Technical Information
Proline Promag 10W
Electromagnetic flowmeter



Sensor with degree of protection IP68 (Type 6P enclosure) with a highly cost-effective transmitter

Application

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

Device properties

- International drinking water approvals
- Degree of protection IP68 (Type 6P enclosure)
- 2-line display with push buttons
- Device in compact or remote version
- HART

Your benefits

- Secure, reliable long-term operation – robust and completely welded sensor
- Energy-saving flow measurement – no pressure loss due to cross-section constriction
- Maintenance-free – no moving parts
- Cost-effective – designed for easy applications and direct integration
- Safe operation – display provides easy readable process information
- Fully industry compliant – IEC/EN/NAMUR

Endress+Hauser
People for Process Automation

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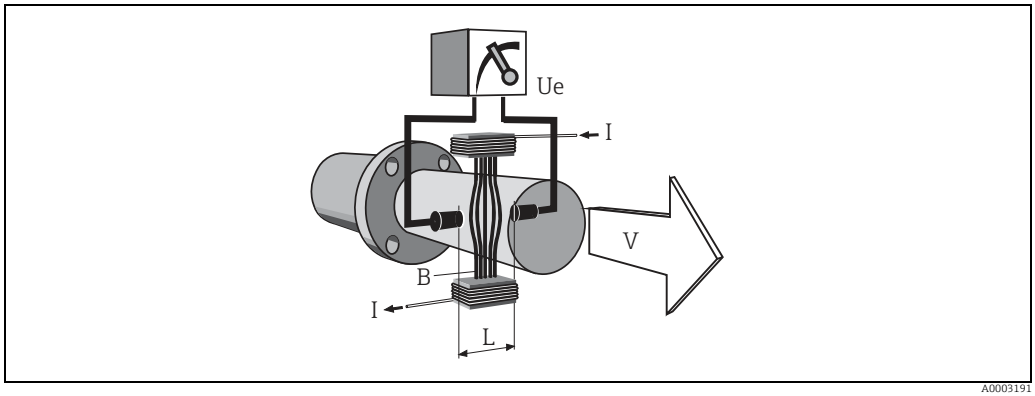
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Function and system design

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.



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$Ue = B \cdot L \cdot v$
$Q = A \cdot v$

Ue	*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

Measured variable

Flow velocity (proportional to induced voltage)

Measuring ranges

Typically v = 0.01 to 10 m/s (0.033 to 33 ft/s) with the specified accuracy

Standard version

Flow characteristic values (SI units)					
Diameter		**Recommended flow**	**Factory settings**		
[mm]	[inch]	Min./max. full scale value (v ~ 0.3 or 10 m/s)	Full scale value Current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulses/s)	Low flow (v ~ 0.04 m/s)
25	1"	9 to 300 dm³/min	75 dm³/min	0.50 dm³	1 dm³/min
32	–	15 to 500 dm³/min	125 dm³/min	1.00 dm³	2 dm³/min
40	1½"	25 to 700 dm³/min	200 dm³/min	1.50 dm³	3 dm³/min
50	2"	35 to 1100 dm³/min	300 dm³/min	2.50 dm³	5 dm³/min
65	–	60 to 2000 dm³/min	500 dm³/min	5.00 dm³	8 dm³/min
80	3"	90 to 3000 dm³/min	750 dm³/min	5.00 dm³	12 dm³/min
100	4"	145 to 4700 dm³/min	1200 dm³/min	10.00 dm³	20 dm³/min
125	–	220 to 7500 dm³/min	1850 dm³/min	15.00 dm³	30 dm³/min
150	6"	20 to 600 m³/h	150 m³/h	0.025 m³	2.5 m³/h
200	8"	35 to 1100 m³/h	300 m³/h	0.05 m³	5.0 m³/h
250	10"	55 to 1700 m³/h	500 m³/h	0.05 m³	7.5 m³/h
300	12"	80 to 2400 m³/h	750 m³/h	0.10 m³	10 m³/h
350	14"	110 to 3300 m³/h	1000 m³/h	0.10 m³	15 m³/h
375	15"	140 to 4200 m³/h	1200 m³/h	0.15 m³	20 m³/h
400	16"	140 to 4200 m³/h	1200 m³/h	0.15 m³	20 m³/h
450	18"	180 to 5400 m³/h	1500 m³/h	0.25 m³	25 m³/h
500	20"	220 to 6600 m³/h	2000 m³/h	0.25 m³	30 m³/h
600	24"	310 to 9600 m³/h	2500 m³/h	0.30 m³	40 m³/h
700	28"	420 to 13500 m³/h	3500 m³/h	0.50 m³	50 m³/h
–	30"	480 to 15000 m³/h	4000 m³/h	0.50 m³	60 m³/h
800	32"	550 to 18000 m³/h	4500 m³/h	0.75 m³	75 m³/h
900	36"	690 to 22500 m³/h	6000 m³/h	0.75 m³	100 m³/h
1000	40"	850 to 28000 m³/h	7000 m³/h	1.00 m³	125 m³/h
–	42"	950 to 30000 m³/h	8000 m³/h	1.00 m³	125 m³/h
1200	48"	1250 to 40000 m³/h	10000 m³/h	1.50 m³	150 m³/h
–	54"	1550 to 50000 m³/h	13000 m³/h	1.50 m³	200 m³/h
1400	–	1700 to 55000 m³/h	14000 m³/h	2.00 m³	225 m³/h
–	60"	1950 to 60000 m³/h	16000 m³/h	2.00 m³	250 m³/h
1600	–	2200 to 70000 m³/h	18000 m³/h	2.50 m³	300 m³/h
–	66"	2500 to 80000 m³/h	20500 m³/h	2.50 m³	325 m³/h
1800	72"	2800 to 90000 m³/h	23000 m³/h	3.00 m³	350 m³/h
–	78"	3300 to 100000 m³/h	28500 m³/h	3.50 m³	450 m³/h
2000	–	3400 to 110000 m³/h	28500 m³/h	3.50 m³	450 m³/h

Flow characteristic values (US units)					
Diameter		Recommended flow rate	Factory settings		
[inch]	[mm]	Min./max. full scale value (v ~ 0.3 or 10 m/s)	Full scale value Current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulses/s)	Low flow (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

Optional version w/o inlet and outlet runs

Flow characteristic values (SI units)					
Diameter		Recommended flow	Factory settings		
[mm]	[inch]	Min./max. full scale value (v ~ 0.12/5 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 4 pulses/s)	Low flow (v ~ 0.02 m/s)
50	2"	15 to 600 dm³/min	300 dm³/min	1.25 dm³	2.25 dm³/min
65	–	25 to 1000 dm³/min	500 dm³/min	2 dm³	4 dm³/min
80	3"	35 to 1500 dm³/min	750 dm³/min	3 dm³	6 dm³/min
100	4"	60 to 2400 dm³/min	1200 dm³/min	5 dm³	9.5 dm³/min
125	–	90 to 3700 dm³/min	1850 dm³/min	8 dm³	15 dm³/min
150	6"	145 to 5400 dm³/min	2500 dm³/min	10 dm³	20 dm³/min
200	8"	220 to 9400 dm³/min	5000 dm³/min	20 dm³	35 dm³/min
250	10"	20 to 850 m³/h	500 m³/h	0.03 m³	3.5 m³/h
300	12"	35 to 1300 m³/h	750 m³/h	0.05 m³	5 m³/h

Flow characteristic values (US units)					
Diameter		Recommended flow	Factory settings		
[inch]	[mm]	Min./max. full scale value (v ~ 0.12/5 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 4 pulses/s)	Low flow (v ~ 0.02 m/s)
2"	50	4 to 160 gal/min	75 gal/min	0.3 gal	0.7 gal/min
–	65	7 to 260 gal/min	130 gal/min	0.5 gal	1.1 gal/min
3"	80	10 to 400 gal/min	200 gal/min	0.8 gal	1.6 gal/min
4"	100	16 to 650 gal/min	300 gal/min	1.2 gal	2.5 gal/min
–	125	24 to 1000 gal/min	450 gal/min	1.8 gal	4 gal/min
6"	150	40 to 1400 gal/min	600 gal/min	2.5 gal	6 gal/min
8"	200	60 to 2500 gal/min	1200 gal/min	5 gal	10 gal/min
10"	250	90 to 3700 gal/min	1500 gal/min	6 gal	16 gal/min
12"	300	155 to 5700 gal/min	2400 gal/min	9 gal	23 gal/min

Operable flow range Over 1000 : 1

Output

Output signal

Current output

- Galvanically isolated
- Active: 4 to 20 mA, R_L < 700 Ω (for HART: $R_L \geq 250$ Ω)
- Full scale value adjustable
- Temperature coefficient: typ. 2 µA/°C, resolution: 1.5 µA

Pulse/status output

- Galvanically isolated
- Passive: 30 V DC / 250 mA
- Open collector
- Can be configured as:
  - Pulse output
    Pulse value and pulse polarity can be selected, max. pulse width adjustable (5 to 2000 ms), pulse frequency max. 100 Hz
  - Status output
    For example, can be configured for error messages, empty pipe detection, flow recognition, limit value

Signal on alarm

Current output

Failsafe mode can be selected (e.g. in accordance with NAMUR Recommendation NE 43)

Pulse output

Failsafe mode can be selected

Status output

"Not conductive" in the event of fault or power supply failure

Load

See "Output signal"

Low flow

Low flow cutoff, switch-on point can be selected as required

Galvanic isolation

All circuits for inputs, outputs and power supply are galvanically isolated from each other.

Power supply

Terminal assignment

Order information "Input / Output"	Terminal No.					
	24 (+)	25 (–)	26 (+)	27 (–)	1 (L1/L+)	2 (N/L–)
A	Pulse/status output		HART current output		Power supply	
Functional values	See “Output signal”				See “Supply voltage”	

Supply voltage

- 85 to 250 V AC, 45 to 65 Hz
- 20 to 28 V AC, 45 to 65 Hz, 11 to 40 V DC

Power consumption

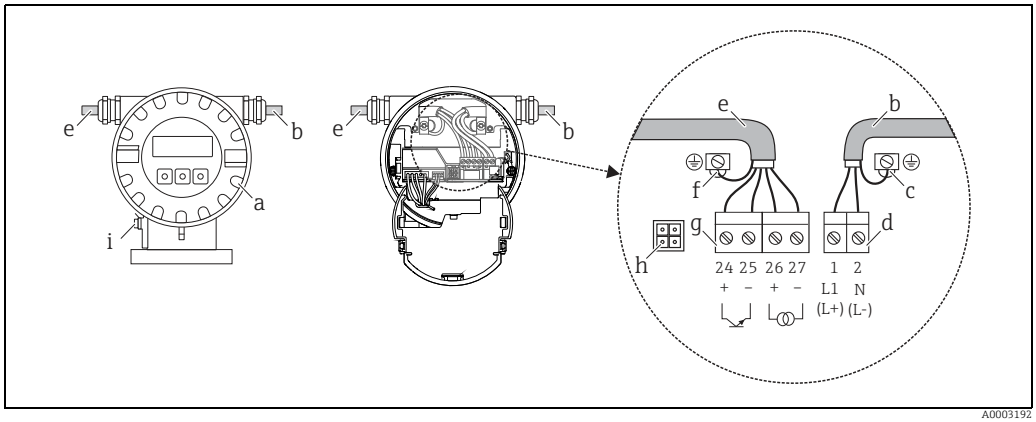
Power consumption
- 85 to 250 V AC: < 12 VA (incl. sensor)
- 20 to 28 V AC: < 8 VA (incl. sensor)
- 11 to 40 V DC: < 6 W (incl. sensor)

