DN | | Pressure rating | A | | B | | D | | H | |
|------|--------|-----------------|------|--------|------|--------|------|--------|------|--------|
| [mm] | [inch] | | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] |
| 600 | 24" | PN 6 | 593 | 23.3 | 676 | 26.61 | 766 | 30.16 | 522 | 20.55 |
| | | PN 10 | | | | | | | | |
| | | PN 16 | | | | | | | | |
| 700 | 28" | PN 6 | 697 | 27.4 | - | - | 786 | 30.94 | 460 | 18.11 |
| | | PN10 | 693 | 27.3 | - | - | 813 | 32.01 | 480 | 18.9 |
| | | PN16 | 687 | 27.1 | - | - | 807 | 31.77 | 490 | 19.29 |
| | | Cl, D | 693 | 27.3 | - | - | 832 | 32.76 | 494 | 19.45 |
| 750 | 30" | Cl, D | 743 | 29.3 | - | - | 883 | 34.76 | 523 | 20.59 |
| 800 | 32" | PN 6 | 799 | 31.5 | - | - | 893 | 35.16 | 520 | 20.47 |
| | | PN 10 | 795 | 31.3 | - | - | 920 | 36.22 | 540 | 21.26 |
| | | PN 16 | 789 | 31.1 | - | - | 914 | 35.98 | 550 | 21.65 |
| | | Cl, D | 795 | 31.3 | - | - | 940 | 37.01 | 561 | 22.09 |
| 900 | 36" | PN 6 | 897 | 35.3 | - | - | 993 | 39.09 | 570 | 22.44 |
| | | PN 10 | 893 | 35.2 | - | - | 1020 | 40.16 | 590 | 23.23 |
| | | PN 16 | 886 | 34.9 | - | - | 1014 | 39.92 | 595 | 23.43 |
| | | Cl, D | 893 | 35.2 | - | - | 1048 | 41.26 | 615 | 24.21 |
| 1000 | 40" | PN 6 | 999 | 39.3 | - | - | 1093 | 43.03 | 620 | 24.41 |
| | | PN 10 | 995 | 39.2 | - | - | 1127 | 44.37 | 650 | 25.59 |
| | | PN 16 | 988 | 38.9 | - | - | 1131 | 44.53 | 660 | 25.98 |
| | | Cl, D | 995 | 39.2 | - | - | 1163 | 45.79 | 675 | 26.57 |
| - | 42" | Cl, D | 1044 | 41.1 | - | - | 1220 | 48.03 | 704 | 27.72 |
| 1200 | 48" | PN 6 | 1203 | 47.4 | - | - | 1310 | 51.57 | 733 | 28.86 |
| | | PN 10 | 1196 | 47.1 | - | - | 1344 | 52.91 | 760 | 29.92 |
| | | PN 16 | 1188 | 46.8 | - | - | 1345 | 52.95 | 775 | 30.51 |
| | | Cl, D | 1196 | 47.1 | - | - | 1385 | 54.53 | 786 | 30.94 |

- 1) In the case of DN 25 to 250, 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 with flanges of the standard pressure rating.
The weight may be lower than indicated depending on the pressure rating and design.

Weight in SI units

| Order code for "Design", option C, D, E, H, I : DN 25 to 400 mm (1 to 16 in) | | | |
|------------------------------------------------------------------------------|------|---------------------------------------|------|
| Nominal diameter | | Reference values EN (DIN), AS, JIS | |
| [mm] | [in] | Pressure rating | [kg] |
| 25 | 1 | PN 40 | 10 |
| 32 | - | PN 40 | 11 |
| 40 | 1 ½ | PN 40 | 12 |
| 50 | 2 | PN 40 | 13 |
| 65 | - | PN 16 | 13 |
| 80 | 3 | PN 16 | 15 |
| 100 | 4 | PN 16 | 18 |
| 125 | - | PN 16 | 25 |
| 150 | 6 | PN 16 | 31 |
| 200 | 8 | PN 10 | 52 |
| 250 | 10 | PN 10 | 81 |
| 300 | 12 | PN 10 | 95 |
| 350 | 14 | PN 6 | 106 |
| 375 | 15 | PN 6 | 121 |
| 400 | 16 | PN 6 | 121 |

| Order code for "Design", option F, J: DN 450 to 2000 mm (18 to 78 in) | | | |
|-----------------------------------------------------------------------|------|-------------------------|--------------------|
| Nominal diameter | | Reference values | |
| [mm] | [in] | EN (DIN) (PN16) [kg] | AS (PN 16) [kg] |
| 450 | 18 | 142 | 138 |
| 500 | 20 | 182 | 186 |
| 600 | 24 | 227 | 266 |
| 700 | 28 | 291 | 369 |
| - | 30 | - | 447 |
| 800 | 32 | 353 | 524 |
| 900 | 36 | 444 | 704 |
| 1000 | 40 | 566 | 785 |
| - | 42 | - | - |
| 1200 | 48 | 843 | 1229 |
| - | 54 | - | - |
| 1400 | - | 1204 | - |
| - | 60 | - | - |
| 1600 | - | 1845 | - |
| - | 66 | - | - |

| Order code for "Design", option F, J: DN 450 to 2 000 mm (18 to 78 in) | | | |
|------------------------------------------------------------------------|------|------------------|------------|
| Nominal diameter | | Reference values | |
| | | EN (DIN) (PN16) | AS (PN 16) |
| [mm] | [in] | [kg] | [kg] |
| 1800 | 72 | 2 357 | - |
| - | 78 | 2 929 | - |
| 2000 | - | 2 929 | - |

| Order code for "Design", option F, J: DN 2 200 to 3 000 mm (84 to 120 in) | | |
|---------------------------------------------------------------------------|------|------------------|
| Nominal diameter | | Reference values |
| | | EN (DIN) (PN6) |
| [mm] | [in] | [kg] |
| - | 84 | - |
| 2200 | - | 3 422 |
| - | 90 | - |
| 2400 | - | 4 094 |
| - | 96 | - |
| - | 102 | - |
| 2600 | - | 7 601.5 |
| - | 108 | - |
| 2800 | - | 9 466.5 |
| - | 114 | - |
| 3000 | - | 11 911 |
| - | 120 | - |

| Order code for "Design", option G, K: DN 450 to 2 000 mm (18 to 78 in) | | |
|------------------------------------------------------------------------|------|------------------|
| Nominal diameter | | Reference values |
| | | EN (DIN) (PN 6) |
| [mm] | [in] | [kg] |
| 450 | 18 | 161 |
| 500 | 20 | 156 |
| 600 | 24 | 208 |
| 700 | 28 | 304 |
| - | 30 | - |
| 800 | 32 | 357 |
| 900 | 36 | 485 |
| 1000 | 40 | 589 |
| - | 42 | - |
| 1200 | 48 | 850 |
| - | 54 | 850 |
| 1400 | - | 1 300 |
| - | 60 | - |
| 1600 | - | 1 845 |

| Order code for "Design", option G, K: DN 450 to 2 000 mm (18 to 78 in) | | |
|------------------------------------------------------------------------|------|------------------|
| Nominal diameter | | Reference values |
| [mm] | [in] | EN (DIN) (PN 6) |
| | | [kg] |
| - | 66 | - |
| 1800 | 72 | 2 357 |
| - | 78 | 2 929 |
| 2000 | - | 2 929 |

