



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Technical Information

# Proline Promag 10W

## Electromagnetic Flow Measuring System

Flow measurement of liquids in water or wastewater applications



### Application

Electromagnetic flowmeter for bidirectional measurement of liquids with a minimum conductivity of  $\geq 50 \mu\text{S}/\text{cm}$ :

- Drinking water
- Wastewater
- Sewage sludge
- Flow measurement up to  $110000 \text{ m}^3/\text{h}$  (484315 gal/min)
- Fluid temperature up to  $+80^\circ\text{C}$  ( $176^\circ\text{F}$ )
- Process pressures up to 40 bar (580 psi)
- Lengths in accordance with DVGW/ISO

Application-specific lining materials:

- Polyurethane
- Hard rubber

Lined measuring pipes with materials approved for drinking water:

- KTW
- WRAS
- NSF
- ACS

### Your benefits

Promag measuring devices offer you cost-effective flow measurement with a high degree of accuracy for a wide range of process conditions.

The uniform Proline transmitter concept comprises:

- High degree of reliability and measuring stability
- Uniform operating concept

The tried-and-tested Promag sensors offer:

- No pressure loss
- Not sensitive to vibrations
- Simple installation and commissioning

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## Function and system design

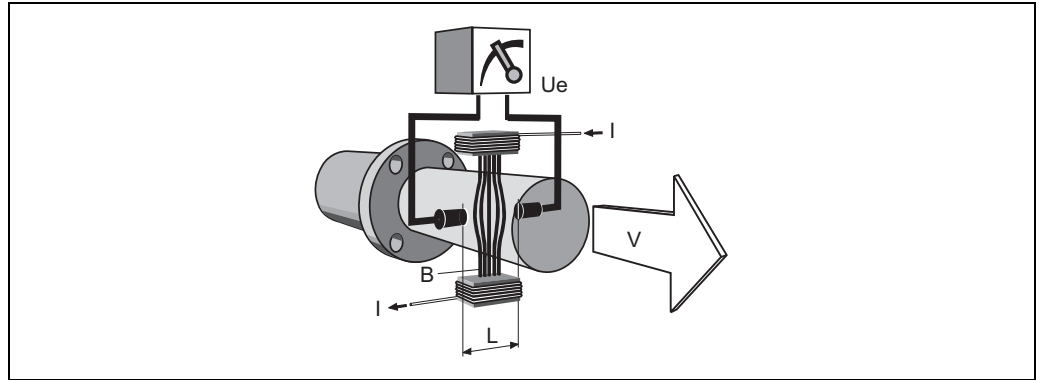
### Measuring principle

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

In the electromagnetic measuring principle, the flowing medium is the moving conductor.

The voltage induced is proportional to the flow velocity and is supplied to the amplifier by means of two measuring electrodes. The flow volume is calculated by means of the pipe cross-sectional area.

The DC magnetic field is created through a switched direct current of alternating polarity.



$$U_e = B \cdot L \cdot v$$

$$Q = A \cdot v$$

$U_e$  Induced voltage

$B$  Magnetic induction (magnetic field)

$L$  Electrode spacing

$v$  Flow velocity

$Q$  Volume flow

$A$  Pipe cross-section

$I$  Current strength

### Measuring system

The measuring system consists of a transmitter and a sensor.

Two versions are available:

- Compact version: Transmitter and sensor form a mechanical unit.
- Remote version: Sensor is mounted separate from the transmitter.

Transmitter:

- Promag 10 (key operation, two-line, unilluminated display)

Sensor:

- Promag W  
DN 25 to 2000 (1 to 78")

## Input

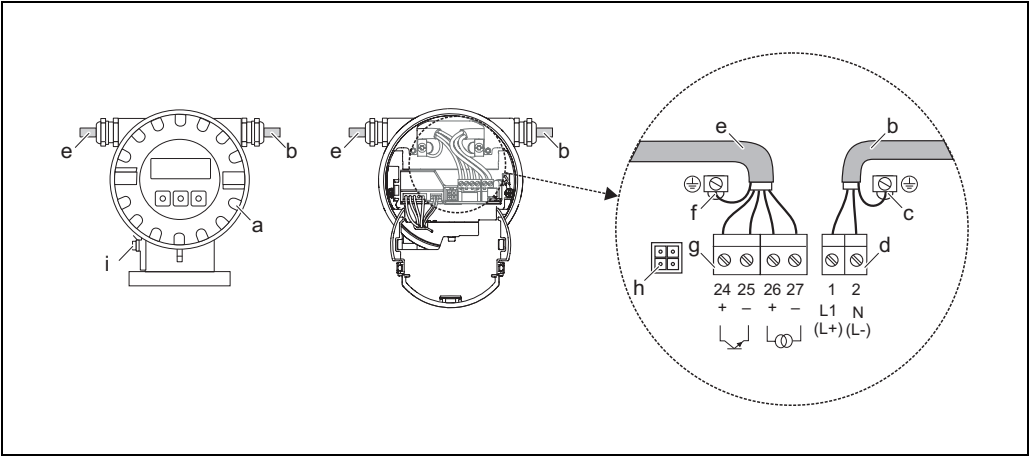
|                            |                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------|
| <b>Measured variable</b>   | Flow velocity (proportional to induced voltage)                                      |
| <b>Measuring ranges</b>    | Typically $v = 0.01$ to $10$ m/s ( $0.033$ to $33$ ft/s) with the specified accuracy |
| <b>Operable flow range</b> | Over $1000 : 1$                                                                      |

## Output

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Output signal</b>      | <p><b>Current output</b></p> <ul style="list-style-type: none"> <li>■ Galvanically isolated</li> <li>■ Active: <math>4</math> to <math>20</math> mA, <math>R_L &lt; 700\ \Omega</math> (for HART: <math>R_L \geq 250\ \Omega</math>)</li> <li>■ Full scale value adjustable</li> <li>■ Temperature coefficient: typ. <math>2\ \mu\text{A}/^\circ\text{C}</math>, resolution: <math>1.5\ \mu\text{A}</math></li> </ul> <p><b>Pulse/status output</b></p> <ul style="list-style-type: none"> <li>■ Galvanically isolated</li> <li>■ Passive: <math>30\ \text{V DC} / 250\ \text{mA}</math></li> <li>■ Open collector</li> <li>■ Can be configured as: <ul style="list-style-type: none"> <li>– Pulse output<br/>Pulse value and pulse polarity can be selected, max. pulse width adjustable (<math>5</math> to <math>2000\ \text{ms}</math>), pulse frequency max. <math>100\ \text{Hz}</math></li> <li>– Status output<br/>For example, can be configured for error messages, empty pipe detection, flow recognition, limit value</li> </ul> </li> </ul> |
| <b>Signal on alarm</b>    | <p><b>Current output</b></p> <p>Failsafe mode can be selected (e.g. in accordance with NAMUR Recommendation NE 43)</p> <p><b>Pulse output</b></p> <p>Failsafe mode can be selected</p> <p><b>Status output</b></p> <p>"Not conductive" in the event of fault or power supply failure</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Load</b>               | See "Output signal"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Low flow</b>           | Low flow cutoff, switch-on point can be selected as required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Galvanic isolation</b> | All circuits for inputs, outputs and power supply are galvanically isolated from each other.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Power supply

### Electrical connection, measuring unit



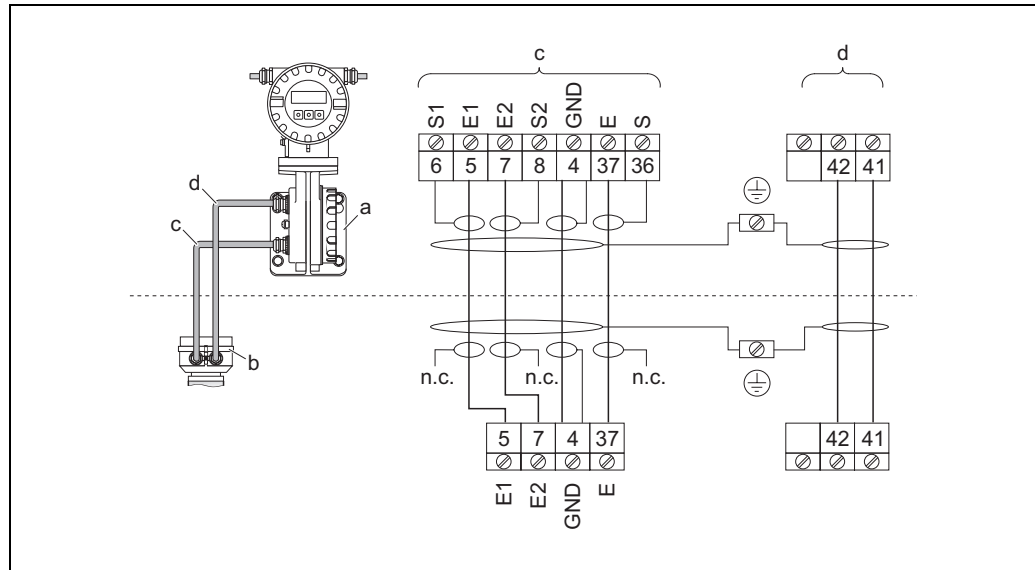
Connecting the transmitter (aluminum field housing), cable cross-section max. 2.5 mm<sup>2</sup> (14 AWG)

- a Electronics compartment cover
- b Power supply cable
- c Ground terminal for power supply cable
- d Terminal connector for power supply cable
- e Signal cable
- f Ground terminal for signal cable
- g Terminal connector for signal cable
- h Service connector for connecting service interface FXA 193 (Fieldcheck, FieldCare)
- i Ground terminal for potential equalization

### Electrical connection, terminal assignment

| Order version     | Terminal No.        |        |                     |        |                      |          |
|-------------------|---------------------|--------|---------------------|--------|----------------------|----------|
|                   | 24 (+)              | 25 (–) | 26 (+)              | 27 (–) | 1 (L1/L+)            | 2 (N/L–) |
| 10***_*****A      | Pulse/status output |        | HART current output |        | Power supply         |          |
| Functional values | See “Output signal” |        |                     |        | See “Supply voltage” |          |

## Electrical connection, remote version



A0012461

### Connecting the remote version

- a Wall-mount housing connection compartment
- b Sensor connection housing cover
- c Signal cable
- d Coil current cable
- n.c. Not connected, insulated cable shields

### Cable colors/numbers for terminals:

5/6 = brown; 7/8 = white; 4 = green; 37/36 = yellow

- Supply voltage (power supply)**
- 85 to 250 V AC, 45 to 65 Hz
  - 20 to 28 V AC, 45 to 65 Hz, 11 to 40 V DC

## Cable entry

### Power supply and signal cables (inputs/outputs):

- Cable entry M20 × 1.5 (8 to 12 mm / 0.31 to 0.47")
- Thread for cable entries, ½" NPT, G ½"

### Connecting cable for remote version:

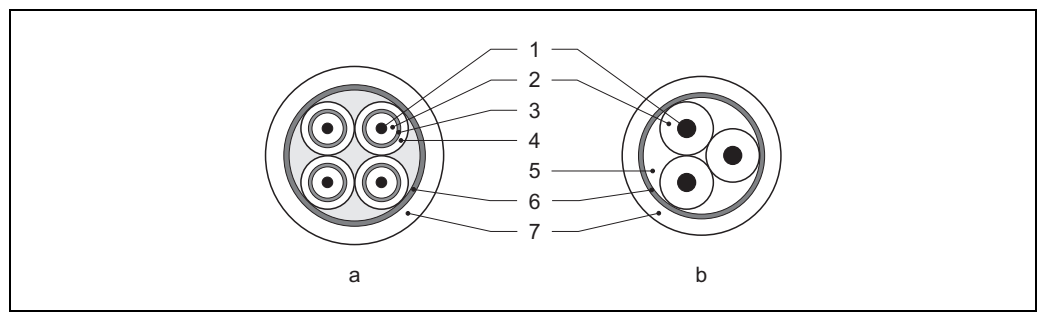
- Cable entry M20 × 1.5 (8 to 12 mm / 0.31 to 0.47")
- Thread for cable entries, ½" NPT, G ½"

**Remote version cable specifications****Coil cable**

- $2 \times 0.75 \text{ mm}^2$  (18 AWG) PVC cable with common, braided copper shield ( $\varnothing \sim 7 \text{ mm} / 0.28''$ )
- Conductor resistance:  $\leq 37 \text{ } \Omega/\text{km}$  ( $\leq 0.011 \text{ } \Omega/\text{ft}$ )
- Capacitance core/core, shield grounded:  $\leq 120 \text{ pF/m}$  ( $\leq 37 \text{ pF/ft}$ )
- Operating temperature:  $-20$  to  $+80 \text{ }^\circ\text{C}$  ( $-4$  to  $+176 \text{ }^\circ\text{F}$ )
- Cable cross-section: max.  $2.5 \text{ mm}^2$  (16 AWG)
- Test voltage for cable insulation:  $\geq 1433 \text{ V AC r.m.s. } 50/60 \text{ Hz}$  or  $\geq 2026 \text{ V DC}$

**Signal cable**

- $3 \times 0.38 \text{ mm}^2$  (20 AWG) PVC cable with common, braided copper shield ( $\varnothing \sim 7 \text{ mm} / 0.28''$ ) and individual shielded cores
- Conductor resistance:  $\leq 50 \text{ } \Omega/\text{km}$  ( $\leq 0.015 \text{ } \Omega/\text{ft}$ )
- Capacitance core/shield:  $\leq 420 \text{ pF/m}$  ( $\leq 128 \text{ pF/ft}$ )
- Operating temperature:  $-20$  to  $+80 \text{ }^\circ\text{C}$  ( $-4$  to  $+176 \text{ }^\circ\text{F}$ )
- Cable cross-section: max.  $2.5 \text{ mm}^2$  (16 AWG)



A0003194

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

**Operation in zones of severe electrical interference**

The measuring device complies with the general safety requirements in accordance with EN 61010-1, the EMC requirements of IEC/EN 61326 and NAMUR Recommendation NE 21.

**Caution!**

Grounding is by means of the ground terminals provided for the purpose inside the connection housing. Ensure that the stripped and twisted lengths of cable shield to the ground terminal are as short as possible.

**Power consumption****Power consumption**

- 85 to 250 V AC:  $< 12 \text{ VA}$  (incl. sensor)
- 20 to 28 V AC:  $< 8 \text{ VA}$  (incl. sensor)
- 11 to 40 V DC:  $< 6 \text{ W}$  (incl. sensor)

**Switch-on current**

- Max.  $16 \text{ A}$  ( $< 5 \text{ ms}$ ) for 250 V AC
- Max.  $5.5 \text{ A}$  ( $< 5 \text{ ms}$ ) for 28 V AC
- Max.  $3.3 \text{ A}$  ( $< 5 \text{ ms}$ ) for 24 V DC

**Power supply failure**

Lasting min.  $\frac{1}{2}$  cycle frequency: EEPROM saves measuring system data

## Potential equalization



### Warning!

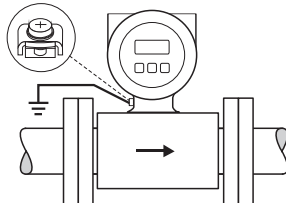
The measuring system must be included in the potential equalization.

Perfect measurement is only ensured when the fluid and the sensor have the same electrical potential. This is ensured by the reference electrode integrated in the sensor as standard.