Switch-on current
- Max. 16 A (< 5 ms) for 250 V AC
- Max. 5.5 A (< 5 ms) for 28 V AC
- Max. 3.3 A (< 5 ms) for 24 V DC

Power supply failure

Lasting min. ½ cycle frequency: EEPROM saves measuring system data

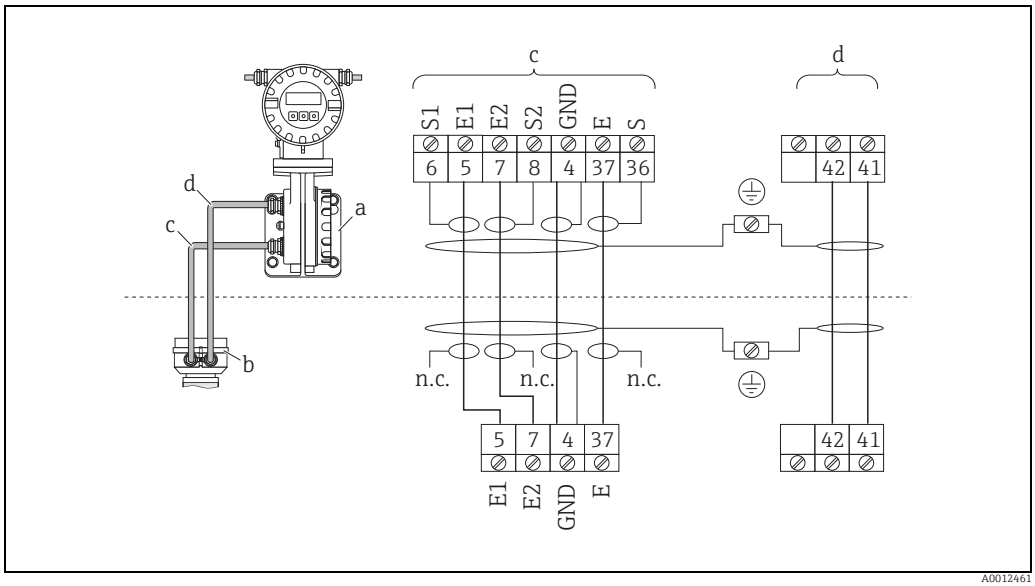
Electrical connection



Connecting the transmitter (aluminum field housing), cable cross-section max. 2.5 mm² (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 *Electrode cable*
f *Ground terminal for electrode cable*
g *Terminal connector for electrode cable*
h *Service connector for connecting service interface FXA 193 (Fieldcheck, FieldCare)*
i *Ground terminal for potential equalization*

Electrical connection, remote version



Connecting the remote version

a *Wall-mount housing connection compartment*
b *Sensor connection housing cover*
c *Electrode 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

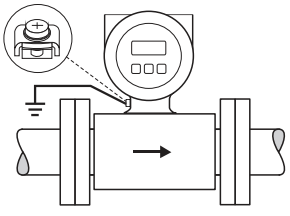
Potential equalization

Note!
The measuring system must be included in the potential equalization.

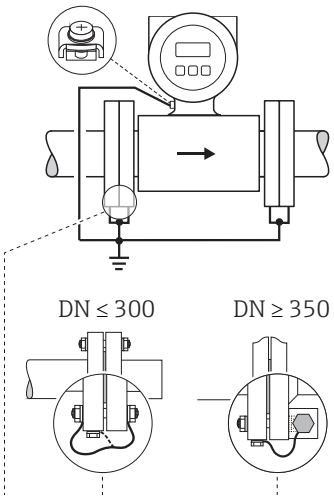
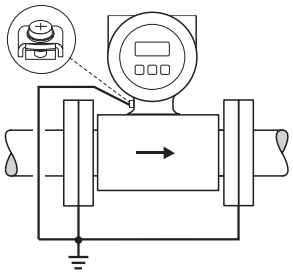
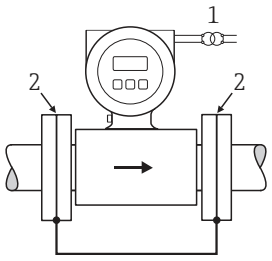
Perfect measurement is only ensured when the fluid and the sensor have the same electrical potential. This is ensured by the reference electrode integrated in the sensor as standard.

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
When using the measuring device in a: ▪ Metal, grounded pipe Potential equalization takes place via the ground terminal of the transmitter. Note! When installing in metal pipes, we recommend you connect the ground terminal of the transmitter housing with the piping.	 A0010831 *Via the ground terminal of the transmitter*

Special situations

Operating conditions	Potential equalization
When using the measuring device in a: ▪ Metal pipe that is not grounded This connection method also applies in situations where: ▪ Customary potential equalization cannot be ensured. ▪ Excessively high equalizing currents can be expected. Both sensor flanges are connected to the pipe flange by means of a ground cable (copper wire, at least 6 mm² / 0.0093 in²) and grounded. Connect the transmitter or sensor connection housing, as applicable, to ground potential by means of the ground terminal provided for the purpose. Ground cable installation depends on the nominal diameter: ▪ DN ≤ 300 (12"): The ground cable is mounted directly on the conductive flange coating with the flange screws. ▪ DN ≥ 350 (14"): The ground cable is mounted directly on the metal transport bracket. Note! The ground cable for flange-to-flange connections can be ordered separately as an accessory from Endress+Hauser.	 *Via the ground terminal of the transmitter and the flanges of the pipe*
When using the measuring device in a: ▪ Plastic pipe ▪ Pipe with insulating lining This connection method also applies in situations where: ▪ Customary potential equalization cannot be ensured. ▪ Excessively high equalizing currents can be expected. Potential equalization takes place using additional ground disks, which are connected to the ground terminal via a ground cable (copper wire, at least 6 mm² / 0.0093 in²). When installing the ground disks, please comply with the enclosed Installation Instructions.	 *Via the ground terminal of the transmitter and the optionally available ground disks*
When using the measuring device in a: ▪ Pipe with a cathodic protection unit The device is installed potential-free in the pipe. Only the two flanges of the pipe are connected with a ground cable (copper wire, at least 6 mm² / 0.0093 in²). Here, the ground cable is mounted directly on the conductive flange coating with flange screws. Note the following when installing: ▪ The applicable regulations regarding potential-free installation must be observed. ▪ There should be **no** electrically conductive connection between the pipe and the device. ▪ The mounting material must withstand the applicable torques.	 *Potential equalization and cathodic protection* *1 Power supply isolation transformer* *2 Electrically isolated*

Cable entry

Power supply and electrode 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"

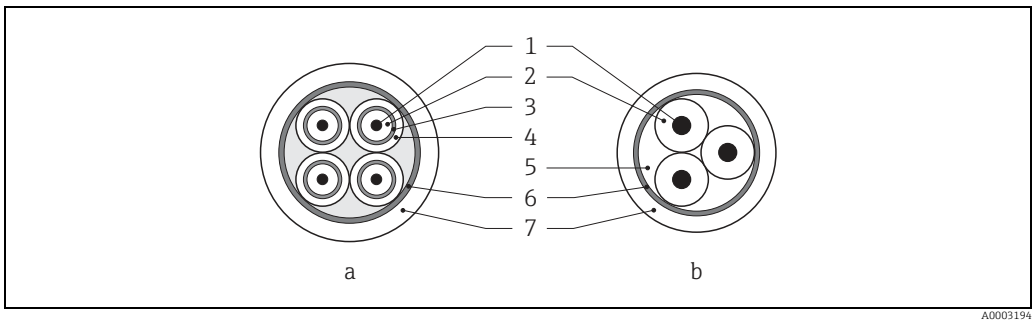
Remote version cable specifications

Coil current cable

- 3 × 0.75 mm² (18 AWG) PVC cable with common, braided copper shield (∅ ~ 9 mm / 0.35")
- Conductor resistance: ≤ 37 Ω/km (≤ 0.011 Ω/ft)
- Capacitance core/core, shield grounded: ≤ 120 pF/m (≤37 pF/ft)
- Operating temperature: −20 to +80 °C (−4 to +176 °F)
- Cable cross-section: max. 2.5 mm² (16 AWG)
- Test voltage for cable insulation: ≥ 1433 V AC r.m.s. 50/60 Hz or ≥ 2026 V DC

Electrode cable

- 3 × 0.38 mm² (20 AWG) PVC cable with common, braided copper shield (∅ ~ 9.5 mm / 0.37") and individual shielded cores
- Conductor resistance: ≤ 50 Ω/km (≤ 0.015 Ω/ft)
- Capacitance core/shield: ≤ 420 pF/m (≤ 128 pF/ft)
- Operating temperature: −20 to +80 °C (−4 to +176 °F)
- Cable cross-section: max. 2.5 mm² (16 AWG)



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a *Electrode cable*
b *Coil current cable*

1 *Core*
2 *Core insulation*
3 *Core shield*
4 *Core jacket*
5 *Core reinforcement*
6 *Cable shield*
7 *Outer jacket*

Operation in zones of severe electrical interference

The measuring 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.

Note!
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.

Performance characteristics

Reference operating conditions

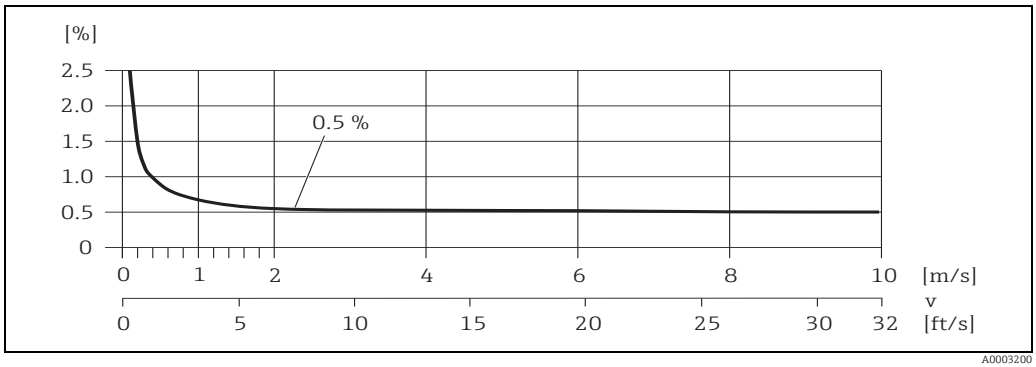
As per DIN EN 29104 and VDI/VDE 2641:
- Fluid temperature: +28 °C ± 2 K (+82 °F ± 2 K)
- Ambient temperature: +22 °C ±2 K (+72 °F ± 2 K)
- Warm-up period: 30 minutes

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

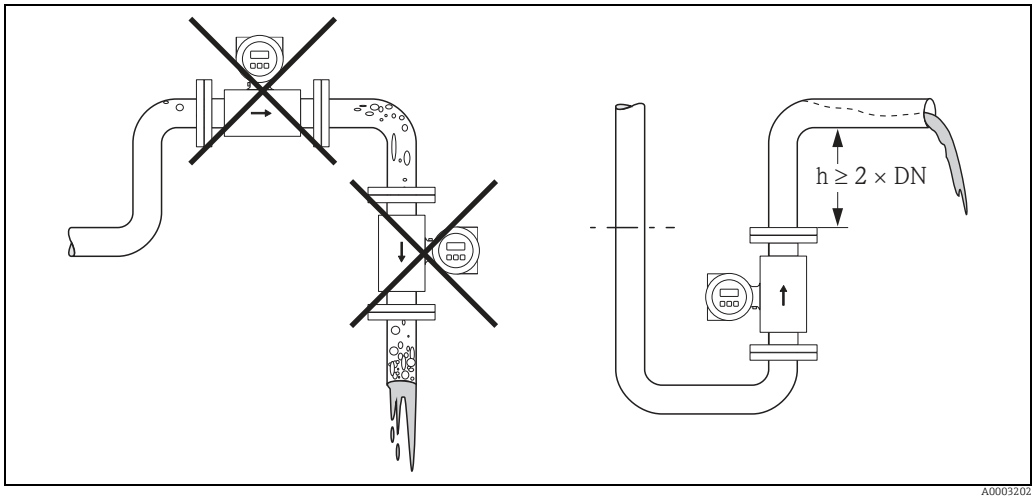
Repeatability

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

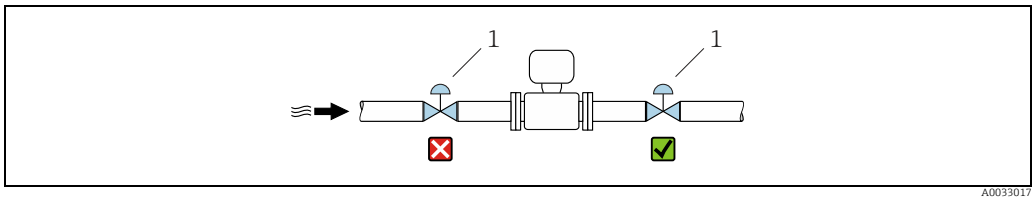
Installations

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.



