Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Proline Promag 50L

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 ≥ 5 µS/cm:
- Drinking water
- Wastewater
- Sewage sludge

- Flow measurement up to 162000 m³/h (713000 gal/min)
- Fluid temperature up to +90 °C (+194 °F)
- Process pressures up to 16 bar (232 psi)
- Lengths in accordance with DVGW/ISO

Application-specific lining of the measuring pipe from polyurethane, hard rubber or PTFE with the following drinking water permissions:
- KTW
- WRAS
- NSF
- ACS

Connection to process control system:
- HART
- PROFIBUS DP/PA

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:
- Modular device and operating concept for a high degree of efficiency
- Software options for electrode cleaning
- Uniform operating concept

The tried-and-tested Promag sensors offer:
- No pressure loss
- Not sensitive to vibrations
- Simple installation and commissioning

TI00097D/06/EN/16.11
71154572

Endress+Hauser
People for Process Automation

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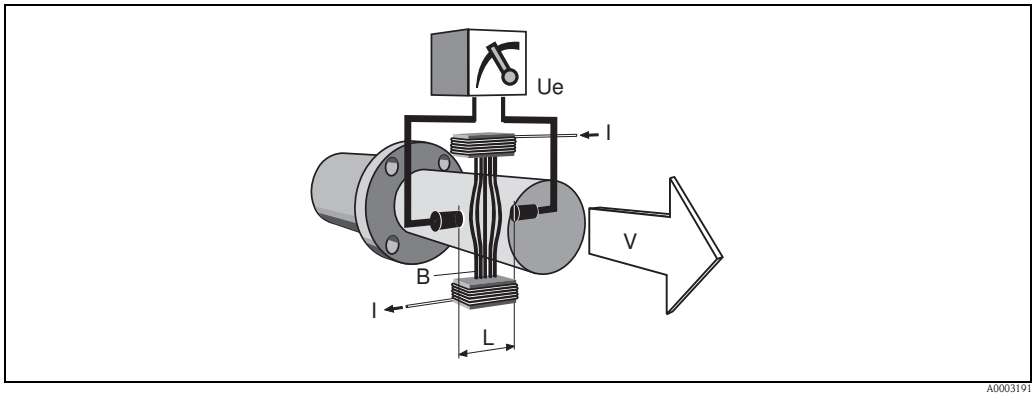
Documentation 43

Registered trademarks 43

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.



A0003191

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

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 50 (key operation, two-line display)

Sensor:
- Promag L
  - DN 50 to 300 (2 to 12")
  - DN 350 to 2400 (14 to 90")

Caution!
To avoid corrosion, the sensor and process connection material must be selected considering the environmental and process conditions.

Input

Measured variable	Flow velocity (proportional to induced voltage)
Measuring ranges	Measuring ranges for liquids Typically v = 0.01 to 10 m/s (0.033 to 33 ft/s) with the specified accuracy
Operable flow range	Over 1000 : 1
Input signal	**Status input (auxiliary input):** U = 3 to 30 V DC, R_i = 5 k**Ω**, galvanically isolated. Configurable for: totalizer(s) reset, measured value suppression, error-message reset. **Status input (auxiliary input) with PROFIBUS DP:** U = 3 to 30 V DC, R_i = 3 k**Ω**, galvanically isolated. Switching level: 3 to 30 V DC, independent of polarity. Configurable for: totalizer(s) reset, measured value suppression, error-message reset, batching start/stop (optional), batch totalizer reset (optional).

Output

Output signal

Current output
active/passive selectable, galvanically isolated, time constant selectable (0.01 to 100 s),
full scale value selectable, temperature coefficient: typ. 0.005% o.r./°C (o.r. = of reading), resolution: 0.5 µA

- Active: 0/4 to 20 mA, $R_L < 700\ \Omega$ (HART: $R_L \geq 250\ \Omega$)
- Passive: 4 to 20 mA, operating voltage V_s: 18 to 30 V DC, $R_i \geq 150\ \Omega$

Pulse/ frequency output
passive, open collector, 30 V DC, 250 mA, galvanically isolated

- Pulse output: pulse value and pulse polarity selectable, max. pulse width configurable (0.5 to 2000 ms)
- Frequency output: full scale frequency 2 to 1000 Hz (f_{max} = 1250 Hz), on/off ratio 1:1, pulse width max. 10 s

PROFIBUS DP interface

- Transmission technology (Physical Layer): RS485 in accordance with ANSI/TIA/EIA-485-A: 1998, galvanically isolated
- Profile version 3.0
- Data transmission rate: 9.6 kBaud to 12 MBaud
- Automatic data transmission rate recognition
- Function blocks: 1× analog input, 1× totalizer
- Output data: volume flow, totalizer
- Input data: positive zero return (ON/OFF), totalizer control, value for local display
- Cyclic data transmission compatible with previous model "Promag 33"
- Bus address adjustable via miniature switches or local display (optional) at the measuring device

PROFIBUS PA Schnittstelle

- Transmission technology (Physical Layer): IEC 61158-2 (MBP), galvanically isolated
- Profile version 3.0
- Current consumption = 11 mA
- Permissible supply voltage: 9 to 32 V
- Bus connection with integrated reverse polarity protection
- Error current FDE (Fault Disconnection Electronic) = 0 mA
- Function blocks: 1× analog input, 2 × totalizer
- Output data: volume flow, totalizer
- Input data: positive zero return (ON/OFF), control totalizer, value for local display
- Cyclic data transmission compatible with previous model "Promag 33"
- Bus address adjustable via miniature switches or local display (optional) at the measuring device

Signal on alarm

- Current output → Failsafe mode can be selected (e.g. in accordance with NAMUR Recommendation NE 43)
- Pulse/ frequency output → Failsafe mode can be selected
- Status output → "Not conductive" in the event of fault or power supply failure

Load

Section "output signal" → 📄 5

Low flow cut off

Switch-on points for low flow are selectable.

Galvanic isolation

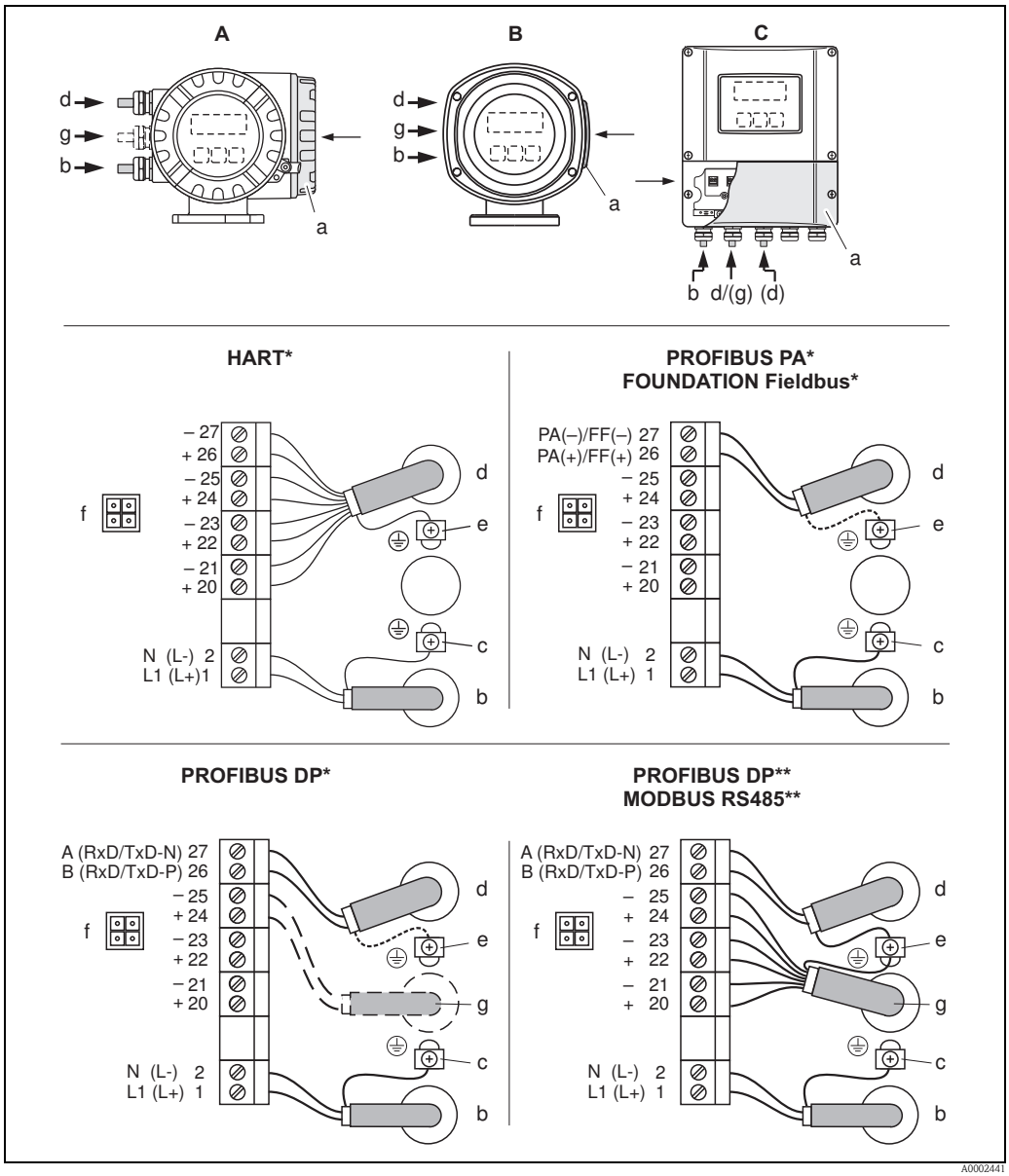
All circuits for inputs, outputs and power supply are galvanically isolated from each other.

Switching output

Status output
Open collector, max. 30 V DC / 250 mA, galvanically isolated
Configurable for: error messages, Empty Pipe Detection (EPD), flow direction, limit values

Power supply

Electrical connection, measuring unit



Connecting the transmitter, cable cross-section max. 2.5 mm² (14 AWG)

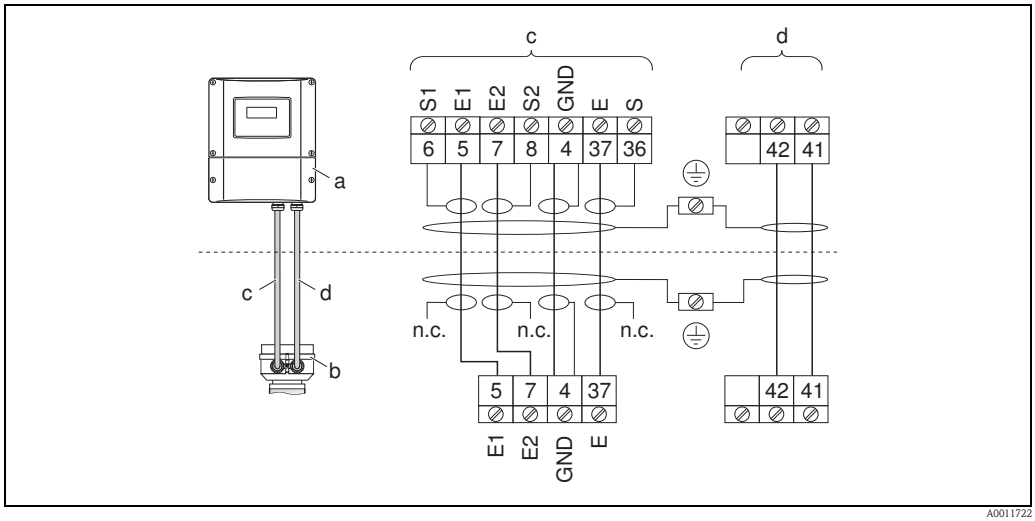
A View A (field housing)
B View B (stainless steel field housing)
C View C (wall-mount housing)

**) not changeable communication board*
***) changeable communication board*
a Cover of the connection compartment
b Cable for power supply: 85 to 260 V AC, 20 to 55 V AC, 16 to 62 V DC
– Terminal No. 1: L1 for AC, L+ for DC
– Terminal No. 2: N for AC, L– for DC
c Ground terminal for protective conductor
d Signal cable: see Terminal assignment → 🖹 7
Fieldbus cable:
– Terminal No. 26: DP (B) / PA (+) / (PA with reverse polarity protection)
– Terminal No. 27: DP (A) / PA (–) / (PA with reverse polarity protection)
e Ground terminal for signal-cable shield / Fieldbus cable / RS485 line
f Service connector for connecting service interface FXA 193 (Fieldcheck, FieldCare)
g Signal cable: see Terminal assignment → 🖹 7
Cable for external termination (only for PROFIBUS DP with fixed assignment communication board):
– Terminal No. 24: +5 V
– Terminal No. 25: DGND

