Technical Information
Proline Promag 10D
Electromagnetic flowmeter

The highly cost-effective flowmeter, available as compact wafer

Application

- The measuring principle is virtually independent of pressure, density, temperature and viscosity
- For basic water applications; optimized for limited space and plastic pipe installations

Device properties
- Short installation length and low weight
- Integrated ground disks made of stainless steel
- International drinking water approvals
- 2-line display with push buttons
- Device in compact or remote version
- HART

Your benefits

- Easy, fast centering of the sensor – innovative housing construction
- Energy-saving flow measurement – no pressure loss due to cross-section construction
- 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
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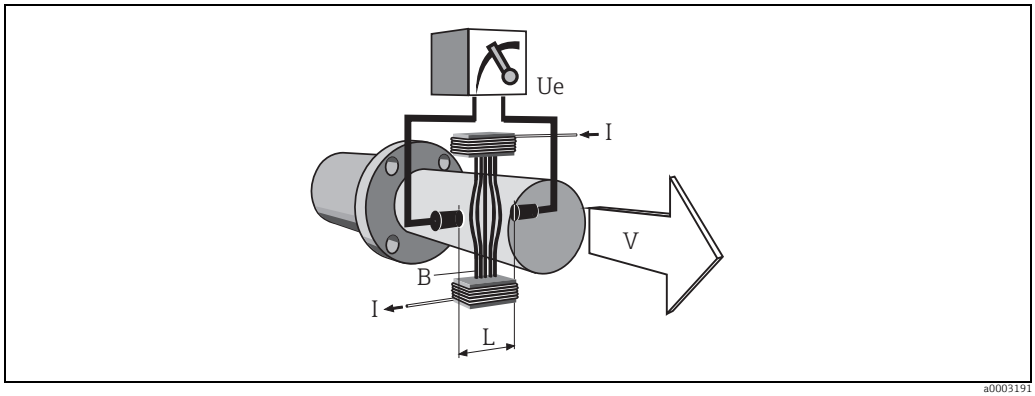
Function and system design

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 fluid 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 D as wafer version
  DN 25 (1"), 40 (1 ½"), 50 (2"), 65 (–), 80 (3"), 100 (4")
- Promag D with threaded connection
  DN 25 (1"), 40 (1 ½"), 50 (2")

Input

Measured variable

Flow velocity (proportional to induced voltage)

Measuring range

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

Flow characteristic values (SI units)					
Diameter		Recommended flow	Factory settings		
[mm]	[inch]	min./max. full scale value (v ~ 0.3 bzw. 10 m/s) [dm³/min]	Full scale value current output (v ~ 2.5 m/s) [dm³/min]	Pulse value (~ 2 pulses/s) [dm³]	Low flow cut off (v ~ 0.04 m/s) [dm³/min]
25	1"	9 to 300	75	0.50	1
40	1 ½"	25 to 700	200	1.50	3
50	2"	35 to 1100	300	2.50	5
65	–	60 to 2000	500	5.00	8
80	3"	90 to 3000	750	5.00	12
100	4"	145 to 4700	1200	10.00	20

Flow characteristic values (US units)					
Diameter		Recommended flow	Factory settings		
[inch]	[mm]	min./max. full scale value (v ~ 0.3 bzw. 10 m/s) [gal/min]	Full scale value current output (v ~ 2.5 m/s) [gal/min]	Pulse value (~ 2 pulses/s) [gal]	Low flow cut off (v ~ 0.04 m/s) [gal/min]
1"	25	2.5 to 80	18	0.20	0.25
1 ½"	40	7 to 190	50	0.50	0.75
2"	50	10 to 300	75	0.50	1.25
–	65	16 to 500	130	1.00	2.00
3"	80	24 to 800	200	2.00	2.50
4"	100	40 to 1250	300	2.00	4.00

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 ≥ 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, 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 cut off

Low flow cut off, 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 characteristic for "inputs/outputs"	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

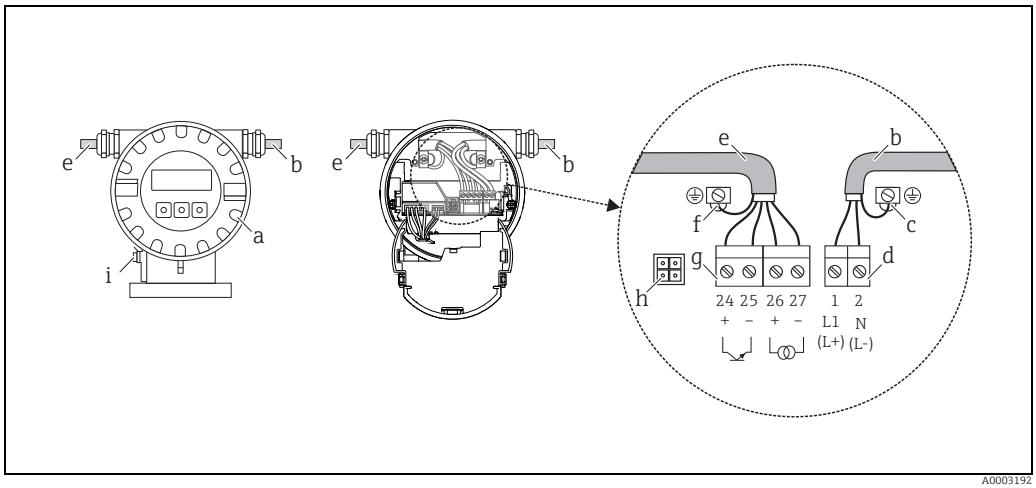
Power consumption
- 85 to 250 V AC: < 12 VA (incl. sensor)
- 20 to 28 V AC: < 8 VA (incl. sensor)
- 11 to 40 V DC: < 6 W (incl. sensor)

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



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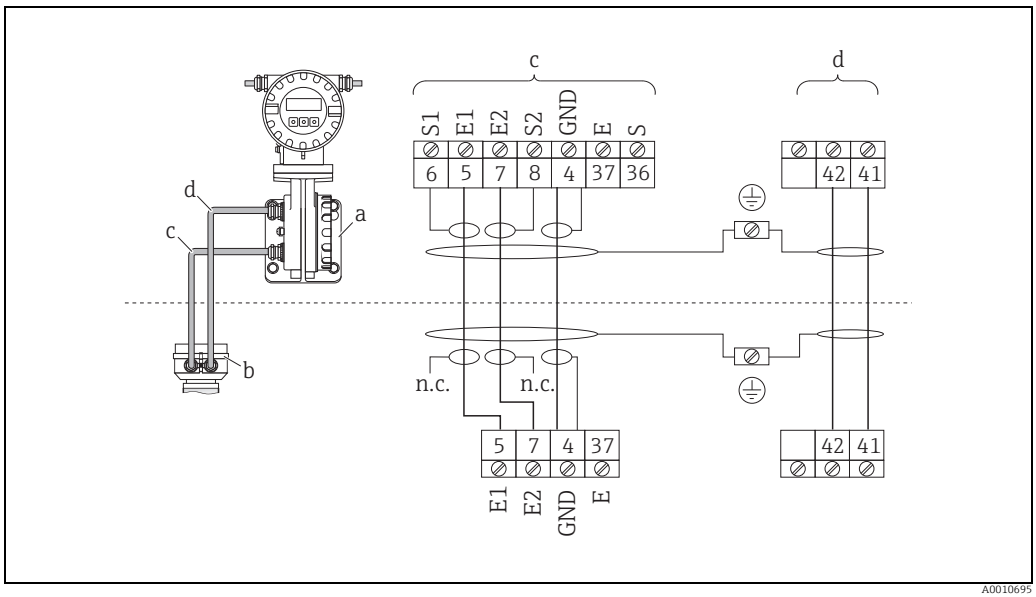
Connecting the transmitter, cable cross-section max. 2.5 mm² (14 AWG)

a Electronics compartment cover
b Power supply cable
c Ground terminal for protective ground
d Terminal connector for power supply cable
e Signal cable
f Ground terminal for signal cable
g Terminal connector for signal cable
h Service connector
i Ground terminal for potential equalization