Mounting location

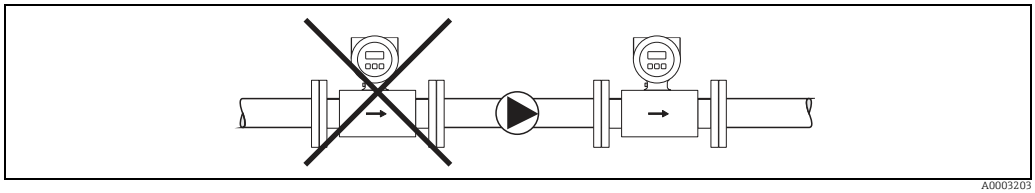


Installation of the sensor after a control valve is not recommended

1 Control valve

Installation of pumps

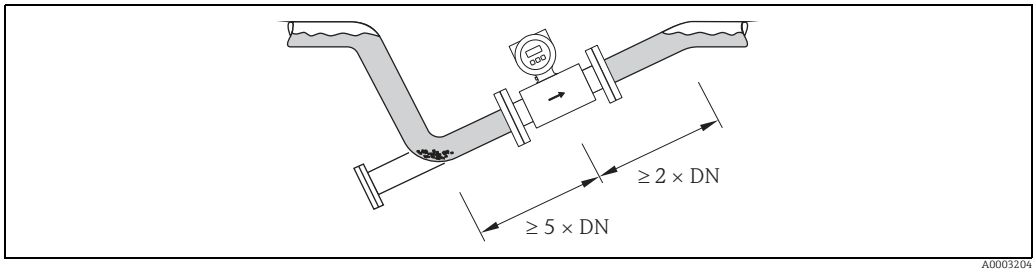
Sensors may not be installed on the pump suction side. This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube. Information on the pressure tightness of the measuring tube lining → 🖹 21, Section "Pressure tightness".
Pulsation dampers may be needed when using piston pumps, piston diaphragm pumps or hose pumps. Information on the shock and vibration resistance of the measuring system → 🖹 17, Section "Shock and vibration resistance".



Installation of pumps

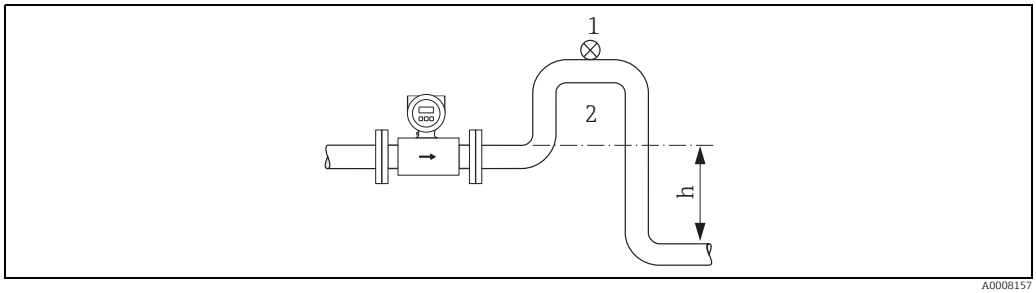
Partially filled pipes
Partially filled pipes with gradients necessitate a drain-type configuration.
The empty pipe detection function (EPD) provides additional security in detecting empty or partially filled pipes.

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



Installation with partially filled pipes

Down pipes
Install a siphon or a vent valve downstream of the sensor in down pipes h ≥ 5 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 → 📄 21, Section "Pressure tightness".



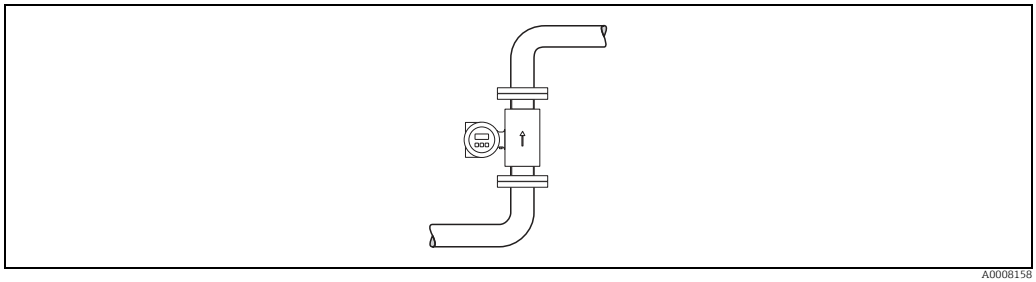
Installation measures for vertical pipes

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.



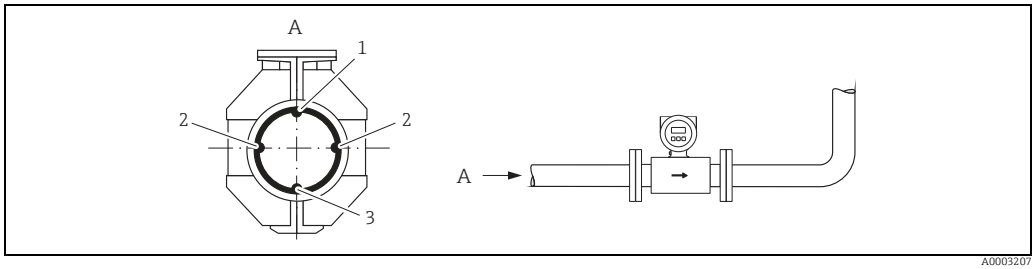
Vertical orientation

Horizontal orientation

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

Note!

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

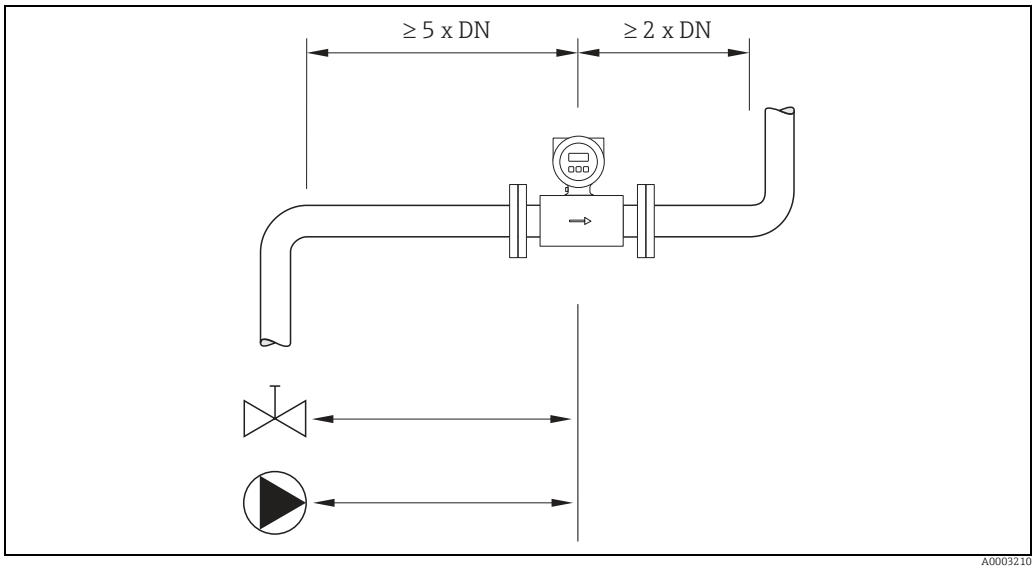
Horizontal orientation

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

Inlet and outlet run

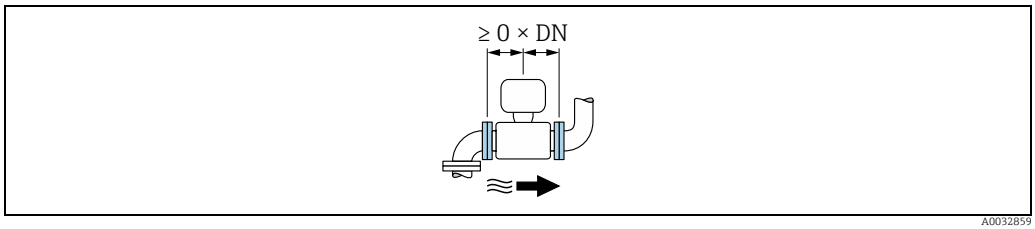
If possible, install the sensor well clear of assemblies such as valves, T-pieces, elbows etc.

Note the following inlet and outlet runs to comply with measuring accuracy specifications:
- Inlet run: ≥ 5 × DN
- Outlet run: ≥ 2 × DN



A0003210

Inlet and outlet run standard version



A0032859

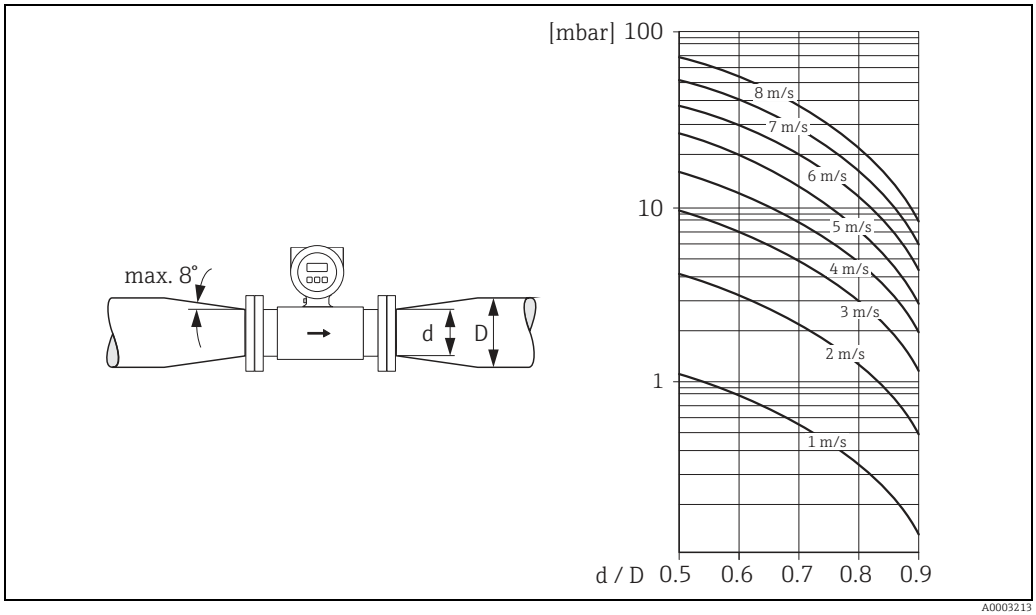
Optional version: w/o inlet and outlet run

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.