Weight in US units

| Order code for "Design", option C, D, E, H, I: DN 1 to 16 in (25 to 400 mm) | | |
|-----------------------------------------------------------------------------|------|------------------|
| Nominal diameter | | Reference values |
| [mm] | [in] | ASME (Class 150) |
| | | [lb] |
| 25 | 1 | 11 |
| 32 | - | - |
| 40 | 1 ½ | 15 |
| 50 | 2 | 20 |
| 65 | - | - |
| 80 | 3 | 31 |
| 100 | 4 | 42 |
| 125 | - | - |
| 150 | 6 | 73 |
| 200 | 8 | 115 |
| 250 | 10 | 198 |
| 300 | 12 | 284 |
| 350 | 14 | 379 |
| 375 | 15 | - |
| 400 | 16 | 448 |

| Order code for "Design", option F, J: DN 18 to 120 in (450 to 3 000 mm) | | |
|-------------------------------------------------------------------------|------|----------------------------------|
| Nominal diameter | | Reference values |
| [mm] | [in] | ASME (Class 150), AWWA (Class D) |
| | | [lb] |
| 450 | 18 | 421 |
| 500 | 20 | 503 |
| 600 | 24 | 666 |
| 700 | 28 | 587 |
| - | 30 | 701 |
| 800 | 32 | 845 |
| 900 | 36 | 1 036 |
| 1000 | 40 | 1 294 |
| - | 42 | 1 477 |
| 1200 | 48 | 1 987 |

| Order code for "Design", option F, J: DN 18 to 120 in (450 to 3 000 mm) | | |
|-------------------------------------------------------------------------|------|----------------------------------|
| Nominal diameter | | Reference values |
| [mm] | [in] | ASME (Class 150), AWWA (Class D) |
| | | [lb] |
| - | 54 | 2 807 |
| 1400 | - | - |
| - | 60 | 3 515 |
| 1600 | - | - |
| - | 66 | 4 699 |
| 1800 | 72 | 5 662 |
| - | 78 | 6 864 |
| 2000 | - | 6 864 |
| - | 84 | 8 280 |
| 2200 | - | - |
| - | 90 | 10 577 |
| 2400 | - | - |
| - | 96 | 15 574.6 |
| - | 102 | 18 023.9 |
| 2600 | - | - |
| - | 108 | 20 783.0 |
| 2800 | - | - |
| - | 114 | 24 060.2 |
| 3000 | - | - |
| - | 120 | 27 724.3 |

| Order code for "Design", option G, K: DN 18 to 78 in (450 to 2 000 mm) | | |
|------------------------------------------------------------------------|------|----------------------------------|
| Nominal diameter | | Reference values |
| [mm] | [in] | ASME (Class 150), AWWA (Class D) |
| | | [lb] |
| 450 | 18 | 562 |
| 500 | 20 | 628 |
| 600 | 24 | 893 |
| 700 | 28 | 882 |
| - | 30 | 1 014 |
| 800 | 32 | 1 213 |
| 900 | 36 | 1 764 |
| 1000 | 40 | 1 984 |
| - | 42 | 2 426 |
| 1200 | 48 | 3 087 |
| - | 54 | 4 851 |
| 1400 | - | - |
| - | 60 | 5 954 |
| 1600 | - | - |
| - | 66 | 8 158 |

| Order code for "Design", option G, K: DN 18 to 78 in (450 to 2 000 mm) | | |
|------------------------------------------------------------------------|------|------------------------------------------------------|
| Nominal diameter | | Reference values ASME (Class 150), AWWA (Class D) |
| [mm] | [in] | [lb] |
| 1800 | 72 | 9040 |
| - | 78 | 10 143 |
| 2000 | - | - |

Measuring tube specification



The values are reference values and can vary depending on the pressure rating, design and order option.