Electrical connection remote version



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Connecting the remote version

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

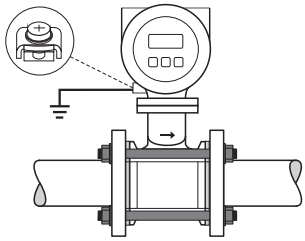
Cable colors/numbers for terminals:
5/6 = brown, 7/8 = white, 4 = green, 41 = 1, 42 = 2

Potential equalization

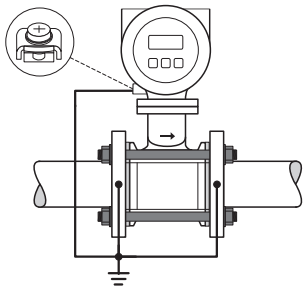
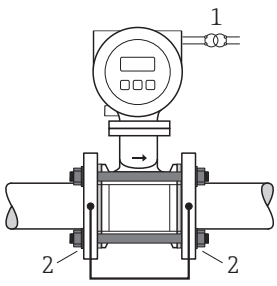
Perfect measurement can only be guaranteed if the fluid and sensor are on the same electric potential. This is ensured by the two ground disks of the sensor.

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, cathodic protection etc. (see table)

Standard

Operating conditions	Potential equalization
When using the measuring device in a: ▪ Metal, grounded pipe ▪ Plastic pipe ▪ Pipe with insulating lining Potential equalization takes place via the ground terminal of the transmitter (standard situation). ✎ Note! When installing in metal pipes, we recommend you connect the ground terminal of the transmitter housing with the piping.	 A0010702 *Via the ground terminal of the transmitter*

Special cases for Promag D as wafer version

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 Potential equalization takes place via the ground terminal of the transmitter and the two pipe flanges. Here, the ground cable (copper wire, 6 mm² / 10 AWG) is mounted directly on the conductive flange coating with flange screws.	 A0010703 *Via the ground terminal of the transmitter and the flanges of the pipe (ground cable: copper wire at least 6 mm² / 10 AWG)*
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, 6 mm² / 10 AWG). 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.	 A0010704 *Potential equalization and cathodic protection (ground cable: copper wire at least 6 mm² / 10 AWG)* *1 Power supply isolation transformer* *2 Electrically isolated*

Cable entries

Power supply and signal cables (inputs/outputs):

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

Connecting cable for remote version:

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

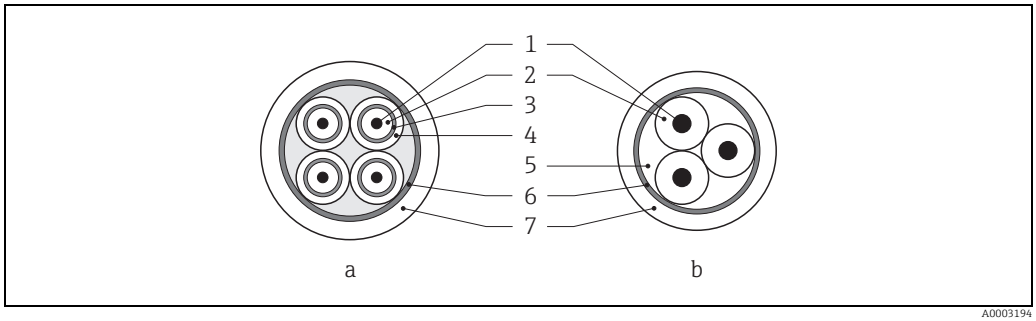
Cable specification remote version

Coil current cable

- 3 × 0.75 mm² (18 AWG) PVC cable with common, braided copper shield (Ø ~ 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 (Ø ~ 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 *Signal cable*
b *Coil current cable*

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

Operation in zones of severe electrical interference

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

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

Performance characteristics

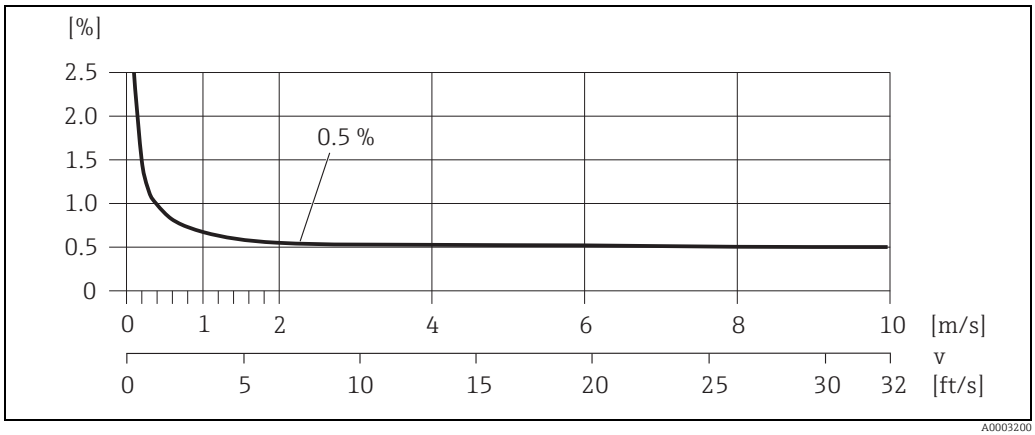
Reference operating conditions

- Error limits following DIN EN 29104, future ISO 20456
- Water, typically +4 to +35°C (+39 to +95 °F); 2 to 6 bar (29 to 87 psi)
- Specification as per calibration protocol ± 5°C (± 41 °F) and ± 2 bar (± 29 psi)
- Data on the measured error based on accredited calibration rigs traced back to ISO 17025

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

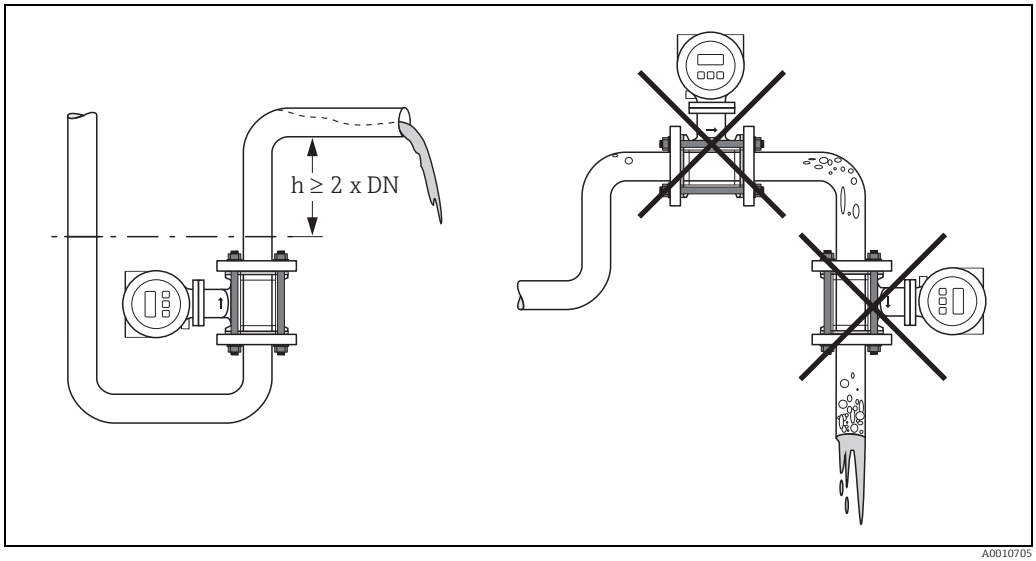
Max. ±0.2% o.r. ± 2 mm/s (±0.2% o.r. ± 0.08 in/s) (o.r. = of reading)

Installation

Mounting location

The sensor should preferably be installed in an ascending pipe. Ensure the sensor is an adequate distance (≥ 2 × DN) away from the next pipe bend.