Electrical connection, terminal assignment

Order version	Terminal No. (inputs/ outputs)			
	20 (+) / 21 (–)	22 (+) / 23 (–)	24 (+) / 25 (–)	26 (+) / 27 (–)
50***–**********W	–	–	–	Current output HART
50***–**********A	–	–	Frequency output	Current output HART
50***–**********D	Status input	Status output	Frequency output	Current output HART
50***–**********H	–	–	–	PROFIBUS PA
50***–**********J	–	–	+5 V (external termination)	PROFIBUS DP
Ground connection, power supply → 🖹 6				

Electrical connection, remote version



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

Terminal numbers and cable colors:
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 55 V AC, 45 to 65 Hz
- 16 to 62 V DC
- PROFIBUS PA
- Non-Ex: 9 to 32 V DC
- Ex i: 9 to 24 V DC
- Ex d: 9 to 32 V DC

Cable entry

Power supply and signal cables (inputs/ outputs):

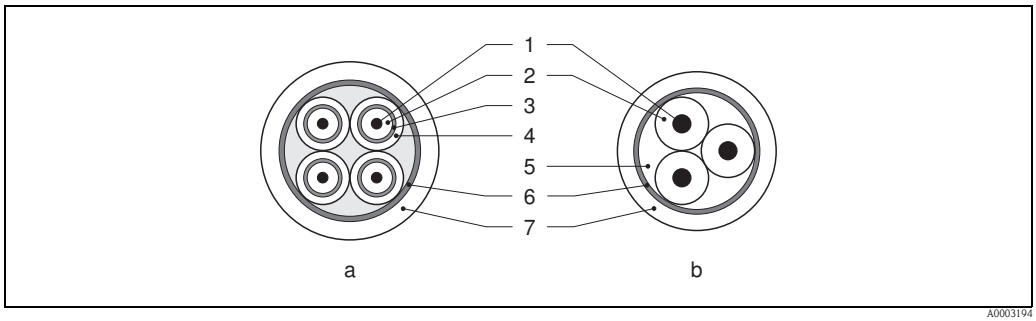
- Cable entry M20 × 1.5 (8 to 12 mm / 0.31 to 0.47")
- Thread for cable entries, ½" NPT, G ½"

Connecting cable for remote version:
- Cable entry M20 × 1.5 (8 to 12 mm / 0.31 to 0.47")
- Sensor cable entry for armoured cables M20 × 1.5 (9.5 to 16 mm / 0.37 to 0.63")
- Thread for cable entries, ½" NPT, G ½"

Remote version cable specifications

Coil cable
- 2 × 0.75 mm² (18 AWG) PVC cable with common, braided copper shield (∅ ~ 7 mm / 0.28")
- 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 (–68 to +176 °F)
- Cable cross-section: max. 2.5 mm² (14 AWG)
- Test voltage for cable insulation: ≤ 1433 AC r.m.s. 50/60 Hz or ≥ 2026 V DC

Signal cable
- 3 × 0.38 mm² (20 AWG) PVC cable with common, braided copper shield (∅ ~ 7 mm / 0.28") and individual shielded cores
- With empty pipe detection (EPD): 4 × 0.38 mm² (20 AWG) PVC cable with common, braided copper shield (∅ ~ 7 mm / 0.28") 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 (–68 to +176 °F)
- Cable cross-section: max. 2.5 mm² (14 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*

Optionally, Endress+Hauser also supplies reinforced connecting cables with an additional, metal strenghtening braid. We recommend such cables for the following cases:
- Cables laid underground
- Danger of rodent attack
- Device used with ingress protection IP 68

Operation in zones of severe electrical interference
The measuring device complies with the general safety requirements in accordance with EN 61010 and the EMC requirements of IEC/EN 61326 as well as the 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

- AC: < 15 VA (incl. sensor)
- DC: < 15 VA (incl. sensor)

Switch-on current:
- Max. 3 A (< 5 ms) for 24 V DC
- Max. 8.5 A (< 5 ms) for 260 V AC

Power supply failure

Lasting min. 1 power cycle:
- EEPROM retain the measuring system data in the event of a power supply failure
- S-DAT: exchangeable data storage chip which stores the data of the sensor (nominal diameter, serial number, calibration factor, zero point etc.)

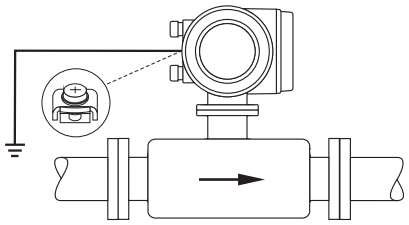
Potential equalization

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

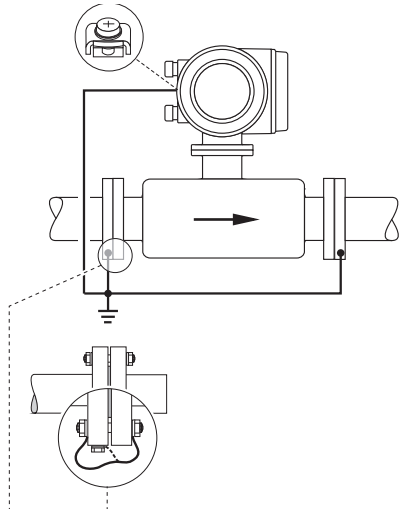
Perfect measurement is only ensured when the fluid and the sensor have the same electrical potential. This is ensured by the reference electrode integrated in the sensor as standard.

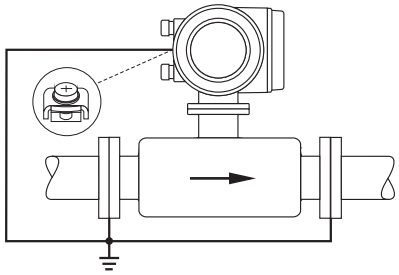
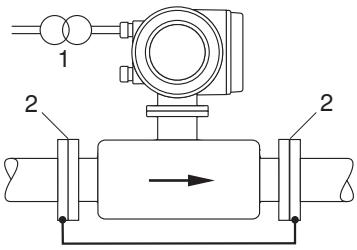
The following should also be taken into consideration for potential equalization:
- Internal grounding concepts in the company
- Operating conditions, such as the material/grounding of the pipes (see Table)

Standard situation

Operating conditions	Potential equalization
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.	 A0011892 *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, 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. The ground cable is mounted directly on the conductive flange coating with the flange screws. Note! The ground cable for flange-to-flange connections can be ordered separately as an accessory from Endress+Hauser → 📄 43.	 A0011576 *Via the ground terminal of the transmitter and the flanges of the pipe*

Operating conditions	Potential equalization
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, min. 6 mm^2 / 0.0093 in^2). When installing the ground disks, please comply with the enclosed Installation Instructions. Ground disks can be ordered separately as an accessory from Endress+Hauser → 📄 43.	 A0011895 *Via the ground terminal of the transmitter*
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, min. 6 mm^2 / 0.0093 in^2). 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.	 A0011896 *Potential equalization and cathodic protection* *1 Power supply isolation transformer* *2 Electrically isolated*

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

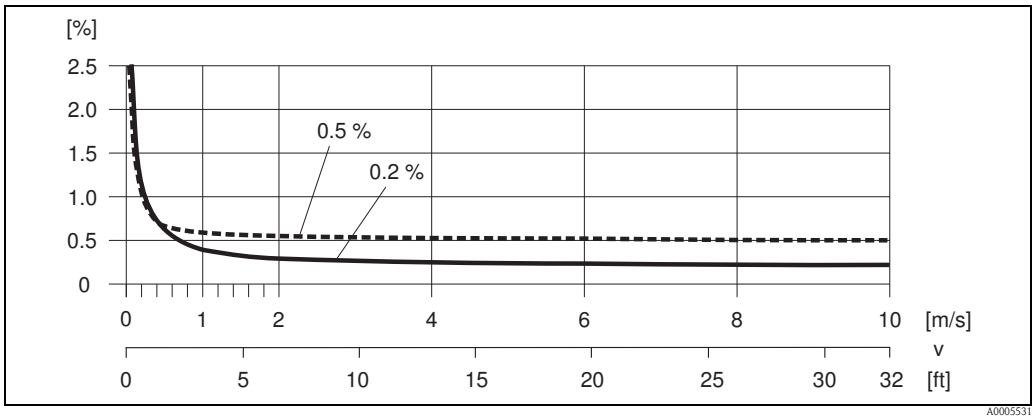
Installation conditions:
- Inlet run > 10 × DN
- Outlet run > 5 × DN
- Sensor and transmitter grounded.
- The sensor is centered in the pipe.

Maximum measured error

- Pulse output: ±0.5% o.r. ± 1 mm/s (±0.5% o.r. ± 0.04 in/s) (o.r. = of reading)
- Current output: also typically ± 5 µA

Optional:
- Pulse output: ±0.2% o.r. ± 2 mm/s (±0.2% o.r. ± 0.08 in/s) (o.r. = of reading)
- Current output: also typically ± 5 µA

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



Max. measured error in % of reading

Repeatability

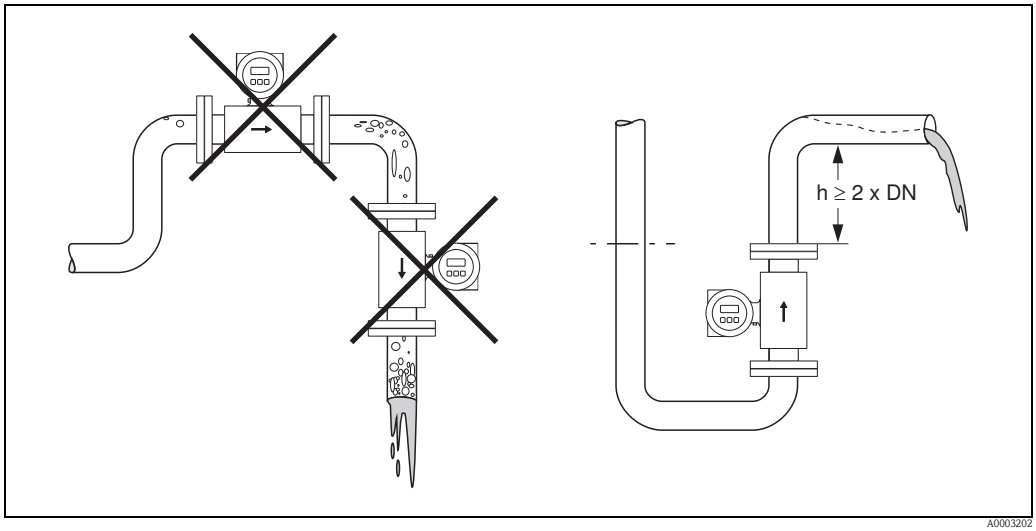
Max. ±0.1% o.r. ± 0.5 mm/s (±0.1% o.r. ± 0.02 in/s) (o.r. = of reading)

Operating conditions: Installations

Installation instructions

Mounting location

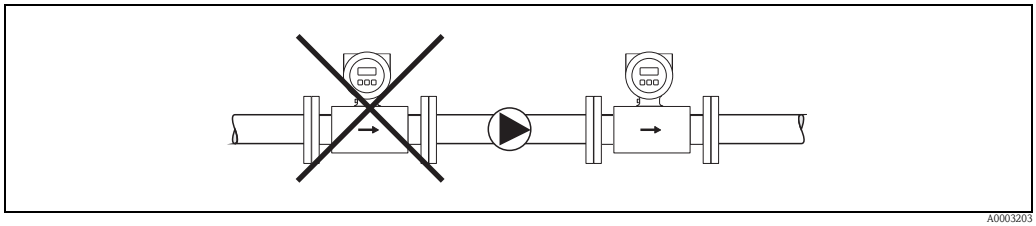
Entrained air or gas bubble formation in the measuring tube can result in an increase in measuring errors.
Avoid the following installation locations in the pipe:
- Highest point of a pipeline. Risk of air accumulating!
- Directly upstream from a free pipe outlet in a vertical pipeline.



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 → 19, 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 → 18, Section "Shock and vibration resistance".

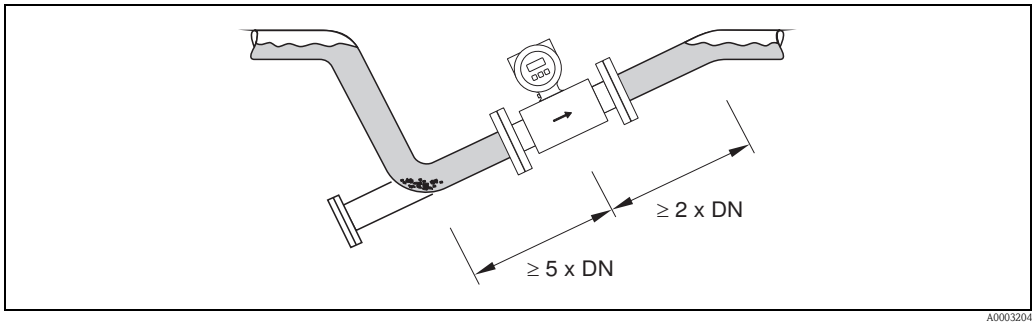


Installation of pumps

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.