| Nominal diameter | | Pressure rating | | | | Measuring tube internal diameter | | | | | |
|-------------------|------|-----------------|--------------|--------------------|-----|----------------------------------|-------|--------------|-------|------|-------|
| | | EN (DIN) | ASME AWWA | AS 2129 AS 4087 | JIS | Hard rubber | | Polyurethane | | PTFE | |
| [mm] | [in] | | | | | [mm] | [in] | [mm] | [in] | [mm] | [in] |
| 25 | 1 | PN 40 | Class 150 | - | 20K | - | - | 24 | 0.93 | 25 | 1.00 |
| 32 | - | PN 40 | - | - | 20K | - | - | 32 | 1.28 | 34 | 1.34 |
| 40 | 1 ½ | PN 40 | Class 150 | - | 20K | - | - | 38 | 1.51 | 40 | 1.57 |
| 50 | 2 | PN 40 | Class 150 | Table E, PN 16 | 10K | 50 | 1.98 | 50 | 1.98 | 52 | 2.04 |
| 50 ¹⁾ | 2 | PN 40 | Class 150 | Table E, PN 16 | 10K | 32 | 1.26 | - | - | - | - |
| 65 | - | PN 16 | - | - | 10K | 66 | 2.60 | 66 | 2.60 | 68 | 2.67 |
| 65 ¹⁾ | - | PN 16 | - | - | 10K | 38 | 1.50 | - | - | - | - |
| 80 | 3 | PN 16 | Class 150 | Table E, PN 16 | 10K | 79 | 3.11 | 79 | 3.11 | 80 | 3.15 |
| 80 ¹⁾ | 3 | PN 16 | Class 150 | Table E, PN 16 | 10K | 50 | 1.97 | - | - | - | - |
| 100 | 4 | PN 16 | Class 150 | Table E, PN 16 | 10K | 101 | 3.99 | 104 | 4.11 | 104 | 4.09 |
| 100 ¹⁾ | 4 | PN 16 | Class 150 | Table E, PN 16 | 10K | 66 | 2.60 | - | - | - | - |
| 125 | - | PN 16 | - | - | 10K | 127 | 4.99 | 130 | 5.11 | 129 | 5.08 |
| 125 ¹⁾ | - | PN 16 | - | - | 10K | 79 | 3.11 | - | - | - | - |
| 150 | 6 | PN 16 | Class 150 | Table E, PN 16 | 10K | 155 | 6.11 | 158 | 6.23 | 156 | 6.15 |
| 150 ¹⁾ | 6 | PN 16 | Class 150 | Table E, PN 16 | 10K | 102 | 4.02 | - | - | - | - |
| 200 | 8 | PN 10 | Class 150 | Table E, PN 16 | 10K | 204 | 8.02 | 207 | 8.14 | 202 | 7.96 |
| 200 ¹⁾ | 8 | PN 16 | Class 150 | Table E, PN 16 | 10K | 127 | 5.00 | - | - | - | - |
| 250 | 10 | PN 10 | Class 150 | Table E, PN 16 | 10K | 258 | 10.14 | 261 | 10.26 | 256 | 10.09 |
| 250 ¹⁾ | 10 | PN 16 | Class 150 | Table E, PN 16 | 10K | 156 | 6.14 | - | - | - | - |
| 300 | 12 | PN 10 | Class 150 | Table E, PN 16 | 10K | 309 | 12.15 | 312 | 12.26 | 306 | 12.03 |
| 300 ¹⁾ | 12 | PN 16 | Class 150 | Table E, PN 16 | 10K | 204 | 8.03 | - | - | - | - |
| 350 | 14 | PN 10 | Class 150 | Table E, PN 16 | 10K | 337 | 13.3 | 340 | 13.4 | - | - |
| 375 | 15 | - | - | PN 16 | 10K | 389 | 15.3 | 392 | 15.4 | - | - |
| 400 | 16 | PN 10 | Class 150 | Table E, PN 16 | 10K | 387 | 15.2 | 390 | 15.4 | - | - |
| 450 | 18 | PN 10 | Class 150 | - | 10K | 436 | 17.2 | 439 | 17.3 | - | - |
| 500 | 20 | PN 10 | Class 150 | Table E, PN 16 | 10K | 487 | 19.2 | 490 | 19.3 | - | - |
| 600 | 24 | PN 10 | Class 150 | Table E, PN 16 | 10K | 585 | 23.0 | 588 | 23.1 | - | - |
| 700 | 28 | PN 10 | Class D | Table E, PN 16 | 10K | 694 | 27.3 | 697 | 27.4 | - | - |
| 750 | 30 | - | Class D | Table E, PN 16 | 10K | 743 | 29.3 | 746 | 29.4 | - | - |
| 800 | 32 | PN 10 | Class D | Table E, PN 16 | - | 794 | 31.3 | 797 | 31.4 | - | - |

| Nominal diameter | | Pressure rating | | | | Measuring tube internal diameter | | | | | |
|------------------|------|-----------------|--------------|--------------------|-----|----------------------------------|-------|--------------|------|------|------|
| | | EN (DIN) | ASME AWWA | AS 2129 AS 4087 | JIS | Hard rubber | | Polyurethane | | PTFE | |
| [mm] | [in] | | | | | [mm] | [in] | [mm] | [in] | [mm] | [in] |
| 900 | 36 | PN 10 | Class D | Table E, PN 16 | - | 895 | 35.2 | 898 | 35.4 | - | - |
| 1000 | 40 | PN 6 | Class D | Table E, PN 16 | - | 991 | 39.0 | 994 | 39.1 | - | - |
| - | 42 | - | Class D | - | - | 1043 | 41.1 | 1043 | 41.1 | - | - |
| 1200 | 48 | PN 6 | Class D | Table E, PN 16 | - | 1191 | 46.9 | 1197 | 47.1 | - | - |
| - | 54 | - | Class D | - | - | 1339 | 52.7 | - | - | - | - |
| 1400 | - | PN 6 | - | - | - | 1402 | 55.2 | - | - | - | - |
| - | 60 | - | Class D | - | - | 1492 | 58.7 | - | - | - | - |
| 1600 | - | PN 6 | - | - | - | 1600 | 63.0 | - | - | - | - |
| - | 66 | - | Class D | - | - | 1638 | 64.5 | - | - | - | - |
| 1800 | 72 | PN 6 | - | - | - | 1786 | 70.3 | - | - | - | - |
| - | 78 | - | Class D | - | - | 1989 | 78.3 | - | - | - | - |
| 2000 | - | PN 6 | - | - | - | 1989 | 78.3 | - | - | - | - |
| - | 84 | - | Class D | - | - | 2099 | 84.0 | - | - | - | - |
| 2200 | - | PN 6 | - | - | - | 2194 | 87.8 | - | - | - | - |
| - | 90 | - | Class D | - | - | 2246 | 89.8 | - | - | - | - |
| 2400 | - | PN 6 | - | - | - | 2391 | 94.1 | - | - | - | - |
| - | 96 | - | Class D | - | - | 2382 | 93.8 | - | - | - | - |
| - | 102 | - | Class D | - | - | 2533 | 99.7 | - | - | - | - |
| 2600 | - | PN 6 | - | - | - | 2580 | 101.6 | - | - | - | - |
| - | 108 | - | Class D | - | - | 2683 | 105.6 | - | - | - | - |
| 2800 | - | PN 6 | - | - | - | 2780 | 109.5 | - | - | - | - |
| - | 114 | - | Class D | - | - | 2832 | 111.5 | - | - | - | - |
| 3000 | - | PN 6 | - | - | - | 2976 | 117.2 | - | - | - | - |
| - | 120 | - | Class D | - | - | 2980 | 117.3 | - | - | - | - |

1) Order code for "Design", option C

Materials

Transmitter housing

Compact version

- Order code for "Housing", option **A** "Compact, alu, coated": Aluminum, AlSi10Mg, coated
- Order code for "Housing", option **M**: polycarbonate plastic
- Window material:
 - For order code for "Housing", option **A**: glass
 - For order code for "Housing", option **M**: plastic