Note!
Entrained air or gas bubble formation in the measuring tube can result in an increase in measuring errors.
For this reason, the following mounting locations should be **avoided**:
- Highest point of a pipeline. Risk of air accumulating!
- Directly upstream from a free pipe outlet in a vertical pipeline. Risk of pipe not filling correctly!

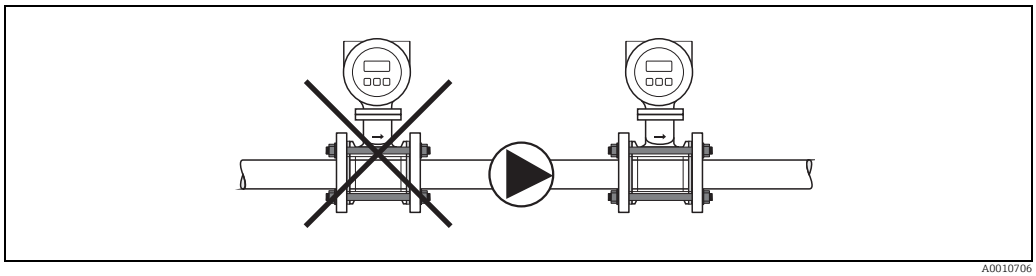


Mounting location

Installation with pumps

The sensor should only be installed on the pump pressure side.

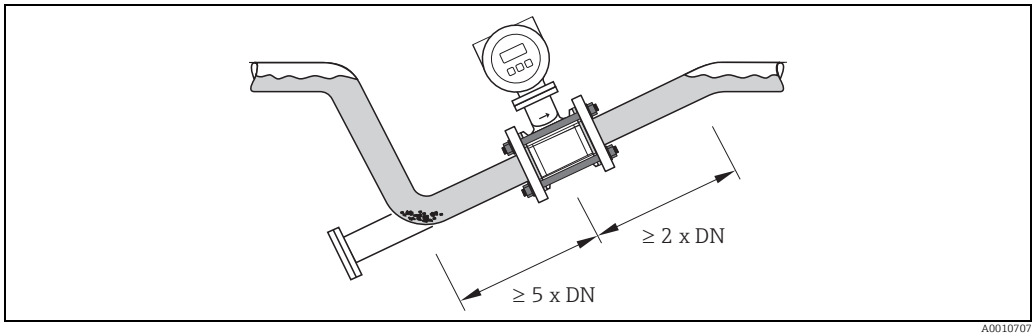
Note!
- The sensor should **never** be installed on the pump suction side in order to avoid the risk of low pressure, and thus damage to the measuring tube.
  Information on the pressure tightness of the measuring tube → 15, section "Pressure tightness".
- Pulsation dampers may be needed if the sensor is installed downstream from piston pumps, piston diaphragm pumps or hose pumps.
  Information on the shock and vibration resistance of the device → 14, section "Shock and vibration resistance".



Installing the device with a pump

Partially filled pipes

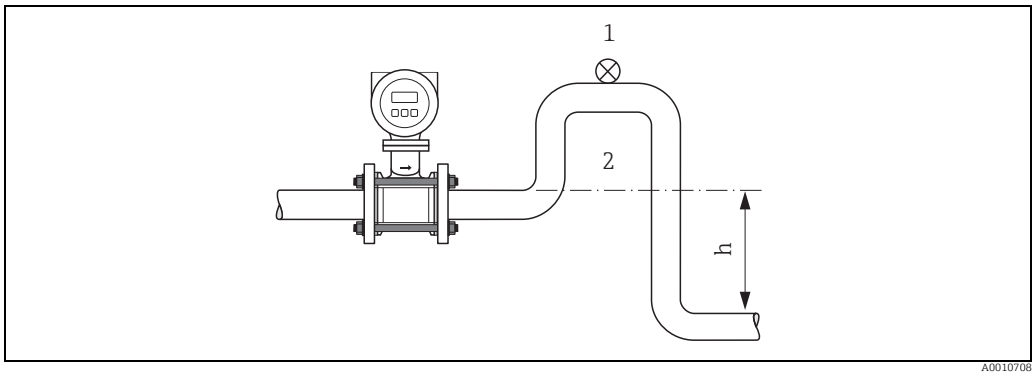
Partially filled pipes with gradients necessitate a drain-type configuration.



Installation with partially filled pipes

Down pipes

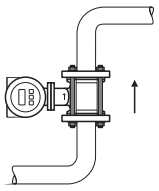
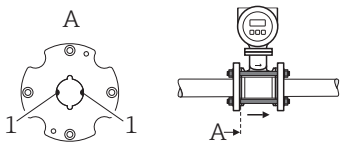
Install a siphon or a vent valve downstream of the sensor in down pipes h ≥ 5 m (16,4 ft). This precaution is to avoid low pressure and the consequent risk of damage to the measuring tube. This measure also prevents the system losing prime, which could cause air pockets. Information on the pressure tightness of the measuring tube → 🖹 15, section "Pressure tightness".



Installation measures for down pipes

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

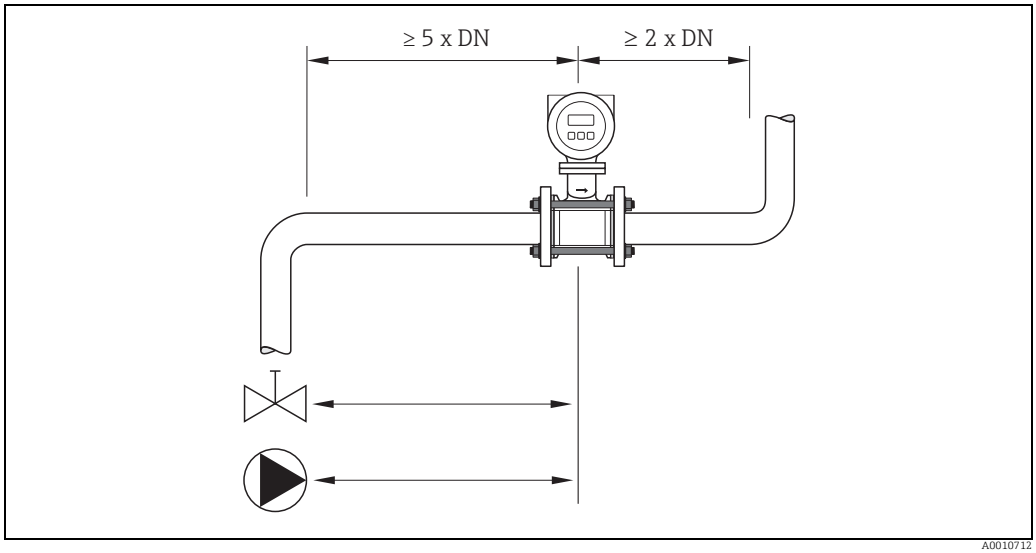
Orientation

Vertical	Horizontal
Vertical orientation is generally preferred. Vertical orientation helps avoid gas and air accumulations and deposits in the measuring tube.	The measuring electrode axis should be horizontal in the case of horizontal orientations. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.
 A0010709	 A0010710
Vertical orientation	*Horizontal orientation* *1 Measuring electrodes for signal detection*