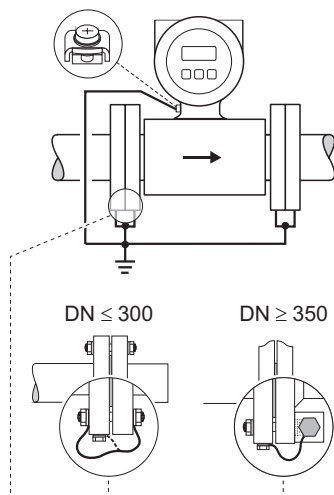
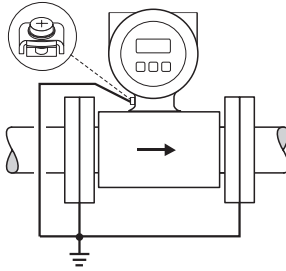
The following should also be taken into consideration for potential equalization:

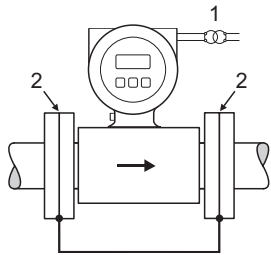
- Internal grounding concepts in the company
- Operating conditions, such as the material/grounding of the pipes (see table)

### Standard situation

| Operating conditions                                                                                                                                                                                                                                                                                                                                                                                                                           | Potential equalization                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>When using the measuring device in a:</p> <ul style="list-style-type: none"> <li>■ Metal, grounded pipe</li> </ul> <p>Potential equalization takes place via the ground terminal of the transmitter.</p> <p> <b>Note!</b><br/>When installing in metal pipes, we recommend you connect the ground terminal of the transmitter housing with the piping.</p> |  <p style="text-align: right;">A0010831</p> <p><i>Via the ground terminal of the transmitter</i></p> |

### Special situations

| Operating conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Potential equalization                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>When using the measuring device in a:</p> <ul style="list-style-type: none"> <li>■ Metal pipe that is not grounded</li> </ul> <p>This connection method also applies in situations where:</p> <ul style="list-style-type: none"> <li>■ Customary potential equalization cannot be ensured.</li> <li>■ Excessively high equalizing currents can be expected.</li> </ul> <p>Both sensor flanges are connected to the pipe flange by means of a ground cable (copper wire, at least 6 mm<sup>2</sup> / 0.0093 in<sup>2</sup>) and grounded. Connect the transmitter or sensor connection housing, as applicable, to ground potential by means of the ground terminal provided for the purpose.</p> <p>Ground cable installation depends on the nominal diameter:</p> <ul style="list-style-type: none"> <li>■ DN ≤ 300 (12"): The ground cable is mounted directly on the conductive flange coating with the flange screws.</li> <li>■ DN ≥ 350 (14"): The ground cable is mounted directly on the metal transport bracket.</li> </ul> <p> <b>Note!</b><br/>The ground cable for flange-to-flange connections can be ordered separately as an accessory from Endress+Hauser.</p> |  <p style="text-align: right;">A0010832</p> <p><i>Via the ground terminal of the transmitter and the flanges of the pipe</i></p>               |
| <p>When using the measuring device in a:</p> <ul style="list-style-type: none"> <li>■ Plastic pipe</li> <li>■ Pipe with insulating lining</li> </ul> <p>This connection method also applies in situations where:</p> <ul style="list-style-type: none"> <li>■ Customary potential equalization cannot be ensured.</li> <li>■ Excessively high equalizing currents can be expected.</li> </ul> <p>Potential equalization takes place using additional ground disks, which are connected to the ground terminal via a ground cable (copper wire, at least 6 mm<sup>2</sup> / 0.0093 in<sup>2</sup>). When installing the ground disks, please comply with the enclosed Installation Instructions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  <p style="text-align: right;">A0010833</p> <p><i>Via the ground terminal of the transmitter and the optionally available ground disks</i></p> |

| Operating conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Potential equalization                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>When using the measuring device in a:</p> <ul style="list-style-type: none"><li>■ Pipe with a cathodic protection unit</li></ul> <p>The device is installed potential-free in the pipe.<br/>Only the two flanges of the pipe are connected with a ground cable (copper wire, at least 6 mm<sup>2</sup> / 0.0093 in<sup>2</sup>). Here, the ground cable is mounted directly on the conductive flange coating with flange screws.</p> <p>Note the following when installing:</p> <ul style="list-style-type: none"><li>■ The applicable regulations regarding potential-free installation must be observed.</li><li>■ There should be <b>no</b> electrically conductive connection between the pipe and the device.</li><li>■ The mounting material must withstand the applicable torques.</li></ul> |  <p><i>Potential equalization and cathodic protection</i></p> <p>1 Power supply isolation transformer<br/>2 Electrically isolated</p> |

## Performance characteristics

### Reference operating conditions

- As per DIN EN 29104 and VDI/VDE 2641:**
- Fluid temperature: +28 °C ± 2 K (+82 °F ± 2 K)
  - Ambient temperature: +22 °C ± 2 K (+72 °F ± 2 K)
  - Warm-up period: 30 minutes

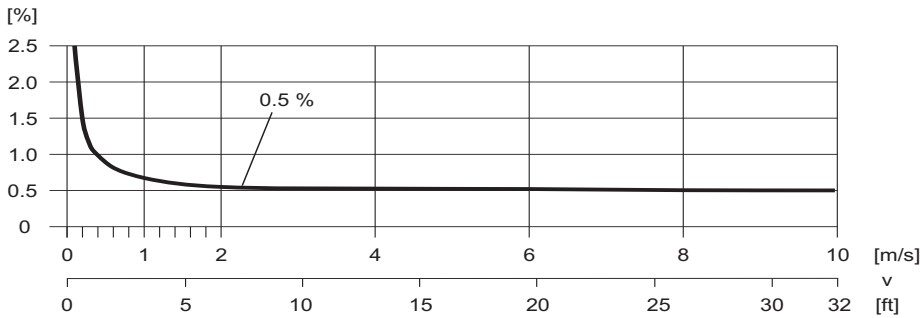
**Installation conditions:**

- Inlet run > 10 × DN
- Outlet run > 5 × DN
- Sensor and transmitter grounded.
- The sensor is centered in the pipe.

### Maximum measured error

- Current output: also typically ± 5 µA
- Pulse output: ±0.5% o.r. ± 2 mm/s (±0.5% o.r. ± 0.08 in/s) (o.r. = of reading)

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



Max. measured error in % of reading

### Repeatability

Max. ±0.2% o.r. ± 2 mm/s (±0.2% o.r. ± 0.08 in/s) (o.r. = of reading)

## Operating conditions: Installations

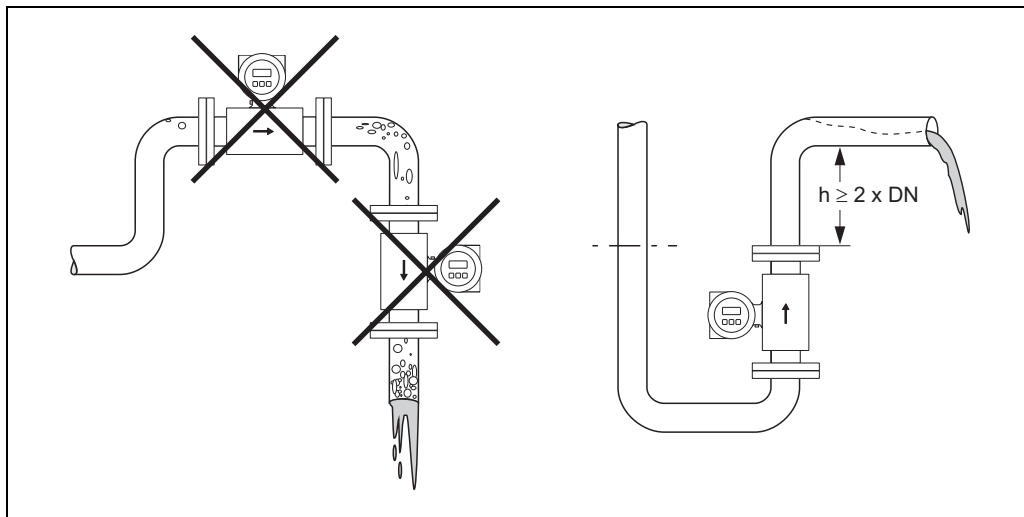
### Installation instructions

#### Mounting location

Entrained air or gas bubble formation in the measuring tube can result in an increase in measuring errors.

**Avoid** the following installation locations in the pipe:

- Highest point of a pipeline. Risk of air accumulating!
- Directly upstream from a free pipe outlet in a vertical pipeline.



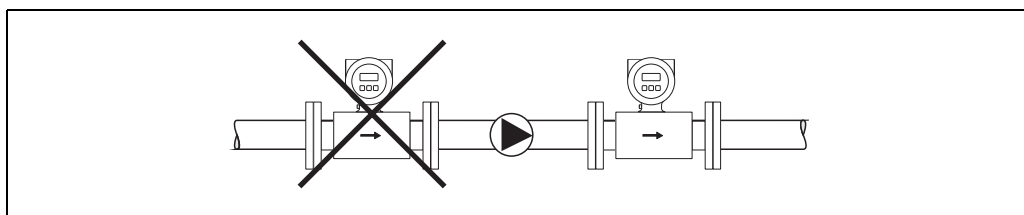
A0003202

Mounting location

#### Installation of pumps

Sensors may not be installed on the pump suction side. This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube. Information on the pressure tightness of the measuring tube lining → 17, Section "Pressure tightness".

Pulsation dampers may be needed when using piston pumps, piston diaphragm pumps or hose pumps. Information on the shock and vibration resistance of the measuring system → 16, Section "Shock and vibration resistance".



A0003203

Installation of pumps

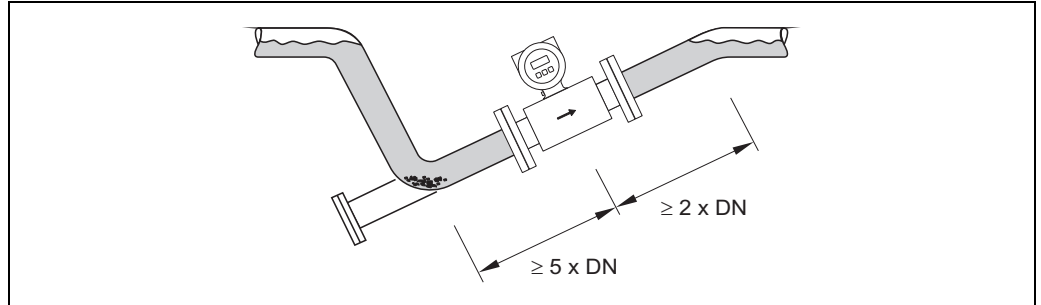
**Partially filled pipes**

Partially filled pipes with gradients necessitate a drain-type configuration.

The empty pipe detection function (EPD) provides additional security in detecting empty or partially filled pipes.

**Caution!**

Risk of solids accumulating. Do not install the sensor at the lowest point in the drain. It is advisable to install a cleaning valve.

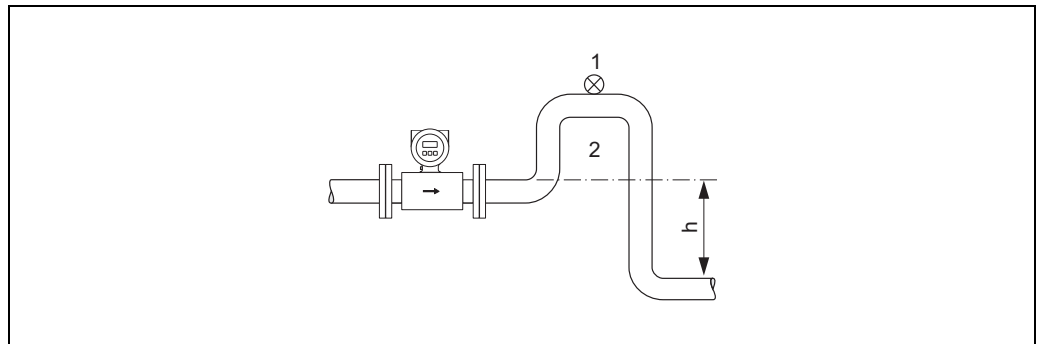


A0003204

*Installation with partially filled pipes*

**Down pipes**

Install a siphon or a vent valve downstream of the sensor in down pipes  $h \geq 5 \text{ m}$  (16.4 ft). This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube. This measure also prevents the liquid current stopping in the pipe which could cause air locks. Information on the pressure tightness of the measuring tube lining → 17, Section "Pressure tightness".



A0008157

*Installation measures for vertical pipes*

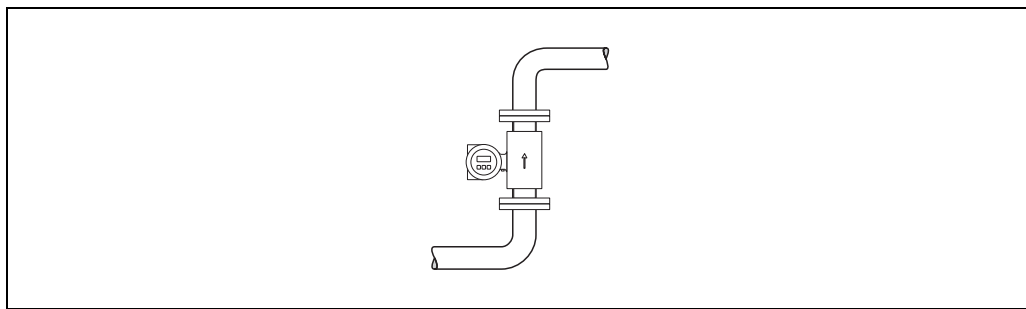
- 1 Vent valve
- 2 Pipe siphon
- h Length of the down pipe

## Orientation

An optimum orientation helps avoid gas and air accumulations and deposits in the measuring tube. However, the measuring device also offers the additional function of empty pipe detection (EPD) for detecting partially filled measuring tubes or if outgassing fluids or fluctuating operating pressures are present.

### Vertical orientation

This is the ideal orientation for self-emptying piping systems and for use in conjunction with empty pipe detection.



A0008156

Vertical orientation

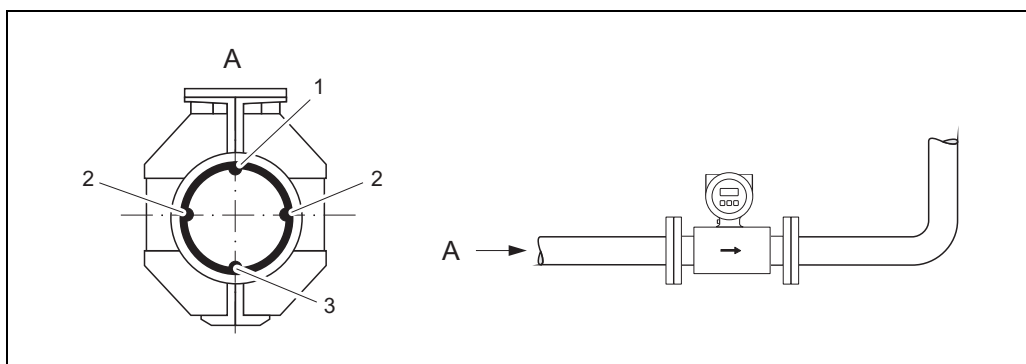
### Horizontal orientation

The measuring electrode axis should be horizontal. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.



#### Caution!

Empty pipe detection only works correctly with horizontal orientation if the transmitter housing is facing upwards. Otherwise there is no guarantee that empty pipe detection will respond if the measuring tube is only partially filled or empty.