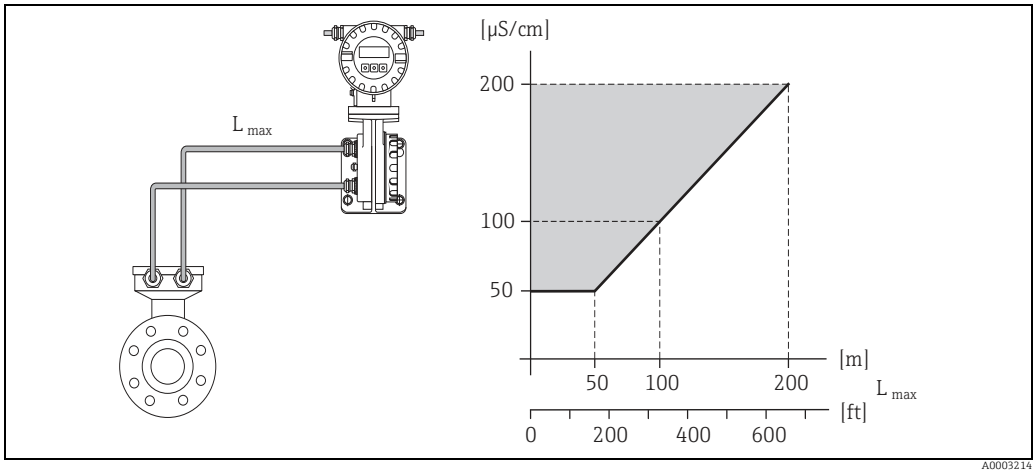


Pressure loss due to adapters

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 µS/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 [µS/cm]

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)



Note!
The permitted temperature range of the measuring tube lining may not be undershot or overshot (→ 18, 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.



Note!
- 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

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

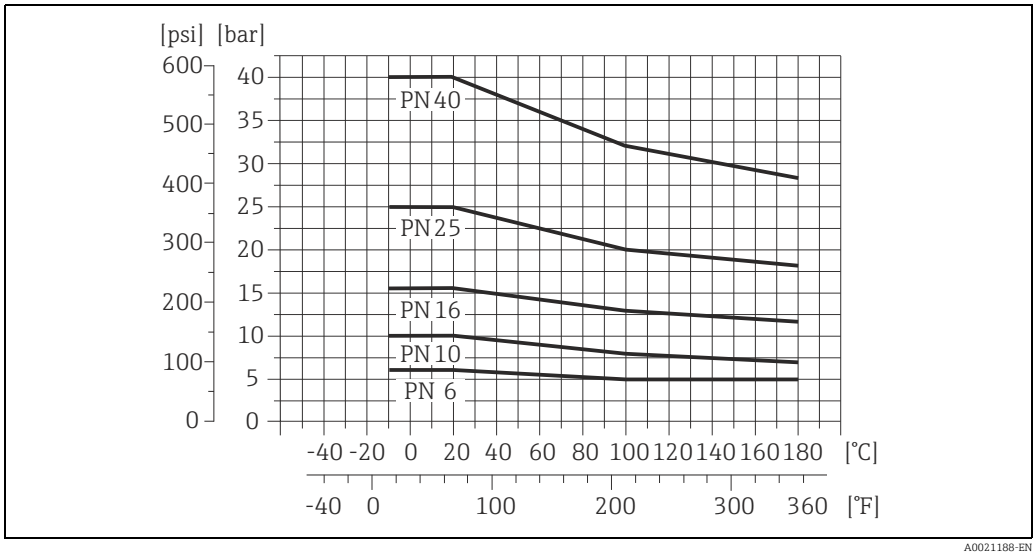
The minimum conductivity is: ≥ 50 µS/cm

Note!
In the remote version, the necessary minimum conductivity also depends on the cable length (→ 16, Section "Length of connecting cable").

Pressure-temperature ratings

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.

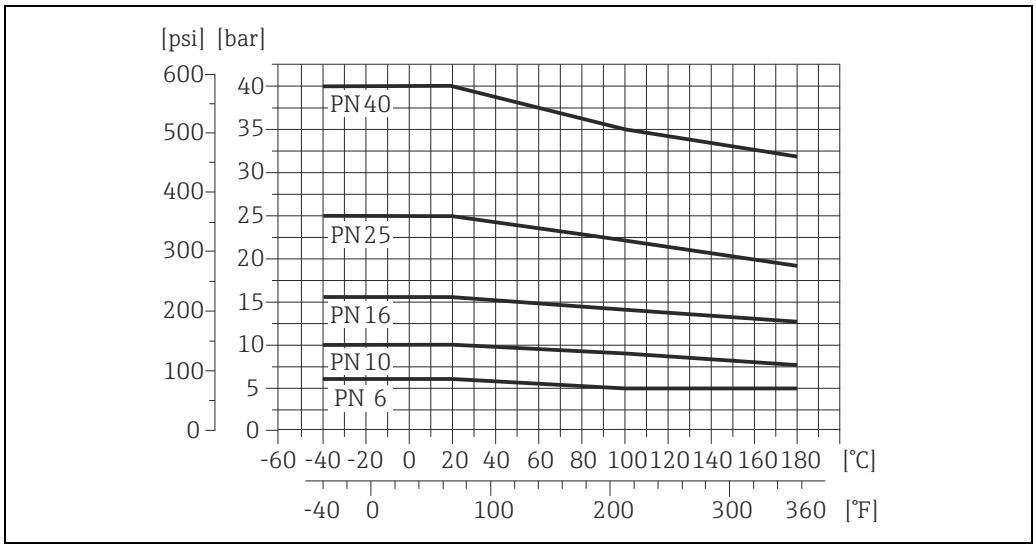
Flange connection to EN 1092-1 (DIN 2501)
Material: S235JRG2, S235JR+N, P250GH, P245GH, E250C, A105



A0021188-EN

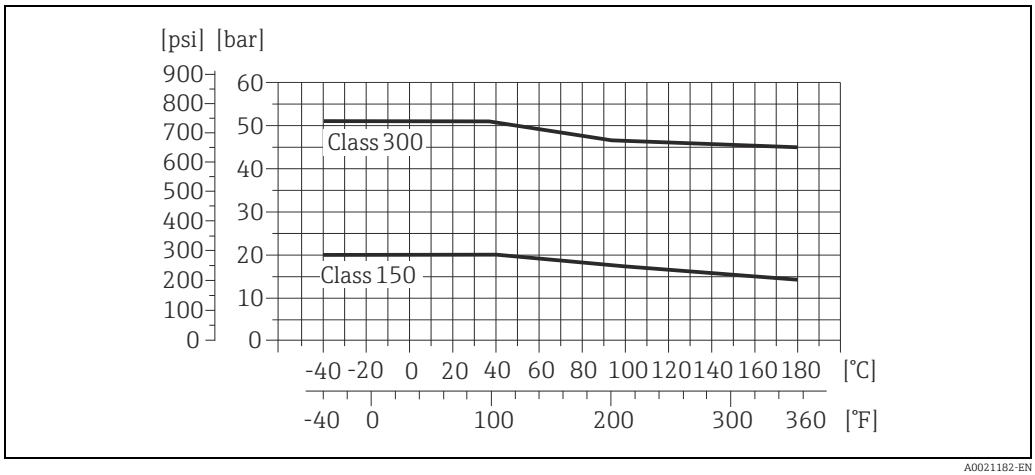
Flange connection to EN 1092-1 (DIN 2501)

Material: 1.4571, 1.4404, F316L



A0021184-EN

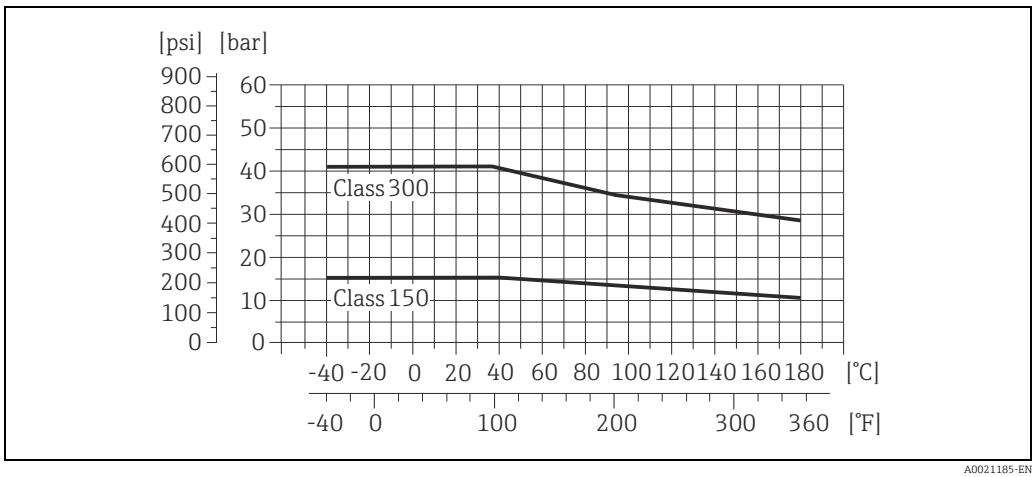
Flange connection to ASME B16.5
Material: A 105



A0021182-EN

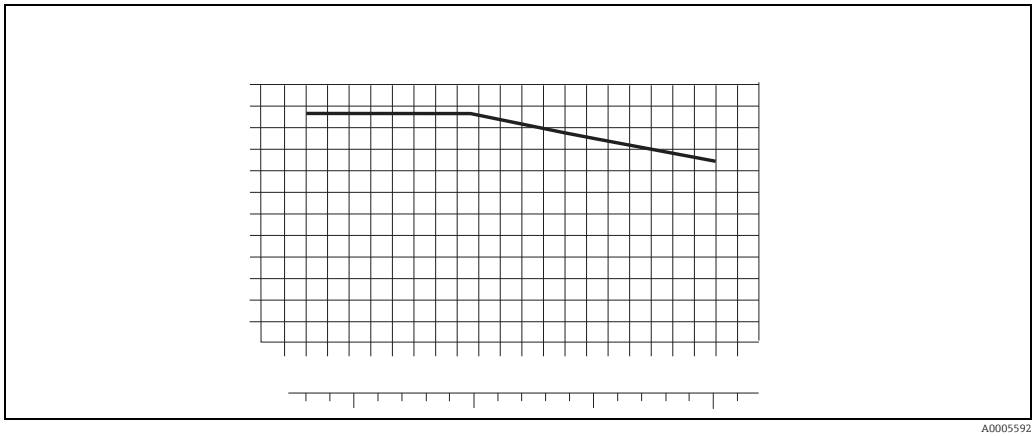
Flange connection to ASME B16.5

Material: F316L



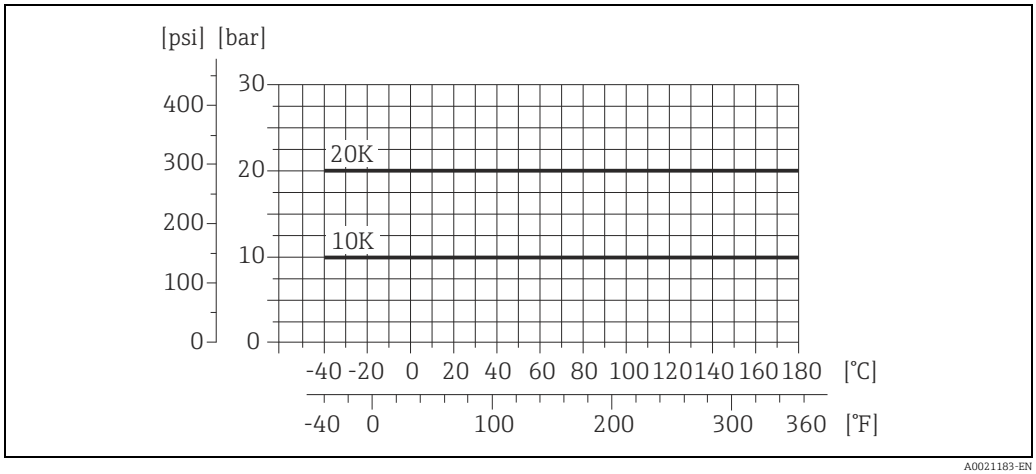
A0021185-EN

Flange connection to AWWA C207, Class D
Material: A105, A181 Cl.70, P265GH, S275JR, E250C, S235JRG2