Inlet and outlet runs

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

The following inlet and outlet runs must be observed in order to meet accuracy specifications:
- Inlet run ≥ 5 × DN
- Outlet run ≥ 2 × DN



Inlet and outlet run

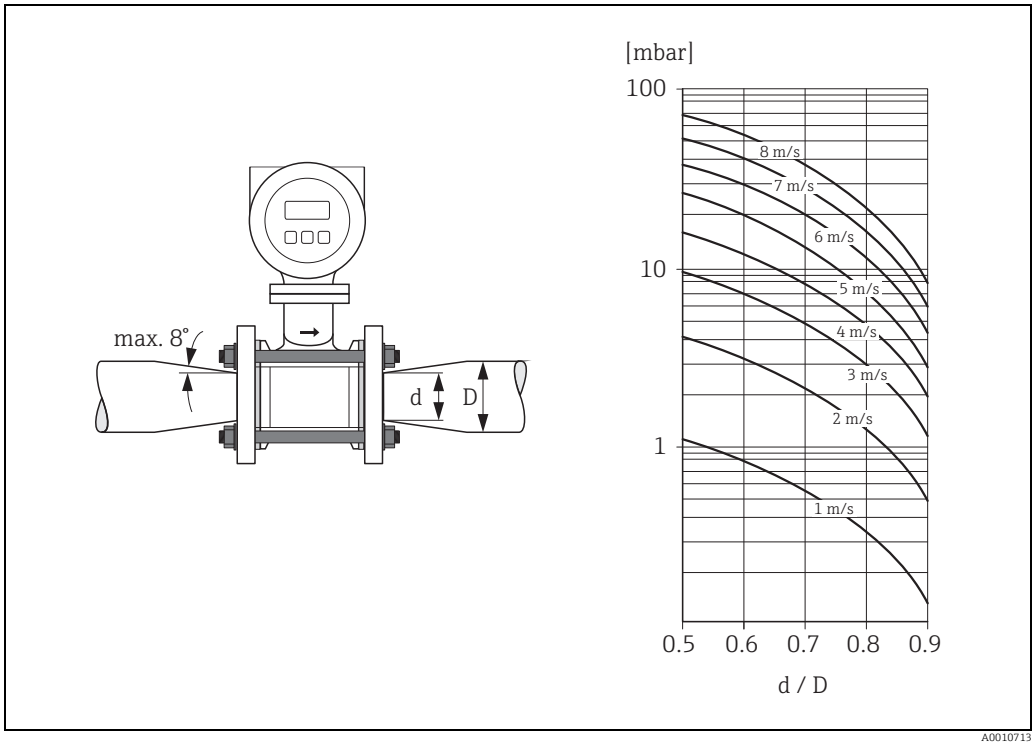
Adapters

Suitable adapters to DIN EN 545 (double-flange reducers) can be used to install the sensor Promag D as wafer version 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!
- Adapters can not be used for Promag D with threaded connection.
- The nomogram only applies to liquids of viscosity similar to water.

The pressure loss is calculated as follows:

1. Calculate the diameter ratio: d/D
2. Read off the pressure loss (as a function of flow velocity (downstream from the reduction) and the d/D ratio from the nomogram)

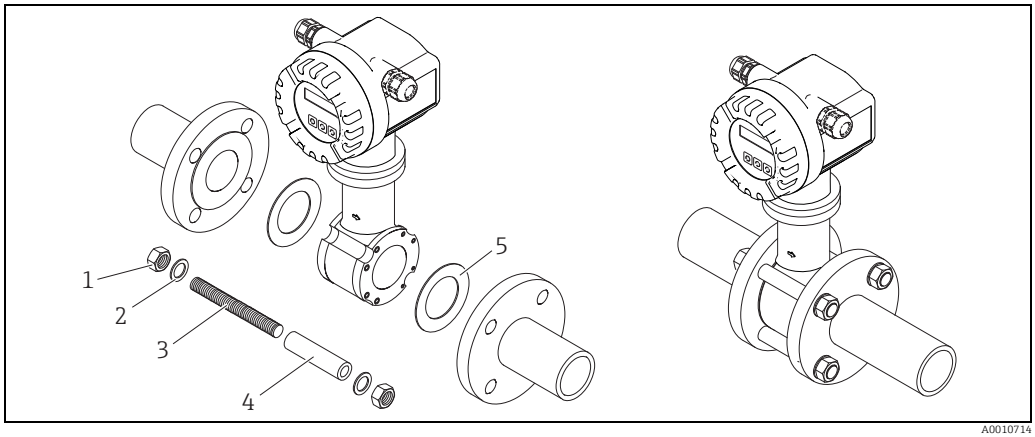


Pressure loss due to adapters

Mounting kit

The sensor Promag D as wafer version is installed between the pipe flanges with a mounting kit. The device is centered using the recesses on the sensor. Centering sleeves are also provided depending on the flange standard or the diameter of the pitch circle.

Note!
- For the sensor Promag D with threaded connection no mounting kit is required.
- A mounting kit consisting of mounting bolts, seals, nuts and washers can be ordered separately (see "Accessories").



Mounting the sensor Promag D as wafer version

1 Nut
2 Washer
3 Mounting bolt
4 Centering sleeve
5 Seal

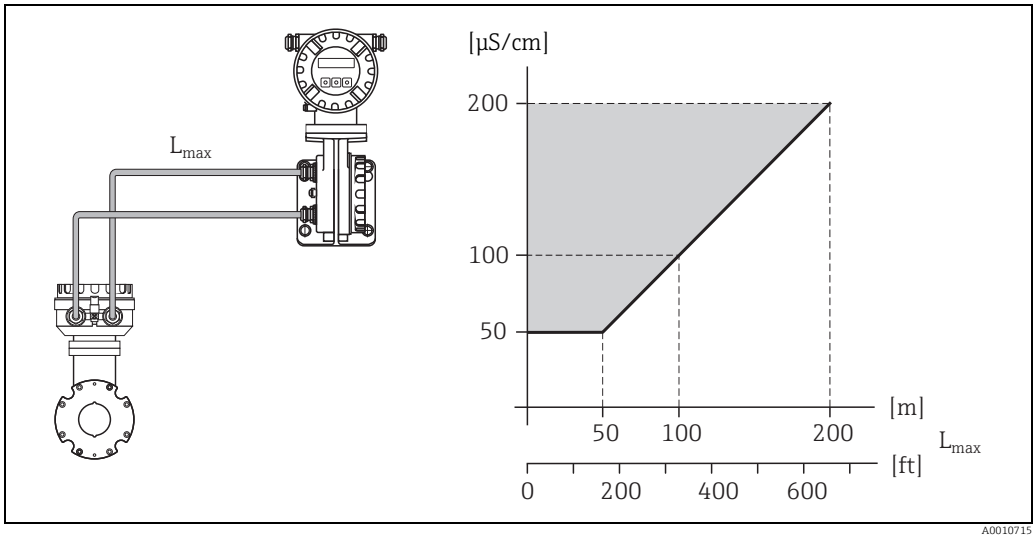
Length of connecting cable

Note the following when mounting the remote version:

- Fix cable run or lay in armored conduit.