A0003207

Horizontal orientation

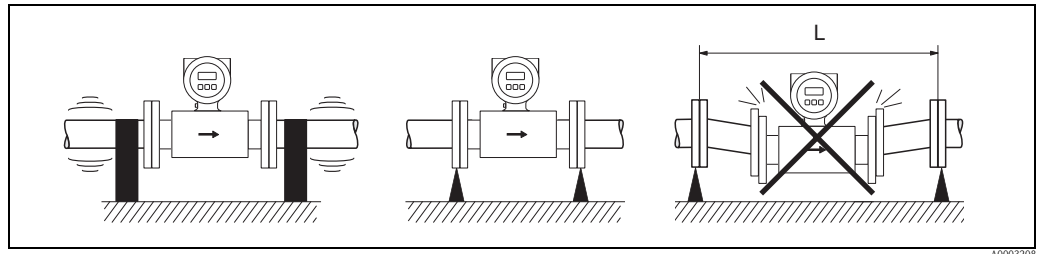
- 1 EPD electrode for empty pipe detection
- 2 Measuring electrodes for signal detection
- 3 Reference electrode for potential equalization

**Vibrations**

Secure the piping and the sensor if vibration is severe.

**Caution!**

If vibrations are too severe, we recommend the sensor and transmitter be mounted separately. Information on the permitted shock and vibration resistance → 16, Section "Shock and vibration resistance".



Measures to prevent vibration of the measuring device

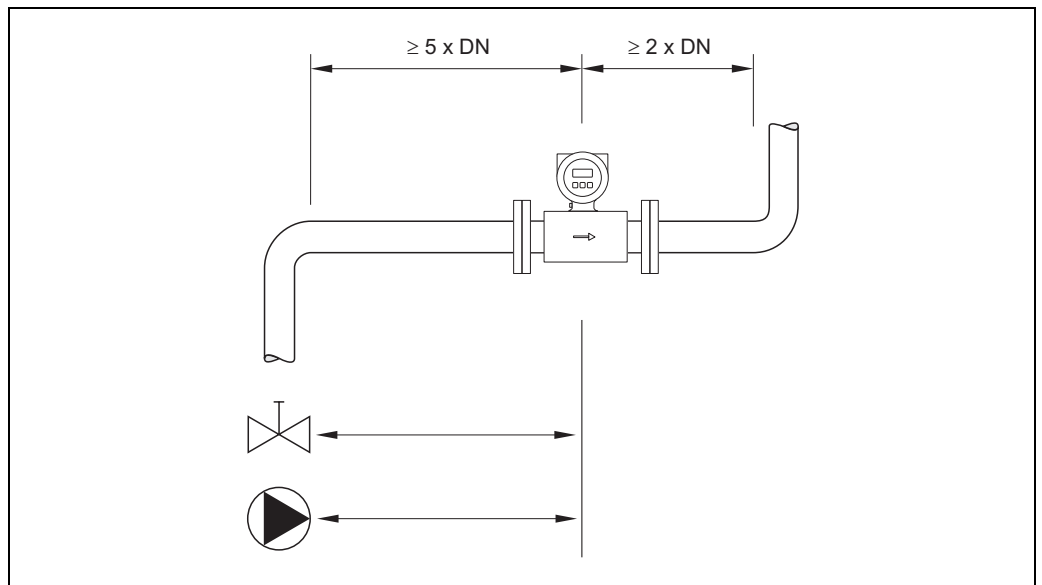
$L > 10\text{ m (33 ft)}$

**Inlet and outlet run**

If possible, install the sensor well clear of assemblies such as valves, T-pieces, elbows etc.

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

- Inlet run:  $\geq 5 \times \text{DN}$
- Outlet run:  $\geq 2 \times \text{DN}$



Inlet and outlet run

## Adapters

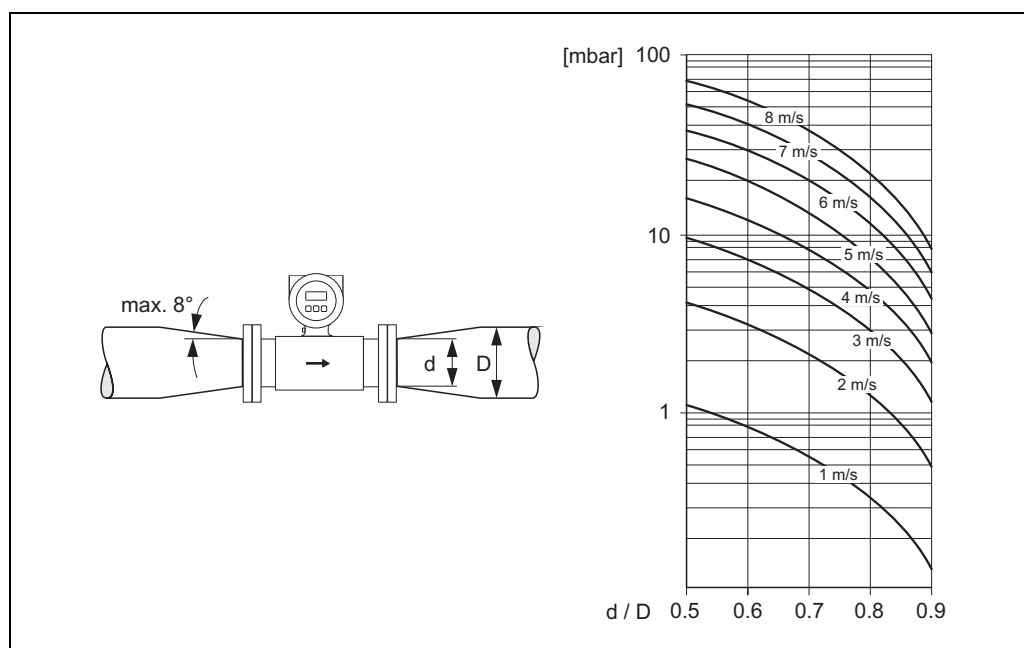
Suitable adapters to DIN EN 545 (double-flange reducers) can be used to install the sensor in larger-diameter pipes. The resultant increase in the rate of flow improves measuring accuracy with very slow-moving fluids. The nomogram shown here can be used to calculate the pressure loss caused by reducers and expanders.



Note!

The nomogram only applies to liquids of viscosity similar to water.

1. Calculate the ratio of the diameters  $d/D$ .
2. From the nomogram read off the pressure loss as a function of flow velocity (downstream from the reduction) and the  $d/D$  ratio.



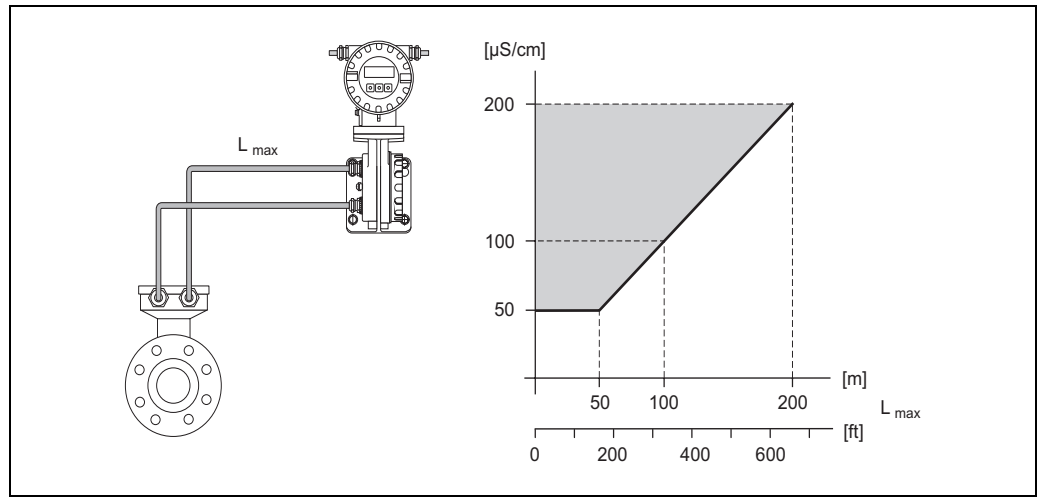
A0003213

Pressure loss due to adapters

**Length of connecting cable**

When mounting the remote version, please note the following to achieve correct measuring results:

- Fix cable run or lay in armored conduit. Cable movements can falsify the measuring signal especially in the case of low fluid conductivities.
- Route the cable well clear of electrical machines and switching elements.
- If necessary, ensure potential equalization between sensor and transmitter.
- The permitted cable length  $L_{\max}$  is determined by the fluid conductivity. A minimum conductivity of  $50 \mu\text{S}/\text{cm}$  is needed for all fluids.
- When the empty pipe detection function is switched on (EPD), the maximum connecting cable length is 10 m (33 ft).



*Permitted length of connecting cable for remote version*

*Area marked in gray = permitted range;  $L_{\max}$  = length of connecting cable in [m] ([ft]); fluid conductivity in [ $\mu\text{S}/\text{cm}$ ]*

A0003214

## Operating conditions: Environment

### Ambient temperature range

#### Transmitter

- -20 to +60 °C (-4 to +140 °F)

#### Sensor

- Flange material carbon steel: -10 to +60 °C (+14 to +140 °F)
- Flange material stainless steel: -40 to +60 °C (-40 to +140 °F)



#### Caution!

The permitted temperature range of the measuring tube lining may not be undershot or overshot (→ 17, Section "Medium temperature range").

Please note the following points:

- Install the device in a shady location. Avoid direct sunlight, particularly in warm climatic regions.
- The transmitter must be mounted separate from the sensor if both the ambient and fluid temperatures are high.

### Storage temperature

The storage temperature corresponds to the operating temperature range of the measuring transmitter and the appropriate measuring sensors.



#### Caution!

- The measuring device must be protected against direct sunlight during storage in order to avoid unacceptably high surface temperatures.
- A storage location must be selected where moisture does not collect in the measuring device. This will help prevent fungus and bacteria infestation which can damage the liner.

### Degree of protection

- Standard: IP 67 (NEMA 4X) for transmitter and sensor.
- Optional: IP 68 (NEMA 6P) for sensor for remote version.
- For information regarding applications where the device is buried directly in the soil or is installed in a flooded wastewater basin please contact your local Endress+Hauser Sales Center.

### Shock and vibration resistance

Acceleration up to 2 g following IEC 600 68-2-6

### Electromagnetic compatibility (EMC)

- As per IEC/EN 61326 as well as NAMUR Recommendation NE 21
- Emission: to limit value for industry EN 55011

## Operating conditions: Process

### Medium temperature range

The permitted temperature depends on the measuring tube lining:

- Polyurethane: -20 to +50 °C (-4 to +122 °F) (DN 25 to 1200 / 1 to 48")
- Hard rubber: 0 to +80 °C (+32 to +176 °F) (DN 50 to 2000 / 2 to 78")

### Conductivity



The minimum conductivity is:  $\geq 50 \mu\text{S}/\text{cm}$

Note!

In the remote version, the necessary minimum conductivity also depends on the cable length  
(→ 15, Section "Length of connecting cable").

### Medium pressure range (nominal pressure)

- EN 1092-1 (DIN 2501)
  - PN 6 (DN 350 to 2000 / 14 to 78")
  - PN 10 (DN 200 to 2000 / 8 to 78")
  - PN 16 (DN 65 to 2000 / 3 to 78")
  - PN 25 (DN 200 to 1000 / 8 to 40")
  - PN 40 (DN 25 to 150 / 1 to 6")
- ANSI B 16.5
  - Class 150 (DN 25 to 600 / 1 to 24")
  - Class 300 (DN 25 to 150 / 1 to 6")
- AWWA
  - Class D (DN 700 to 2000 / 28 to 78")
- JIS B2220
  - 10 K (DN 50 to 300 / 2 to 12")
  - 20 K (DN 25 to 300 / 1 to 12")
- AS 2129
  - Table E (DN 80, 100, 150 to 1200 / 3", 4", 6 to 48")
- AS 4087
  - PN 16 (DN 80, 100, 150 to 1200 / 3", 4", 6 to 48")

### Pressure tightness

*Measuring tube lining: Polyurethane*

| Nominal diameter |          | Limit values for abs. pressure [mbar] ([psi]) at fluid temperatures: |       |                |       |
|------------------|----------|----------------------------------------------------------------------|-------|----------------|-------|
| [mm]             | [inch]   | 25 °C (77 °F)                                                        |       | 50 °C (122 °F) |       |
|                  |          | [mbar]                                                               | [psi] | [mbar]         | [psi] |
| 25 to 1200       | 1 to 48" | 0                                                                    | 0     | 0              | 0     |

*Measuring tube lining: Hard rubber*

| Nominal diameter |          | Limit values for abs. pressure [mbar] ([psi]) at fluid temperatures: |       |                |       |                |       |
|------------------|----------|----------------------------------------------------------------------|-------|----------------|-------|----------------|-------|
| [mm]             | [inch]   | 25 °C (77 °F)                                                        |       | 70 °C (158 °F) |       | 80 °C (176 °F) |       |
|                  |          | [mbar]                                                               | [psi] | [mbar]         | [psi] | [mbar]         | [psi] |
| 50 to 2000       | 2 to 78" | 0                                                                    | 0     | 0              | 0     | 0              | 0     |

**Limiting flow**

The diameter of the pipe and the flow rate determine the nominal diameter of the sensor.

The optimum flow velocity is between 2 to 3 m/s (6.5 to 9.8 ft/s). The velocity of flow (v), moreover, has to be matched to the physical properties of the fluid:

- $v < 2$  m/s (6.5 ft/s): for abrasive fluids such as potter's clay, lime milk, ore slurry etc.
- $v > 2$  m/s (6.5 ft/s): for fluids causing build-up such as wastewater sludges etc.