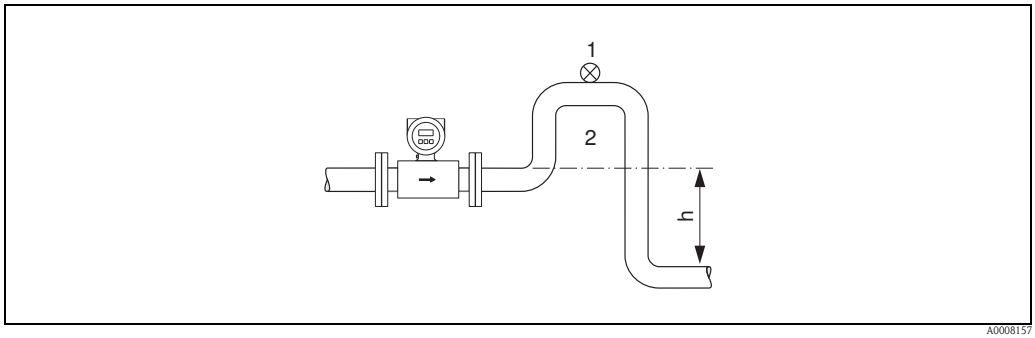
Caution!
Risk of solids accumulating. Do not install the sensor at the lowest point in the drain. It is advisable to install a cleaning valve.



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 → 19, Section "Pressure tightness".



Installation measures for vertical pipes

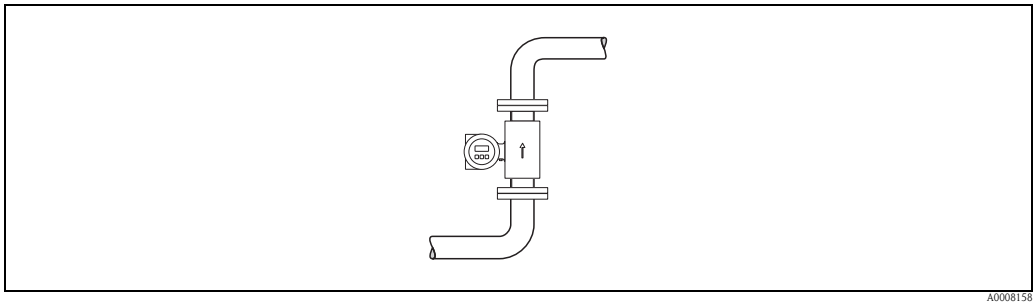
1 Vent valve
2 Pipe siphon
h Length of the down pipe

Orientation

An optimum orientation helps avoid gas and air accumulations and deposits in the measuring tube. Promag, nevertheless, supplies a range of options and accessories for correct measuring of problematic mediums:

- Empty Pipe Detection (EPD) for recognition of partially filled measuring tubes, or for degassing mediums or for applications with fluctuating process pressure.

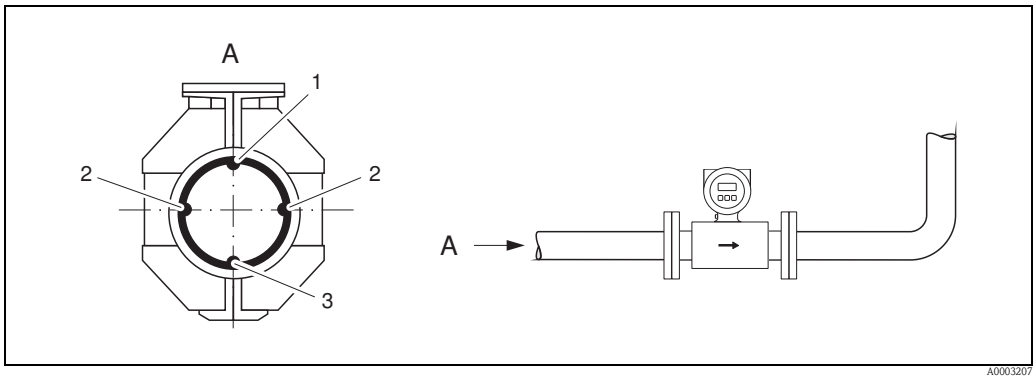
Vertical orientation
This is the ideal orientation for self-emptying piping systems and for use in conjunction with empty pipe detection.



Vertical orientation

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

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.



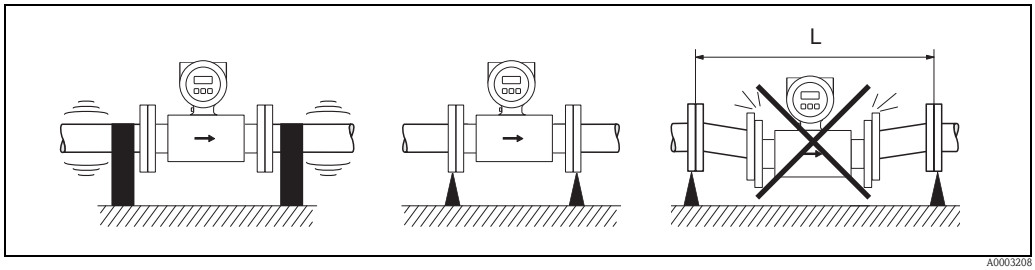
Horizontal orientation

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 → 18, Section "Shock and vibration resistance".



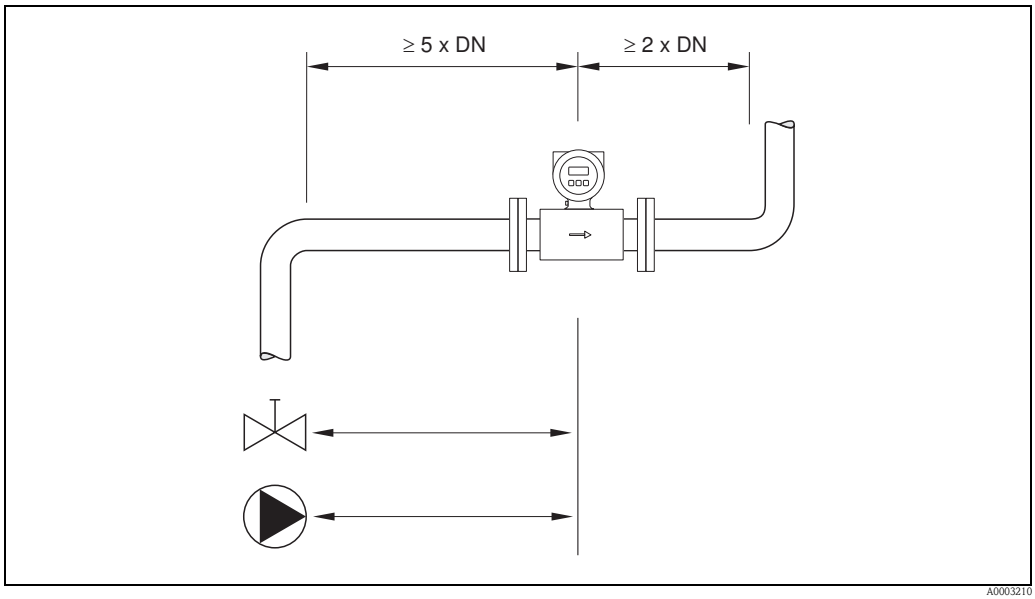
Measures to prevent vibration of the measuring device

L > 10 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: ≥ 5 × DN
- Outlet run: ≥ 2 × DN



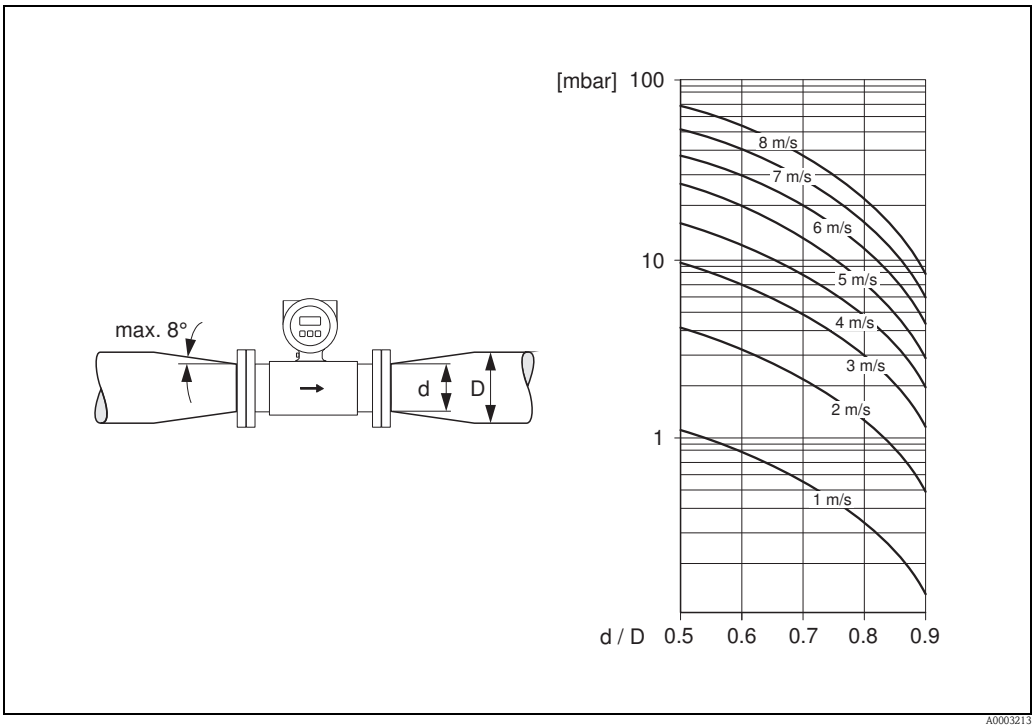
Inlet and outlet run

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.

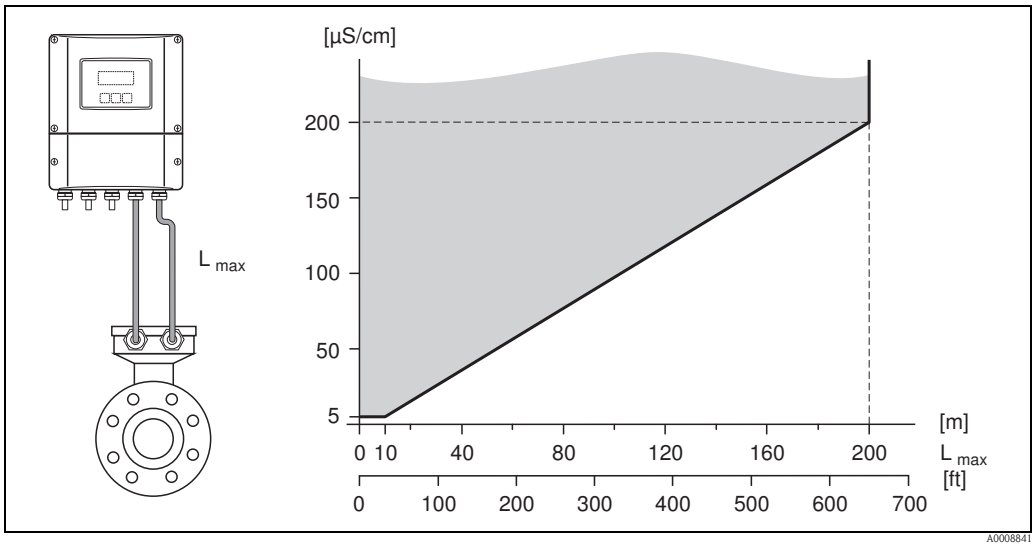


Pressure loss due to adapters

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.
  The required minimum conductivity for measuring
  – fluids in general: 5 µS/cm
  – demineralized water: 20 µS/cm
- 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]

Operating conditions: Environment

Ambient temperature range

Transmitter
- Standard: –20 to +60 °C (–4 to +140 °F)
- Optional: –40 to +60 °C (–40 to +140 °F)

Note!
At ambient temperatures below –20 °C (–4 °F) the readability of the display may be impaired.

Sensor
- Flange material carbon steel: –10 to +60 °C (14 to +140 °F)
- Flange material stainless steel (DN ≤300): –40 to +60 °C (–40 to +140 °F)

Caution!
The permitted temperature range of the measuring tube lining may not be undershot or overshot (→ 🖹 19, 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 (→ 🖹 19, Section "Medium temperature range").

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 (DN ≤ 300 only with stainless steel flange).
- 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

Operating conditions: Process

Medium temperature range

- 0 to +80 °C (+32 to +176 °F) for hard rubber (DN 350 to 2400)
- –20 to +50 °C (–4 to +122 °F) for polyurethane (DN 50 to 1200)
- –20 to +90 °C (–4 to +194 °F) for PTFE (DN 50 to 300)

Conductivity

Minimum conductivity:
- ≥ 5 µS/cm for fluids in general
- ≥ 20 µS/cm for demineralized water

Note!
In the remote version, the necessary minimum conductivity also depends on the cable length (→ 17, Section "Length of connecting cable").