  ✎ Note!
  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, establish potential equalization between the 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.



Permitted length of connecting cable for remote version
– The area shaded gray marks the permitted range
– Length of connecting cable L_{max}
– Fluid conductivity in [µS/cm]

Environment

Ambient temperature range

- Sensor: –20 to +60 °C (–4 to +140 °F)
- Transmitter: –20 to +60 °C (–4 to +140 °F)

Caution!
- The permitted temperature range of the measuring tube lining may not be undershot or overshot (→ 🖹 15, section "Medium temperature range").
- 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

- Sensor: –20 to +60 °C (–4 to +140 °F)
- Transmitter: –20 to +60 °C (–4 to +140 °F)

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

IP 67 (NEMA 4X) for transmitter and sensor

Shock and vibration resistance

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

Electromagnetic compatibility (EMC)

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

Process

Medium temperature range

0 to +60 °C (+32 to +140 °F)

Medium pressure range

- EN 1092-1 (DIN 2501) up to PN 16
- ASME B 16.5 up to Class 150
- JIS B2220 up to 10 K
- DIN ISO 228 (G" external thread) up to PN 16
- ANSI/ASME B 1.20 (NPT" external thread) up to Class 150

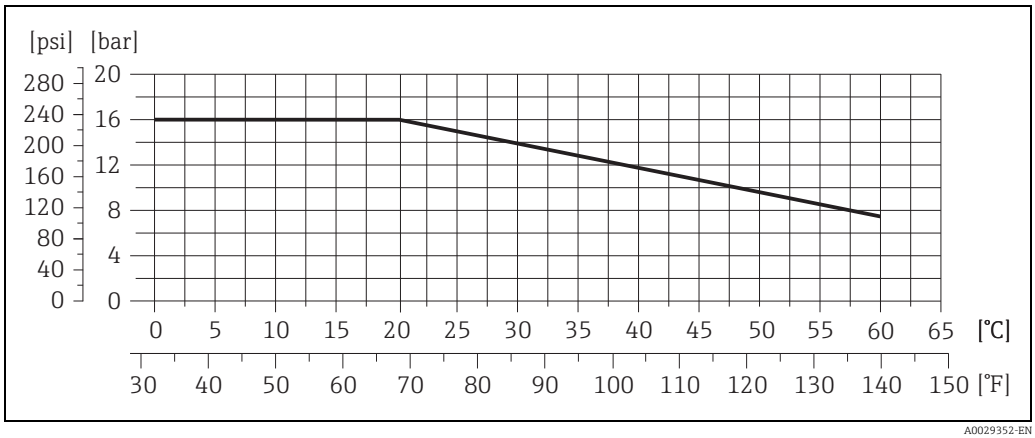
Conductivity

The minimum conductivity is ≥ 50 µS/cm

Note!
In the remote version, the necessary minimum conductivity also depends on the length of the connecting cable (→ 📖 10, section "Length of connecting cable").

Pressure-temperature ratings

Permitted process pressure



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Pressure tightness

Measuring tube: 0 mbar abs (0 psi abs) with a fluid temperature of ≤ 60 °C (140 °F)

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 (6,56 to 9,84 ft/s). The velocity of flow (v), moreover, has to be matched to the physical properties of the fluid:

- v < 2 m/s (6,56 ft/s): for abrasive fluids such as potter's clay, lime milk, ore slurry etc.
- v > 2 m/s (6,56 ft/s): for fluids causing build-up such as wastewater sludges etc.

For an overview of the measuring range full scale values, see the "Measuring range" section → 📖 4.

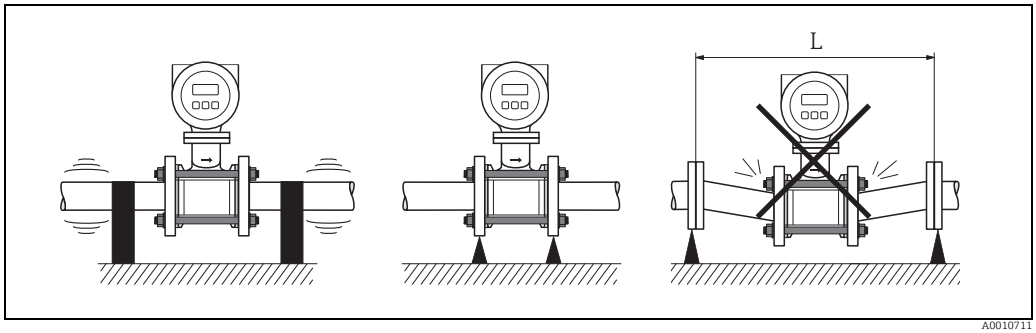
Pressure loss

- 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 (→ 📖 12, section "Adapters")

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 → 14, section "Shock and vibration resistance".



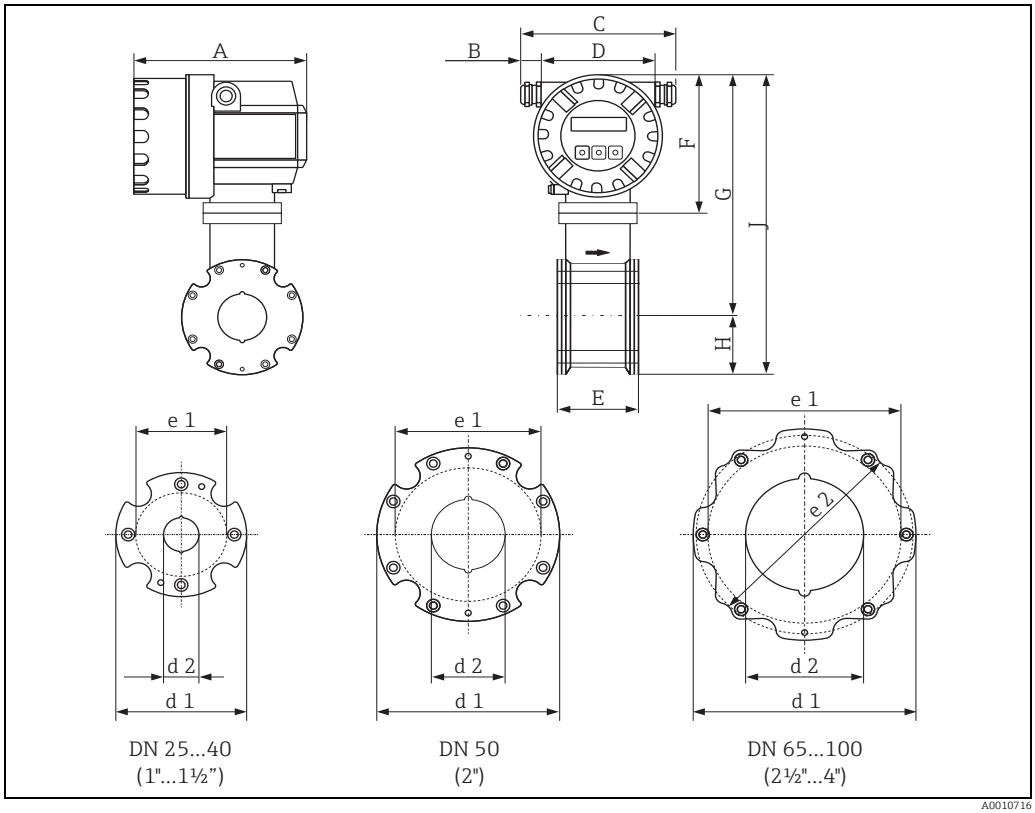
Measures to prevent vibration of the measuring device