| Flow characteristic values (SI units) |        |                                  |                                       |                       |                         |
|---------------------------------------|--------|----------------------------------|---------------------------------------|-----------------------|-------------------------|
| Diameter                              |        | Recommended flow                 | Factory settings                      |                       |                         |
|                                       |        | Min./max. full scale value       | Full scale value                      | Pulse value           | Low flow                |
| [mm]                                  | [inch] | ( $v \sim 0.3$ or $10$ m/s)      | Current output<br>( $v \sim 2.5$ m/s) | ( $\sim 2$ pulses/s)  | ( $v \sim 0.04$ m/s)    |
| 25                                    | 1"     | 9 to 300 dm <sup>3</sup> /min    | 75 dm <sup>3</sup> /min               | 0.50 dm <sup>3</sup>  | 1 dm <sup>3</sup> /min  |
| 32                                    | –      | 15 to 500 dm <sup>3</sup> /min   | 125 dm <sup>3</sup> /min              | 1.00 dm <sup>3</sup>  | 2 dm <sup>3</sup> /min  |
| 40                                    | 1½"    | 25 to 700 dm <sup>3</sup> /min   | 200 dm <sup>3</sup> /min              | 1.50 dm <sup>3</sup>  | 3 dm <sup>3</sup> /min  |
| 50                                    | 2"     | 35 to 1100 dm <sup>3</sup> /min  | 300 dm <sup>3</sup> /min              | 2.50 dm <sup>3</sup>  | 5 dm <sup>3</sup> /min  |
| 65                                    | –      | 60 to 2000 dm <sup>3</sup> /min  | 500 dm <sup>3</sup> /min              | 5.00 dm <sup>3</sup>  | 8 dm <sup>3</sup> /min  |
| 80                                    | 3"     | 90 to 3000 dm <sup>3</sup> /min  | 750 dm <sup>3</sup> /min              | 5.00 dm <sup>3</sup>  | 12 dm <sup>3</sup> /min |
| 100                                   | 4"     | 145 to 4700 dm <sup>3</sup> /min | 1200 dm <sup>3</sup> /min             | 10.00 dm <sup>3</sup> | 20 dm <sup>3</sup> /min |
| 125                                   | –      | 220 to 7500 dm <sup>3</sup> /min | 1850 dm <sup>3</sup> /min             | 15.00 dm <sup>3</sup> | 30 dm <sup>3</sup> /min |
| 150                                   | 6"     | 20 to 600 m <sup>3</sup> /h      | 150 m <sup>3</sup> /h                 | 0.025 m <sup>3</sup>  | 2.5 m <sup>3</sup> /h   |
| 200                                   | 8"     | 35 to 1100 m <sup>3</sup> /h     | 300 m <sup>3</sup> /h                 | 0.05 m <sup>3</sup>   | 5.0 m <sup>3</sup> /h   |
| 250                                   | 10"    | 55 to 1700 m <sup>3</sup> /h     | 500 m <sup>3</sup> /h                 | 0.05 m <sup>3</sup>   | 7.5 m <sup>3</sup> /h   |
| 300                                   | 12"    | 80 to 2400 m <sup>3</sup> /h     | 750 m <sup>3</sup> /h                 | 0.10 m <sup>3</sup>   | 10 m <sup>3</sup> /h    |
| 350                                   | 14"    | 110 to 3300 m <sup>3</sup> /h    | 1000 m <sup>3</sup> /h                | 0.10 m <sup>3</sup>   | 15 m <sup>3</sup> /h    |
| 375                                   | 15"    | 140 to 4200 m <sup>3</sup> /h    | 1200 m <sup>3</sup> /h                | 0.15 m <sup>3</sup>   | 20 m <sup>3</sup> /h    |
| 400                                   | 16"    | 140 to 4200 m <sup>3</sup> /h    | 1200 m <sup>3</sup> /h                | 0.15 m <sup>3</sup>   | 20 m <sup>3</sup> /h    |
| 450                                   | 18"    | 180 to 5400 m <sup>3</sup> /h    | 1500 m <sup>3</sup> /h                | 0.25 m <sup>3</sup>   | 25 m <sup>3</sup> /h    |
| 500                                   | 20"    | 220 to 6600 m <sup>3</sup> /h    | 2000 m <sup>3</sup> /h                | 0.25 m <sup>3</sup>   | 30 m <sup>3</sup> /h    |
| 600                                   | 24"    | 310 to 9600 m <sup>3</sup> /h    | 2500 m <sup>3</sup> /h                | 0.30 m <sup>3</sup>   | 40 m <sup>3</sup> /h    |
| 700                                   | 28"    | 420 to 13500 m <sup>3</sup> /h   | 3500 m <sup>3</sup> /h                | 0.50 m <sup>3</sup>   | 50 m <sup>3</sup> /h    |
| –                                     | 30"    | 480 to 15000 m <sup>3</sup> /h   | 4000 m <sup>3</sup> /h                | 0.50 m <sup>3</sup>   | 60 m <sup>3</sup> /h    |
| 800                                   | 32"    | 550 to 18000 m <sup>3</sup> /h   | 4500 m <sup>3</sup> /h                | 0.75 m <sup>3</sup>   | 75 m <sup>3</sup> /h    |
| 900                                   | 36"    | 690 to 22500 m <sup>3</sup> /h   | 6000 m <sup>3</sup> /h                | 0.75 m <sup>3</sup>   | 100 m <sup>3</sup> /h   |
| 1000                                  | 40"    | 850 to 28000 m <sup>3</sup> /h   | 7000 m <sup>3</sup> /h                | 1.00 m <sup>3</sup>   | 125 m <sup>3</sup> /h   |
| –                                     | 42"    | 950 to 30000 m <sup>3</sup> /h   | 8000 m <sup>3</sup> /h                | 1.00 m <sup>3</sup>   | 125 m <sup>3</sup> /h   |
| 1200                                  | 48"    | 1250 to 40000 m <sup>3</sup> /h  | 10000 m <sup>3</sup> /h               | 1.50 m <sup>3</sup>   | 150 m <sup>3</sup> /h   |
| –                                     | 54"    | 1550 to 50000 m <sup>3</sup> /h  | 13000 m <sup>3</sup> /h               | 1.50 m <sup>3</sup>   | 200 m <sup>3</sup> /h   |
| 1400                                  | –      | 1700 to 55000 m <sup>3</sup> /h  | 14000 m <sup>3</sup> /h               | 2.00 m <sup>3</sup>   | 225 m <sup>3</sup> /h   |
| –                                     | 60"    | 1950 to 60000 m <sup>3</sup> /h  | 16000 m <sup>3</sup> /h               | 2.00 m <sup>3</sup>   | 250 m <sup>3</sup> /h   |
| 1600                                  | –      | 2200 to 70000 m <sup>3</sup> /h  | 18000 m <sup>3</sup> /h               | 2.50 m <sup>3</sup>   | 300 m <sup>3</sup> /h   |
| –                                     | 66"    | 2500 to 80000 m <sup>3</sup> /h  | 20500 m <sup>3</sup> /h               | 2.50 m <sup>3</sup>   | 325 m <sup>3</sup> /h   |
| 1800                                  | 72"    | 2800 to 90000 m <sup>3</sup> /h  | 23000 m <sup>3</sup> /h               | 3.00 m <sup>3</sup>   | 350 m <sup>3</sup> /h   |
| –                                     | 78"    | 3300 to 100000 m <sup>3</sup> /h | 28500 m <sup>3</sup> /h               | 3.50 m <sup>3</sup>   | 450 m <sup>3</sup> /h   |
| 2000                                  | –      | 3400 to 110000 m <sup>3</sup> /h | 28500 m <sup>3</sup> /h               | 3.50 m <sup>3</sup>   | 450 m <sup>3</sup> /h   |

| Flow characteristic values (US units) |      |                                                                            |                                                     |                               |                            |
|---------------------------------------|------|----------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------|----------------------------|
| Diameter                              |      | Recommended flow rate<br>Min./max. full scale value<br>(v ~ 0.3 or 10 m/s) | Factory settings                                    |                               |                            |
| [inch]                                | [mm] |                                                                            | Full scale value<br>Current output<br>(v ~ 2.5 m/s) | Pulse value<br>(~ 2 pulses/s) | Low flow<br>(v ~ 0.04 m/s) |
| 1"                                    | 25   | 2.5 to 80 gal/min                                                          | 18 gal/min                                          | 0.20 gal                      | 0.25 gal/min               |
| –                                     | 32   | 4 to 130 gal/min                                                           | 30 gal/min                                          | 0.20 gal                      | 0.50 gal/min               |
| 1½"                                   | 40   | 7 to 190 gal/min                                                           | 50 gal/min                                          | 0.50 gal                      | 0.75 gal/min               |
| 2"                                    | 50   | 10 to 300 gal/min                                                          | 75 gal/min                                          | 0.50 gal                      | 1.25 gal/min               |
| –                                     | 65   | 16 to 500 gal/min                                                          | 130 gal/min                                         | 1 gal                         | 2.0 gal/min                |
| 3"                                    | 80   | 24 to 800 gal/min                                                          | 200 gal/min                                         | 2 gal                         | 2.5 gal/min                |
| 4"                                    | 100  | 40 to 1250 gal/min                                                         | 300 gal/min                                         | 2 gal                         | 4.0 gal/min                |
| –                                     | 125  | 60 to 1950 gal/min                                                         | 450 gal/min                                         | 5 gal                         | 7.0 gal/min                |
| 6"                                    | 150  | 90 to 2650 gal/min                                                         | 600 gal/min                                         | 5 gal                         | 12 gal/min                 |
| 8"                                    | 200  | 155 to 4850 gal/min                                                        | 1200 gal/min                                        | 10 gal                        | 15 gal/min                 |
| 10"                                   | 250  | 250 to 7500 gal/min                                                        | 1500 gal/min                                        | 15 gal                        | 30 gal/min                 |
| 12"                                   | 300  | 350 to 10600 gal/min                                                       | 2400 gal/min                                        | 25 gal                        | 45 gal/min                 |
| 14"                                   | 350  | 500 to 15000 gal/min                                                       | 3600 gal/min                                        | 30 gal                        | 60 gal/min                 |
| 15"                                   | 375  | 600 to 19000 gal/min                                                       | 4800 gal/min                                        | 50 gal                        | 60 gal/min                 |
| 16"                                   | 400  | 600 to 19000 gal/min                                                       | 4800 gal/min                                        | 50 gal                        | 60 gal/min                 |
| 18"                                   | 450  | 800 to 24000 gal/min                                                       | 6000 gal/min                                        | 50 gal                        | 90 gal/min                 |
| 20"                                   | 500  | 1000 to 30000 gal/min                                                      | 7500 gal/min                                        | 75 gal                        | 120 gal/min                |
| 24"                                   | 600  | 1400 to 44000 gal/min                                                      | 10500 gal/min                                       | 100 gal                       | 180 gal/min                |
| 28"                                   | 700  | 1900 to 60000 gal/min                                                      | 13500 gal/min                                       | 125 gal                       | 210 gal/min                |
| 30"                                   | –    | 2150 to 67000 gal/min                                                      | 16500 gal/min                                       | 150 gal                       | 270 gal/min                |
| 32"                                   | 800  | 2450 to 80000 gal/min                                                      | 19500 gal/min                                       | 200 gal                       | 300 gal/min                |
| 36"                                   | 900  | 3100 to 100000 gal/min                                                     | 24000 gal/min                                       | 225 gal                       | 360 gal/min                |
| 40"                                   | 1000 | 3800 to 125000 gal/min                                                     | 30000 gal/min                                       | 250 gal                       | 480 gal/min                |
| 42"                                   | –    | 4200 to 135000 gal/min                                                     | 33000 gal/min                                       | 250 gal                       | 600 gal/min                |
| 48"                                   | 1200 | 5500 to 175000 gal/min                                                     | 42000 gal/min                                       | 400 gal                       | 600 gal/min                |
| 54"                                   | –    | 9 to 300 Mgal/min                                                          | 75 Mgal/min                                         | 0.0005 Mgal                   | 1.3 Mgal/min               |
| –                                     | 1400 | 10 to 340 Mgal/min                                                         | 85 Mgal/min                                         | 0.0005 Mgal                   | 1.3 Mgal/min               |
| 60"                                   | –    | 12 to 380 Mgal/min                                                         | 95 Mgal/min                                         | 0.0005 Mgal                   | 1.3 Mgal/min               |
| –                                     | 1600 | 13 to 450 Mgal/min                                                         | 110 Mgal/min                                        | 0.0008 Mgal                   | 1.7 Mgal/min               |
| 66"                                   | –    | 14 to 500 Mgal/min                                                         | 120 Mgal/min                                        | 0.0008 Mgal                   | 2.2 Mgal/min               |
| 72"                                   | 1800 | 16 to 570 Mgal/min                                                         | 140 Mgal/min                                        | 0.0008 Mgal                   | 2.6 Mgal/min               |
| 78"                                   | –    | 18 to 650 Mgal/min                                                         | 175 Mgal/min                                        | 0.001 Mgal                    | 3.0 Mgal/min               |
| –                                     | 2000 | 20 to 700 Mgal/min                                                         | 175 Mgal/min                                        | 0.001 Mgal                    | 3.0 Mgal/min               |

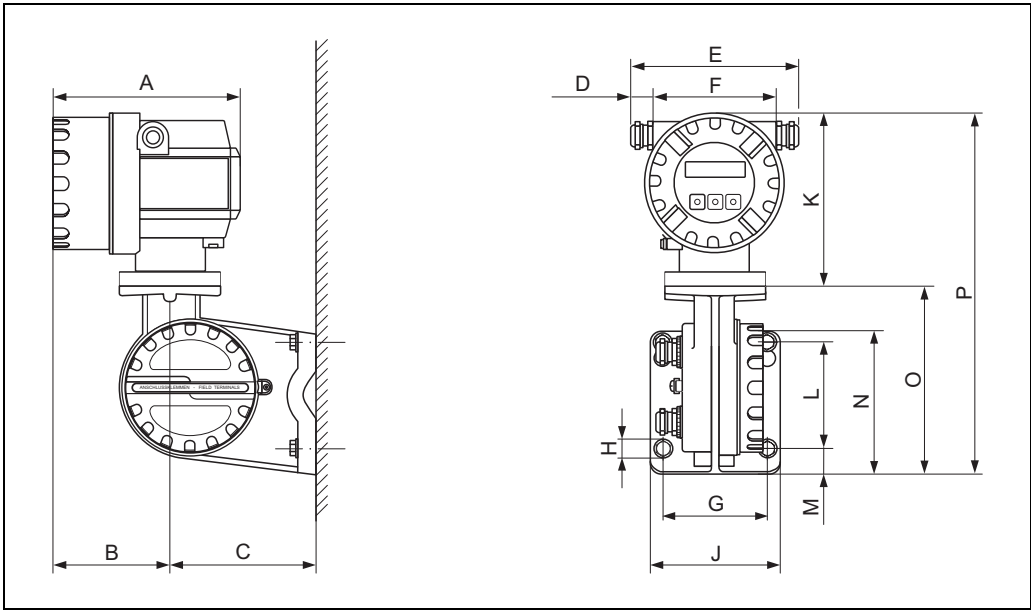
**Pressure loss**

- No pressure loss if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545 (→  14, Section "Adapters").

# Mechanical construction

Design, dimensions

Transmitter, remote version



Transmitter dimensions, remote version

Dimensions in SI units

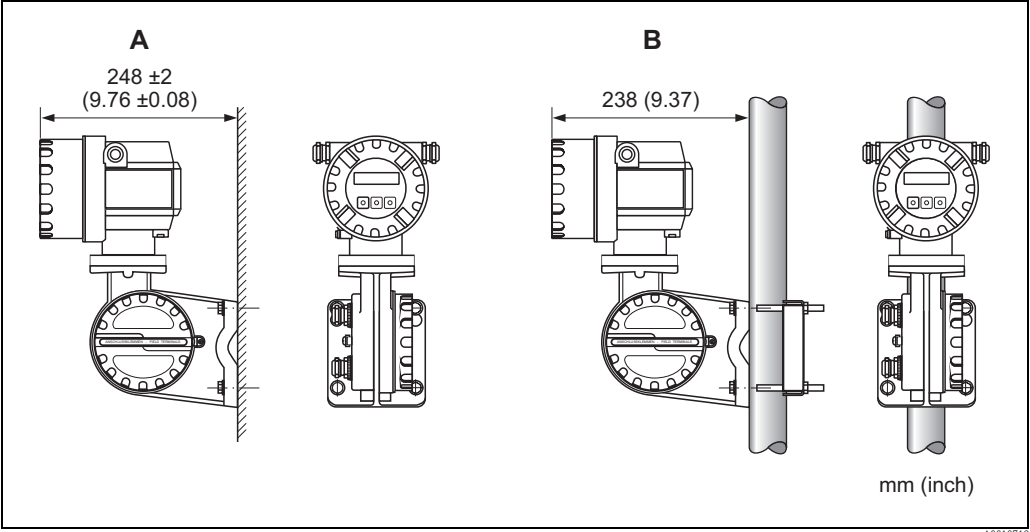
| A   | B   | C   | D        | E          | F     | G     | Ø H      |
|-----|-----|-----|----------|------------|-------|-------|----------|
| 178 | 113 | 135 | 20 to 30 | 161 to 181 | 113   | 100   | 8.6 (M8) |
| J   | K   | L   | M        | N          | O     | P     |          |
| 123 | 150 | 100 | 25       | 133        | 177.5 | 327.5 |          |

All dimensions in [mm]

Dimensions in US units

| A    | B    | C    | D            | E            | F    | G     | Ø H       |
|------|------|------|--------------|--------------|------|-------|-----------|
| 7.00 | 4.45 | 5.31 | 0.79 to 1.81 | 6.34 to 7.13 | 4.45 | 3.94  | 0.34 (M8) |
| J    | K    | L    | M            | N            | O    | P     |           |
| 4.84 | 5.90 | 3.94 | 0.98         | 5.24         | 6.99 | 12.89 |           |