Medium pressure range (nominal pressure)

- EN 1092-1 (DIN 2501)
  - PN 6 (DN 350 to 2400)
  - PN 10 (DN 200 to 2400)
  - PN 16 (DN 50 to 150)
- EN 1092-1, lap joint flange, stampel plate
  - PN 10 (DN 50 to 300)
- ANSI B 16.5
  - Class 150 (2" to 24")
- AWWA
  - Class D (28" to 90")
- AS2129
  - Table E (350 to 1200)
- AS4087
  - PN 16 (350 to 1200)

Pressure tightness

Measuring tube lining: Polyurethane, hard rubber

Promag L Nominal diameter		Measuring tube lining	Resistance of measuring tube lining to partial vacuum Limit values for abs. pressure [mbar] ([psi]) at various fluid temperatures		
			25 °C	50 °C	80° C
[mm]	[inch]		77 °F	122 °F	176° F
50 to 1200	2 to 48"	Polyurethane	0	0	-
350 to 2400	14 to 90"	Hard rubber	0	0	0

Measuring tube lining: PTFE

Nominal diameter		Limit values for abs. pressure [mbar] ([psi]) at fluid temperatures:			
		25 °C (77 °F)		90 °C (194 °F)	
[mm]	[inch]	[mbar]	[psi]	[mbar]	[psi]
50	2"	0	0	0	0
65	–	0	0	40	0.58
80	3"	0	0	40	0.58
100	4"	0	0	135	1.96
125	–	135	1.96	240	3.48
150	6"	135	1.96	240	3.48
200	8"	200	2.90	290	4.21
250	10"	330	4.79	400	5.80
300	12"	400	5.80	500	7.25

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 Current output	Pulse value	Low flow cut off
[mm]	[inch]	(v ~ 0.3 or 10 m/s)	(v ~ 2.5 m/s)	(~ 2 pulses/s)	(v ~ 0.04 m/s)
50	2"	35 to 1100 dm^3/min	300 dm^3/min	2.50 dm^3	5 dm^3/min
65	–	60 to 2000 dm^3/min	500 dm^3/min	5.00 dm^3	8 dm^3/min
80	3"	90 to 3000 dm^3/min	750 dm^3/min	5.00 dm^3	12 dm^3/min
100	4"	145 to 4700 dm^3/min	1200 dm^3/min	10.00 dm^3	20 dm^3/min
125	–	220 to 7500 dm^3/min	1850 dm^3/min	15.00 dm^3	30 dm^3/min
150	6"	20 to 600 m^3/h	150 m^3/h	0.025 m^3	2.5 m^3/h
200	8"	35 to 1100 m^3/h	300 m^3/h	0.05 m^3	5.0 m^3/h
250	10"	55 to 1700 m^3/h	500 m^3/h	0.05 m^3	7.5 m^3/h
300	12"	80 to 2400 m^3/h	750 m^3/h	0.10 m^3	10 m^3/h
350	14"	110 to 3300 m^3/h	1000 m^3/h	0.10 m^3	15 m^3/h
375	15"	140 to 4200 m^3/h	1200 m^3/h	0.15 m^3	20 m^3/h
400	16"	140 to 4200 m^3/h	1200 m^3/h	0.15 m^3	20 m^3/h
450	18"	180 to 5400 m^3/h	1500 m^3/h	0.25 m^3	25 m^3/h
500	20"	220 to 6600 m^3/h	2000 m^3/h	0.25 m^3	30 m^3/h
600	24"	310 to 9600 m^3/h	2500 m^3/h	0.30 m^3	40 m^3/h
700	28"	420 to 13500 m^3/h	3500 m^3/h	0.50 m^3	50 m^3/h
–	30"	480 to 15000 m^3/h	4000 m^3/h	0.50 m^3	60 m^3/h
800	32"	550 to 18000 m^3/h	4500 m^3/h	0.75 m^3	75 m^3/h
900	36"	690 to 22500 m^3/h	6000 m^3/h	0.75 m^3	100 m^3/h
1000	40"	850 to 28000 m^3/h	7000 m^3/h	1.00 m^3	125 m^3/h
–	42"	950 to 30000 m^3/h	8000 m^3/h	1.00 m^3	125 m^3/h
1200	48"	1250 to 40000 m^3/h	10000 m^3/h	1.50 m^3	150 m^3/h
–	54"	1550 to 50000 m^3/h	13000 m^3/h	1.50 m^3	200 m^3/h
1400	–	1700 to 55000 m^3/h	14000 m^3/h	2.00 m^3	225 m^3/h
–	60"	1950 to 60000 m^3/h	16000 m^3/h	2.00 m^3	250 m^3/h
1600	–	2200 to 70000 m^3/h	18000 m^3/h	2.50 m^3	300 m^3/h
–	66"	2500 to 80000 m^3/h	20500 m^3/h	2.50 m^3	325 m^3/h
1800	72"	2850 to 90000 m^3/h	23000 m^3/h	3.00 m^3	350 m^3/h
–	78"	3300 to 100000 m^3/h	28500 m^3/h	3.50 m^3	450 m^3/h
2000	–	3400 to 110000 m^3/h	28500 m^3/h	3.50 m^3	450 m^3/h
–	84"	3700 to 125000 m^3/h	31000 m^3/h	4.50 m^3	500 m^3/h
2200	–	4100 to 136000 m^3/h	34000 m^3/h	4.50 m^3	540 m^3/h
–	90"	4300 to 143000 m^3/h	36000 m^3/h	5.00 m^3	570 m^3/h
2400	–	4800 to 162000 m^3/h	40000 m^3/h	5.50 m^3	650 m^3/h

Flow characteristic values (US units)

Diameter		Recommended flow rate	Factory settings		
		Min./max. full scale value	Full scale value Current output	Pulse value	Low flow cut off
[inch]	[mm]	(v ~ 0.3 or 10 m/s)	(v ~ 2.5 m/s)	(~ 2 pulses/s)	(v ~ 0.04 m/s)
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

Diameter		Recommended flow rate	Factory settings		
		Min./max. full scale value	Full scale value Current output	Pulse value	Low flow cut off
[inch]	[mm]	(v ~ 0.3 or 10 m/s)	(v ~ 2.5 m/s)	(~ 2 pulses/s)	(v ~ 0.04 m/s)
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/day	75 Mgal/day	0.0005 Mgal	1.3 Mgal/min
–	1400	10 to 340 Mgal/day	85 Mgal/day	0.0005 Mgal	1.3 Mgal/min
60"	–	12 to 380 Mgal/day	95 Mgal/day	0.0005 Mgal	1.3 Mgal/min
–	1600	13 to 450 Mgal/day	110 Mgal/day	0.0008 Mgal	1.7 Mgal/min
66"	–	14 to 500 Mgal/day	120 Mgal/day	0.0008 Mgal	2.2 Mgal/min
72"	1800	16 to 570 Mgal/day	140 Mgal/day	0.0008 Mgal	2.6 Mgal/min
78"	–	18 to 650 Mgal/day	175 Mgal/day	0.0010 Mgal	3.0 Mgal/min
–	2000	20 to 700 Mgal/day	175 Mgal/day	0.0010 Mgal	3.0 Mgal/min
–	2000	20 to 700 Mgal/day	175 Mgal/day	0.0010 Mgal	2.9 Mgal/day
84"	–	24 to 800 Mgal/day	190 Mgal/day	0.0011 Mgal	3.2 Mgal/day
–	2200	26 to 870 Mgal/day	210 Mgal/day	0.0012 Mgal	3.4 Mgal/day
90"	–	27 to 910 Mgal/day	220 Mgal/day	0.0013 Mgal	3.6 Mgal/day
–	2400	31 to 1030 Mgal/day	245 Mgal/day	0.0014 Mgal	4.1 Mgal/day

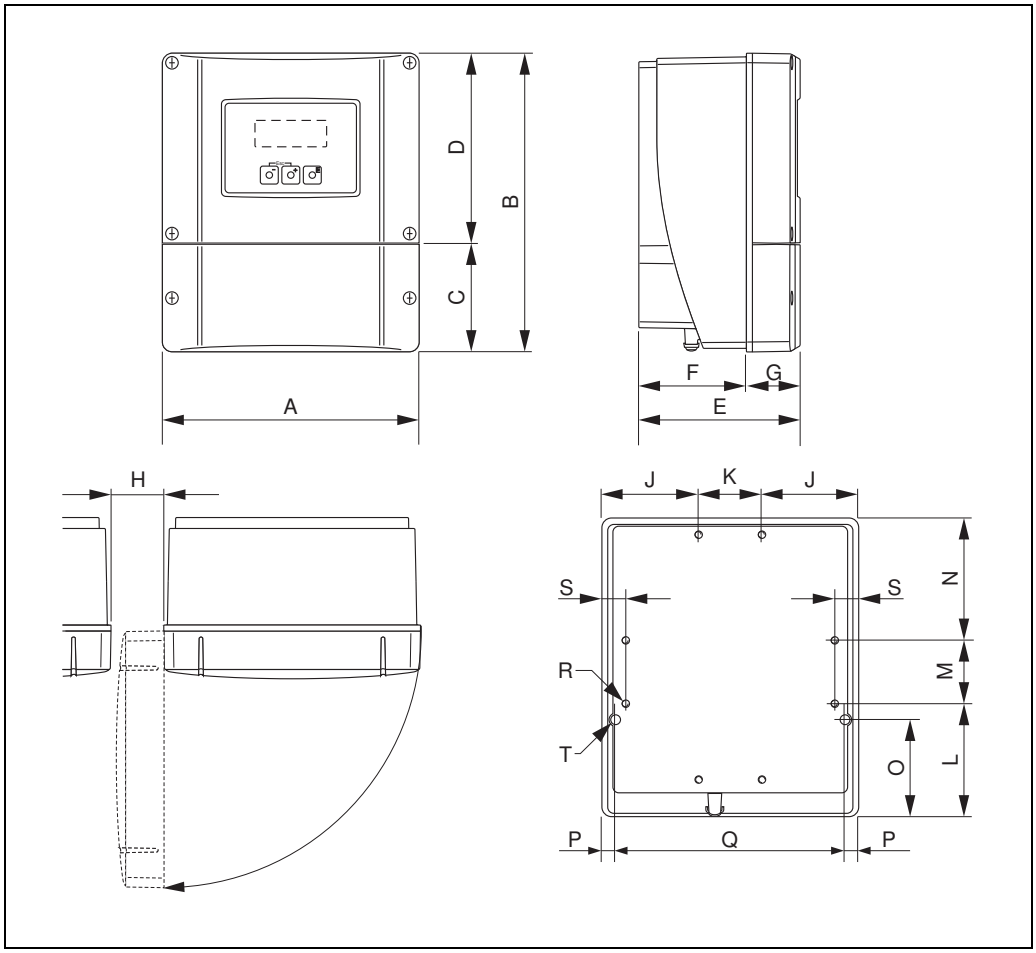
Pressure loss

- 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").

Mechanical construction

Design. dimensions

Transmitter remote version, wall-mount housing (non Ex-zone and II3G/Zone 2)



A0001150

Dimensions in SI units

A	B	C	D	E	F	G	H	J	K
215	250	90.5	159.5	135	90	45	> 50	81	53
L	M	N	O	P	Q	R	S	T[1)]	
95	53	102	81.5	11.5	192	8 × M5	20	2 × ∅ 6.5	

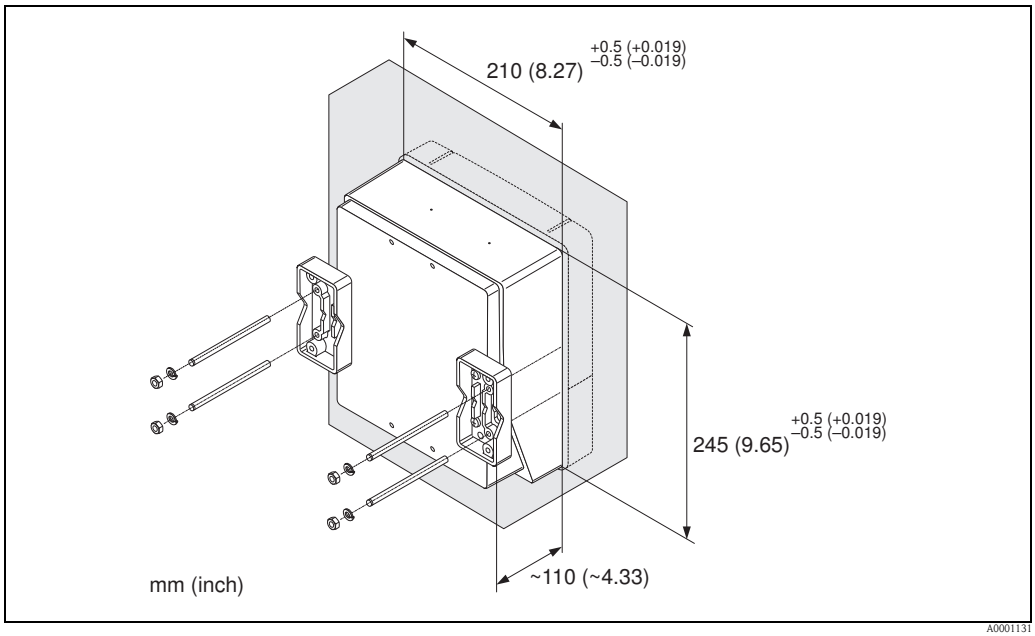
[1)] Securing screw for wall mounting: M6 (screw head max. 10.5 mm)
All dimensions in [mm]