L > 10 m (32.8 ft)

Mechanical construction

Design, dimensions

Compact version Promag D as wafer version



Engineering unit mm (in)

Dimensions (SI units)

DN EN (DIN) / JIS	A	B	C	D	E	F	G	H	J	d 1	d 2	e 1 max. Ø seals
25	178	20 to 27.5	153 to 168	113	55	150	240	43	283	86	24	68
40					69		251	52	303	104	38	87
50					83		262	62	324	124	50	106
65					93		272	70	342	139	60	125
80					117		276	75	351	151	76	135
100					148		290	89	379	179	97	160

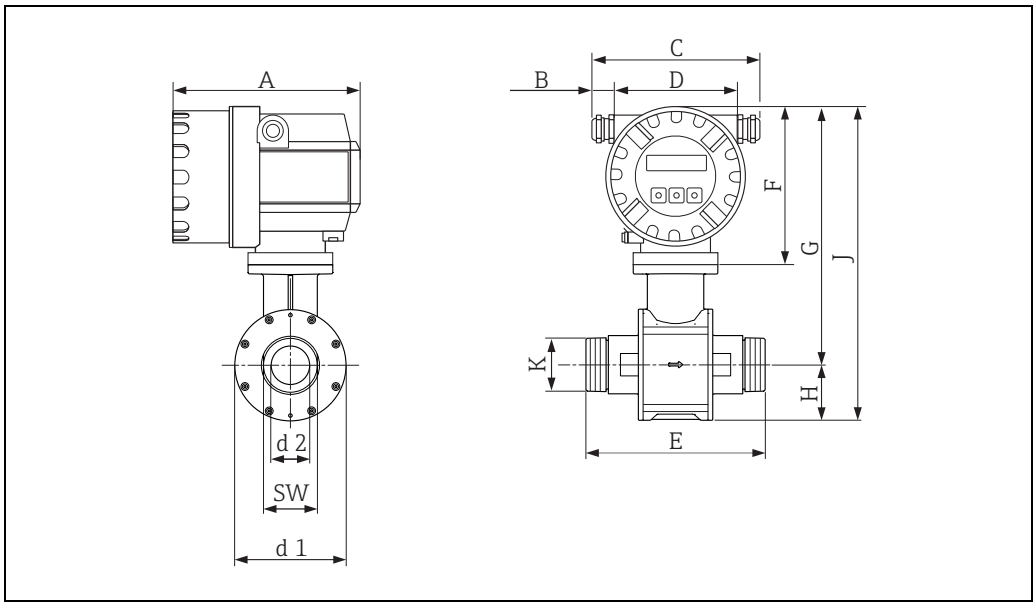
All dimensions in [mm]

Dimensions (US units)

DN ANSI	A	B	C	D	E	F	G	H	J	d 1	d 2	e 1	e 2
												max. Ø seals	
1"	7.00	0.79 to 1.08	6.02 to 6.61	4.45	2.17	5.90	9.45	1.69	11.1	3.39	0.94	2.68	–
1 ½"					2.72		9.88	2.05	11.9	4.11	1.50	3.43	–
2"					3.27		10.3	2.44	12.8	4.88	1.97	4.17	–
3"					4.61		10.9	2.95	13.8	5.94	2.99	–	5.43
4"					5.83		11.4	3.50	14.9	7.05	3.82	6.30	–

All dimensions in [inch]

Compact version Promag D with threaded connection



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Dimensions (SI units)

DN EN (DIN)	A	B	C	D	E	F	G	H	J	d 1	d 2	SW1)	K
25	178	20 to 27,5	153 to 168	113	110	150	240	43	283	86	22	28	G1"
40					140		251	52	303	104	34.4	50	G1 ½"
50					200		262	62	324	124	43	60	G2"

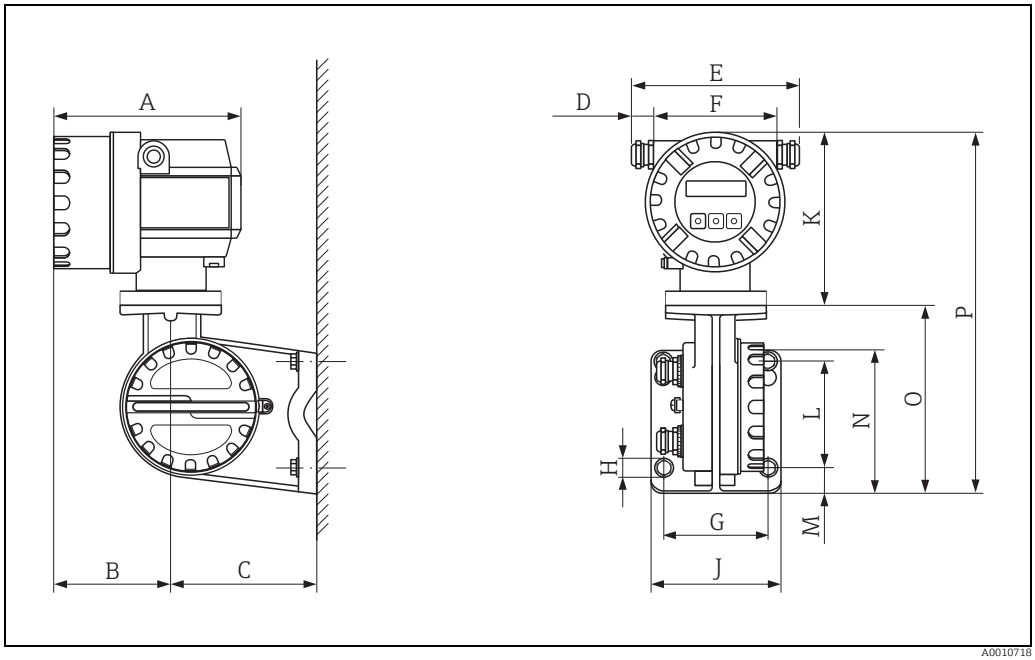
[1] SW = Width across flats (AF)
All dimensions in [mm]

Dimensions (US units)

DN ANSI	A	B	C	D	E	F	G	H	J	d 1	d 2	SW1)	K
1"	7	0.79 to 1.08	6.02 to 6.61	4.45	4.33	5.9	9.45	1.69	11.1	3.39	0.87	1.1	NPT1"
1½ "					5.51		9.88	2.05	11.9	4.11	1.35	1.97	NPT 1½"
2"					7.87		10.3	2.44	12.8	4.88	1.69	2.36	NPT2"

[1] SW = Width across flats (AF)
All dimensions in [inch]

Transmitter remote version



Transmitter dimensions, remote version

Dimensions (SI units)