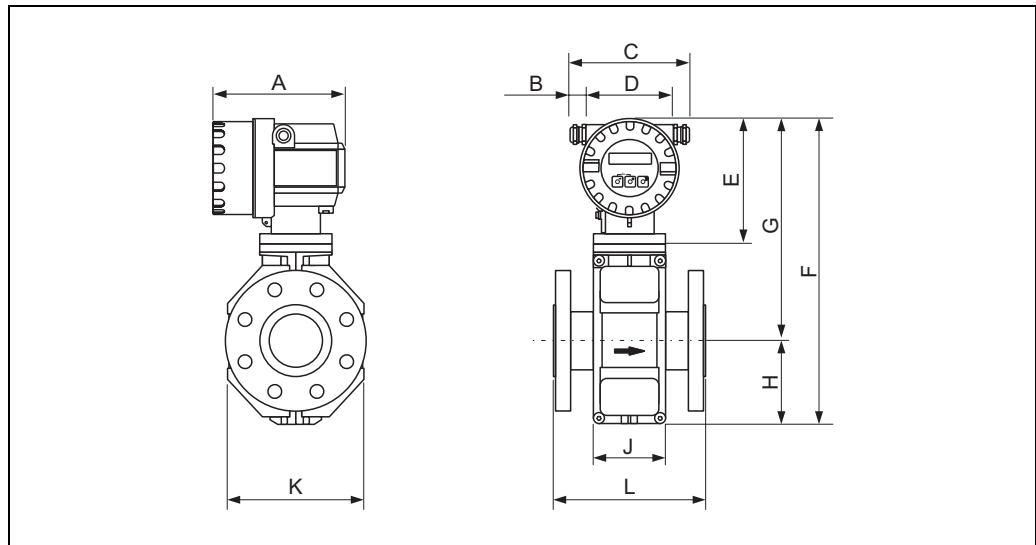
All dimensions in [inch]



A0010719

Transmitter mounting, remote version

- A Direct wall mounting
- B Pipe mounting

**Compact version DN ≤ 300 (12")**

A0012464

*Dimensions in SI units*

| DN<br>EN (DIN) / JIS / AS <sup>2)</sup> | L <sup>1)</sup> | A   | B        | C          | D   | E   | F   | G   | H   | J   | K   |
|-----------------------------------------|-----------------|-----|----------|------------|-----|-----|-----|-----|-----|-----|-----|
| 25                                      | 200             | 178 | 20 to 30 | 161 to 181 | 113 | 150 | 341 | 257 | 84  | 94  | 120 |
| 32                                      | 200             |     |          |            |     |     | 341 | 257 | 84  | 94  | 120 |
| 40                                      | 200             |     |          |            |     |     | 341 | 257 | 84  | 94  | 120 |
| 50                                      | 200             |     |          |            |     |     | 341 | 257 | 84  | 94  | 120 |
| 65                                      | 200             |     |          |            |     |     | 391 | 282 | 109 | 94  | 180 |
| 80                                      | 200             |     |          |            |     |     | 391 | 282 | 109 | 94  | 180 |
| 100                                     | 250             |     |          |            |     |     | 391 | 282 | 109 | 94  | 180 |
| 125                                     | 250             |     |          |            |     |     | 472 | 322 | 150 | 140 | 260 |
| 150                                     | 300             |     |          |            |     |     | 472 | 322 | 150 | 140 | 260 |
| 200                                     | 350             |     |          |            |     |     | 527 | 347 | 180 | 156 | 324 |
| 250                                     | 450             |     |          |            |     |     | 577 | 372 | 205 | 166 | 400 |
| 300                                     | 500             |     |          |            |     |     | 627 | 397 | 230 | 166 | 460 |

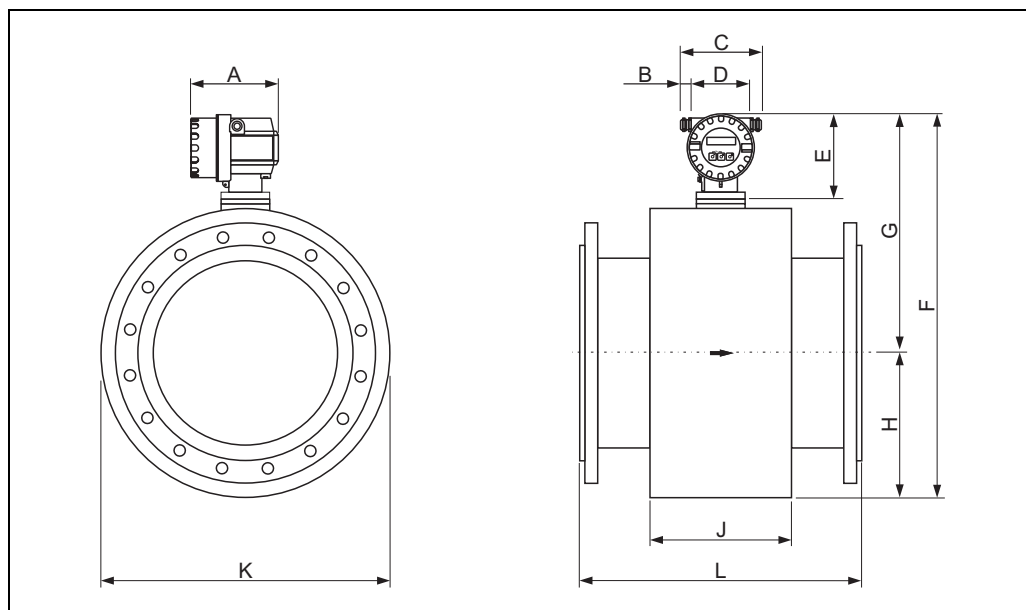
<sup>1)</sup> The length is regardless of the pressure rating selected. Fitting length to DVGW.

<sup>2)</sup> For flanges to AS, only the nominal diameters DN 80, 100 and 150 to 300 are available.  
All dimensions in [mm]

*Dimensions in US units*

| DN<br>ANSI | L <sup>1)</sup> | A    | B            | C            | D    | E    | F    | G    | H    | J    | K    |
|------------|-----------------|------|--------------|--------------|------|------|------|------|------|------|------|
| 1"         | 7.87            | 7.01 | 0.79 to 1.18 | 6.34 to 7.13 | 4.45 | 5.91 | 13.4 | 10.1 | 3.31 | 3.70 | 4.72 |
| 1½"        | 7.87            |      |              |              |      |      | 13.4 | 10.1 | 3.31 | 3.70 | 4.72 |
| 2"         | 7.87            |      |              |              |      |      | 13.4 | 10.1 | 3.31 | 3.70 | 4.72 |
| 3"         | 7.87            |      |              |              |      |      | 15.4 | 11.1 | 4.29 | 3.70 | 7.09 |
| 4"         | 9.84            |      |              |              |      |      | 15.4 | 11.1 | 4.29 | 3.70 | 7.09 |
| 6"         | 11.8            |      |              |              |      |      | 18.6 | 12.7 | 5.91 | 5.51 | 10.2 |
| 8"         | 13.8            |      |              |              |      |      | 20.8 | 13.7 | 7.09 | 6.14 | 12.8 |
| 10"        | 17.7            |      |              |              |      |      | 22.7 | 14.7 | 8.07 | 6.14 | 15.8 |
| 12"        | 19.7            |      |              |              |      |      | 24.7 | 15.6 | 9.06 | 6.54 | 18.1 |

<sup>1)</sup> The length is regardless of the pressure rating selected. Fitting length to DVGW.  
All dimensions in [inch]

**Compact version DN ≥ 350 (14")**

A0003218

*Dimensions in SI units*

| DN<br>EN (DIN) / AS <sup>2)</sup> | L <sup>1)</sup> | A   | B        | C          | D   | E   | F      | G      | H      | J    | K    |
|-----------------------------------|-----------------|-----|----------|------------|-----|-----|--------|--------|--------|------|------|
| 350                               | 550             | 178 | 20 to 30 | 161 to 181 | 113 | 150 | 738.5  | 456.5  | 282.0  | 276  | 564  |
| 375                               | 600             |     |          |            |     |     | 790.5  | 482.5  | 308.0  | 276  | 616  |
| 400                               | 600             |     |          |            |     |     | 790.5  | 482.5  | 308.0  | 276  | 616  |
| 450                               | 650             |     |          |            |     |     | 840.5  | 507.5  | 333.0  | 292  | 666  |
| 500                               | 650             |     |          |            |     |     | 891.5  | 533.0  | 358.5  | 292  | 717  |
| 600                               | 780             |     |          |            |     |     | 995.5  | 585.0  | 410.5  | 402  | 821  |
| 700                               | 910             |     |          |            |     |     | 1198.5 | 686.5  | 512.0  | 589  | 1024 |
| 750                               | 975             |     |          |            |     |     | 1198.5 | 686.5  | 512.0  | 626  | 1024 |
| 800                               | 1040            |     |          |            |     |     | 1241.5 | 708.5  | 533.5  | 647  | 1067 |
| 900                               | 1170            |     |          |            |     |     | 1394.5 | 784.5  | 610.0  | 785  | 1220 |
| 1000                              | 1300            |     |          |            |     |     | 1546.5 | 860.5  | 686.0  | 862  | 1372 |
| 1050                              | 1365            |     |          |            |     |     | 1598.5 | 886.5  | 712.0  | 912  | 1424 |
| 1200                              | 1560            |     |          |            |     |     | 1796.5 | 985.5  | 811.0  | 992  | 1622 |
| 1350                              | 1755            |     |          |            |     |     | 1998.5 | 1086.5 | 912.0  | 1252 | 1824 |
| 1400                              | 1820            |     |          |            |     |     | 2148.5 | 1161.5 | 987.0  | 1252 | 1974 |
| 1500                              | 1950            |     |          |            |     |     | 2196.5 | 1185.5 | 1011.0 | 1392 | 2022 |
| 1600                              | 2080            | 178 | 20 to 30 | 161 to 181 | 113 | 150 | 2286.5 | 1230.5 | 1056.0 | 1482 | 2112 |
| 1650                              | 2145            |     |          |            |     |     | 2360.5 | 1267.5 | 1093.0 | 1482 | 2186 |
| 1800                              | 2340            |     |          |            |     |     | 2550.5 | 1362.5 | 1188.0 | 1632 | 2376 |
| 2000                              | 2600            |     |          |            |     |     | 2650.5 | 1412.5 | 1238.0 | 1732 | 2476 |

<sup>1)</sup> The length is regardless of the pressure rating selected. Fitting length to DVGW.

<sup>2)</sup> For flanges to AS, only DN 350, 400, 500 and 600 are available.

All dimensions in [mm]

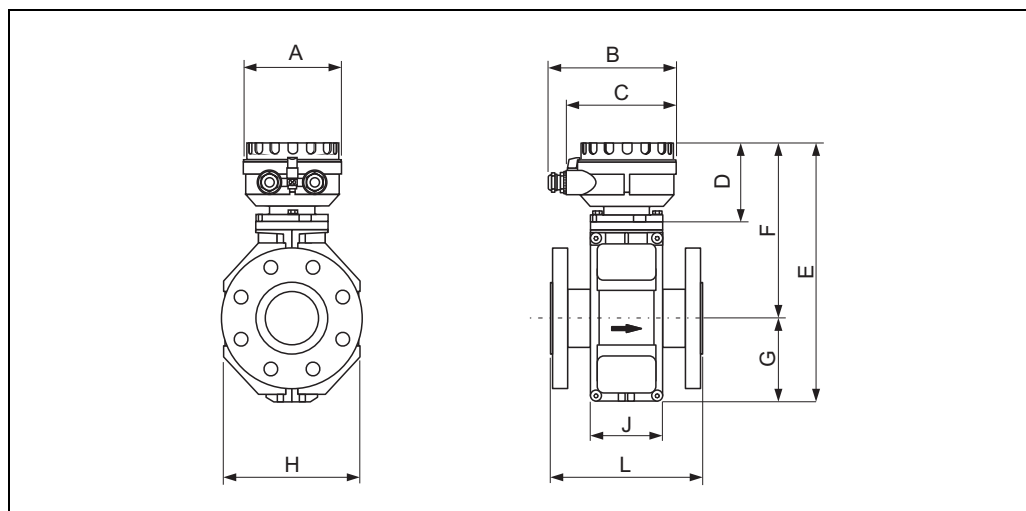
*Dimensions in US units*

| DN<br>ANSI / AWWA <sup>2)</sup> | L <sup>1)</sup> | A    | B            | C            | D    | E    | F     | G    | H    | J    | K    |
|---------------------------------|-----------------|------|--------------|--------------|------|------|-------|------|------|------|------|
| 14"                             | 21.6            | 7.01 | 0.79 to 1.18 | 6.34 to 7.13 | 4.45 | 5.91 | 29.1  | 17.9 | 11.1 | 10.9 | 22.2 |
| 15"                             | 23.6            |      |              |              |      |      | 31.1  | 18.9 | 12.1 | 10.9 | 24.2 |
| 16"                             | 23.6            |      |              |              |      |      | 31.1  | 18.9 | 12.1 | 10.9 | 24.2 |
| 18"                             | 25.6            |      |              |              |      |      | 33.1  | 19.9 | 13.1 | 11.5 | 26.2 |
| 20"                             | 25.6            |      |              |              |      |      | 35.1  | 20.9 | 14.1 | 11.5 | 28.2 |
| 24"                             | 30.7            |      |              |              |      |      | 39.2  | 23.0 | 16.2 | 15.8 | 32.3 |
| 28"                             | 35.8            |      |              |              |      |      | 47.2  | 27.0 | 20.1 | 23.2 | 40.3 |
| 30"                             | 38.4            |      |              |              |      |      | 47.2  | 27.0 | 20.1 | 24.6 | 40.3 |
| 32"                             | 40.9            |      |              |              |      |      | 48.9  | 27.9 | 21.0 | 25.5 | 42.0 |
| 36"                             | 46.0            |      |              |              |      |      | 54.9  | 30.9 | 24.0 | 30.9 | 48.0 |
| 40"                             | 51.2            |      |              |              |      |      | 60.9  | 33.9 | 27.0 | 33.9 | 54.0 |
| 42"                             | 53.7            |      |              |              |      |      | 62.9  | 34.9 | 28.0 | 35.9 | 56.0 |
| 48"                             | 61.4            |      |              |              |      |      | 71.7  | 38.8 | 31.9 | 39.0 | 63.8 |
| 54"                             | 69.1            |      |              |              |      |      | 78.7  | 42.8 | 35.9 | 42.3 | 71.8 |
| 56"                             | 71.7            |      |              |              |      |      | 84.6  | 45.7 | 38.9 | 49.3 | 77.7 |
| 60"                             | 76.8            |      |              |              |      |      | 86.5  | 46.7 | 39.8 | 54.8 | 79.6 |
| 64"                             | 81.9            |      |              |              |      |      | 90.0  | 48.4 | 41.6 | 58.4 | 83.2 |
| 66"                             | 84.4            |      |              |              |      |      | 92.9  | 49.9 | 43.0 | 58.4 | 86.0 |
| 72"                             | 92.1            |      |              |              |      |      | 100.4 | 53.6 | 46.8 | 64.2 | 93.5 |
| 78"                             | 102.3           |      |              |              |      |      | 104.3 | 55.6 | 48.7 | 68.2 | 97.5 |

<sup>1)</sup> The length is regardless of the pressure rating selected. Fitting length to DVGW.

<sup>2)</sup> Flanges ≤ DN 600 only to ANSI available, ≥ DN 700 only to AWWA available.