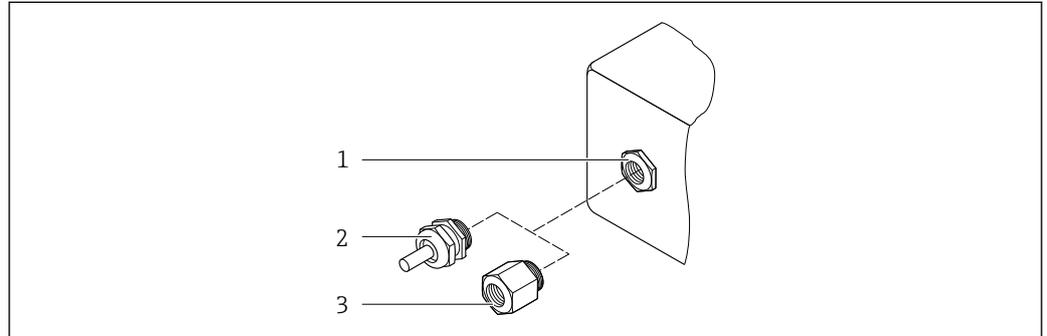
Remote version (wall-mount housing)

- Order code for "Housing", option **P** "Remote, alu, coated": Aluminum, AlSi10Mg, coated
- Order code for "Housing", option **N**: polycarbonate plastic
- Window material:
 - For order code for "Housing", option **P**: glass
 - For order code for "Housing", option **N**: plastic

Sensor connection housing

- Aluminum, AlSi10Mg, coated
- Polycarbonate plastic (only in conjunction with order code for "Sensor option", options CA, C3, CB, CC, CD, CD)

Cable entries/cable glands



33 Possible cable entries/cable glands

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

Compact and remote versions and sensor connection housing

| Cable entry/cable gland | Material |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cable gland M20 × 1.5 | <ul style="list-style-type: none"> ▪ Plastic ▪ Nickel-plated brass |
| Remote version: cable gland M20 × 1.5 Option of armored connecting cable | <ul style="list-style-type: none"> ▪ Sensor connection housing: Nickel-plated brass ▪ Transmitter wall-mount housing: Plastic |
| Adapter for cable entry with female thread G ½" or NPT ½" | Nickel-plated brass |

Device plug

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

Connecting cable of remote version

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

Electrode and coil current cable:

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

Sensor housing

- DN 25 to 300 (1 to 12")
 - Aluminum half-shell housing, aluminum, AlSi10Mg, coated
 - Fully welded carbon steel housing with protective varnish
- DN 350 to 3000900 (14 to 12036")
 - Fully welded carbon steel housing with protective varnish

Measuring tubes

- DN 25 to 600 (1 to 24")
Stainless steel: 1.4301, 1.4306, 304, 304L
- DN 700 to (28 to ")
Stainless steel: 1.4301, 304, S30408, or equivalent

Liner

- DN 25 to 300 (1 to 12"): PTFE
- DN 25 to 1200 (1 to 48"): polyurethane
- DN 50 to 3000 (2 to 120"): hard rubber

Electrodes

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

Process connections

-  For flanges made of carbon steel:
- DN ≤ 300 (12"): with Al/Zn protective coating or protective varnish
 - DN ≥ 350 (14"): protective varnish

-  All carbon steel lap joint flanges are supplied with a hot-dip galvanized finish.

EN 1092-1 (DIN 2501)

Fixed flange

- Carbon steel:
 - DN ≤ 300: S235JRG2, S235JR+N, P245GH, A105, E250C
 - DN 350 to 3000: P245GH, S235JRG2, A105, E250C
- Stainless steel:
 - DN ≤ 300: 1.4404, 1.4571, F316L
 - DN 350 to 600: 1.4571, F316L, 1.4404
 - DN 700 to 1000: 1.4404, F316L

Lap joint flange

- Carbon steel DN ≤ 300: S235JRG2, A105, E250C
- Stainless steel DN ≤ 300: 1.4306, 1.4404, 1.4571, F316L

Lap joint flange, stamped plate

- Carbon steel DN ≤ 300: S235JRG2 similar to S235JR+AR or 1.0038
- Stainless steel DN ≤ 300: 1.4301 similar to 304

ASME B16.5

Fixed flange, lap joint flange

- Carbon steel: A105
- Stainless steel: F316L

JIS B2220

- Carbon steel: A105, A350 LF2
- Stainless steel: F316L

AWWA C207

Carbon steel: A105, P265GH, A181 Class 70, E250C, S275JR

AS 2129

Carbon steel: A105, P235GH, P265GH

AS 4087

Carbon steel: A105, P265GH, S275JR

Seals

As per DIN EN 1514-1, form IBC

Accessories

Display guard

Stainless steel, 1.4301 (304L)

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)
- ASME B16.5
- JIS B2220
- AS 2129 Table E
- AS 4087 PN 16
- AWWA C207 Class D



For information on the different materials used in the process connections → 94

Surface roughness

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

Display and user interface

Operation concept

Operator-oriented menu structure for user-specific tasks

- Commissioning
- Operation
- Diagnosis
- Expert level

Quick and safe commissioning

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

Reliable operation

- Operation in local language
- 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 reliability

- 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:

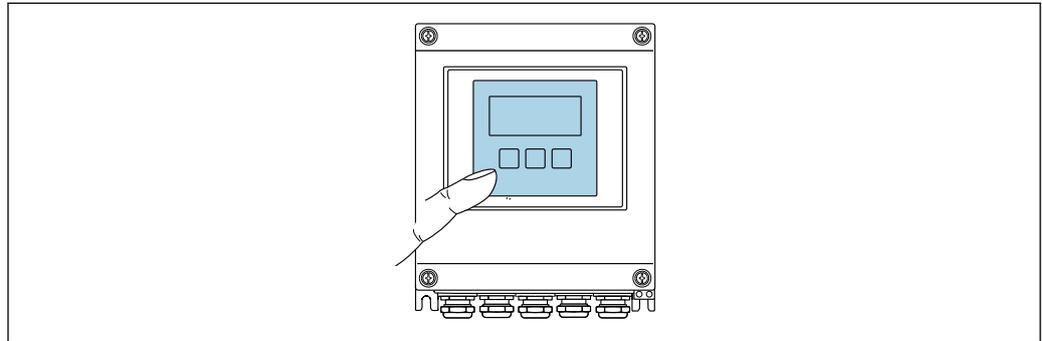
- Via local operation:
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech, Swedish
- Via "FieldCare", "DeviceCare" operating tool:
English, German, French, Spanish, Italian, Chinese, Japanese
- Via Web browser (only available for device versions with HART, PROFIBUS DP and EtherNet/IP):
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech, Swedish