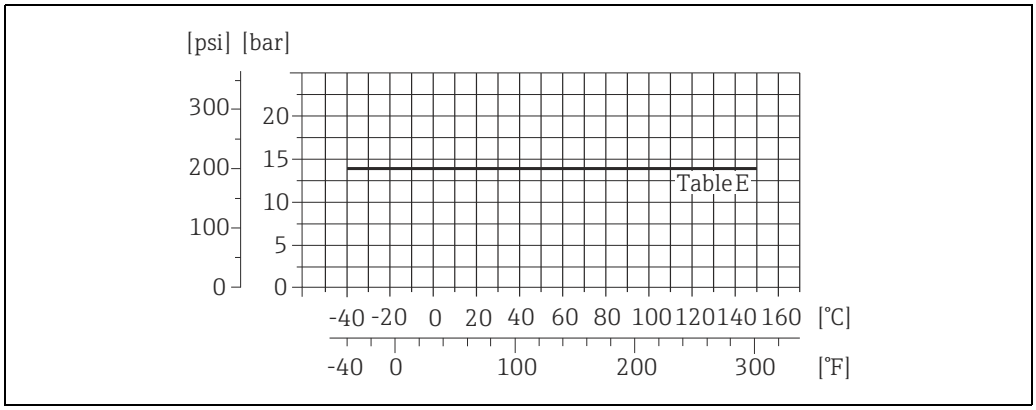
A0005592

Flange connection to JIS B2220
Material: A105, A350 LF2, F316L



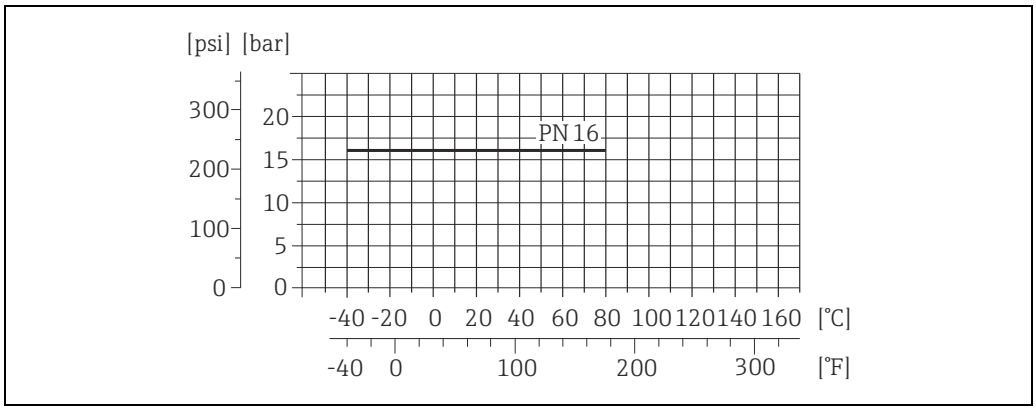
A0021183-EN

Flange connection to AS 2129 Table E
Material: A105, P235GH, P265GH, S235JRG2



A0021189-EN

Flange connection to AS 4087 PN 16
Material: A105, P265GH, S275JR



A0023077-EN

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")
- ASME B 16.5
  - Class 150 (DN 25 to 600 / 1 to 24")
  - Class 300 (DN 25 to 150 / 1 to 6")
- AWWA C2072
  - Class D (DN 700 to 2000 / 28 to 78")
- JIS B2220
  - 10 K (DN 50 to 750 / 2 to 30")
  - 20 K (DN 25 to 600 / 1 to 24")
- 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:			
		25 °C (77 °F)		50 °C (122 °F)	
[mm]	[inch]	[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:					
		25 °C (77 °F)		70 °C (158 °F)		80 °C (176 °F)	
[mm]	[inch]	[mbar]	[psi]	[mbar]	[psi]	[mbar]	[psi]
50 to 2000	2 to 78"	0	0	0	0	0	0

Limiting flow

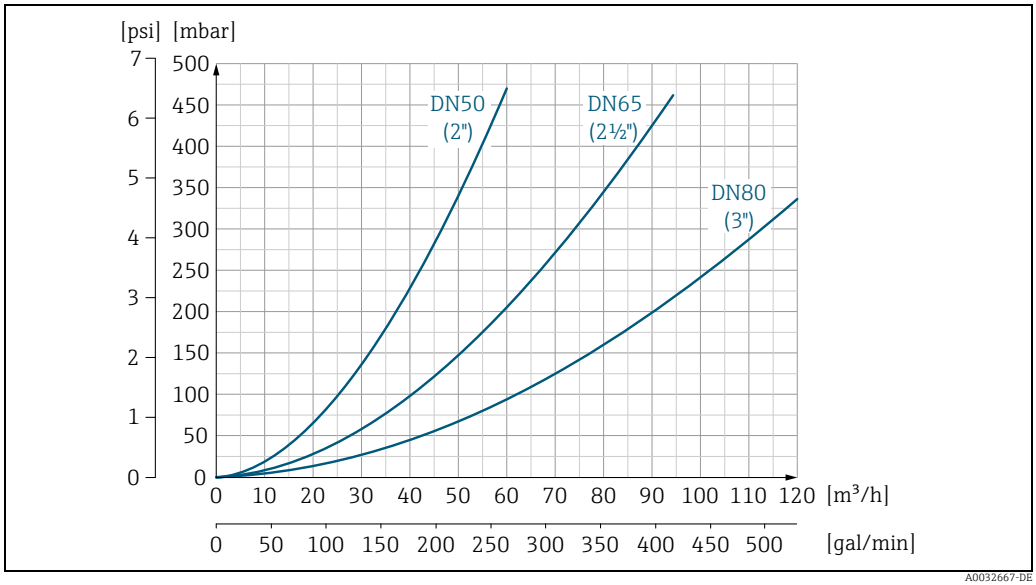
The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum flow velocity is between 2 to 3 m/s (6.5 to 9.8 ft/s).

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.

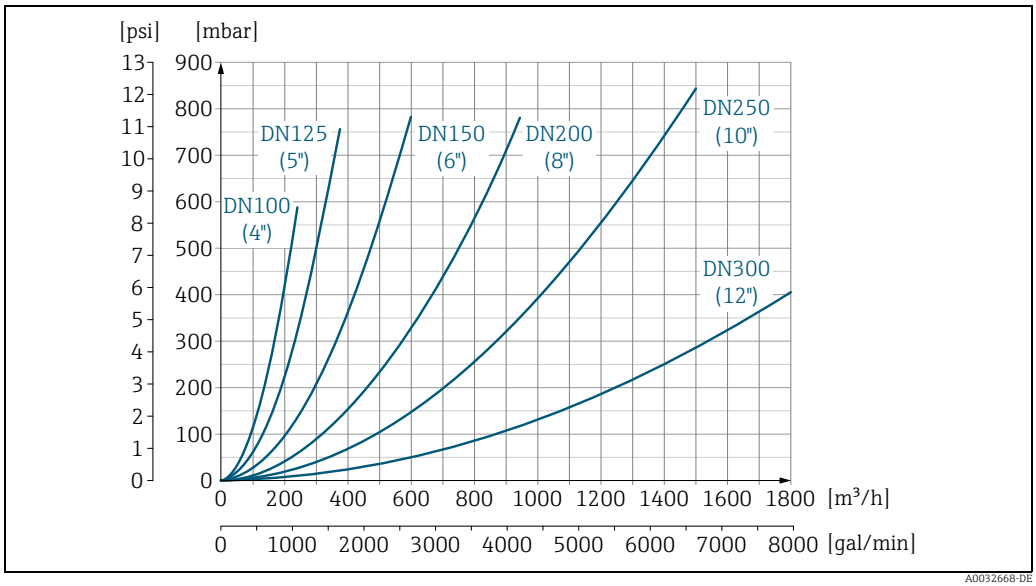
Note!
- A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter (→ 16, Section "Adapters").
- For fluids with high levels of solids, the selection of a pipe with nominal diameter > DN 8 (⅜") may be considered, to improve the stability of the signal and cleanability due to larger electrodes.

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 (→ 16, Section "Adapters").



Pressure loss DN 50 to 80 (2 to 3") for optional version w/o inlet and outlet runs

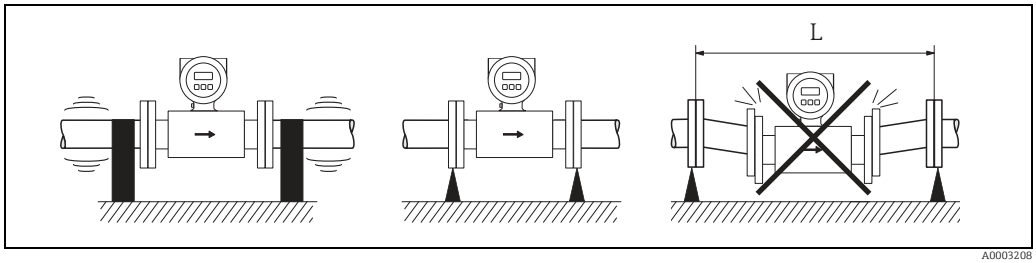


Pressure loss DN 100 to 300 (4 to 12") for optional version w/o inlet and outlet runs

Vibrations

Secure the piping and the sensor if vibration is severe.

Note!
If vibrations are too severe, we recommend the sensor and transmitter be mounted separately. Information on the permitted shock and vibration resistance → 🖹 17, Section "Shock and vibration resistance".