Dimensions in US units

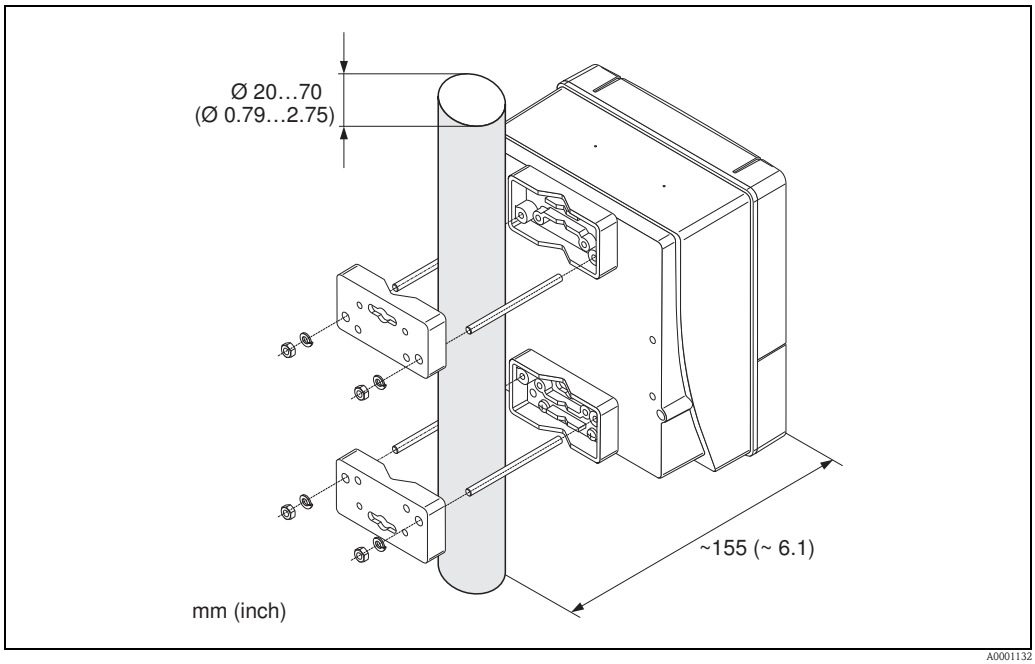
A	B	C	D	E	F	G	H	J	K
8.46	9.84	3.56	6.27	5.31	3.54	1.77	> 1.97	3.18	2.08
L	M	N	O	P	Q	R	S	T[1)]	
3.74	2.08	4.01	3.20	0.45	7.55	8 × M5	0.79	2 × ∅ 6.5	

[1)] Securing screw for wall mounting: M6 (screw head max. 0.41")
All dimensions in [inch]

There is a separate mounting kit for the wall-mounted housing. It can be ordered from Endress+Hauser as an accessory. The following installation variants are possible:
- Panel-mounted installation
- Pipe mounting

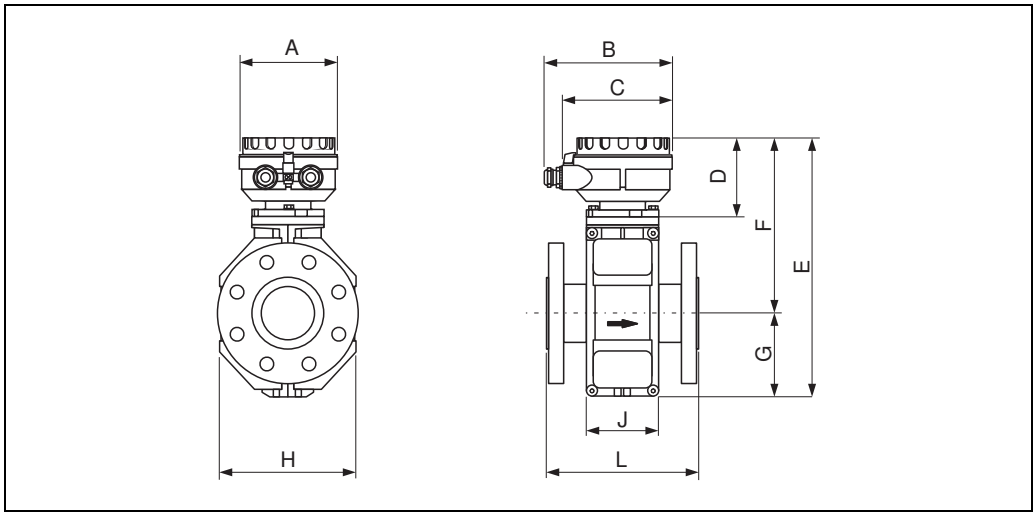


Panel-mounted installation



Pipe mounting

Sensor, remote version, DN 50 to 300



A0012462

Dimensions in SI units

DN	L[1)]	A	B	C	D	E	F	G	H	J
50	200	129	163	143	102	286	202	84	120	94
65	200					336	227	109	180	94
80	200					336	227	109	180	94
100	250					336	227	109	180	94
125	250					417	267	150	260	140
150	300					417	267	150	260	140
200	350					472	292	180	324	156
250	450					522	317	205	400	156
300	500					572	342	230	460	166

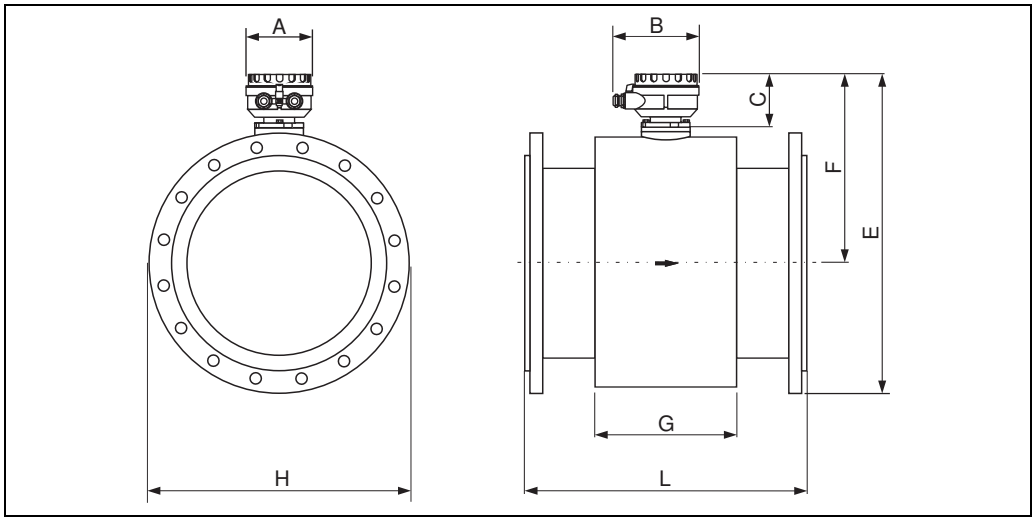
1) The length (L) is regardless of the pressure rating selected. Fitting length to DVGW.
All dimensions in [mm]

Dimensions in US units

DN	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					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 (L) is regardless of the pressure rating selected. Fitting length to DVGW
All dimensions in [inch]

Sensor, remote version, DN 350 to 2400



Dimensions in SI units

DN	L	A	B	C	F	G
350	550	129	163	102	353	290
375	600				379	290
400	600				379	290
450	600				407	290
500	600				432	290
600	600				473	290
700	700				538	424
750	750				575	454
800	800				594	500
900	900				644	580
1000	1000				694	660
1050	1050				730	755
1200	1200				808	828
1350	1350				920	1008
1400	1400				920	1008
1500	1500				1020	1147
1600	1600				1020	1147
1650	1650				1071	1284
1800	1800				1128	1379
2000	2000				1239	1569
2150	2150				1339	1711
2200	2200				1339	1711
2300	2300				1444	1859
2400	2400				1444	1859

All dimensions in [mm]

DN	E at pressure rating				H at pressure rating			
	PN 6	PN 10	ANSI AWWA	AS	PN 6	PN 10	ANSI AWWA	AS
350	598	605	620	615	490	505	533	525
375	–	–	–	654	–	–	–	550
400	649	661	677	669	540	565	597	580

DN	E at pressure rating				H at pressure rating			
	PN 6	PN 10	ANSI AWWA	AS	PN 6	PN 10	ANSI AWWA	AS
450	704	714	724	727	595	615	635	640
500	754	767	781	784	645	670	699	705
600	850	863	879	885	755	780	813	825
700	973	990	1006	998	860	895	927	910
750	–	–	1072	1078	–	–	984	995
800	1087	1107	1129	1129	975	1015	1060	1060
900	1187	1207	1233	1237	1075	1115	1168	1175
1000	1287	1314	1344	1337	1175	1230	1289	1255
1050	–	–	1408	–	–	–	1346	–
1200	1516	1541	1569	1558	1405	1455	1511	1490
1350	–	–	1762	–	–	–	1683	–
1400	1735	1758	–	–	1630	1675	–	–
1500	–	–	1947	–	–	–	1854	–
1600	1935	1978	–	–	1830	1915	–	–
1650	–	–	2087	–	–	–	2032	–
1800	2150	2185	2226	–	2045	2115	2197	–
2000	2371	2401	2420	–	2265	2325	2362	–
2150	–	–	2606	–	–	–	2534	–
2200	2576	2614	–	–	2475	2550	–	–
2300	–	–	2796	–	–	–	2705	–
2400	2786	2824	–	–	2685	2760	–	–

All dimensions in [mm]

Dimensions in US units

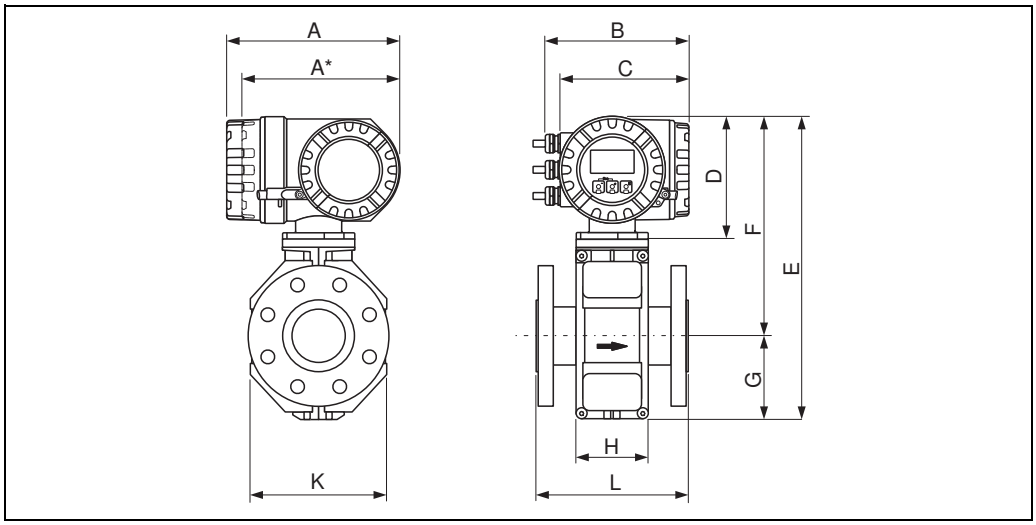
DN	L	A	B	C	F	G
14"	21.6	5.08	6.42	4.02	13.9	11.4
15"	23.6				14.9	11.4
16"	23.6				14.9	11.4
18"	23.6				16.0	11.4
20"	23.6				17.0	11.4
24"	23.6				18.6	11.4
28"	27.6				21.4	16.7
30"	29.5				22.8	17.9
32"	31.5				23.6	19.7
36"	35.4				25.6	22.8
40"	39.4				27.5	26.0
42"	41.3				28.9	29.7
48"	47.2				32.0	32.6
54"	53.1				36.0	39.6
60"	59.0				40.2	45.2
66"	64.9				42.1	50.6
72"	70.8				44.4	54.2
78"	78.7				48.8	61.8
84"	84.6				52.7	67.4
90"	90.5				56.9	73.2

All dimensions in [inch]