Onsite operation**Via display module**

Features:

- Standard features 4-line, illuminated, graphic display; touch control
- Order code for "Display; operation", option BA "WLAN" offers standard equipment features in addition to access via web browser

 Information about WLAN interface →  99



A0032074

 34 Operation with touch control

Display elements

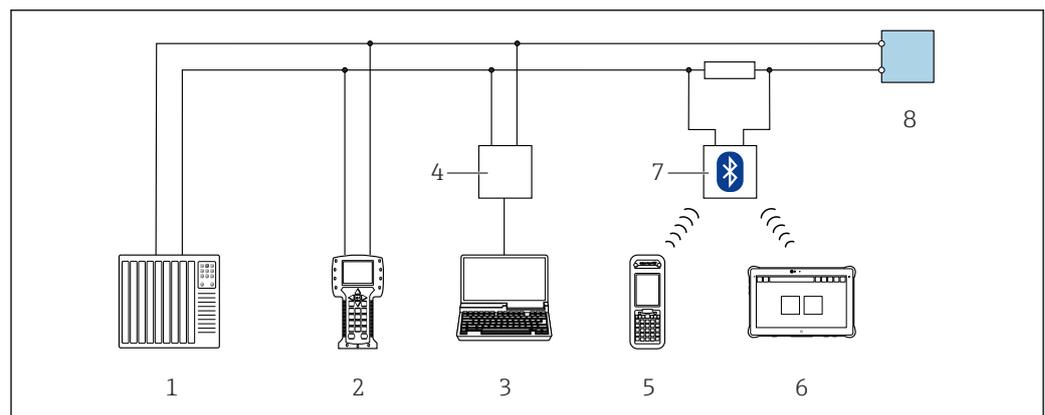
- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured

Operating elements

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

Remote operation**Via HART protocol**

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



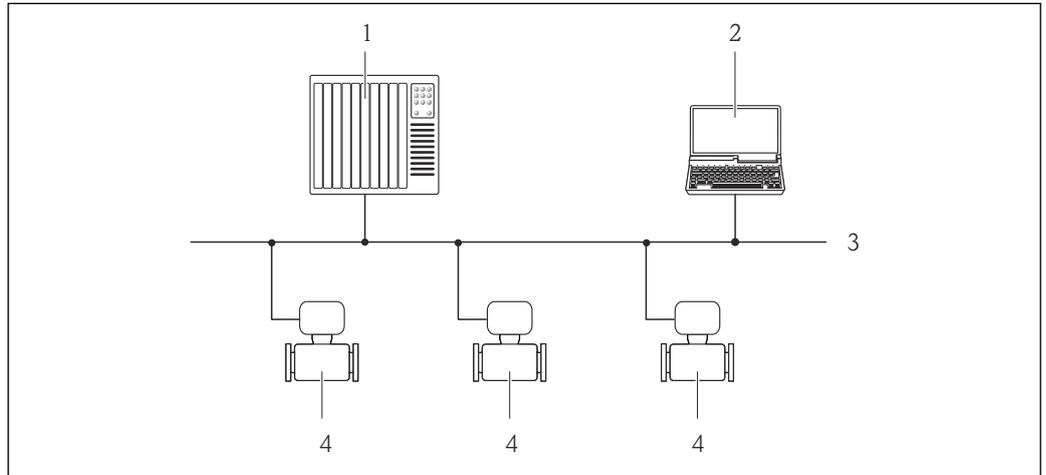
A0028747

 35 Options for remote operation via HART protocol

- 1 Control system (e.g. PLC)
- 2 Field Communicator 475
- 3 Computer with operating tool (e.g. FieldCare, AMS Device Manager, SIMATIC PDM)
- 4 Commobox FXA195 (USB)
- 5 Field Xpert SFX350 or SFX370
- 6 Field Xpert SMT70
- 7 VIATOR Bluetooth modem with connecting cable
- 8 Transmitter