All dimensions in [inch]

**Sensor, remote version DN ≤ 300 (12")**

A0012462

*Dimensions in SI units*

| DN<br>EN (DIN) / JIS / AS <sup>2)</sup> | L <sup>1)</sup> | A   | B   | C   | D   | E   | F   | G   | H   | J   |
|-----------------------------------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 25                                      | 200             | 129 | 163 | 143 | 102 | 286 | 202 | 84  | 120 | 94  |
| 32                                      | 200             | 129 | 163 | 143 | 102 | 286 | 202 | 84  | 120 | 94  |
| 40                                      | 200             | 129 | 163 | 143 | 102 | 286 | 202 | 84  | 120 | 94  |
| 50                                      | 200             | 129 | 163 | 143 | 102 | 286 | 202 | 84  | 120 | 94  |
| 65                                      | 200             | 129 | 163 | 143 | 102 | 336 | 227 | 109 | 180 | 94  |
| 80                                      | 200             | 129 | 163 | 143 | 102 | 336 | 227 | 109 | 180 | 94  |
| 100                                     | 250             | 129 | 163 | 143 | 102 | 336 | 227 | 109 | 180 | 94  |
| 125                                     | 250             | 129 | 163 | 143 | 102 | 417 | 267 | 150 | 260 | 140 |
| 150                                     | 300             | 129 | 163 | 143 | 102 | 417 | 267 | 150 | 260 | 140 |
| 200                                     | 350             | 129 | 163 | 143 | 102 | 472 | 292 | 180 | 324 | 156 |
| 250                                     | 450             | 129 | 163 | 143 | 102 | 522 | 317 | 205 | 400 | 166 |
| 300                                     | 500             | 129 | 163 | 143 | 102 | 572 | 342 | 230 | 460 | 166 |

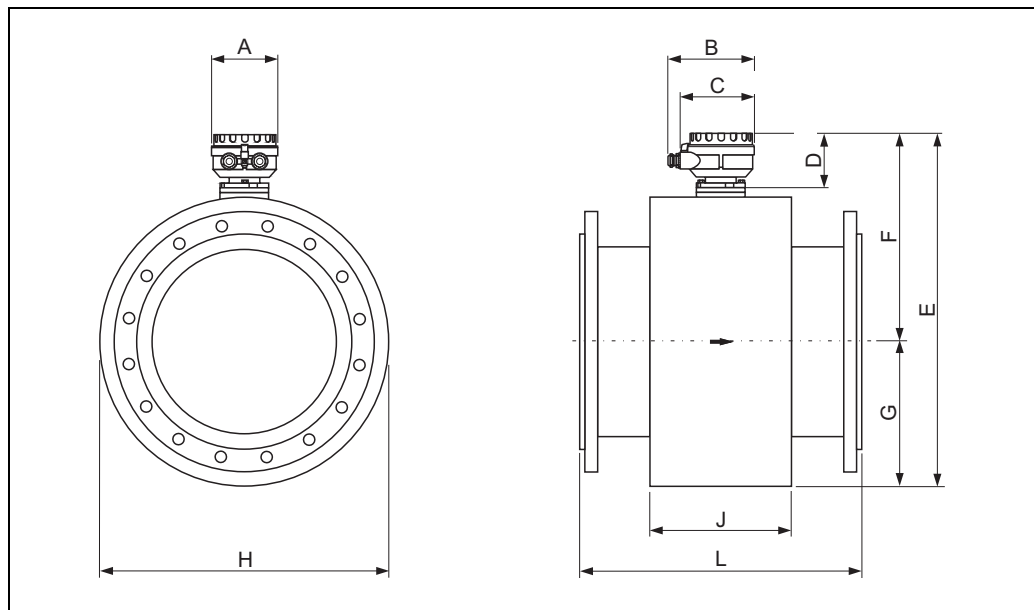
<sup>1)</sup> The length is regardless of the pressure rating selected. Fitting length to DVGW.

<sup>2)</sup> For flanges to AS, only the nominal diameters DN 80, 100 and 150 to 300 are available.  
All dimensions in [mm]

*Dimensions in US units*

| DN<br>ANSI | L <sup>1)</sup> | A    | B    | C    | D    | E    | F    | G    | H    | J    |
|------------|-----------------|------|------|------|------|------|------|------|------|------|
| 1"         | 7.87            | 5.08 | 6.42 | 5.63 | 4.02 | 11.3 | 7.95 | 3.32 | 4.72 | 3.70 |
| 1½"        | 7.87            |      |      |      |      | 11.3 | 7.95 | 3.32 | 4.72 | 3.70 |
| 2"         | 7.87            |      |      |      |      | 11.3 | 7.95 | 3.32 | 4.72 | 3.70 |
| 3"         | 7.87            |      |      |      |      | 13.2 | 8.94 | 4.30 | 7.10 | 3.70 |
| 4"         | 9.84            |      |      |      |      | 13.2 | 8.94 | 4.30 | 7.10 | 3.70 |
| 6"         | 11.8            |      |      |      |      | 16.4 | 10.5 | 5.91 | 10.2 | 5.51 |
| 8"         | 13.8            |      |      |      |      | 18.6 | 11.5 | 7.10 | 12.8 | 6.14 |
| 10"        | 17.7            |      |      |      |      | 20.6 | 12.5 | 8.08 | 15.8 | 6.14 |
| 12"        | 19.7            |      |      |      |      | 22.5 | 13.5 | 9.06 | 18.1 | 6.54 |

<sup>1)</sup> The length is regardless of the pressure rating selected. Fitting length to DVGW.  
All dimensions in [inch]

**Sensor, remote version DN ≥ 350 (14")**

A0003220

*Dimensions in SI units*

| DN<br>EN (DIN) / AS <sup>2)</sup> | L <sup>1)</sup> | A   | B   | C   | D   | E      | F      | G      | H    | J    |
|-----------------------------------|-----------------|-----|-----|-----|-----|--------|--------|--------|------|------|
| 350                               | 550             | 129 | 163 | 143 | 102 | 683.5  | 401.5  | 282.0  | 564  | 276  |
| 375                               | 600             |     |     |     |     | 735.5  | 427.5  | 308.0  | 616  | 276  |
| 400                               | 600             |     |     |     |     | 735.5  | 427.5  | 308.0  | 616  | 276  |
| 450                               | 650             |     |     |     |     | 785.5  | 452.5  | 333.0  | 666  | 292  |
| 500                               | 650             |     |     |     |     | 836.5  | 478.0  | 358.5  | 717  | 292  |
| 600                               | 780             |     |     |     |     | 940.5  | 530.0  | 410.5  | 821  | 402  |
| 700                               | 910             |     |     |     |     | 1143.5 | 631.5  | 512.0  | 1024 | 589  |
| 750                               | 975             |     |     |     |     | 1143.5 | 631.5  | 512.0  | 1024 | 626  |
| 800                               | 1040            |     |     |     |     | 1186.5 | 653.0  | 533.5  | 1067 | 647  |
| 900                               | 1170            |     |     |     |     | 1339.5 | 729.5  | 610.0  | 1220 | 785  |
| 1000                              | 1300            |     |     |     |     | 1491.5 | 805.5  | 686.0  | 1372 | 862  |
| 1050                              | 1365            |     |     |     |     | 1543.5 | 831.5  | 712.0  | 1424 | 912  |
| 1200                              | 1560            |     |     |     |     | 1741.5 | 930.5  | 811.0  | 1622 | 992  |
| 1350                              | 1755            |     |     |     |     | 1943.5 | 1031.5 | 912.0  | 1824 | 1252 |
| 1400                              | 1820            |     |     |     |     | 2093.5 | 1106.5 | 987.0  | 1974 | 1252 |
| 1500                              | 1950            |     |     |     |     | 2141.5 | 1130.5 | 1011.0 | 2022 | 1392 |
| 1600                              | 2080            |     |     |     |     | 2231.5 | 1175.5 | 1056.0 | 2112 | 1482 |
| 1650                              | 2145            |     |     |     |     | 2305.5 | 1212.5 | 1093.0 | 2186 | 1482 |
| 1800                              | 2340            |     |     |     |     | 2495.5 | 1307.5 | 1188.0 | 2376 | 1632 |
| 2000                              | 2600            |     |     |     |     | 2595.5 | 1357.5 | 1238.0 | 2476 | 1732 |

<sup>1)</sup> The length is regardless of the pressure rating selected. Fitting length to DVGW.

<sup>2)</sup> For flanges to AS, only DN 350, 400, 500 and 600 are available.

All dimensions in [mm]

*Dimensions in US units*

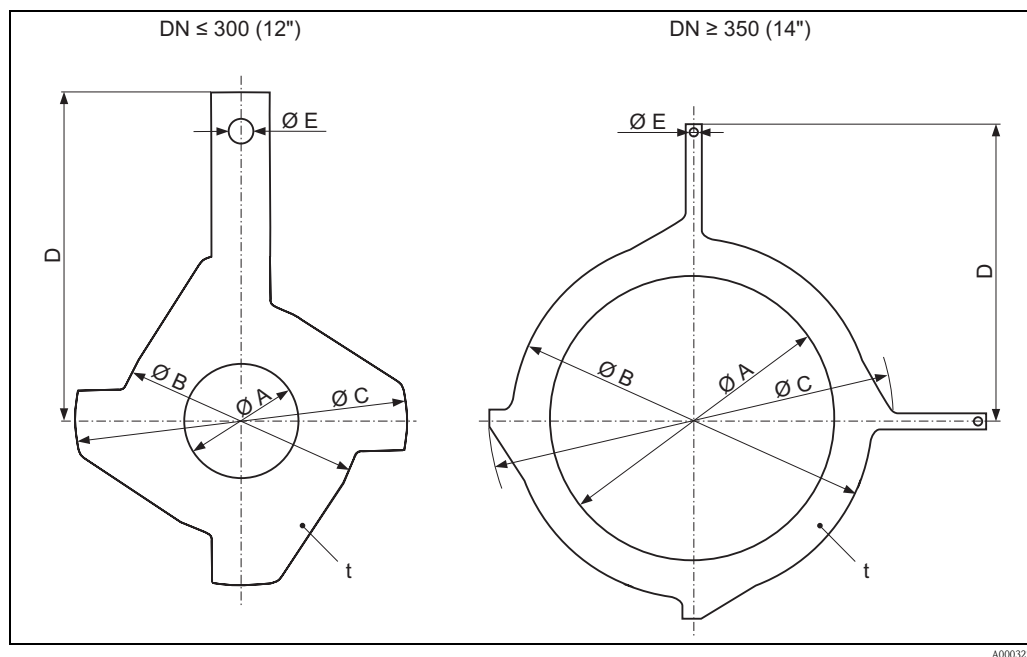
| DN<br>ANSI / AWWA <sup>2)</sup> | L <sup>1)</sup> | A    | B    | C    | D    | E     | F    | G    | H    | J    |
|---------------------------------|-----------------|------|------|------|------|-------|------|------|------|------|
| 14"                             | 21.6            | 5.08 | 6.42 | 5.63 | 4.02 | 29.1  | 15.8 | 11.1 | 22.2 | 10.9 |
| 15"                             | 23.6            |      |      |      |      | 31.1  | 16.8 | 12.1 | 24.2 | 10.9 |
| 16"                             | 23.6            |      |      |      |      | 31.1  | 16.8 | 12.1 | 24.2 | 10.9 |
| 18"                             | 25.6            |      |      |      |      | 33.1  | 17.8 | 13.1 | 26.2 | 11.5 |
| 20"                             | 25.6            |      |      |      |      | 35.1  | 18.8 | 14.1 | 28.2 | 11.5 |
| 24"                             | 30.7            |      |      |      |      | 39.2  | 20.9 | 16.2 | 32.3 | 15.8 |
| 28"                             | 35.8            |      |      |      |      | 45.0  | 24.9 | 20.1 | 40.3 | 23.2 |
| 30"                             | 38.4            |      |      |      |      | 45.0  | 24.9 | 20.1 | 40.3 | 24.6 |
| 32"                             | 40.9            |      |      |      |      | 46.7  | 25.7 | 21.0 | 42.0 | 25.5 |
| 36"                             | 46.0            |      |      |      |      | 52.7  | 28.7 | 24.0 | 48.0 | 30.9 |
| 40"                             | 51.2            |      |      |      |      | 58.7  | 31.7 | 27.0 | 54.0 | 33.9 |
| 42"                             | 53.7            |      |      |      |      | 60.7  | 32.7 | 28.0 | 56.0 | 35.9 |
| 48"                             | 61.4            |      |      |      |      | 68.5  | 36.6 | 31.9 | 63.8 | 39.0 |
| 54"                             | 69.1            |      |      |      |      | 76.5  | 40.6 | 35.9 | 71.8 | 42.3 |
| 56"                             | 71.7            |      |      |      |      | 82.4  | 43.6 | 38.9 | 77.7 | 49.3 |
| 60"                             | 76.8            |      |      |      |      | 84.3  | 44.5 | 39.8 | 79.6 | 54.8 |
| 64"                             | 81.9            |      |      |      |      | 87.9  | 46.3 | 41.6 | 83.2 | 58.4 |
| 66"                             | 84.4            |      |      |      |      | 90.8  | 47.7 | 43.0 | 86.0 | 58.4 |
| 72"                             | 92.1            |      |      |      |      | 98.2  | 51.5 | 46.8 | 93.5 | 64.2 |
| 78"                             | 102.3           |      |      |      |      | 102.2 | 53.4 | 48.7 | 97.5 | 68.2 |

<sup>1)</sup> The length is regardless of the pressure rating selected. Fitting length to DVGW.

<sup>2)</sup> Flanges ≤ DN 600 only to ANSI available, ≥ DN 700 only to AWWA available.

All dimensions in [inch]

## Ground disk for flange connections



## Dimensions (SI units)

| DN <sup>1)</sup><br>EN (DIN) / JIS / AS <sup>2)</sup> | A   | B   | C     | D    | E   | t |
|-------------------------------------------------------|-----|-----|-------|------|-----|---|
| 25                                                    | 26  | 62  | 77.5  | 87.5 | 6.5 | 2 |
| 32                                                    | 35  | 80  | 87.5  | 94.5 |     |   |
| 40                                                    | 41  | 82  | 101   | 103  |     |   |
| 50                                                    | 52  | 101 | 115.5 | 108  |     |   |
| 65                                                    | 68  | 121 | 131.5 | 118  |     |   |
| 80                                                    | 80  | 131 | 154.5 | 135  |     |   |
| 100                                                   | 104 | 156 | 186.5 | 153  |     |   |
| 125                                                   | 130 | 187 | 206.5 | 160  |     |   |
| 150                                                   | 158 | 217 | 256   | 184  |     |   |
| 200                                                   | 206 | 267 | 288   | 205  |     |   |
| 250                                                   | 260 | 328 | 359   | 240  |     |   |
| 300 <sup>3)</sup>                                     | 312 | 375 | 413   | 273  |     |   |
| 300 <sup>4)</sup>                                     | 310 | 375 | 404   | 268  |     |   |
| 350 <sup>3)</sup>                                     | 343 | 433 | 479   | 365  | 9.0 |   |
| 375 <sup>3)</sup>                                     | 393 | 480 | 542   | 395  |     |   |
| 400 <sup>3)</sup>                                     | 393 | 480 | 542   | 395  |     |   |
| 450 <sup>3)</sup>                                     | 439 | 538 | 583   | 417  |     |   |
| 500 <sup>3)</sup>                                     | 493 | 592 | 650   | 460  |     |   |
| 600 <sup>3)</sup>                                     | 593 | 693 | 766   | 522  |     |   |

<sup>1)</sup> Ground disks can be used for all flange standards/pressure ratings that can be delivered, except for DN ≥ 300.