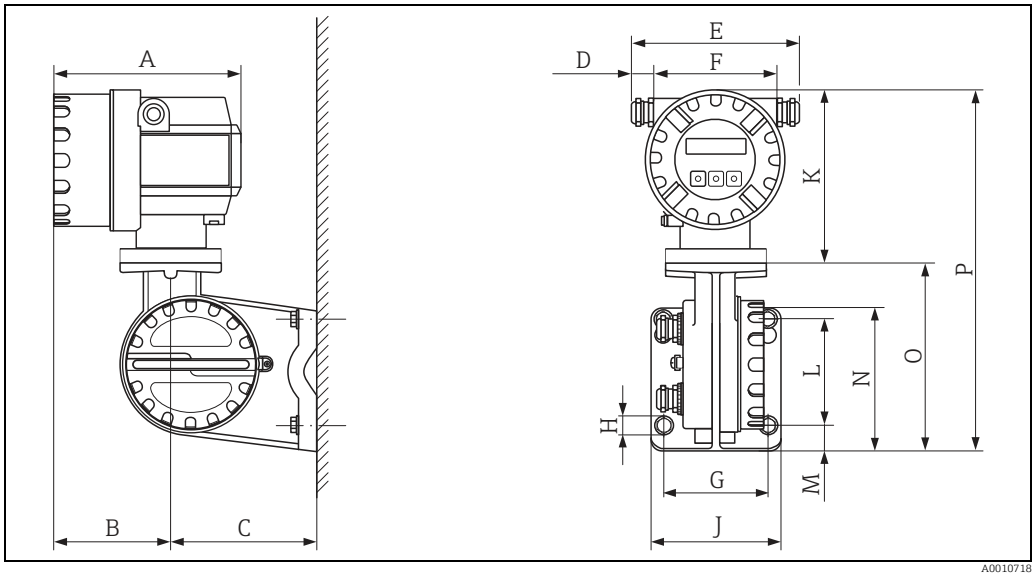
Measures to prevent vibration of the measuring device

L > 10 m (33 ft)

Mechanical construction

Design, dimensions

Transmitter, remote version



Transmitter dimensions, remote version

Dimensions in SI units

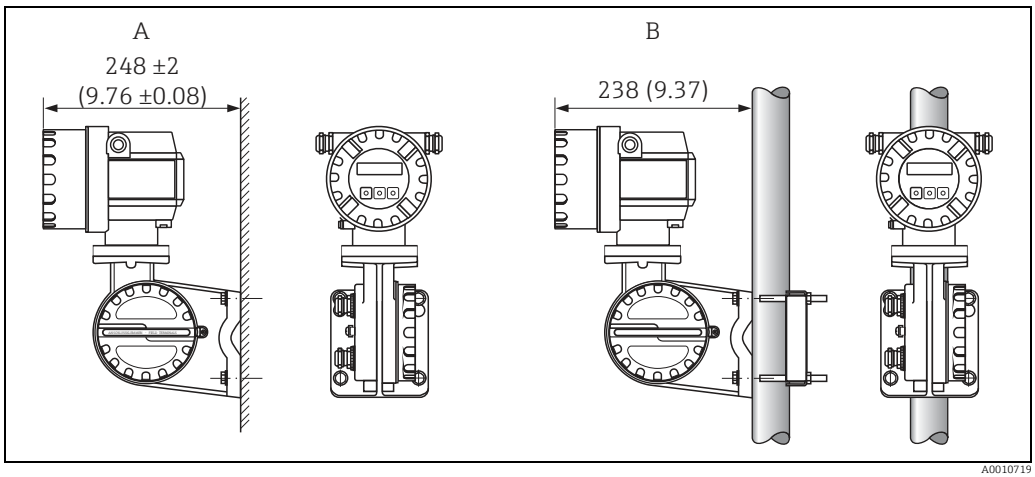
A	B	C	D	E	F	G	Ø H
178	113	135	20 to 27.5	153 to 168	113	100	8.6 (M8)
J	K	L	M	N	O	P	
123	150	100	25	133	177.5	327.5	

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 1.08	6.02 to 6.61	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	

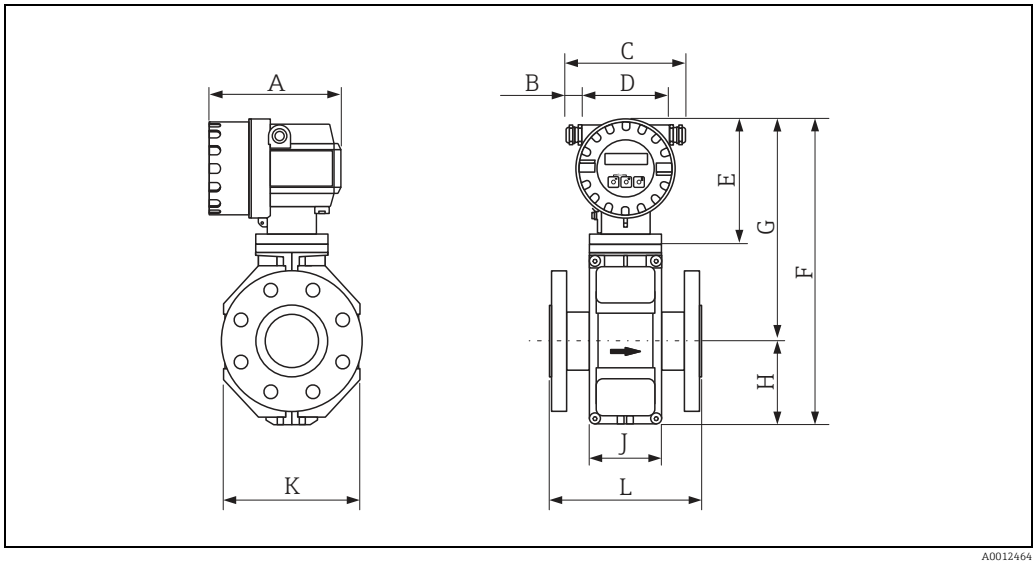
All dimensions in [inch]



Transmitter mounting, remote version. Engineering unit mm (in)

A Direct wall mounting
B Pipe mounting

Compact version DN ≤ 300 (12")



A0012464

Standard version

Dimensions in SI units

DN EN (DIN) / JIS / AS [2]	L [1]	A	B	C	D	E	F	G	H	J	K
25	200	178	20 to 27.5	153 to 168	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

[1] The length is regardless of the pressure rating selected. Fitting length to DVGW.
[2] 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 ASME	L [1]	A	B	C	D	E	F	G	H	J	K
1"	7.87	7.01	0.79 to 1.08	6.02 to 6.61	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

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

Optional version w/o inlet and outlet runs

Dimensions in SI units

DN EN (DIN) / JIS / AS [2]	L [1]	A	B	C	D	E	F	G	H	J	K
50	200	178	20 to 27.5	153 to 168	113	150	341	257	84	94	120
65	200						341	257	84	94	120
80	200						391	282	109	94	180
100	250						391	282	109	94	180
125	250						391	282	109	94	180
150	300						391	282	109	94	180
200	350						472	322	150	140	260
250	450						472	322	150	140	260
300	500						527	347	180	156	324

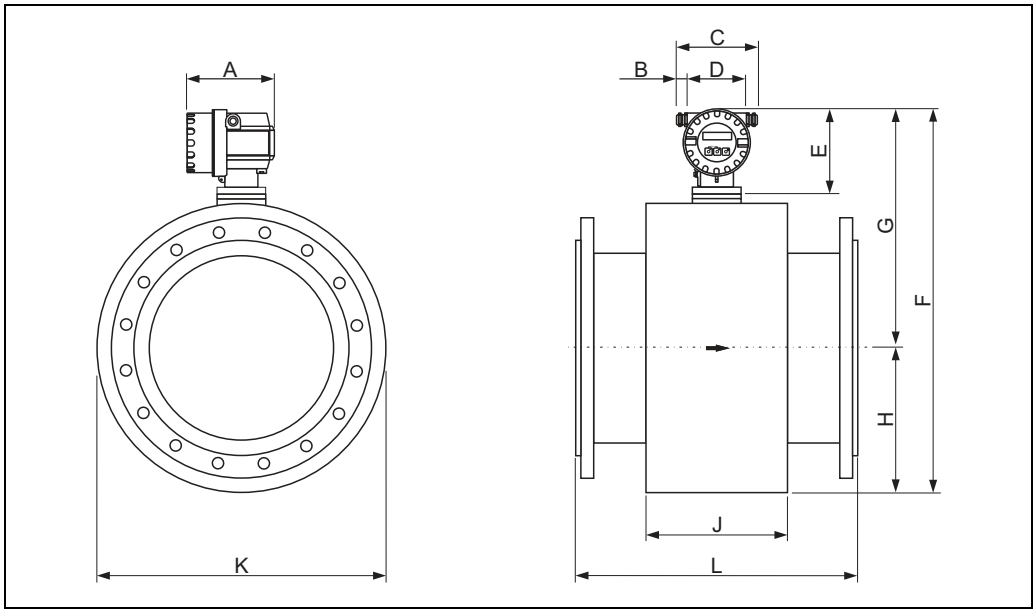
[1] The length is regardless of the pressure rating selected. Fitting length to DVGW.
[2] For flanges to AS, only the nominal diameters DN 80, 100 and 150 to 300 are available.
All dimensions in [mm]

Dimensions in US units

DN ASME	L [1]	A	B	C	D	E	F	G	H	J	K
2"	7.87	7.01	0.79 to 1.08	6.02 to 6.61	4.45	5.91	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						15.4	11.1	4.29	3.70	7.09
8"	13.8						18.6	12.7	5.91	5.51	10.2
10"	17.7						18.6	12.7	5.91	5.51	10.2
12"	19.7						20.8	13.7	7.09	6.14	12.8

[1] 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 EN (DIN) / AS [2]	L [1]	A	B	C	D	E	F	G	H	J	K
350	550	178	20 to 27.5	153 to 168	113	150	738.5	456.5	282.0	288	564
375	600						790.5	482.5	308.0	288	616
400	600						790.5	482.5	308.0	288	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						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

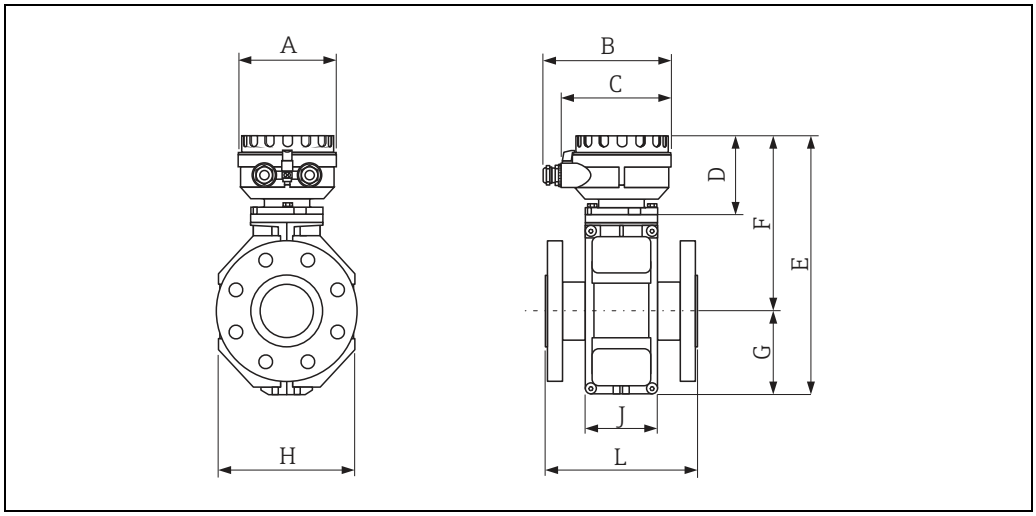
[1] The length is regardless of the pressure rating selected. Fitting length to DVGW.
[2] For flanges to AS, only DN 350, 400, 500 and 600 are available.
All dimensions in [mm]