Via PROFIBUS DP network

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



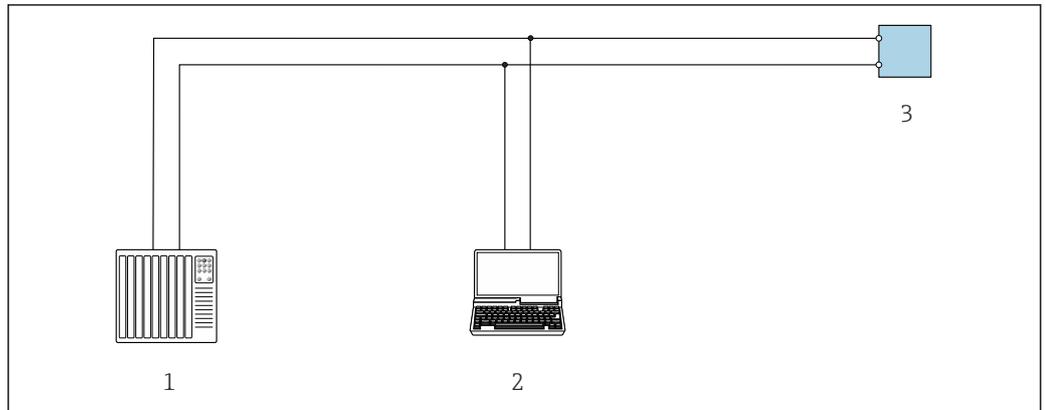
A0020903

36 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 Modbus RS485 protocol

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



A0029437

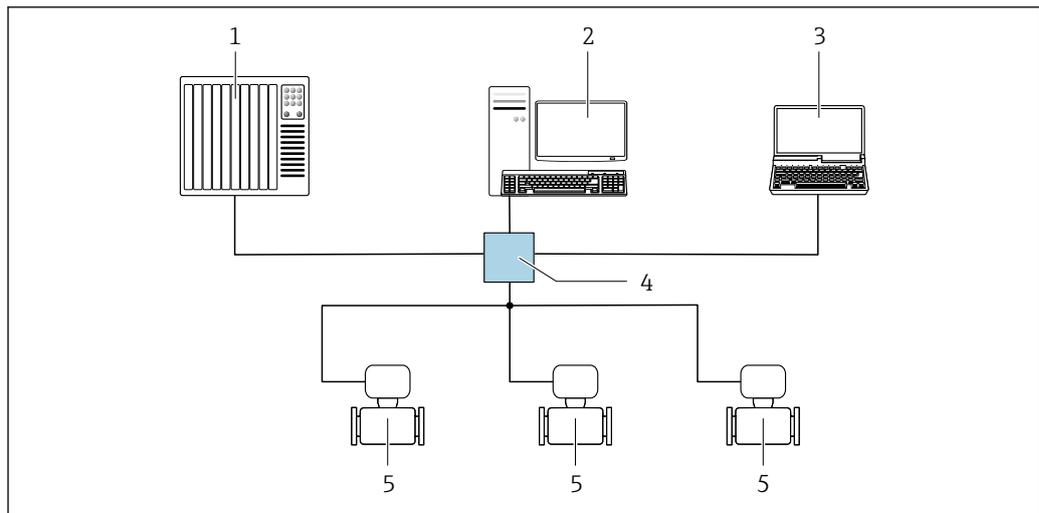
37 Options for remote operation via Modbus RS485 protocol (active)

- 1 Control system (e.g. PLC)
- 2 Computer with web browser (e.g. Microsoft Edge) to access the integrated device web server or with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 3 Transmitter

Via EtherNet/IP network

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

Star topology



A0032078

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

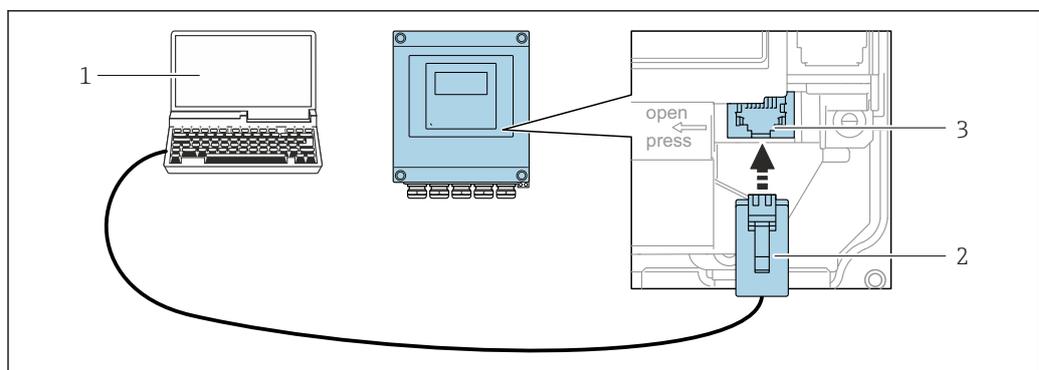
- 1 Automation system, e.g. "RSLogix" (Rockwell Automation)
- 2 Workstation for measuring device operation: with Custom Add-On Profile for "RSLogix 5000" (Rockwell Automation) or with Electronic Data Sheet (EDS)
- 3 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated Web server or computer with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP"
- 4 Standard Ethernet switch, e.g. Scalance X204 (Siemens)
- 5 Measuring device

Service interface

Via service interface (CDI-RJ45)

This communication interface is present in the following device version:

- Order code for "Output", option **H**: 4 to 20 mA HART, pulse/frequency output, switch output
- Order code for "Output", option **I**: 4 to 20 mA HART, 2 x pulse/frequency/switch output, status input
- Order code for "Output", option **J**: 4 to 20 mA HART, certified pulse output, switch output; status input
- Order code for "Output", option **L**: PROFIBUS DP
- Order code for "Output", option **M**: Modbus RS485
- Order code for "Output", option **O**: Modbus RS485, 4 to 20 mA, 2 x pulse/frequency/switch output
- Order code for "Output", option **P**: Modbus RS485, 4 to 20 mA, certified pulse output, pulse/frequency/switch output
- Order code for "Output", option **N**: Ethernet/IP



A0029163

39 Connection via service interface (CDI-RJ45)

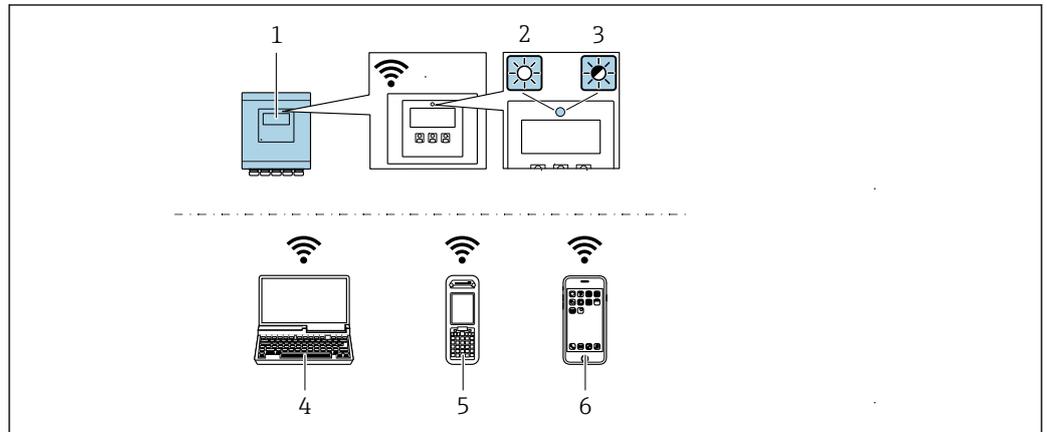
- 1 Computer with web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device web server or with operating tool "FieldCare", "DeviceCare" with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 2 Standard Ethernet connecting cable with RJ45 plug
- 3 Service interface (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", option BA "WLAN":

4-line, illuminated, graphic display; touch control + WLAN



A0043149

- 1 Transmitter with integrated WLAN antenna
- 2 LED lit constantly: WLAN reception is enabled on measuring device
- 3 LED flashing: WLAN connection established between operating unit and measuring device
- 4 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)
- 5 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)
- 6 Smart phone or tablet (e.g. Field Xpert SMT70)

| | |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Function | WLAN: IEEE 802.11 b/g (2.4 GHz) <ul style="list-style-type: none"> ■ Access Point with DHCP server (factory setting) ■ Network |
| Encryption | WPA2-PSK AES-128 (in accordance with IEEE 802.11i) |
| Configurable WLAN channels | 1 to 11 |
| Degree of protection | IP67 |
| Available antenna | Internal antenna |
| Range | Typically 10 m (32 ft) |