<sup>2)</sup> Only DN 32, 40, 65 and 125 are available for flanges according to AS.

<sup>3)</sup> PN 10/16

<sup>4)</sup> PN 25, JIS 10K/20K

All dimensions in [mm]

*Dimensions (US units)*

| DN <sup>1)</sup><br>ANSI | A     | B    | C     | D    | E    | t    |
|--------------------------|-------|------|-------|------|------|------|
| 1"                       | 1.02  | 2.44 | 3.05  | 3.44 | 0.26 | 0.08 |
| 1½"                      | 1.61  | 3.23 | 3.98  | 4.06 |      |      |
| 2"                       | 2.05  | 3.98 | 4.55  | 4.25 |      |      |
| 3"                       | 3.15  | 5.16 | 6.08  | 5.31 |      |      |
| 4"                       | 4.09  | 6.14 | 7.34  | 6.02 |      |      |
| 6"                       | 6.22  | 8.54 | 10.08 | 7.24 |      |      |
| 8"                       | 8.11  | 10.5 | 11.3  | 8.07 |      |      |
| 10"                      | 10.2  | 12.9 | 14.1  | 9.45 |      |      |
| 12"                      | 12.3  | 14.8 | 16.3  | 10.8 |      |      |
| 14"                      | 13.5  | 17.1 | 18.9  | 14.4 | 0.35 |      |
| 15"                      | 15.45 | 18.9 | 21.3  | 15.6 |      |      |
| 16"                      | 15.45 | 18.9 | 21.3  | 15.6 |      |      |
| 18"                      | 17.3  | 21.2 | 23.0  | 16.4 |      |      |
| 20"                      | 19.4  | 23.3 | 25.6  | 18.1 |      |      |
| 24"                      | 23.4  | 27.3 | 30.1  | 20.6 |      |      |

<sup>1)</sup> Ground disks can be used for all flange standards/pressure ratings.  
All dimensions in [inch]

## Weight

Weight in SI units

| Weight data in kg |        |                             |      |             |                                |           |       |             |                             |      |      |
|-------------------|--------|-----------------------------|------|-------------|--------------------------------|-----------|-------|-------------|-----------------------------|------|------|
| Diameter          |        | Compact version             |      |             | Remote version (without cable) |           |       |             |                             |      |      |
| [mm]              | [inch] | EN (DIN) / AS <sup>1)</sup> | JIS  | ANSI / AWWA | EN (DIN) / AS <sup>1)</sup>    | Sensor    | JIS   | ANSI / AWWA | Transmitter<br>Wall housing |      |      |
| 25                | 1"     | PN 40                       | 5.7  | 5.7         | PN 40                          | 10K       | 5.3   | 5.3         | 3.1                         |      |      |
| 32                | –      |                             | 6.4  | 5.7         |                                |           | –     | 6.0         |                             | 5.3  | –    |
| 40                | 1½"    |                             | 7.8  | 6.7         |                                |           | 7.8   | 7.4         |                             | 6.3  | 7.4  |
| 50                | 2"     |                             | 9.0  | 7.7         |                                |           | 9.0   | 8.6         |                             | 7.3  | 8.6  |
| 65                | –      | PN 16                       | 10.4 | 9.5         | PN 16                          | 10K       | 10.0  | 9.1         |                             | –    |      |
| 80                | 3"     |                             | 12.4 | 10.9        |                                |           | 12.4  | 12.0        |                             | 10.5 | 12.0 |
| 100               | 4"     |                             | 14.4 | 13.1        |                                |           | 14.4  | 14.0        |                             | 12.7 | 14.0 |
| 125               | –      |                             | 19.9 | 19.4        |                                |           | –     | 19.5        |                             | 19.0 | –    |
| 150               | 6"     | PN 10                       | 23.9 | 22.9        | PN 10                          | Class 150 | 23.5  | 22.5        |                             | 23.5 |      |
| 200               | 8"     |                             | 43.4 | 40.3        |                                |           | 43.3  | 43          |                             | 39.9 | 43   |
| 250               | 10"    |                             | 63.4 | 67.8        |                                |           | 73.4  | 63          |                             | 67.4 | 73   |
| 300               | 12"    |                             | 68.4 | 70.7        |                                |           | 108.4 | 68          |                             | 70.3 | 108  |
| 350               | 14"    | PN 6                        | 10K  | Class 150   | 175                            | 103       | –     | 173         |                             |      |      |
| 375               | 15"    |                             |      |             | –                              | 118       | –     | –           |                             |      |      |
| 400               | 16"    |                             |      |             | 120                            | 205       | 118   | 203         |                             |      |      |
| 450               | 18"    |                             |      |             | 161                            | 255       | 159   | 253         |                             |      |      |
| 500               | 20"    |                             |      |             | 156                            | 285       | 154   | 283         |                             |      |      |
| 600               | 24"    |                             |      |             | 208                            | 405       | 206   | 403         |                             |      |      |
| 700               | 28"    |                             |      |             | 304                            | 400       | 302   | 398         |                             |      |      |
| –                 | 30"    |                             |      |             | –                              | 460       | –     | 458         |                             |      |      |
| 800               | 32"    |                             |      |             | 357                            | 550       | 355   | 548         |                             |      |      |
| 900               | 36"    |                             |      |             | 485                            | 800       | 483   | 798         |                             |      |      |
| 1000              | 40"    |                             |      | 589         | 900                            | 587       | 898   |             |                             |      |      |
| –                 | 42"    |                             |      | –           | 1100                           | –         | 1098  |             |                             |      |      |
| 1200              | 48"    |                             |      | 850         | 1400                           | 848       | 1398  |             |                             |      |      |
| –                 | 54"    |                             |      | –           | 2200                           | –         | 2198  |             |                             |      |      |
| 1400              | –      |                             |      | 1300        | –                              | 1298      | –     |             |                             |      |      |
| –                 | 60"    |                             |      | –           | 2700                           | –         | 2698  |             |                             |      |      |
| 1600              | –      |                             |      | 1700        | –                              | 1698      | –     |             |                             |      |      |
| –                 | 66"    |                             |      | –           | 3700                           | –         | 3698  |             |                             |      |      |
| 1800              | 72"    |                             |      | 2200        | 4100                           | 2198      | 4098  |             |                             |      |      |
| –                 | 78"    |                             |      | –           | 4600                           | –         | 4598  |             |                             |      |      |
| 2000              | –      |                             |      | 2800        | –                              | 2798      | –     |             |                             |      |      |

<sup>1)</sup> For flanges to AS, only DN 80, 100, 150 to 400, 500 and 600 are available.

- Transmitter (compact version): 1.8 kg
- Weight data valid for standard pressure ratings and without packaging material

Weight in US units (only ANSI/AWWA)

| Weight data in lbs |        |                 |         |                                |                             |
|--------------------|--------|-----------------|---------|--------------------------------|-----------------------------|
| Diameter           |        | Compact version |         | Remote version (without cable) |                             |
| [mm]               | [inch] | ANSI /AWWA      |         | Sensor<br>ANSI / AWWA          | Transmitter<br>Wall housing |
| 25                 | 1"     | Class 150       | 12.6    | Class 150                      | 6.8                         |
| 40                 | 1½"    |                 | 17.2    |                                |                             |
| 50                 | 2"     |                 | 19.9    |                                |                             |
| 80                 | 3"     |                 | 27.3    |                                |                             |
| 100                | 4"     |                 | 31.8    |                                |                             |
| 150                | 6"     |                 | 52.7    |                                |                             |
| 200                | 8"     |                 | 95.5    |                                |                             |
| 250                | 10"    |                 | 162.1   |                                |                             |
| 300                | 12"    |                 | 239.0   |                                |                             |
| 350                | 14"    |                 | 380.1   |                                |                             |
| 400                | 16"    |                 | 448.5   |                                |                             |
| 450                | 18"    |                 | 558.8   |                                |                             |
| 500                | 20"    |                 | 624.9   |                                |                             |
| 600                | 24"    |                 | 889.5   |                                |                             |
| 700                | 28"    | Class D         | 878.5   | Class D                        |                             |
| –                  | 30"    |                 | 1010.8  |                                |                             |
| 800                | 32"    |                 | 1209.2  |                                |                             |
| 900                | 36"    |                 | 1760.5  |                                |                             |
| 1000               | 40"    |                 | 1981.0  |                                |                             |
| –                  | 42"    |                 | 2422.0  |                                |                             |
| 1200               | 48"    |                 | 3083.5  |                                |                             |
| –                  | 54"    |                 | 4847.5  |                                |                             |
| –                  | 60"    |                 | 5950.0  |                                |                             |
| –                  | 66"    |                 | 8155.0  |                                |                             |
| 1800               | 72"    |                 | 9037.0  |                                |                             |
| –                  | 78"    |                 | 10139.0 |                                |                             |

■ Transmitter (compact version): 4.0 lbs

■ Weight data valid for standard pressure ratings and without packaging material

## Measuring tube specifications

| Diameter |        | Pressure rating   |         |         |               |         |      | Internal diameter   |        |                      |        |
|----------|--------|-------------------|---------|---------|---------------|---------|------|---------------------|--------|----------------------|--------|
| [mm]     | [inch] | EN (DIN)<br>[bar] | AS 2129 | AS 4087 | ANSI<br>[lbs] | AWWA    | JIS  | Hard rubber<br>[mm] | [inch] | Polyurethane<br>[mm] | [inch] |
| 25       | 1"     | PN 40             | –       | –       | Cl. 150       | –       | 20 K | –                   | –      | 24                   | 0.94   |
| 32       | –      | PN 40             | –       | –       | –             | –       | 20 K | –                   | –      | 32                   | 1.26   |
| 40       | 1½"    | PN 40             | –       | –       | Cl. 150       | –       | 20 K | –                   | –      | 38                   | 1.50   |
| 50       | 2"     | PN 40             | Table E | PN 16   | Cl. 150       | –       | 10 K | 50                  | 1.97   | 50                   | 1.97   |
| 65       | –      | PN 16             | –       | –       | –             | –       | 10 K | 66                  | 2.60   | 66                   | 2.60   |
| 80       | 3"     | PN 16             | Table E | PN 16   | Cl. 150       | –       | 10 K | 79                  | 3.11   | 79                   | 3.11   |
| 100      | 4"     | PN 16             | Table E | PN 16   | Cl. 150       | –       | 10 K | 102                 | 4.02   | 102                  | 4.02   |
| 125      | –      | PN 16             | –       | –       | –             | –       | 10 K | 127                 | 5.00   | 127                  | 5.00   |
| 150      | 6"     | PN 16             | Table E | PN 16   | Cl. 150       | –       | 10 K | 156                 | 6.14   | 156                  | 6.14   |
| 200      | 8"     | PN 10             | Table E | PN 16   | Cl. 150       | –       | 10 K | 204                 | 8.03   | 204                  | 8.03   |
| 250      | 10"    | PN 10             | Table E | PN 16   | Cl. 150       | –       | 10 K | 258                 | 10.2   | 258                  | 10.2   |
| 300      | 12"    | PN 10             | Table E | PN 16   | Cl. 150       | –       | 10 K | 309                 | 12.2   | 309                  | 12.2   |
| 350      | 14"    | PN 6              | Table E | PN 16   | Cl. 150       | –       | –    | 342                 | 13.5   | 342                  | 13.5   |
| 375      | 15"    | –                 | –       | PN 16   | –             | –       | –    | 392                 | 15.4   | –                    | –      |
| 400      | 16"    | PN 6              | Table E | PN 16   | Cl. 150       | –       | –    | 392                 | 15.4   | 392                  | 15.4   |
| 450      | 18"    | PN 6              | –       | –       | Cl. 150       | –       | –    | 437                 | 17.2   | 437                  | 17.2   |
| 500      | 20"    | PN 6              | Table E | PN 16   | Cl. 150       | –       | –    | 492                 | 19.4   | 492                  | 19.4   |
| 600      | 24"    | PN 6              | Table E | PN 16   | Cl. 150       | –       | –    | 594                 | 23.4   | 594                  | 23.4   |
| 700      | 28"    | PN 6              | –       | –       | –             | Class D | –    | 692                 | 27.2   | 692                  | 27.2   |
| –        | 30"    | –                 | –       | –       | –             | Class D | –    | 742                 | 29.2   | 742                  | 29.2   |
| 800      | 32"    | PN 6              | –       | –       | –             | Class D | –    | 794                 | 31.3   | 794                  | 31.3   |
| 900      | 36"    | PN 6              | –       | –       | –             | Class D | –    | 891                 | 35.1   | 891                  | 35.1   |
| 1000     | 40"    | PN 6              | –       | –       | –             | Class D | –    | 994                 | 39.1   | 994                  | 39.1   |
| –        | 42"    | –                 | –       | –       | –             | Class D | –    | 1043                | 41.1   | 1043                 | 41.1   |
| 1200     | 48"    | PN 6              | –       | –       | –             | Class D | –    | 1197                | 47.1   | 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              | –       | –       | –             | Class D | –    | 1786                | 70.3   | –                    | –      |
| 2000     | 78"    | PN 6              | –       | –       | –             | Class D | –    | 1989                | 78.3   | –                    | –      |

**Material**

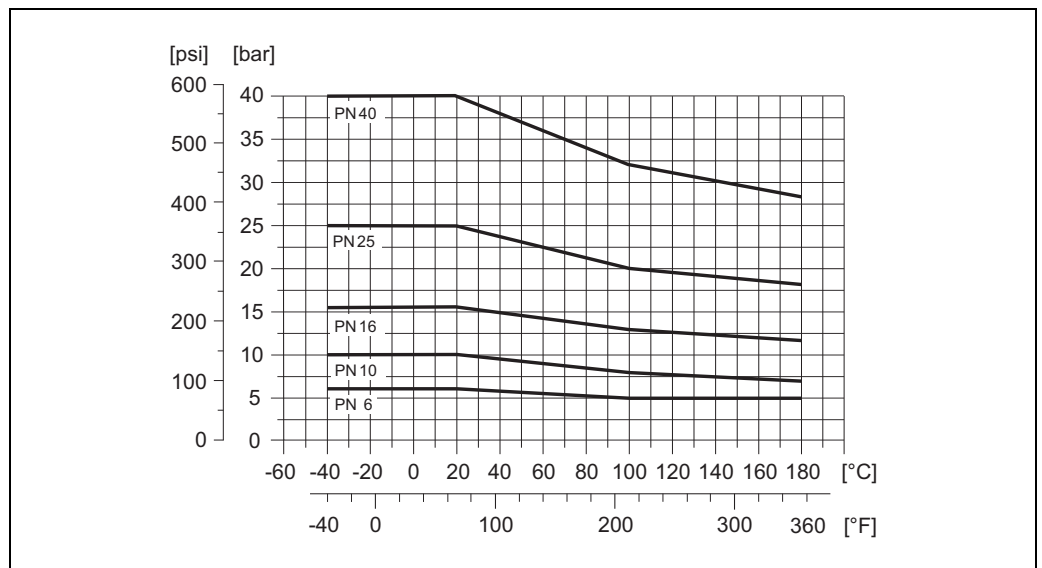
- Housing: powder-coated die-cast aluminum
- Sensor housing
  - DN 25 to 300 (1 to 12"): powder-coated die-cast aluminum
  - DN 350 to 2000 (14 to 78"): with protective lacquering
- Measuring tube
  - DN ≤ 300 (12"): stainless steel 1.4301 or 1.4306/304L;  
(Flange material: carbon steel with Al/Zn protective coating)
  - DN ≥ 350 (14"): stainless steel 1.4301 or 1.4306/304L;  
(Flange material: carbon steel with protective lacquering)
- Electrodes: 1.4435/316L, Alloy C-22
- Flanges
  - EN 1092-1 (DIN2501): RSt37-2 (S235JRG2); C22, Fe 410W B  
(DN ≤ 300 (12"): with Al/Zn protective coating; DN ≥ 350 (14") with protective lacquering)
  - ANSI: A105  
(DN ≤ 300 (12"): with Al/Zn protective coating; DN ≥ 350 (14") with protective lacquering)
  - AWWA: 1.0425 (with protective lacquering)
  - JIS: RSt37-2 (S235JRG2); HII; 1.0425  
(DN ≤ 300 (12"): with Al/Zn protective coating; DN ≥ 350 (14") with protective lacquering)
  - AS 2129
    - (DN 25, 80, 100, 150...1200 / 1", 3", 4", 6...48"): A105 or RSt37-2 (S235JRG2)
    - (DN 50, 80, 350, 400, 500 / 2", 3", 14", 16", 20"): A105 or St44-2 (S275JR)
  - AS 4087: A105 or St44-2 (S275JR)  
(DN ≤ 300 (12"): with Al/Zn protective coating; DN ≥ 350 (14") with protective lacquering)
- Seals: to DIN EN 1514-1
- Ground disks: 1.4435/316L or Alloy C-22

**Material load diagram****Caution!**

The following diagrams contain material load diagrams (reference curves) for flange materials with regard to the medium temperature. However, the maximum medium temperatures permitted always depend on the lining material of the sensor and/or the sealing material.