DN	E at pressure rating				H at pressure rating			
	PN 6	PN 10	ANSI AWWA	AS	PN 6	PN 10	ANSI AWWA	AS
14"	23.5	23.8	24.4	24.2	19.3	19.9	21.0	20.7
15"	–	–	–	25.7	–	–	–	21.7
16"	25.6	26.0	26.7	26.3	22.2	23.5	23.5	22.8
18"	27.7	28.1	28.5	28.6	24.2	25.0	25.0	25.2
20"	29.7	30.2	30.7	30.9	26.4	27.5	27.5	27.8
24"	33.5	34.0	34.6	34.8	30.7	32.0	32	32.5
28"	38.3	39.0	39.6	39.3	33.9	35.2	36.5	35.8
30"	–	–	42.2	42.2	–	–	38.7	39.2
32"	42.8	43.6	44.4	44.4	38.4	40.0	41.7	41.7
36"	46.7	47.5	48.5	48.7	42.3	43.9	46.0	46.3
40"	50.6	51.7	52.9	52.2	46.3	48.4	50.7	49.4
42"	–	–	55.4	–	–	–	53.0	–
48"	59.7	60.6	61.8	61.3	55.3	57.3	59.5	58.7
54"	–	–	69,4	–	–	–	66.3	–
60"	–	–	76.7	–	–	–	73.0	–
66"	–	–	82.2	–	–	–	80.0	–
72"	84.7	86.05	87.7	–	80.5	83.3	86.5	–
78"	93.4	94.5	95.3	–	89.2	91.5	93.0	–
84"	–	–	102.6	–	–	–	99.8	–
90"	–	–	110.1	–	–	–	106.5	–

All dimensions in [inch]

Compact version DN 50 to 300



Dimensions in SI units

DN	L[1)]	A	A*	B	C	D	E	F	G	H	K
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	227	207	187	168	160	472	322	150	140	260
150	300						472	322	150	140	260
200	350						527	347	180	156	324
250	450						577	372	205	156	400
300	500						627	397	230	166	460

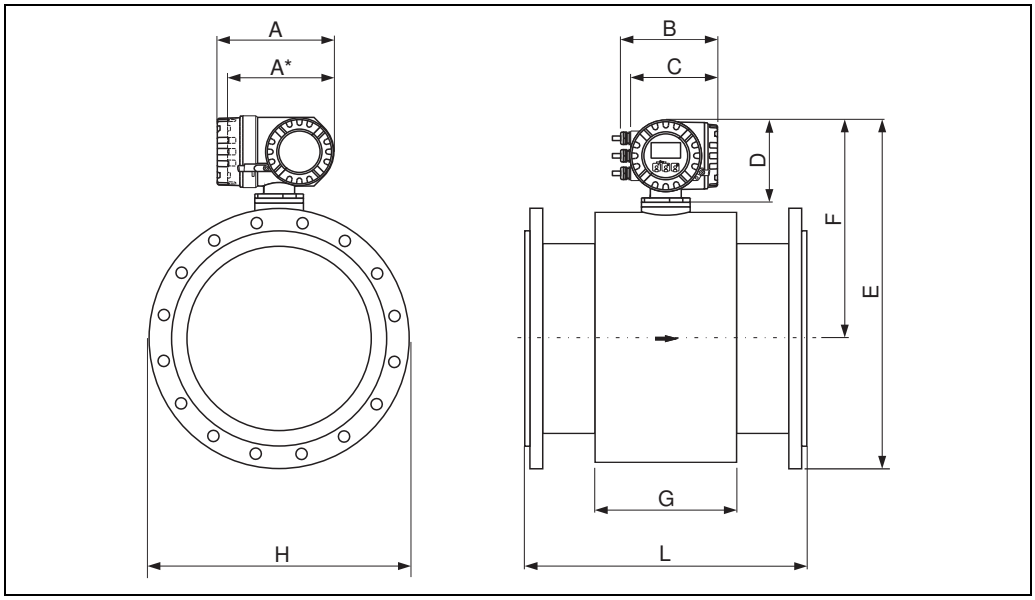
[1)] The length (L) is regardless of the pressure rating selected. Fitting length to DVGW.
All dimensions in [mm]

Dimensions in US units

DN	L[1)]	A	A*	B	C	D	E	F	G	H	K
2"	7.87						13.4	10.1	3.32	3.70	4.72
3"	7.87						15.4	11.1	4.30	3.70	7.10
4"	9.84						15.4	11.1	4.30	3.70	7.10
6"	11.8	8.94	8.15	7.36	6.61	6.30	18.6	12.7	5.91	5.51	10.2
8"	13.8						20.8	13.7	7.10	6.14	12.8
10"	17.7						22.7	14.7	8.08	6.14	15.8
12"	19.7						24.7	15.6	9.06	6.54	18.1

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

Compact version DN 350 to 2400



Dimensions in SI units

DN	L	A	A*	B	C	D	F	G
350	550	227	207	187	168	160	411	290
375	600						437	290
400	600						437	290
450	600						465	290
500	600						490	290
600	600						531	290
700	700						596	424
750	750						633	454
800	800						652	500
900	900						702	580
1000	1000						752	660
1050	1050						788	755
1200	1200						866	828
1350	1350						978	1008
1400	1400						978	1008
1500	1500						1078	1147
1600	1600						1078	1147
1650	1650						1129	1284
1800	1800						1186	1379
2000	2000						1297	1569
2150	2150						1397	1711
2200	2200						1397	1711
2300	2300						1502	1859
2400	2400						1502	1859

All dimensions in [mm]

DN	E at pressure rating:				H at pressure rating:			
	PN 6	PN 10	ANSI AWWA	AS	PN 6	PN 10	ANSI AWWA	AS
350	656	663	678	673	490	505	533	525
375	–	–	–	712	–	–	–	550
400	707	719	735	727	540	565	597	580

DN	E at pressure rating:				H at pressure rating:			
	PN 6	PN 10	ANSI AWWA	AS	PN 6	PN 10	ANSI AWWA	AS
450	762	772	782	785	595	615	635	640
500	812	825	839	842	645	670	699	705
600	908	921	937	943	755	780	813	825
700	1026	1043	1059	1051	860	895	927	910
750	–	–	1125	1131	–	–	984	995
800	1140	1160	1182	1182	975	1015	1060	1060
900	1240	1260	1286	1290	1075	1115	1168	1175
1000	1340	1367	1397	1380	1175	1230	1289	1255
1050	–	–	1461	–	–	–	1346	–
1200	1569	1594	1622	1611	1405	1455	1511	1490
1350	–	–	1820	–	–	–	1683	–
1400	1793	1816	–	–	1630	1675	–	–
1500	–	–	2005	–	–	–	1854	–
1600	1993	2036	–	–	1830	1915	–	–
1650	–	–	2145	–	–	–	2032	–
1800	2208	2243	2284	–	2045	2115	2197	–
2000	2429	2459	2478	–	2265	2325	2362	–
2150	–	–	2664	–	–	–	2534	–
2200	2634	2672	–	–	2475	2550	2705	–
2300	–	–	2854	–	–	–	–	–
2400	2844	2882	–	–	2685	2760	–	–

All dimensions in [mm]

Dimensions in US units

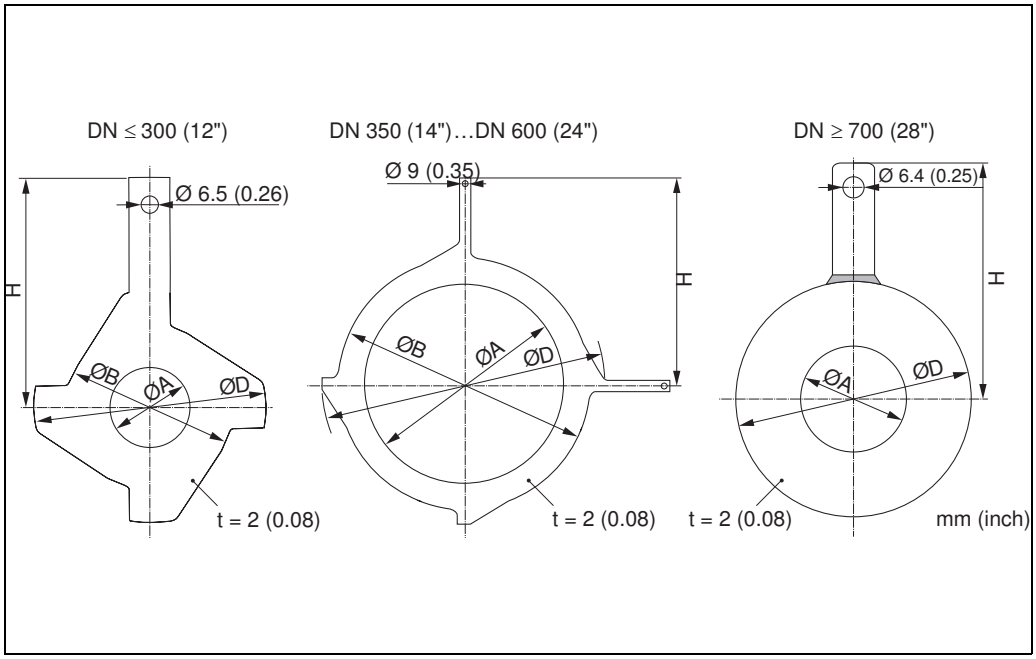
DN	L	A	A*	B	C	D	F	G
14"	21.6						16.2	11.4
15"	23.6						17.2	11.4
16"	23.6						17.2	11.4
18"	23.6						18.3	11.4
20"	23.6						19.3	11.4
24"	23.6						20.9	11.4
28"	27.6						23.6	16.7
30"	29.5						25.1	17.9
32"	31.5						25.9	19.7
36"	35.4						27.8	22.8
40"	39.4						29.8	26.0
42"	41.3	8.94	8.15	7.36	6.61	6.30	31.2	29.7
48"	47.2						34.3	32.6
54"	53.1						38.5	39.7
60"	59.0						42.4	45.27
66"	64.9						44.5	50.6
72"	70.8						46.7	54.3
78"	78.7						51.0	61.8
84"	84.6						55.0	67.4
90"	90.5						59.1	73.2

All dimensions in [inch]

DN	E at pressure rating:				H at pressure rating:			
	PN 6	PN 10	ANSI AWWA	AS	PN 6	PN 10	ANSI AWWA	AS
14"	25.8	26.1	26.7	26.5	19.3	19.9	21.0	20.7
15"	–	–	–	28.0	–	–	–	21.7
16"	27.8	28.3	28.9	28.6	21.3	22.2	23.5	22.8
18"	30.0	30.4	30.8	30.9	23.4	24.2	25.0	25.2
20"	32.0	32.5	33.0	33.1	25.4	26.4	27.5	27.8
24"	35.8	36.3	36.9	37.1	29.7	30.7	32.0	32.5
28"	40.6	41.3	41.9	41.6	33.9	35.2	36.5	35.8
30"	–	–	44.5	44.7	–	–	38.7	39.2
32"	45.1	45.8	46.7	46.7	38.4	40.0	41.7	41.7
36"	49.0	49.8	50.8	51.0	42.3	43.9	46.0	46.3
40"	52.9	54.0	55.2	54.5	46.3	48.4	50.7	49.4
42"	–	–	57.7	–	–	–	53.0	–
48"	61.9	62.9	64.0	63.6	55.3	57.3	59.5	58.7
54"	–	–	71.7	–	–	–	66.3	–
60"	–	–	78.9	–	–	–	73.0	–
66"	–	–	84.5	–	–	–	80.0	–
72"	87.0	88.3	89.9	–	80.5	83.3	86.5	–
78"	95.6	96.8	97.6	–	89.2	91.5	93.0	–
84"	–	–	104.9	–	–	–	99.8	–
90"	–	–	112.4	–	–	–	–	–

All dimensions in [inch]

Ground disk



Dimensions in SI and US units

DN		Pressure rating	A		B		D		H	
[mm]	[inch]		[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
50	2"	1)	52	2.05	101	3.98	115.5	4.55	108	4.25
65	2 ½"	1)	68	2.68	121	4.76	131.5	5.18	118	4.65
80	3"	1)	80	3.15	131	5.16	154.5	6.08	135	5.31
100	4"	1)	104	4.09	156	6.14	186.5	7.34	153	6.02
125	5"	1)	130	5.12	187	7.36	206.5	8.13	160	6.30
150	6"	1)	158	6.22	217	8.54	256	10.08	184	7.24
200	8"	1)	206	8.11	267	10.51	288	11.34	205	8.07
250	10"	1)	260	10.24	328	12.91	359	14.13	240	9.45
300	12"	1)	312	12.28	375	14.76	413	16.26	273	10.75
350	14"	DIN, PN 6	343	13.50	433	16.54	479	18.86	365	14.37
		DIN, PN 10			420	17.05				
		ANSI, Cl.150								
400	16"	DIN, PN 6	393	15.47	470	18.50	542	21.34	395	15.55
		DIN, PN 10			480	18.90				
		ANSI, Cl.150								
450	18"	DIN, PN 6	439	17.28	525	20.67	583	22.95	417	16.42
		DIN, PN 10			538	21.18				
		ANSI, Cl.150								
500	20"	DIN, PN 6	493	19.41	575	23.31	650	25.59	460	18.11
		DIN, PN 10			592	22.64				
		ANSI, Cl.150								
600	24"	DIN, PN 6	593	23.35	676	27.28	766	30.16	522	20.55
		DIN, PN 10			693	26.61				
		ANSI, Cl.150								
700	28"	DIN, PN 6	697	27.44	–	–	786	30.94	460	18.11
		DIN, PN 10	693	27.28	–	–	813	32.01	480	18.9
		AS, PN 16	687	27.05	–	–	807	31.77	490	19.29
		AWWA, Class D	693	27.28	–	–	832	32.76	494	19.45
750	30"	AS, PN 16								
		AWWA, Class D	743	29.25	–	–	833	32.8	523	20.59

DN		Pressure rating	A		B		D		H	
[mm]	[inch]		[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
800	32"	DIN, PN 6	799	31.46	–	–	893	35.16	520	20.47
		DIN, PN 10	795	31.30	–	–	920	36.22	540	21.26
		AS, PN 16	789	31.06	–	–	914	35.98	550	21.65
		AWWA, Class D	795	31.30	–	–	940	37.01	561	22.09
900	36"	DIN, PN 6	897	35.31	–	–	993	39.09	570	22.44
		DIN, PN 10	893	35.16	–	–	1020	40.16	590	23.23
		AS, PN 16	886	34.88	–	–	1014	39.92	595	23.43
		AWWA, Class D	893	35.16	–	–	1048	41.26	615	24.21
1000	40"	DIN, PN 6	999	39.33	–	–	1093	43.03	620	24.41
		DIN, PN 10	995	39.17	–	–	1127	44.37	650	25.59
		AS, PN 16	988	38.90	–	–	1131	44.53	660	25.98
		AWWA, Class D	995	39.17	–	–	1163	45.79	675	26.57
1050	42"	AWWA, Class D	1044	41.10	–	–	1220	48.03	704	27.72
1200	48"	DIN, PN 6	1203	47.36	–	–	1310	51.57	733	28.86

1) Ground disks can be used for all flange norms/ pressure ratings.