Dimensions in US units

DN ASME / AWWA [2]	L [1]	A	B	C	D	E	F	G	H	J	K
14"	21.6	7.01	0.79 to 1.08	6.02 to 6.61	4.45	5.91	29.1	17.9	11.1	11.3	22.2
15"	23.6						31.1	18.9	12.1	11.3	24.2
16"	23.6						31.1	18.9	12.1	11.3	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

[1] The length is regardless of the pressure rating selected. Fitting length to DVGW.
[2] Flanges ≤ DN 600 only to ASME available, ≥ DN 700 only to AWWA available.
All dimensions in [inch]

Sensor, remote version DN ≤ 300 (12")



A0012462

Standard version

Dimensions in SI units

DN EN (DIN) / JIS / AS [2]	L [1]	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

[1] The length is regardless of the pressure rating selected. Fitting length to DVGW.
[2] 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 ASME	L [1]	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

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

Optional version w/o inlet and outlet runs

Dimensions in SI units

DN EN (DIN) / JIS / AS [2]	L [1]	A	B	C	D	E	F	G	H	J
50	200	129	163	143	102	286	202	84	120	94
65	200					286	202	84	120	94
80	200					336	227	109	180	94
100	250					336	227	109	180	94
125	250					336	227	109	180	94
150	300					336	227	109	180	94
200	350					417	267	150	260	140
250	450					417	267	150	260	140
300	500					472	292	180	324	156

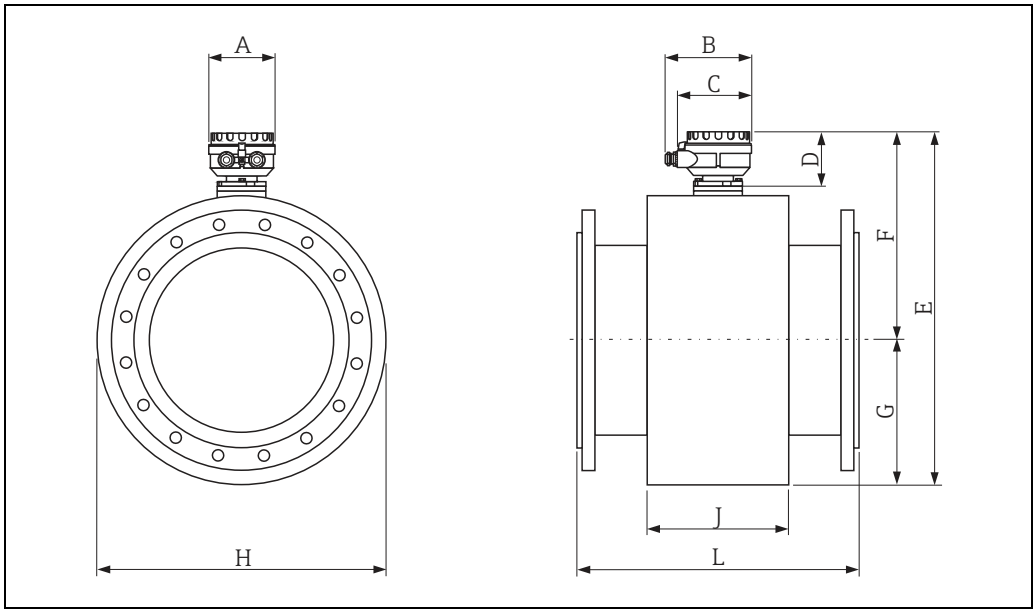
[1] The length is regardless of the pressure rating selected. Fitting length to DVGW.
[2] For flanges to AS, only the nominal diameters DN 80, 100 and 150 to 300 are available.
All dimensions in [mm]

Dimensions in US units

DN ASME	L [1]	A	B	C	D	E	F	G	H	J
2"	7.87	5.08	6.42	5.63	4.02	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					13.2	8.94	4.30	7.10	3.70
8"	13.8					16.4	10.5	5.91	10.2	5.51
10"	17.7					16.4	10.5	5.91	10.2	5.51
12"	19.7					18.6	11.5	7.10	12.8	6.14

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

Sensor, remote version DN ≥ 350 (14")



Dimensions in SI units

DN EN (DIN) / AS [2]	L [1]	A	B	C	D	E	F	G	H	J
350	550	129	163	143	102	683.5	401.5	282.0	564	288
375	600					735.5	427.5	308.0	616	288
400	600					735.5	427.5	308.0	616	288
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

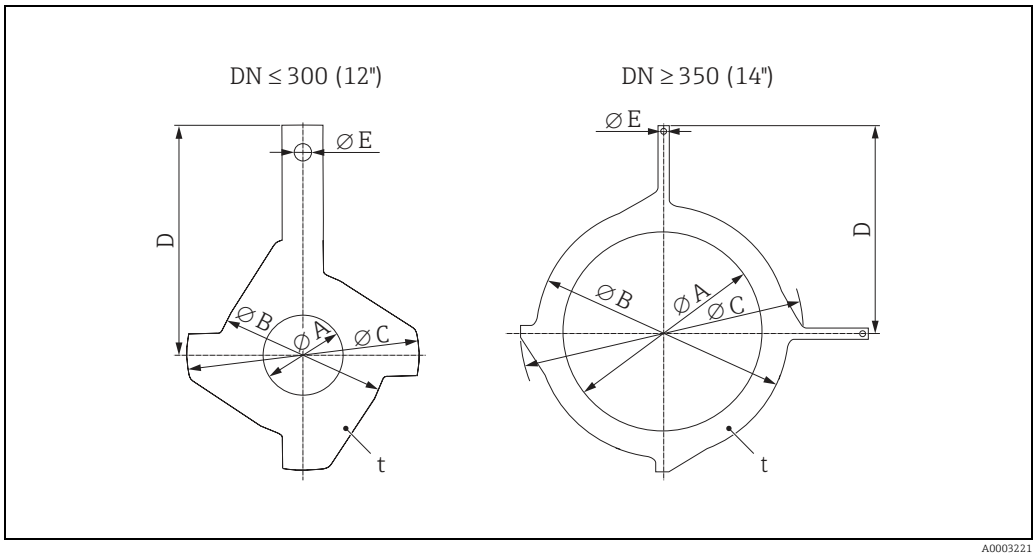
[1] The length is regardless of the pressure rating selected. Fitting length to DVGW.
[2] For flanges to AS, only DN 350, 400, 500 and 600 are available.
All dimensions in [mm]

Dimensions in US units

DN ASME / AWWA [2]	L [1]	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	11.3
15"	23.6					31.1	16.8	12.1	24.2	11.3
16"	23.6					31.1	16.8	12.1	24.2	11.3
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

[1] The length is regardless of the pressure rating selected. Fitting length to DVGW.
[2] Flanges ≤ DN 600 only to ASME available, ≥ DN 700 only to AWWA available.
All dimensions in [inch]

Ground disk for flange connections



A0003221

Dimensions (SI units)

DN [1] EN (DIN) / JIS / AS [2]	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 [3]	312	375	413	273		
300 [4]	310	375	404	268		
350 [3]	343	433	479	365	9.0	
375 [3]	393	480	542	395		
400 [3]	393	480	542	395		
450 [3]	439	538	583	417		
500 [3]	493	592	650	460		
600 [3]	593	693	766	522		

[1] Ground disks can be used for all flange standards/pressure ratings that can be delivered, except for DN ≥ 300.
[2] Only DN 32, 40, 65 and 125 are available for flanges according to AS.
[3] PN 10/16
[4] PN 25, JIS 10K/20K
All dimensions in [mm]

Dimensions (US units)

DN [1] ASME	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		

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

Weight

Standard version

Weight in SI units

Weight data in kg																
Diameter		Compact version							Remote version (without cable)							
									Sensor							Transmitter
[mm]	[inch]		EN (DIN) / AS [1]		JIS		ASME / AWWA			EN (DIN) / AS [1]		JIS		ASME / AWWA		Wall housing
25	1"	PN 40	5.7	10K	5.7	Class 150	5.7		PN 40	5.3	10K	5.3	Class 150	5.3		
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	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"		23.9		22.9		23.9			23.5		22.5		23.5		
200	8"	PN 10	43.4		40.3		43.3		PN 10	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	105		81.1		175		PN 6	103		79.1		173		
375	15"		120		–		–			118		–		–		
400	16"		120		102		205			118		100		203		
450	18"		161		130		255			159		128		253		
500	20"		156		144		285			154		142		283		3.1
600	24"		208		190		405			206		188		403		
700	28"		304		282	Class D	400			302		280	Class D	398		
–	30"		–		333		460			–		331		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		–		–		

[1] 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 ASME/AWWA)

Weight data in lbs						
Diameter		Compact version		Remote version (without cable)		
				Sensor		Transmitter
[mm]	[inch]		ASME /AWWA		ASME / AWWA	Wall housing
25	1"	Class 150	12.6	Class 150	11.7	6.8
40	1½"		17.2		16.3	
50	2"		19.9		19.0	
80	3"		27.3		26.5	
100	4"		31.8		30.9	
150	6"		52.7		51.8	
200	8"		95.5		94.8	
250	10"		162.1		161.0	
300	12"		239.0		238.1	
350	14"		380.1		381.5	
400	16"		448.5		447.6	
450	18"		558.8		557.9	
500	20"		624.9		624.0	
600	24"		889.5		888.6	
700	28"	Class D	878.5	Class D	877.6	
–	30"		1010.8		1009.9	
800	32"		1209.2		1208.3	
900	36"		1760.5		1759.6	
1000	40"		1981.0		1980.1	
–	42"		2422.0		2421.1	
1200	48"		3083.5		3082.6	
–	54"		4847.5		4846.6	
–	60"		5950.0		5949.1	
–	66"		8155.0		8154.1	
1800	72"		9037.0		9036.1	
–	78"		10139.0		10139.0	

- Transmitter (compact version): 4.0 lbs
- Weight data valid for standard pressure ratings and without packaging material

Optional version w/o inlet and outlet runs

Weight in SI units

Weight data in kg														
Diameter		Compact version						Remote version (without cable)						
								Sensor						Transmitter
[mm]	[inch]	EN (DIN) / AS [1]		JIS		ASME / AWWA		EN (DIN) / AS [1]		JIS		ASME / AWWA		Wall housing
50	2"	PN 40	9.6	10K	8.3	Class 150	9.6	PN 40	9.2	10K	7.9	Class 150	9.2	6.8
65	–	PN 16	11.4	10K	10.5	Class 150	–	PN 16	11.0	10K	10.1	Class 150	–	
80	3"	PN 16	13.8	10K	12.3	Class 150	13.8	PN 16	13.4	10K	11.9	Class 150	13.4	
100	4"	PN 16	15.4	10K	14.9	Class 150	16.5	PN 16	15.0	10K	14.5	Class 150	16.1	
125	–	PN 16	23.9	10K	23.8	Class 150	–	PN 16	23.5	10K	23.4	Class 150	–	
150	6"	PN 16	29.2	10K	29.9	Class 150	30.9	PN 16	28.8	10K	29.5	Class 150	30.5	
200	8"	PN 10	51.7	10K	49.5	Class 150	52.9	PN 10	51.3	10K	49.1	Class 150	52.6	
250	10"	PN 10	80.5	10K	82.7	Class 150	90.6	PN 10	80.1	10K	82.3	Class 150	90.2	
300	12"	PN 10	94.1	10K	88.9	Class 150	129.8	PN 10	93.7	10K	88.5	Class 150	129.4	

[1] 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 ASME/AWWA)