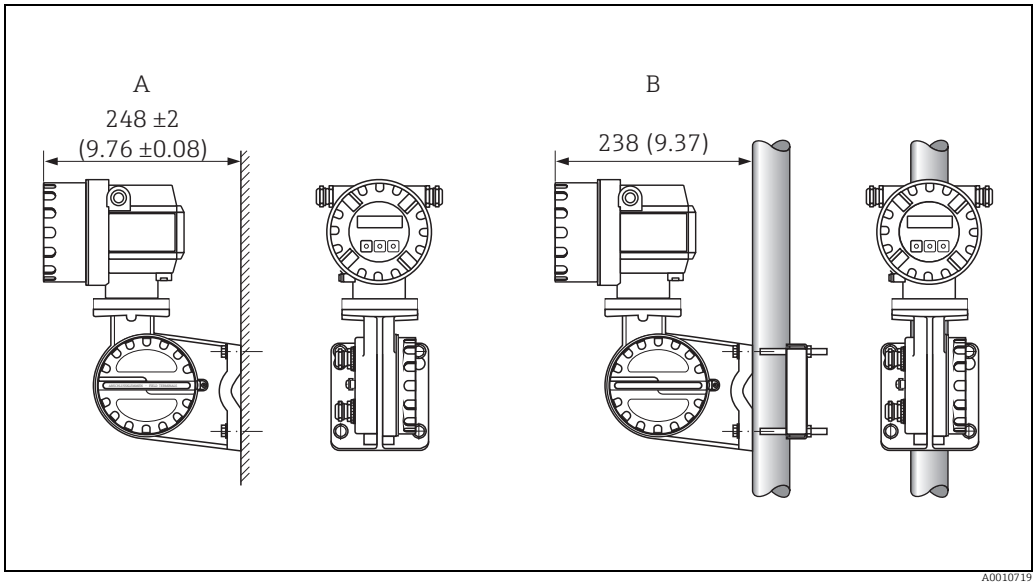
A	B	C	D	E	F	G	Ø H
178	113	135	20 to 27.5	153 to 168	113	100	8.6 (ISO-M8)
J	K	L	M	N	O	P	
123	150	100	25	133	177.5	327.5	

All dimensions in [mm]

Dimensions (US units)

A	B	C	D	E	F	G	Ø H
7.00	14.5	5.31	0.79 to 1.08	6.02 to 6.61	4.45	3.94	0.34 (ISO-M8)
J	K	L	M	N	O	P	
4.84	5.90	3.94	0.98	5.24	6.99	12.9	

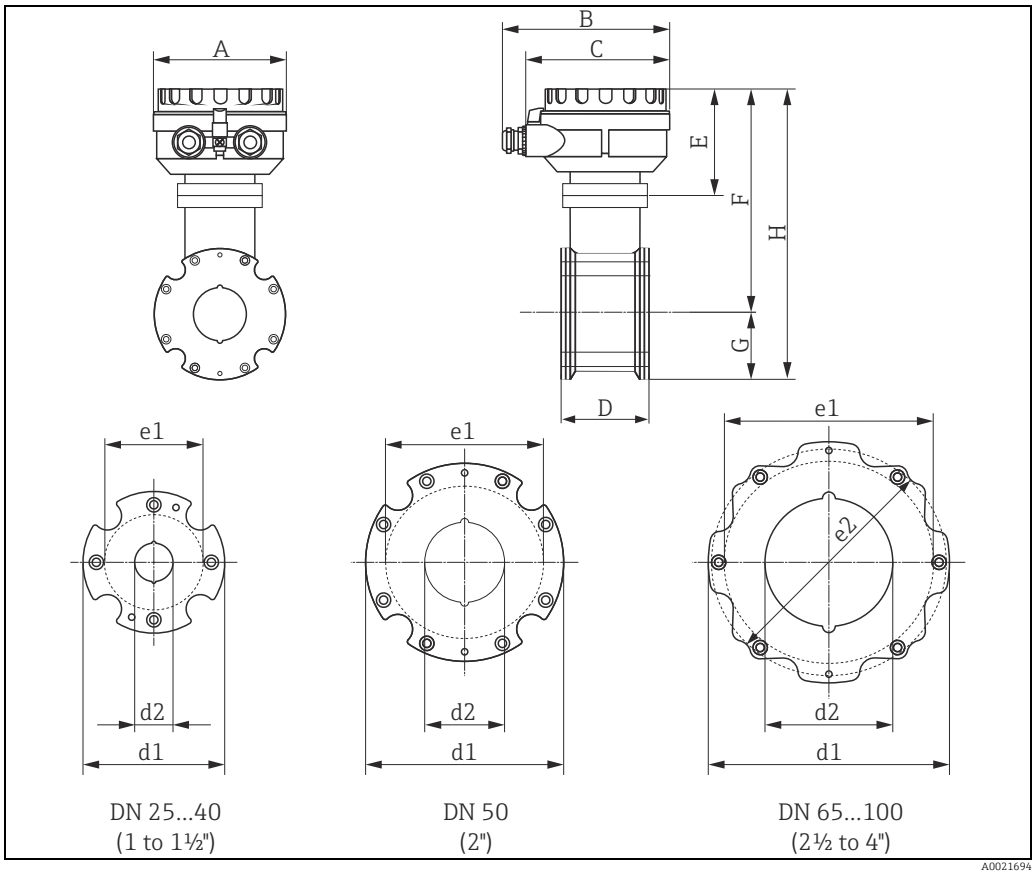
All dimensions in [inch]



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

A Direct wall mounting
B Pipe mounting

Sensor remote version Promag D as wafer version



Engineering unit mm (in)

Dimensions (SI units)

DN EN (DIN) / JIS	A	B	C	D	E	F	G	H	d 1	d 2	e 1 max. Ø seals
25	129	163	143	55	102	192	43	235	86	24	68
40				69		203	52	255	104	38	87
50				83		214	62	276	124	50	106
65				93		224	70	294	139	60	125
80				117		228	75	303	151	76	135
100				148		242	89	331	179	97	160

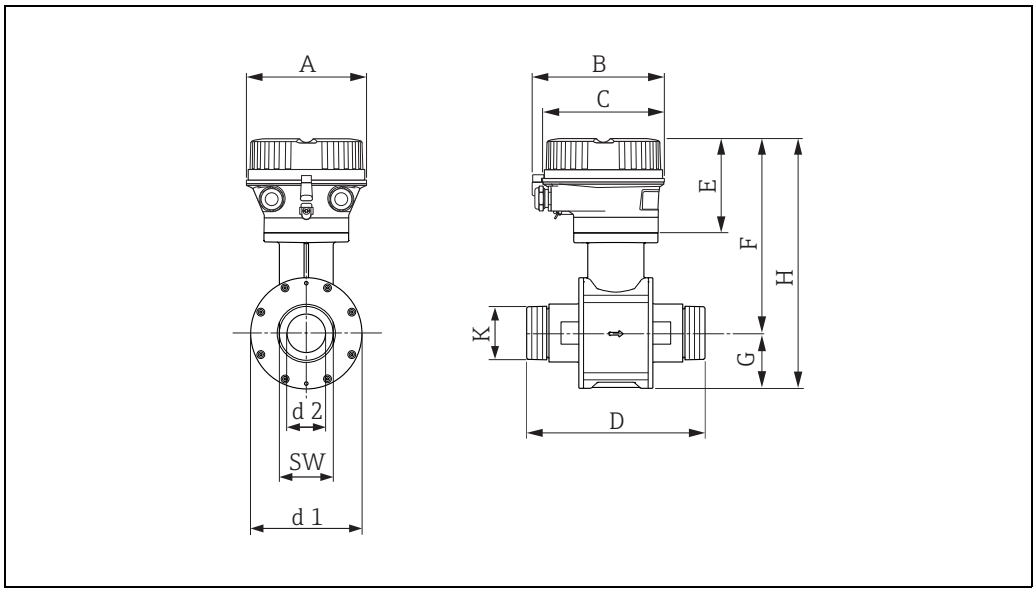
All dimensions in [mm]