Weight

SI units

Compact version (lap joint flanges / welded flanges DN >300)

Weight data in kg										
Nominal diameter		Compact version (including transmitter)								
[mm]	[inch]	EN (DIN)		EN (DIN)		ANSI / AWWA		AS		
50	2"	PN 16	10,6	PN 6	–	ANSI / Class 150	10,6	PN 16	–	Table E	–
65	2 ½"		12,0		–		–		–		–
80	3"		14,0		–		14,0		–		–
100	4"		16,0		–		16,0		–		–
125	5"		21,5		–		–		–		–
150	6"		25,5		–		25,5		–		–
200	8"	PN 10	45		–		45		–		–
250	10"		65		–		65		–		–
300	12"		70		–		70		–		–
350	14"		90		79		139		101		101
375	15"		–		–		–		107		–
400	16"		106		91		170		122		122
450	18"		114		101		193		135		145
500	20"		134		116		230		184		184
600	24"		164		157		304		262		262
700	28"		242		192	AWWA / Class D	268		369		348
750	30"		–		–		320		447		435
800	32"		317		242		385		505		495
900	36"		395		310		472		704		692
1000	40"		470		361		589		761		763
1050	42"		–		–		672		–		–
1200	48"		719		531		903		1221		1239
–	54"		–		–		1275		–		–
1400	–		1116		786		–		–		–
–	60"		–		–		1596		–		–
1600	–		1626		1060		–		–		–
1650	66"		–		–		2133		–		–
1800	72"		2109		1420		2570		–		–
2000	78"		2632		1879		3115		–		–
–	84"		–		–		3757		–		–
2200	–		3424		2514		–		–		–
–	90"		–		–		4799		–		–
2400	–		4096		2998		–		–		–

Transmitter Promag (compact version): 3.4 kg
(Weight data valid without packaging material)

Remote version (lap joint flanges / welded flanges DN>300)

Weight data in kg										
Nominal diameter		**Remote version (sensor plus sensor housing without cable)**								
[mm]	**[inch]**	**EN (DIN)**		**EN (DIN)**		**ANSI / AWWA**		**AS**		
50	2"	PN 16	8,6	PN 6	–	ANSI / Class 150	8,6	PN 16	–	Table E –
65	2 ½"		10,0		–		–		–	–
80	3"		12,0		–		12,0		–	–
100	4"		14,0		–		14,0		–	–
125	5"		19,5		–		–		–	–
150	6"		23,5		–		23,5		–	–
200	8"	PN 10	43		–		43		–	–
250	10"		63		–		63		–	–
300	12"		68		–		108		–	–
350	14"		87		76		136		98	98
375	15"		–		–		–		104	–
400	16"		103		88		167		119	119
450	18"		111		98		190		132	142
500	20"		131		113		227		181	181
600	24"		161		154		301		259	259
700	28"		240		190	AWWA / Class D	266		367	346
750	30"		–		–		318		445	433
800	32"		315		240		383		503	493
900	36"		393		308		470		702	690
1000	40"		468		359		587		759	761
1050	42"		–		–		670		–	–
1200	48"		717		529		901		1219	1237
–	54"		–		–		1273		–	–
1400	–		1114		784		–		–	–
–	60"		–		–		1594		–	–
1600	–		1624		1058		–		–	–
1650	66"		–		–		2131		–	–
1800	72"		2107		1418		2568		–	–
2000	78"		2630		1877		3113		–	–
–	84"		–		–		3755		–	–
2200	–		3422		2512		–		–	–
–	90"		–		–		4797		–	–
2400	–		4094		2996		–		–	–

Transmitter Promag (remote version): 6 kg
(Weight data valid without packaging material)

Lap joint flanges, stamped plate

Weight data in kg						
Nominal diameter		Compact version		Remote version (without cable)		
[mm]	[inch]	EN (DIN)		Sensor EN (DIN)		Transmitter
50	2"	PN 10	7.2	PN 10	5.2	6.0
65	2 ½"		8.0		6.0	6.0
80	3"		9.0		7.0	6.0
100	4"		11.5		9.5	6.0
125	5"		15.0		13.0	6.0
150	6"		19.0		17.0	6.0
200	8"		37.5		35.5	6.0
250	10"		56.0		54.0	6.0
300	12"		57.0		55.0	6.0
Transmitter Promag (compact version): 3.4 kg (Weight data valid for standard pressure ratings and without packaging material)						

US units

ANSI / AWWA (lap joint flanges / welded flanges DN >300)

Weight data in lbs					
Nominal diameter		Compact version		Remote version (without cable)	
[mm]	[inch]	ANSI / AWWA		ANSI / AWWA	
50	2"	ANSI / Class 150	23	ANSI / Class 150	19
65	2 ½"		–		–
80	3"		31		26
100	4"		35		31
125	5"		–		–
150	6"		56		52
200	8"		99		95
250	10"		143		139
300	12"		243		238
350	14"		306		301
375	15"		–		–
400	16"		375		369
450	18"		425		420
500	20"		507		501
600	24"		670		664
700	28"	AWWA / Class D	591	AWWA / Class D	587
750	30"		706		701
800	32"		849		845
900	36"		1041		1036
1000	40"		1299		1294
–	42"		1482		1477
1200	48"		1991		1987
–	54"		2811		1273
–	60"		3519		3515
1650	66"		4703		4699
1800	72"		5667		5662
2000	78"		6869		6864
–	84"		8284		8280
–	90"		10582		10577
Transmitter Promag (compact version): 7.5 lbs Transmitter Promag (remote version): 13 lbs (Weight data valid without packaging material)					

Measuring tube specifications

Internal diameter for pressure rating EN (DIN), AS 2129, AS 4087, ANSI and AWWA

Nominal diameter		Pressure rating			Internal diameter measuring tube					
		EN (DIN)	AS 2129 AS 4087	ANSI AWWA	Hard rubber		Polyurethane		PTFE	
[mm]	[inch]				[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
50	2"	PN 10/16		Class 150	–	–	50.3	2.0	51.7	2.0
65*	2"	PN 10/16		Class 150	–	–	66.1	2.6	67.7	2.7
80	3"	PN 10/16		Class 150	–	–	78.9	3.1	79.9	3.1
100	4"	PN 10/16		Class 150	–	–	104.3	4.1	103.8	4.1
125	5"	PN 10/16		Class 150	–	–	129.7	5.1	129.1	5.1
150	6"	PN 10/16		Class 150	–	–	158.3	6.2	156.3	6.2
200	8"	PN 10/16		Class 150	–	–	206.7	8.1	202.1	8.0
250	10"	PN 10/16		Class 150	–	–	260.6	10.3	256.2	10.1
300	12"	PN 10/16			–	–	311.5	12.3	305.5	12.0
				Class 150	–	–	309.9	12.2	303.9	12.0
350	14"	PN 6			341	13.4	344	13.5	–	–
		PN 10			341	13.4	344	13.5	–	–
			PN 16 Table E		339	13.3	342	13.4	–	–
				Class 150	339	13.3	342	13.4	–	–
375	15"	PN 10			391	15.4	–	–	–	–
			PN 16	–	389	15.3	392	15.4	–	–
400	16"	PN 6			391	15.4	394	13.5	–	–
		PN 10			442	17.4	394	13.5	–	–
			PN 16 Table E		389	15.3	392	13.4	–	–
				Class 150	389	15.3	392	13.4	–	–
450	18"	PN 6			442	17.4	445	17.5	–	–
		PN 10			493	19.4	445	17.5	–	–
			PN 16 Table E		440	17.3	443	17.4	–	–
				Class 150	438	17.2	441	17.3	–	–
500	20"	PN 6			493	19.4	496	19.5	–	–
		PN 10			595	23.4	496	19.5	–	–
			PN 16 Table E		489	19.2	492	19.3	–	–
				Class 150	489	19.2	492	19.3	–	–
600	24"	PN 6			595	23.4	598	23.5	–	–
		PN 10			590	23.2	598	23.5	–	–
			PN 16 Table E		591	23.2	594	23.4	–	–
				Class 150	589	23.1	592	23.3	–	–
700	28"	PN 6			696	27.4	699	27.5	–	–
		PN 10			694	27.3	697	27.4	–	–
			PN 16 Table E		690	27.2	693	27.3	–	–
				Class D	694	27.3	697	27.4	–	–
750	30"	PN 6			–	–	699	27.5	–	–
		PN 10			–	–	697	27.4	–	–
			PN 16 Table E		741	29.2	744	29.3	–	–
				Class D	743	29.3	746	29.4	–	–

Nominal diameter		Pressure rating			Internal diameter measuring tube					
		EN (DIN)	AS 2129 AS 4087	ANSI AWWA	Hard rubber		Polyurethane		PTFE	
[mm]	[inch]				[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
800	32"	PN 6			798	31.4	801	31.5	–	–
		PN 10			796	31.3	799	31.5	–	–
			PN 16 Table E		792	31.2	795	31.3	–	–
				Class D	794	31.3	797	31.4	–	–
900	36"	PN 6			897	35.3	900	35.4	–	–
		PN 10			895	35.2	898	35.4	–	–
			PN 16 Table E		889	35.0	892	35.1	–	–
				Class D	895	35.2	898	35.4	–	–
1000	40"	PN 6			999	39.3	1002	39.4	–	–
		PN 10			997	39.3	1000	39.4	–	–
			PN 16 Table E		991	39.0	994	39.1	–	–
				Class D	995	39.1	998	39.3	–	–
1050	42"	PN 6			–	–	–	–	–	–
		PN 10			–	–	–	–	–	–
			PN 16 Table E		–	–	–	–	–	–
				Class D	1046	41.2	1049	41.3	–	–
1200	48"	PN 6			1203	47.4	1206	47.5	–	–
		PN 10			1199	47.2	1202	47.3	–	–
			PN 16 Table E		1191	46.9	1194	47.0	–	–
				Class D	1195	47.0	1198	47.2	–	–
–	54"	–	–	–	1345	53.8	–	–	–	–
1400	–	PN 6			1402	56.1	–	–	–	–
		PN 10	–	–	1394	5578	–	–	–	–
–	60"	0	–	Class D	1498	59.9	–	–	–	–
1600	–	PN 6			1600	64.0	–	–	–	–
		PN 10	–	–	1590	63.6	–	–	–	–
–	66"		–	Class D	1646	65.8	1198	47.2	–	–
1800	72"	PN 6			1800	72.0	1206	47.5	–	–
		PN 10			1790	71.6	1202	47.3	–	–
			–	Class D	1790	71.6	1198	47.2	–	–
2000	78"	PN 6			1998	79.9	–	–	–	–
		PN 10			1990	79.6	–	–	–	–
			–	Class D	1986	79.4	–	–	–	–
–	84"	–	–	Class D	2099	84.0	–	–	–	–
2200	–	PN 6			2194	87.8	–	–	–	–
		PN 10	–	–	2186	87.4	–	–	–	–
–	90"			Class D	2246	89.8	–	–	–	–
2400	–	PN 6			2394	95.8	–	–	–	–
		PN 10	–	–	2386	95.4	–	–	–	–

* Specification according EN 1092-1 (not according DIN 2501)