**Flange connection to EN 1092-1 (DIN 2501)**

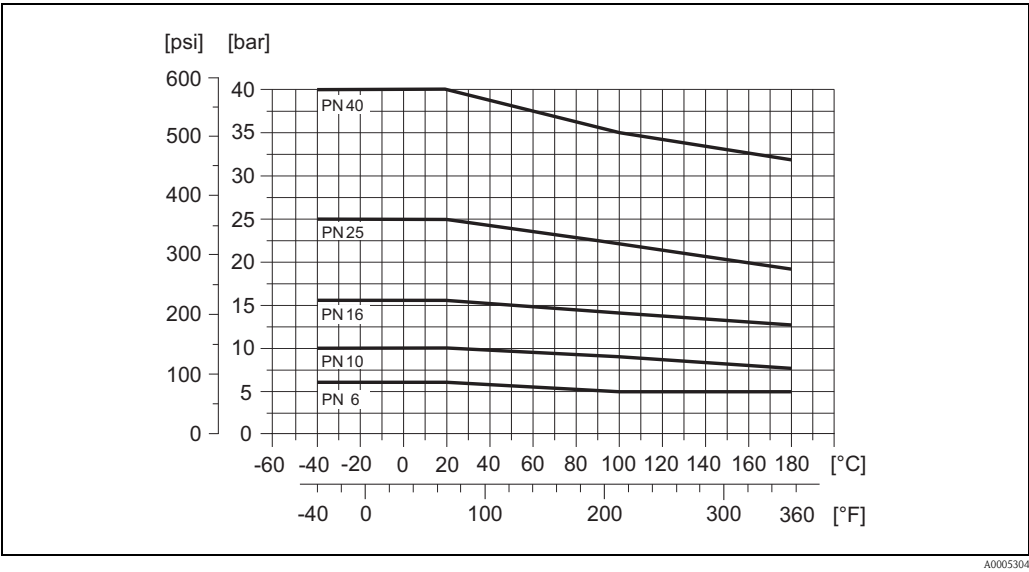
Material: RSt37-2 (S235JRG2) / C22 / Fe 410W B



A0005594

Flanschanschluss nach EN 1092-1 (DIN 2501)

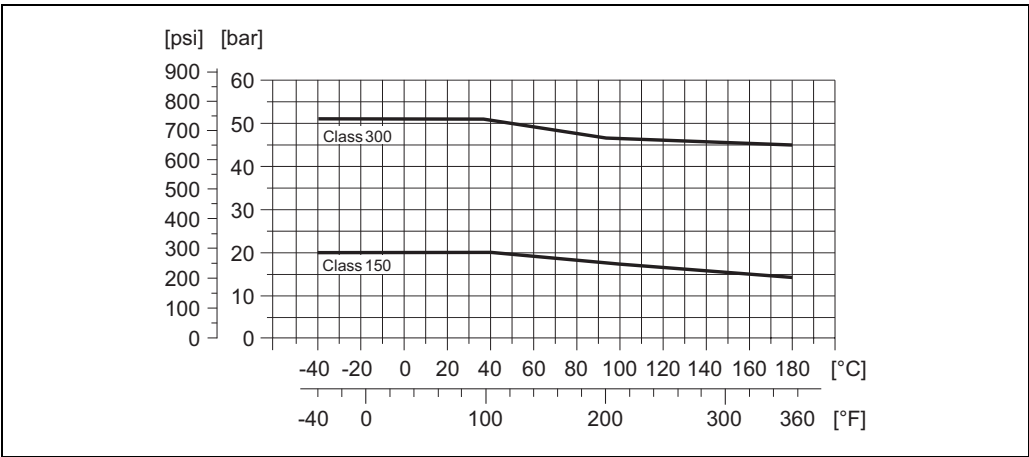
Werkstoff: 316L / 1.4571



A0005304

Flange connection to ANSI B16.5

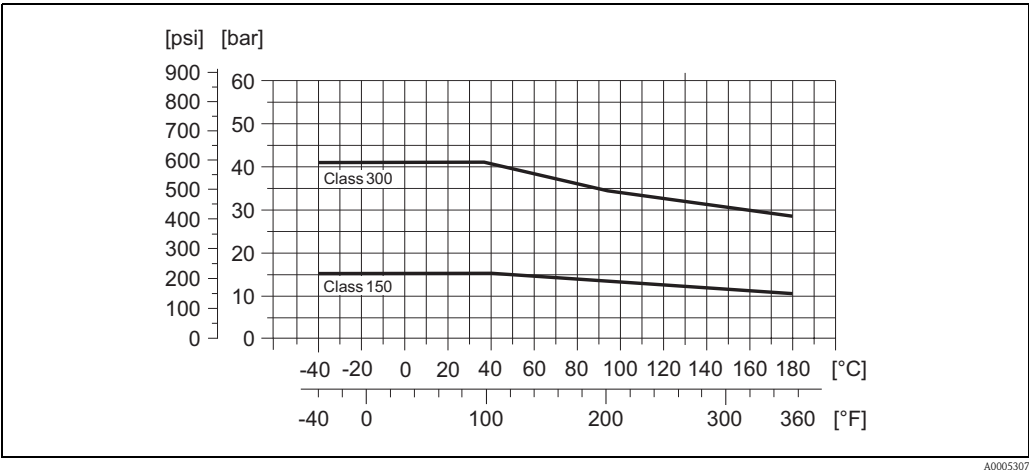
Material: A 105



A0003226

Flanschanschluss nach ANSI B16.5

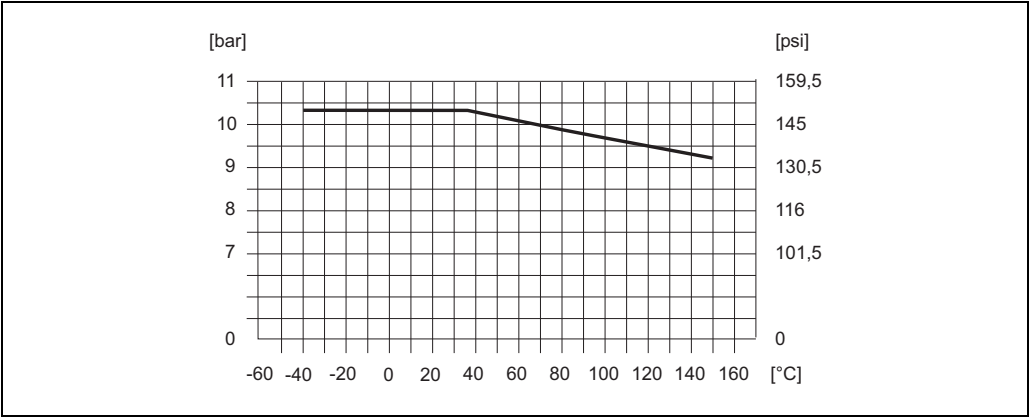
Werkstoff: F316L



A0005307

**Flange connection to AWWA C207, Class D**

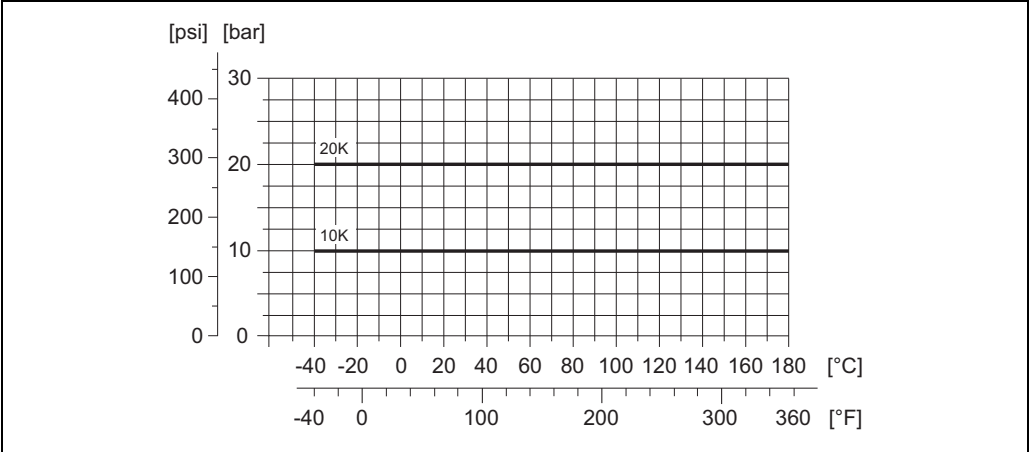
Material: 1.0425



A0005592

**Flange connection to JIS B2220**

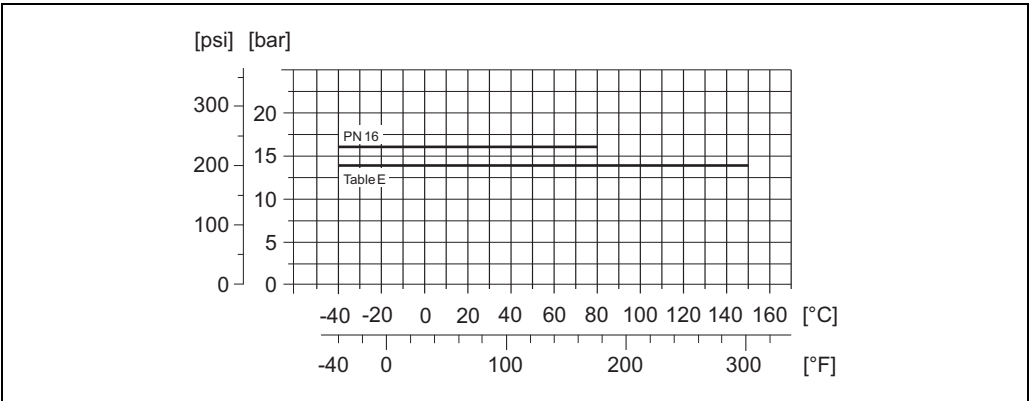
Material: RSt37-2 (S235)RG2 / HII / 1.0425 / 316L



A0005228

**Flange connection to AS 2129 Table E or AS 4087 PN 16**

Material: A105 / RSt37-2 (S235)RG2 / St44-2 (S275)JR



A0005595

**Fitted electrodes**

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

- 1.4435
- Alloy C-22

|                            |                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Process connections</b> | Flange connection: <ul style="list-style-type: none"> <li>■ EN 1092-1 (DIN 2501), DN ≤ 300 (12") form A, DN ≥ 350 (14") form B<br/>(Dimensions to DIN 2501, DN 65 PN 16 and DN 600 (24") PN 16 exclusively to EN 10921)</li> <li>■ ANSI B16.5</li> <li>■ AWWA C 207, Class D</li> <li>■ JIS B2220</li> <li>■ AS 2129 Table E</li> <li>■ AS 4087 PN 16</li> </ul> |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                          |                                                                                                                                    |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>Surface roughness</b> | Electrodes with 1.4435 (AISI 316L), Alloy C-22: ≤ 0.3 to 0.5 µm (12 to 20 µin)<br>(All data refer to parts in contact with medium) |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------|

## Human interface

|                         |                                                                                                                                                                                                                                        |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Display elements</b> | <ul style="list-style-type: none"> <li>■ Liquid crystal display: unilluminated, two-line, 16 characters per line</li> <li>■ Display (operating mode) preconfigured: volume flow and totalizer status</li> <li>■ 1 totalizer</li> </ul> |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                           |                                          |
|---------------------------|------------------------------------------|
| <b>Operating elements</b> | Local operation via three keys (◀, +, ▶) |
|---------------------------|------------------------------------------|

|                         |                                           |
|-------------------------|-------------------------------------------|
| <b>Remote operation</b> | Operation via HART protocol and FieldCare |
|-------------------------|-------------------------------------------|

## Certificates and approvals

|                |                                                                                                                                                                                     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CE mark</b> | The measuring system is in conformity with the statutory requirements of the EC Directives. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark. |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                    |                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------|
| <b>C-tick mark</b> | The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)". |
|--------------------|----------------------------------------------------------------------------------------------------------------|

|                    |                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ex approval</b> | Information about currently available Ex versions (FM, CSA etc.) can be supplied by your Endress+Hauser Sales Center on request. All explosion protection data are given in a separate documentation which is available upon request. |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Other standards and guidelines</b> | <ul style="list-style-type: none"> <li>■ EN 60529<br/>Degrees of protection by housing (IP code).</li> <li>■ EN 61010<br/>Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures.</li> <li>■ IEC/EN 61326<br/>"Emission in accordance with requirements for Class A".<br/>Electromagnetic compatibility (EMC requirements).</li> <li>■ ANSI/ISA-S82.01<br/>Safety Standard for Electrical and Electronic Test, Measuring, Controlling and related Equipment – General Requirements. Pollution degree 2, Installation Category II.</li> <li>■ CAN/CSA-C22.2 No. 1010.1-92<br/>Safety requirements for Electrical Equipment for Measurement and Control and Laboratory Use.<br/>Pollution degree 2, Installation Category II.</li> </ul> |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pressure measuring device approval</b> | Measuring devices with a nominal diameter smaller than or equal to DN 25 correspond to Article 3(3) of the EC Directive 97/23/EC (Pressure Equipment Directive) and have been designed and manufactured according to good engineering practice. Where necessary (depending on the medium and process pressure), there are additional optional approvals to Category II/III for larger nominal diameters. |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Ordering information

Your Endress +Hauser service organization can provide detailed ordering information and information on the order codes on request.

## Accessories

Various accessories, which can be ordered separately from Endress+Hauser, are available for the transmitter and the sensor. Your Endress+Hauser service organization can provide detailed information on the order codes in question.

## Documentation

- System Information Promag 10 (SI042D/06)
- Operating Instructions Promag 10 (BA082D/06)

## Registered trademarks

KALREZ® and VITON®

Registered trademarks of E.I. Du Pont de Nemours & Co., Wilmington, USA

TRI-CLAMP®

Registered trademark of Ladish & Co., Inc., Kenosha, USA

HART®

Registered trademark of the HART Communication Foundation, Austin, USA

FieldCare®, Fieldcheck®, Field Xpert™, Applicator®

Registered or registration-pending trademarks of Endress+Hauser Flowtec AG, Reinach, CH

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**Endress+Hauser**   
People for Process Automation