Weight data in lbs						
Diameter		Compact version		Remote version (without cable)		
				Sensor		Transmitter
[mm]	[inch]	ASME /AWWA		ASME / AWWA		Wall housing
50	2"	Class 150	21.2	Class 150	20.3	6.8
80	3"	Class 150	30.4	Class 150	29.6	
100	4"	Class 150	36.4	Class 150	35.5	
150	6"	Class 150	68.1	Class 150	67.2	
200	8"	Class 150	116.7	Class 150	116.0	
250	10"	Class 150	200.0	Class 150	198.9	
300	12"	Class 150	286.2	Class 150	285.3	

- 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			
		EN (DIN)	AS 2129	AS 4087	ASME	AWWA	JIS	Hard rubber		Polyurethane	
[mm]	[inch]	[bar]			[lbs]			[mm]	[inch]	[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[1)]	8"	PN 10	Table E	PN 16	Cl. 150	–	10 K	204	8.03	204	8.03
200[2)]	8"	PN 16	Table E	PN 16	Cl. 150	–	10 K	201	7.91	–	–
250[1)]	10"	PN 10	Table E	PN 16	Cl. 150	–	10 K	258	10.2	258	10.2
250[2)]	10"	PN 16	Table E	PN 16	Cl. 150	–	10 K	251	9.88	–	–
300[1)]	12"	PN 10	Table E	PN 16	Cl. 150	–	10 K	309	12.2	309	12.2
300[2)]	12"	PN 16	Table E	PN 16	Cl. 150	–	10 K	309	12.2	–	–
350	14"	PN 6	Table E	PN 16	Cl. 150	–	10 K	342	13.5	342	13.5
375	15"	–	–	PN 16	–	–	-	392	15.4	–	–
400	16"	PN 6	Table E	PN 16	Cl. 150	–	10 K	392	15.4	392	15.4
450	18"	PN 6	–	–	Cl. 150	–	10 K	437	17.2	437	17.2
500	20"	PN 6	Table E	PN 16	Cl. 150	–	10 K	492	19.4	492	19.4
600	24"	PN 6	Table E	PN 16	Cl. 150	–	10 K	594	23.4	594	23.4
700	28"	PN 6	–	–	–	Class D	10 K	692	27.2	692	27.2
750	30"	–	–	–	–	Class D	10 K	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	–	–

1) Standard version

2) Optional version w/o inlet and outlet runs

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 (304) or 1.4306 (304L);
    (Flange material: carbon steel with Al/Zn protective coating)
  - DN ≥ 350 (14"): stainless steel 1.4301 (304) or 1.4306 (304L);
    (Flange material: carbon steel with protective lacquering)
- Electrodes: 1.4435 (316L), Alloy C22
- Flange
  - EN 1092-1 (DIN2501)
    - DN 25 to 3501:
      - Stainless-steel, 1.4571, F316L
      - Carbon steel, S235JRG2, S235JR+N, P250GH, P245GH, E250C, A105
    - DN 350 to 6001:
      - Stainless-steel, 1.4571, F316
      - Carbon steel, P245GH, S235JRG2, S235JR+N, A105, E250C
    - DN > 6001:
      - Stainless-steel, 1.4404, F316L
      - Carbon steel, P245GH, S235JRG2, S235JR+N, P250GH, E250C
  - ASME B16.5
    - DN 25 to 600
      - Stainless-steel, F316L similar to 1.4404
      - Carbon steel, A105
  - AWWA C207: Carbon steel, A105, Cl.70 A181, P265GH, S275JR, E250C
  - JIS B2220:
    - Carbon steel, A105, A350 LF2
    - Stainless steel, F316L

    (DN ≤ 300 (12") with Al/Zn protective coating; DN ≥ 350 (14") with protective lacquering)
  - AS 2129: Carbon steel, A105, P235GH, P265GH, S235JRG2
  - AS 4087: Carbon steel, A105, P265GH, S275JR
- Seals: to DIN EN 1514-1 IBC form
- Ground disks: 1.4435 (316L) or Alloy C22

1Order code "Design", option A "insertion length short"'

Fitted electrodes

Measuring electrodes, reference electrodes and empty pipe detection electrodes available as standard with:
- 1.4435 (316L)
- Alloy C22

Process connections

Flange connection:
- EN 1092-1 (DIN 2501), DN ≤ 300 (12") form A, DN ≥ 350 (14") form B
  (Dimensions to DIN 2501, DN 65 PN 16 and DN 600 (24") PN 16 exclusively to EN 10921)
- ASME B16.5
- AWWA C 207, Class D
- JIS B2220
- AS 2129 Table E
- AS 4087 PN 16

Surface roughness

Electrodes with 1.4435 (316L), Alloy C22: ≤ 0.3 to 0.5 µm (12 to 20 µin)
(All data refer to parts in contact with medium)

Operability

Local operation

Display elements

- Liquid crystal display: unilluminated, two-line, 16 characters per line

- Display (operating mode) preconfigured: volume flow and totalizer status
- 1 totalizer

Operating elements

Local operation via three keys (S, O, F)

Remote operation

Operation via HART protocol and FieldCare

Certificates and approvals

CE mark

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.

C-tick mark

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

Ex approval

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.

Other standards and guidelines

- EN 60529
  Degrees of protection by housing (IP code).
- EN 61010
  Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures.
- IEC/EN 61326
  "Emission in accordance with requirements for Class A". Electromagnetic compatibility (EMC requirements).
- ANSI/ISA-S82.01
  Safety Standard for Electrical and Electronic Test, Measuring, Controlling and related Equipment - General Requirements. Pollution degree 2, Installation Category II.
- CAN/CSA-C22.2 No. 1010.1-92
  Safety requirements for Electrical Equipment for Measurement and Control and Laboratory Use. Pollution degree 2, Installation Category II.

Pressure equipment directive

The measuring devices can be ordered with or without PED (Pressure Equipment Directive). If a device with PED is required, this must ordered explicitly. This is not possible or required for devices with nominal diameters of DN 25 (1") or smaller.

- With the identification PED/G1/III on the sensor nameplate, Endress+Hauser confirms conformity with the "Basic safety requirements" of Appendix I of the Pressure Equipment Directive 2014/68/EU.
- Devices with this identification (with PED) are suitable for the following types of fluid:
  - Fluids of Group 1 and 2 with a steam pressure of greater than, or smaller and equal to 0.5 bar (7.3 psi)
  - Unstable gases
- Devices without this identification (without PED) are designed and manufactured according to good engineering practice. They correspond to the requirements of Art.4, Section 3 of the Pressure Equipment Directive 2014/68/EU. Their application is illustrated in Diagrams 6 to 9 in Appendix II of the Pressure Equipment Directive 2014/68/EU.

Ordering information

Detailed ordering information is available from the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: www.endress.com/worldwide

Product Configurator - the tool for individual product configuration:
- Up-to-the-minute configuration data

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

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.

Device-specific accessories

For the transmitter

Accessory	Description
Proline Promag 10 transmitter	Transmitter for replacement or storage. Use the order code to define the following specifications: ▪ Approvals ▪ Degree of protection/version ▪ Cable for remote version ▪ Cable entry ▪ Display/power supply/operation ▪ Software ▪ Outputs/inputs
Mounting set for Promag 10 transmitter	Mounting set for aluminum field housing (remote version). Suitable for Pipe mounting
Cable for remote version	Coil and electrode cables, various lengths.
Process display RIA45	Multifunctional 1-channel display unit: ▪ Universal input ▪ Transmitter power supply ▪ Limit relay ▪ Analog output
Process display RIA251	Digital display device for looping into the 4 to 20 mA current loop.
Field display unit RIA16	Digital field display device for looping into the 4 to 20 mA current loop.
Application Manager RMM621	Electronic recording, display, balancing, control, saving and event and alarm monitoring of analog and digital input signals. Values and conditions determined are output by means of analog and digital output signals. Remote transmission of alarms, input values and calculated values using a PSTN or GSM modem.

For the sensor

Accessory	Description
Wall-mounting kit for Promag H	Wall-mounting kit for the Promag H sensor.
Mounting kit for Promag D as wafer version	▪ Mounting bolts ▪ Nuts incl. washers ▪ Flange seals ▪ Centering sleeves (if required for the flange)
Set of seals for Promag D as wafer version	Set of seals consisting of two flange seals.
Mounting kit for Promag H	▪ 2 process connections ▪ Threaded fasteners ▪ Seals
Set of seals for Promag H	For regular replacement of the seals of the Promag H sensor.
Welding jig for Promag H	Weld nipple as process connection: welding jig for installation in pipe.

Accessory	Description
Adapter connection for Promag A/H	Adapter connections for installing a Promag H instead of a Promag 30/33A or Promag 30/33H DN 25.
Ground cable for Promag E/L/P/W	Ground cable for potential equalization.
Ground disk for Promag E/L/P/W	Ground disk for potential equalization.

Communication-specific accessories

Accessory	Description
HART Communicator Field Xpert SFX 100	Handheld terminal for remote configuration and for obtaining measured values via the HART current output (4 to 20 mA). Contact your Endress+Hauser representative for more information.
Fieldgate FXA320	Gateway for remote interrogation of HART sensors and actuators via Web browser: ▪ 2-channel analog input (4 to 20 mA) ▪ 4 binary inputs with event counter function and frequency measurement ▪ Communication via modem, Ethernet or GSM ▪ Visualization via Internet/Intranet in Web browser and/or WAP cellular phone ▪ Limit value monitoring with alarm by e-mail or SMS ▪ Synchronized time stamping of all measured values.
Fieldgate FXA520	Gateway for remote interrogation of HART sensors and actuators via Web browser: ▪ Web server for remote monitoring of up to 30 measuring points ▪ Intrinsically safe version [EEx ia]IIC for applications in hazardous areas ▪ Communication via modem, Ethernet or GSM ▪ Visualization via Internet/Intranet in Web browser and/or WAP cellular phone ▪ Limit value monitoring with alarm by e-mail or SMS ▪ Synchronized time stamping of all measured values ▪ Remote diagnosis and remote configuration of connected HART devices
FXA195	The Commubox FXA195 connects intrinsically safe Smart transmitters with HART protocol to the USB port of a personal computer. This makes the remote operation of the transmitters possible with the aid of configuration programs (e.g. FieldCare). Power is supplied to the Commubox by means of the USB port

Service-specific accessories

Accessory	Description
Applicator	Software for selecting and planning flowmeters. The Applicator software can be downloaded from the Internet or ordered on CD-ROM for installation on a local PC. Contact your Endress+Hauser representative for more information.
Fieldcheck	Tester/simulator for testing flowmeters in the field. When used in conjunction with the "FieldCare" software package, test results can be imported into a database, printed out and used for official certification. Contact your Endress+Hauser representative for more information.
FieldCare	FieldCare is Endress+Hauser's FDT-based asset management tool. It can configure all intelligent field units in your system and helps you manage them. By using status information, it is also a simple but effective way of checking their status and condition.

Accessory	Description
Memograph M graphic display recorder	The Memograph M graphic display recorder provides information on all the relevant process variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a DSD card or USB stick. Memograph M boasts a modular design, intuitive operation and a comprehensive security concept. The ReadWin® 2000 PC software is part of the standard package and is used for configuring, visualizing and archiving the data captured. The mathematics channels which are optionally available enable continuous monitoring of specific power consumption, boiler efficiency and other parameters which are important for efficient energy management.
FXA193	Service interface from the device to the PC for operation via FieldCare.

Documentation

- System Information Promag 10 (SI042D/06)
- Operating Instructions Promag 10 (BA00082D/06)

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