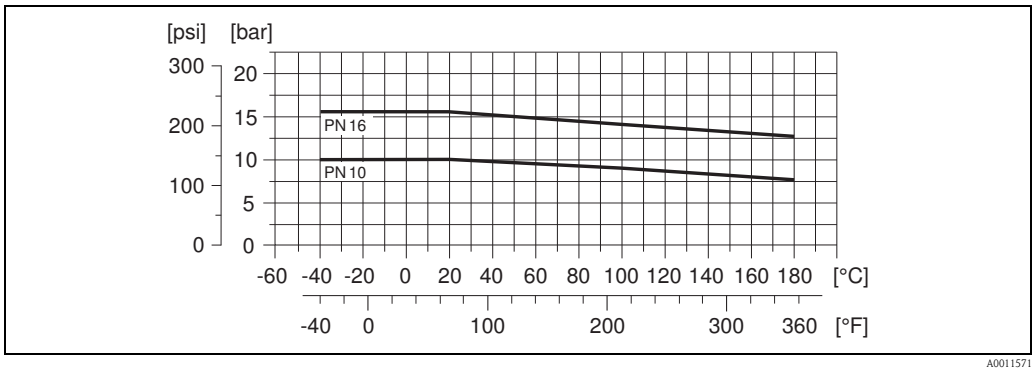
Material

- Transmitter housing:
  - Compact housing: powder-coated die-cast aluminum
  - Wall-mounted housing: powder-coated die-cast aluminum
- Sensor housing
  - DN 50 to 300: powder-coated die-cast aluminum
  - DN 350 to 1200: with protective lacquering
- Measuring tube:
  - DN ≤300; stainless steel 1.4301/304 or 1.4306/304L
  - DN ≥350; stainless steel 202 or 304
- Electrodes: 1.4435/304L, Alloy C-22
- Flange
  - EN 1092-1 (DIN 2501): DN ≤ 300: 1.4306/304L; 1.4307/304L; 1.4301/304; 1.0038 (S235JRG2)
  - EN 1092-1 (DIN 2501): DN ≥ 350: A105; 1.0038 (S235JRG2)
  - ANSI: A105; 316L
  - AWWA: A181/A105; 1.0425/316L (P265GH); 1.0044 (S275JR)
  - AS 2129: A105; 1.0345 (P235GH); 1.0425/316L (P265GH); 1.0038 (S235JRG2); FE 410 WB
  - AS 4087: A105; 1.0425/316L (P265GH); 1.0044 (S275JR)
- Seals: to DIN EN 1514-1
- Ground disks: 1.4435/316L or Alloy C-22

Material load diagram

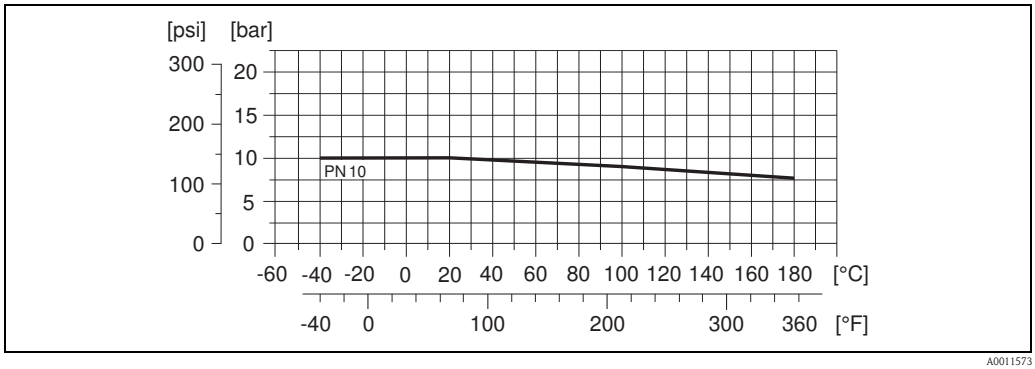
Caution!
The following diagrams contain material load diagrams (reference curves) for flange materials with regard to the medium temperature. However, the maximum medium temperatures permitted always depend on the lining material of the sensor and/or the sealing material (→ 19).

Flange connection to EN 1092-1 (DIN 2501); DN ≤ 300
Material: 1.4306/304L; 1.4307/304L



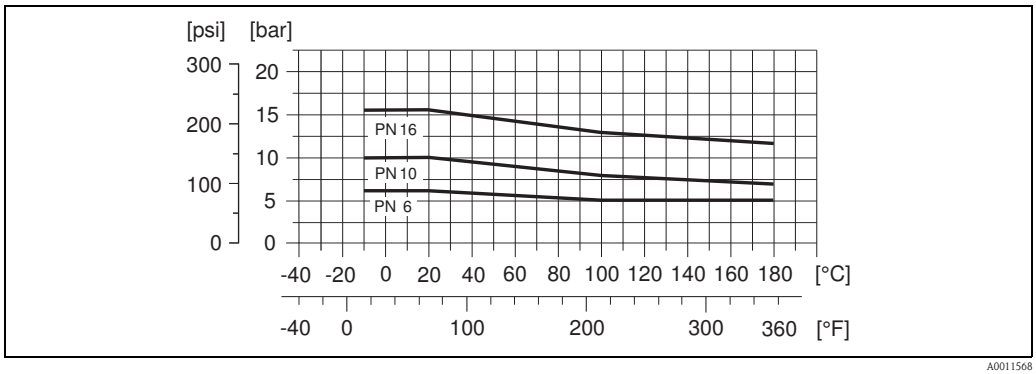
A0011571

Flange connection to EN 1092-1; DN ≤ 300
Material: 1.4301/304; lap joint flange, stamped plate



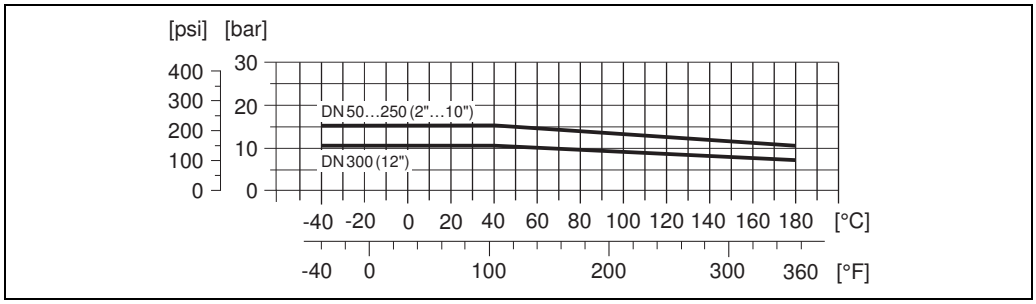
A0011573

Flange connection to EN 1092-1 (DIN 2501)
Material: A105, 1.0038 (S235JRG2); lap joint flange, stamped plate only in PN 10



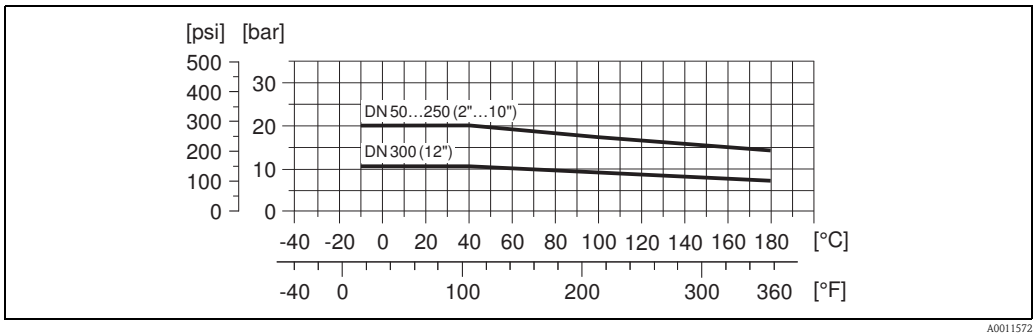
A0011568

Flange connection to ANSI B16.5; DN ≤ 300
Werkstoff: 316L



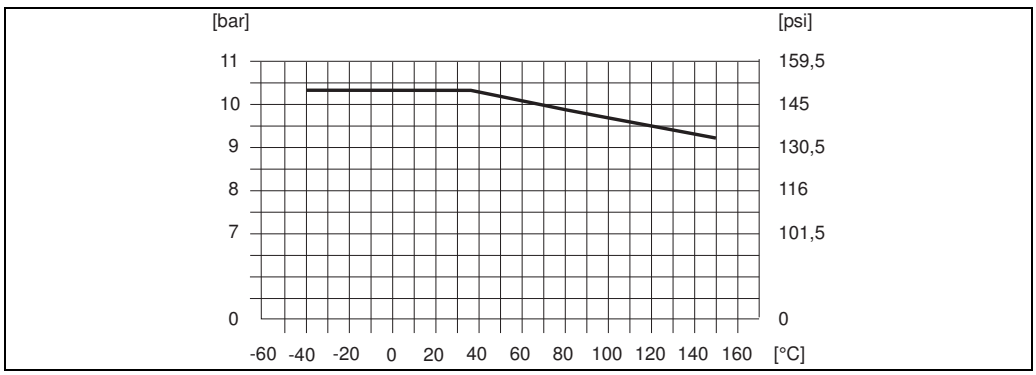
A0011580

Flange connection to ANSI B16.5; DN ≤ 300
Material: A105



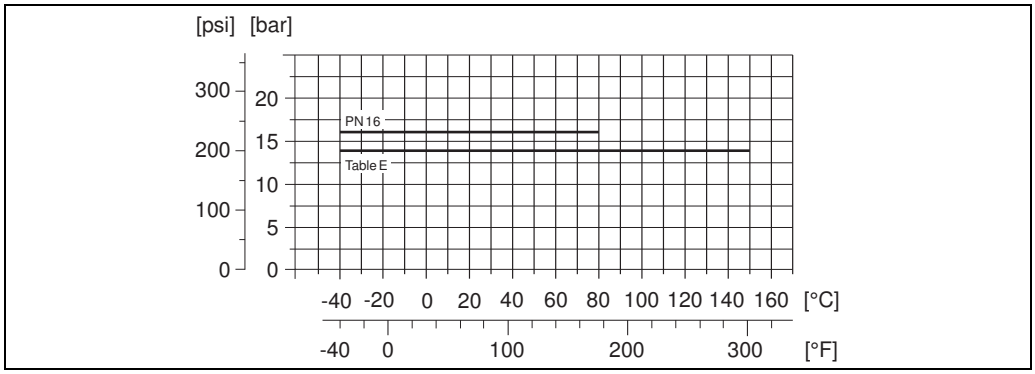
A0011572

Flange connection to AWWA C207, Class D; DN ≤ 350
Material: A181/A105; 1.0425/316L (P265GH); 1.0044 (S275JR)



A0011572

Flange connection to AS 2129 Table E oder AS 4087 PN16; DN ≤ 350
Material:
AS 2129 Table E: A105; 1.0345 (P235GH); 1.0425 (P265GH); 1.0038 (S235JRG2); FE 410 WB
AS 4087 Class D: A105; 1.0425/316L (P265GH); 1.0044 (S275JR)



A0011572

Fitted electrodes

Measuring electrodes, reference electrodes and empty pipe detection electrodes available as standard with:
- 1.4435/304L
- Alloy C-22

Process connections

Flange connection:
- EN 1092-1 (DIN 2501)
  - DN ≤300 = form A
  - DN ≥ 350 = form B
- ANSI B16.5
- AWWA C207
- AS

Surface roughness

Electrodes with 1.4435/304L, Alloy C-22: ≤ 0.3 to 0.5 µm (≤ 11.8 to 19.7 µin)
(All data refer to parts in contact with medium)

Human interface

Display elements

- Liquid crystal display: unilluminated, two-line, 16 characters per line
- Custom configurations for presenting different measured-value and status variables
- 2 totalizers

Operating elements

- Onsite operation via three keys (−, +, E)
- Quick Setup menus for straightforward commissioning

Language groups

Language groups available for operation in different countries:

- Western Europe and America (WEA):
  English, German, Spanish, Italian, French, Dutch and Portuguese
- Eastern Europe and Scandinavia (EES):
  English, Russian, Polish, Norwegian, Finnish, Swedish and Czech
- South and East Asia (SEA):
  English, Japanese, Indonesian

You can change the language group via the operating program "FieldCare".

Remote operation

Operation via HART, PROFIBUS DP/PA

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 Communication and Media Authority (ACMA)".

Drinking water approval

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

PROFIBUS DP/PA certification

The flow device has successfully passed all the test procedures carried out and is certified and registered by the PNO (PROFIBUS User Organisation). The device thus meets all the requirements of the following specifications:

- Certified to PROFIBUS PA, profile version 3.0 (device certification number: on request).
- The device can also be operated with certified devices of other manufacturers (interoperability).

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
- NAMUR NE 21
  Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment.

- NAMUR NE 43
  Standardisation of the signal level for the breakdown information of digital transmitters with analogue output signal.
- NAMUR NE 53
  Software of field devices and signal-processing devices with digital electronics.

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

- Flow measurement (FA005D/06)
- Operating Instructions Promag 50 (BA00046D/06 und BA049D/06)
- Operating Instructions Promag 50 PROFIBUS DP/PA (BA00055D/06 und BA056D/06)

You can order the documents from your Endress+Hauser service organization or download them from the internet addresses given on the last page.

Registered trademarks

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PROFIBUS®
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