Supported operating tools

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

| Supported operating tools | Operating unit | Interface | Additional information |
|---------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Web browser | Notebook, PC or tablet with web browser | <ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Ethernet-based fieldbus (EtherNet/IP) | Special Documentation for device |
| DeviceCare SFE100 | Notebook, PC or tablet with Microsoft Windows system | <ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Fieldbus protocol | → 106 |
| FieldCare SFE500 | Notebook, PC or tablet with Microsoft Windows system | <ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Fieldbus protocol | → 106 |

| Supported operating tools | Operating unit | Interface | Additional information |
|---------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Field Xpert | SMT70/77/50 | <ul style="list-style-type: none"> ▪ All Fieldbus protocols ▪ WLAN interface ▪ Bluetooth ▪ CDI-RJ45 service interface | Operating Instructions BA01202S Device description files: Use update function of handheld terminal |
| SmartBlue app | Smart phone or tablet with iOS or Android | WLAN | → 📄 106 |

 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) from Rockwell Automation → www.rockwellautomation.com
- Process Device Manager (PDM) from Siemens → www.siemens.com
- Asset Management Solutions (AMS) from Emerson → www.emersonprocess.com
- FieldCommunicator 375/475 from Emerson → www.emersonprocess.com
- Field Device Manager (FDM) from Honeywell → www.process.honeywell.com
- FieldMate from Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The related device description files are available: www.endress.com → Download Area

Web server

With the integrated web server, the device can be operated and configured via a web browser and via the service interface (CDI-RJ45) or 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 displayed and can be used to monitor device health. 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", option BA "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 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 report (PDF file, only available with the **Heartbeat Verification** → 📄 104 application package)
- Flash firmware version for device firmware upgrade, for example
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package → 📄 104)

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.

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:

| | HistoROM backup | T-DAT | S-DAT |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Available data | <ul style="list-style-type: none"> ▪ Event logbook, e.g. diagnostic events ▪ Device firmware package ▪ Driver for system integration for exporting via web server, e.g.: <ul style="list-style-type: none"> ▪ GSD for PROFIBUS DP ▪ EDS for EtherNet/IP | <ul style="list-style-type: none"> ▪ Measured value logging ("Extended HistoROM" order option) ▪ Current parameter data record (used by firmware at run time) ▪ Indicator (minimum/maximum values) ▪ Totalizer value | <ul style="list-style-type: none"> ▪ Sensor data: e.g. nominal diameter ▪ Serial number ▪ Calibration data ▪ Device configuration (e.g. SW options, fixed I/O or multi I/O) |
| Storage location | Fixed on the user interface PC board in the connection compartment | Can be plugged into the user interface PC board in the connection compartment | In the sensor plug in the transmitter neck part |

Data backup

Automatically

- 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 goes into operation immediately, without any errors.
- If the sensor is replaced: Once the S-DAT has been replaced with new device data, the measuring device goes into operation immediately, without any errors.

Data transmission

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
 - EDS for EtherNet/IP

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:

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

Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Downloads**.

| | |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CE mark | <p>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.</p> <p>Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.</p> |
| UKCA marking | <p>The device meets the legal requirements of the applicable UK regulations (Statutory Instruments). These are listed in the UKCA Declaration of Conformity along with the designated standards. By selecting the order option for UKCA marking, Endress+Hauser confirms a successful evaluation and testing of the device by affixing the UKCA mark.</p> <p>Contact address Endress+Hauser UK: Endress+Hauser Ltd. Floats Road Manchester M23 9NF United Kingdom www.uk.endress.com</p> |
| RCM marking | <p>The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".</p> |
| Ex-approval | <p>The devices are certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Control Drawing" document. This is referenced on the nameplate.</p> |
| Drinking water approval | <ul style="list-style-type: none"> ▪ ACS ▪ KTW/W270 ▪ NSF 61 ▪ WRAS BS 6920 |
| HART certification | <p>HART interface</p> <p>The measuring device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ▪ Certified according to HART 7 ▪ The device can also be operated with certified devices of other manufacturers (interoperability) |
| Conformity PROFIBUS | <p>PROFIBUS interface</p> <p>The measuring device is registered with PI (PROFIBUS and PROFINET International). It meets all the requirements of PA Profile 3.02 specifications and can also be operated with certified devices of other manufacturers (interoperability).</p> |
| Modbus RS485 certification | <p>The measuring instrument meets all the requirements of the MODBUS RS485 conformity test and has the "MODBUS RS485 Conformance Test Policy, Version 2.0". The measuring instrument has successfully passed all the test procedures carried out.</p> |
| EtherNet/IP certification | <p>The measuring device is certified and registered by the ODVA (Open Device Vendor Association). The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ▪ 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) |
| Radio approval | <p>The measuring device has radio approval.</p> <p> For detailed information on the radio approval, see the Special Documentation →  107</p> |
| Measuring instrument approval | <p>The measuring device is (optionally) approved as a cold water meter (MI-001) for volume measurement in service subject to legal metrological control in accordance with the European Measuring Instruments Directive 2014/32/EU (MID).</p> <p>The measuring device is qualified according to OIML R49: 2013.</p> |

External 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
- EN 61326-1/-2-3
EMC requirements for electrical equipment for measurement, control and laboratory use
- ANSI/ISA-61010-1 (82.02.01)
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General Requirements
- CAN/CSA-C22.2 No. 61010-1-12
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General 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
- ETSI EN 300 328
Guidelines for 2.4 GHz radio components.
- EN 301489
Electromagnetic compatibility and radio spectrum matters (ERM).

Ordering information

Detailed ordering information is available from your nearest sales organization www.addresses.endress.com or in the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Configuration**.



Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: direct input of information specific to the measuring point, such as the 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.

| Cleaning | Package | Description |
|----------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Electrode cleaning circuit (ECC) | The electrode cleaning circuit (ECC) function has been developed to have a solution for applications where magnetite (Fe ₃ O ₄) deposits frequently occur (e.g. hot water). Since magnetite is highly conductive this build up leads to measuring errors and ultimately to the loss of signal. The application package is designed to avoid build-up of very conductive matter and thin layers (typical of magnetite). |

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

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

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 Promag 400 | <p>Transmitter for replacement or storage. Use the order code to define the following specifications:</p> <ul style="list-style-type: none"> ▪ Approvals ▪ Output / input ▪ Display/operation ▪ Housing ▪ Software <p> For details, see Installation Instructions EA00104D</p> | |

| | |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display guard | <p>Is used to protect the display against impact or scoring, for example from sand in desert areas.</p> <p> Order number: 71228792</p> <p> Installation Instructions EA01093D</p> |
| Weather protection cover | <p>Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight.</p> <p> Order number: 71343504</p> <p> Installation Instructions EA01191D</p> |
| Connecting cable for remote version | Coil current and electrode cables, various lengths, reinforced cables available on request. |
| Ground cable | Set, consisting of two ground cables for potential equalization. |
| Post mounting kit | Post mounting kit for transmitter. |
| Compact → Remote conversion kit | For converting a compact device version to a remote device version. |
| Conversion kit Promag 50/53 → Promag 400 | For converting a Promag with transmitter 50/53 to a Promag 400. |

For the sensor

| Accessories | Description |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ground disks | <p>Are used to ground the medium in lined measuring tubes to ensure proper measurement.</p> <p> For details, see Installation Instructions EA00070D</p> |

Communication-specific accessories

| Accessories | Description |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Commubox FXA195 HART | <p>For intrinsically safe HART communication with FieldCare via the USB interface.</p> <p> Technical Information TI00404F</p> |
| Commubox FXA291 | <p>Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop.</p> <p> Technical Information TI405C/07</p> |
| HART Loop Converter HMX50 | <p>Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values.</p> <p> <ul style="list-style-type: none"> ▪ Technical Information TI00429F ▪ Operating Instructions BA00371F </p> |
| Wireless HART adapter SWA70 | <p>Is used for the wireless connection of field devices. The WirelessHART adapter can be easily integrated into field devices and existing infrastructures, offers data protection and transmission safety and can be operated in parallel with other wireless networks with minimum cabling complexity.</p> <p> Operating Instructions BA00061S</p> |
| Fieldgate FXA42 | <p>Is used to transmit the measured values of connected 4 to 20 mA analog measuring devices, as well as digital measuring devices</p> <p> <ul style="list-style-type: none"> ▪ Technical Information TI01297S ▪ Operating Instructions BA01778S ▪ Product page: www.endress.com/fxa42 </p> |

| | |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Field Xpert SMT50 | <p>The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress.</p> <p>This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle.</p>  <ul style="list-style-type: none"> ▪ Technical Information TI01342S ▪ Operating Instructions BA01709S ▪ Product page: www.endress.com/smt50 |
| Field Xpert SMT70 | <p>The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in hazardous and non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress.</p> <p>This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle.</p>  <ul style="list-style-type: none"> ▪ Technical Information TI01342S ▪ Operating Instructions BA01709S ▪ Product page: www.endress.com/smt70 |
| Field Xpert SMT77 | <p>The Field Xpert SMT77 tablet PC for device configuration enables mobile plant asset management in areas categorized as Ex Zone 1.</p>  <ul style="list-style-type: none"> ▪ Technical Information TI01418S ▪ Operating Instructions BA01923S ▪ Product page: www.endress.com/smt77 |

Service-specific accessories

| Accessory | Description |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicator | <p>Software for selecting and sizing Endress+Hauser measuring devices:</p> <ul style="list-style-type: none"> ▪ Choice of measuring devices with 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. <p>Applicator is available:</p> <ul style="list-style-type: none"> ▪ Via the Internet: https://portal.endress.com/webapp/applicator ▪ As a downloadable DVD for local PC installation. |
| W@M | <p>W@M Life Cycle Management</p> <p>Improved productivity with information at your fingertips. Data relevant to a plant and its components is generated from the first stages of planning and during the asset's complete life cycle.</p> <p>W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access for your staff to current, in-depth data shortens your plant's engineering time, speeds up procurement processes and increases plant uptime.</p> <p>Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, see: www.endress.com/lifecyclemanagement</p> |
| FieldCare | <p>FDT-based plant asset management tool from Endress+Hauser.</p> <p>It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.</p>  <p>Operating Instructions BA00027S and BA00059S</p> |
| DeviceCare | <p>Tool for connecting and configuring Endress+Hauser field devices.</p>  <p>Innovation brochure IN01047S</p> |
| Commubox FXA291 | <p>Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop.</p>  <p>Technical Information TI00405C</p> |

System components

| Accessories | Description |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Memograph M graphic data manager | <p>The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick.</p> <ul style="list-style-type: none">  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 the nameplate
 - *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the matrix code on the nameplate

Standard documentation

Brief Operating Instructions

Brief Operating Instructions for the sensor

| Measuring device | Documentation code |
|------------------|--------------------|
| Proline Promag W | KA01266D |

Transmitter Brief Operating Instructions

| Measuring device | Documentation code | | | |
|------------------|--------------------|-------------|--------------|-------------|
| | HART | PROFIBUS DP | Modbus RS485 | EtherNet/IP |
| Proline 400 | KA01263D | KA01420D | KA01419D | KA01418D |

Operating Instructions

| Measuring device | Documentation code | | | |
|------------------|--------------------|-------------|--------------|-------------|
| | HART | PROFIBUS DP | Modbus RS485 | EtherNet/IP |
| Promag W 400 | BA01063D | BA01234D | BA01231D | BA01214D |

Description of device parameters

| Measuring device | Documentation code | | | |
|------------------|--------------------|-------------|--------------|-------------|
| | HART | PROFIBUS DP | Modbus RS485 | EtherNet/IP |
| Promag 400 | GP01043D | GP01044D | GP01045D | GP01046D |

Supplementary device-dependent documentation

Special Documentation

| Content | Documentation code |
|---------------------------------------------|--------------------|
| Display modules A309/A310 | SD01793D |
| Information on Custody Transfer Measurement | SD02038D |
| Information on Custody Transfer Measurement | SD02561D |

| Content | Documentation code | | | |
|-------------------------------------|--------------------|-------------|--------------|-------------|
| | HART | PROFIBUS DP | Modbus RS485 | EtherNet/IP |
| Web server | SD01811D | SD01813D | SD01812D | SD01814D |
| Heartbeat Verification + Monitoring | SD01847D | SD02569D | SD02568D | SD02570D |

Installation Instructions

| Content | Comment |
|---------------------------------------------------------------|--------------------------------------------------------------------|
| Installation instructions for spare part sets and accessories | Documentation code: specified for each individual accessory → 104. |

Registered trademarks

HART®

Registered trademark of the FieldComm Group, Austin, USA

PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

Modbus®

Registered trademark of SCHNEIDER AUTOMATION, INC.

EtherNet/IP™

Trademark of ODVA, Inc.



www.addresses.endress.com