Dimensions (US units)

DN ANSI	A	B	C	D	E	F	G	H	d 1	d 2	e 1 max. Ø seals	e 2
1"	5.08	6.42	5.63	2.17	4.02	7.56	1.69	9.25	3.39	0.94	2.68	–
1 ½"				2.72		7.99	2.05	10.0	4.11	1.50	3.43	–
2"				3.27		8.43	2.44	10.9	4.88	1.97	4.17	–
3"				4.61		8.98	2.95	11.9	5.94	2.99	–	5.43
4"				5.83		9.53	3.50	13.0	7.05	3.82	6.30	–

Alle dimensions in [inch]

Sensor remote version Promag D with threaded connection



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Dimensions (SI units)

DN EN (DIN)	A	B	C	D	E	F	G	H	d 1	d 2	SW1)	K
25	129	163	143	110	102	192	43	235	86	22	28	G1"
40				140		203	52	255	104	34,4	50	G1 ½"
50				200		214	62	276	124	43	60	G2"

1) SW = Width across flats (AF)
All dimensions in [mm]

Dimensions (US units)

DN ANSI	A	B	C	D	E	F	G	H	d 1	d 2	SW1)	K
1"	5.08	6.42	5.63	4.33	4.02	7.56	1.69	9.25	3.39	0.87	1.1	NPT1"
1 ½"				5.51		7.99	2.05	10.0	4.11	1.35	1.97	NPT1 ½"
2"				7.87		8.43	2.44	10.9	4.88	1.69	2.36	NPT2"

1) SW = Width across flats (AF)
All dimensions in [inch]

Weight

Weight data without packaging material.

Diameter		Compact version						Remote version (without cable)			
		Total		Sensor		Transmitter		Sensor		Transmitter (field housing)	
[inch]	[mm]	[lbs]	[kg]	[lbs]	[kg]	[lbs]	[kg]	[lbs]	[kg]	[lbs]	[kg]
1"	25	6.4	2.9	2.4	1.1	4.0	1.8	5.5	2.5	6.8	3.1
1 ½"	40	7.7	3.5	3.7	1.7	4.0	1.8	6.8	3.1	6.8	3.1
2"	50	9.5	4.3	5.5	2.5	4.0	1.8	8.6	3.9	6.8	3.1
–	65	11.3	5.1	7.3	3.3	4.0	1.8	10.4	4.7	6.8	3.1
3"	80	13.5	6.1	9.5	4.3	4.0	1.8	12.6	5.7	6.8	3.1
4"	100	19.4	8.8	15.4	7.0	4.0	1.8	18.5	8.4	6.8	3.1

Measuring tube specifications

Pressure ratings Promag D as wafer version

Pressure rating EN (DIN)

Diameter		Pressure rating	Mounting bolts			Centering sleeves length		Measuring tube internal diameter	
[inch]	[mm]			[inch]	[mm]	[inch]	[mm]	[inch]	[mm]
1"	25	EN (DIN) PN16	4 × M12 ×	5.71"	145	2.13"	54	0.94"	24
1 ½"	40		4 × M16 ×	6.69"	170	2.68"	68	1.50"	38
2"	50		4 × M16 ×	7.28"	185	3.23"	82	1.97"	50
–	65[2]		4 × M16 ×	7.87"	200	3.62"	92	2.36"	60
–	65[2]		8 × M16 ×	7.87"	200	– *	– *	2.36"	60
3"	80		8 × M16 ×	8.86"	225	4.57"	116	2.99"	76
4"	100		8 × M16 ×	10.24"	260	5.79"	147	3.82"	97

[≠] EN (DIN) flange: 4-hole → with centering sleeves
[2] EN (DIN) flange: 8-hole → without centering sleeves
* A centering sleeve is not required. The device is centered directly via the sensor housing.

Pressure rating JIS

Diameter		Pressure rating	Mounting bolts			Centering sleeves length		Measuring tube internal diameter	
[inch]	[mm]			[inch]	[mm]	[inch]	[mm]	[inch]	[mm]
1"	25	JIS 10 K	4 × M16 ×	6.69"	170	2.13"	54	0.94"	24
1 ½"	40		4 × M16 ×	6.69"	170	2.68"	68	1.50"	38
2"	50		4 × M16 ×	7.28"	185	– *	– *	1.97"	50
–	65		4 × M16 ×	7.87"	200	– *	– *	2.36"	60
3"	80		8 × M16 ×	8.86"	225	– *	– *	2.99"	76
4"	100		8 × M16 ×	10.24"	260	– *	– *	3.82"	97

* A centering sleeve is not required. The device is centered directly via the sensor housing.

Pressure rating ANSI

Diameter		Pressure rating	Mounting bolts			Centering sleeves length		Measuring tube internal diameter	
[inch]	[mm]			[inch]	[mm]	[inch]	[mm]	[inch]	[mm]
1"	25	ANSI Class 150	4 × UNC ½ " ×	5.70"	145	– *		0.94"	24
1 ½"	40		4 × UNC ½ " ×	6.50"	165	– *		1.50"	38
2"	50		4 × UNC 5/8" ×	7.50"	190.5	– *		1.97"	50
3"	80		4 × UNC 5/8" ×	9.25"	235	– *		2.99"	76
4"	100		8 × UNC 5/8" ×	10.4"	264	5.79"	147	3.82"	97
* A centering sleeve is not required. The device is centered directly via the sensor housing.									

Pressure ratings Promag D with threaded connection

Pressure rating EN (DIN)

Diameter		Pressure rating	Threaded connection	Wrench size SW		Measuring tube internal diameter	
[mm]	[inch]			[mm]	[inch]	[mm]	[inch]
25	1"	EN (DIN) PN16	G 1"	28	1.1	24	0.94"
40	1 ½"		G 1 ½"	50	1.97	38	1.50"
50	2"		G 2"	60	2.36	50	1.97"

Pressure rating ANSI

Diameter		Pressure rating	Threaded connection	Wrench size SW		Measuring tube internal diameter	
[mm]	[inch]			[mm]	[inch]	[mm]	[inch]
25	1"	ANSI Class 150	NPT 1"	28	1.1	24	0.94"
40	1 ½"		NPT 1 ½"	50	1.97	38	1.50"
50	2"		NPT 2"	60	2.36	50	1.97"

Material

- Sensor housing: powder-coated die-cast aluminum
- Transmitter housing: powder-coated die-cast aluminum
- Measuring tube: polyamide, O-rings: EPDM
  (Drinking water approvals: WRAS BS 6920, ACS, NSF 61, KTW/W270)
- Electrodes: 1.4435 (316L)
- Ground disks Promag D as wafer version: 1.4301 (304)
- Ground disks Promag D with threaded connection: 1.4301 (304)

Mounting bolts

Tensile strength

- Galvanized steel mounting bolts: strength category 5.6 or 5.8
- Stainless steel mounting bolts: strength category A 2 – 70

Fitted electrodes

Measuring electrodes (2 pieces) made of 1.4435 (316L)

Process connections

Promag D as wafer version

The wafer version is compatible with the following process connections:
- EN 1092-1 (DIN 2501)
- ASME B16.5
- JIS B2220

Promag D with threaded connection

- DIN ISO 228, G" external thread
- ANSI/ASME B1.20, NPT" external thread

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

Remote operation

Operation via HART protocol and FieldCare

Certificates and approvals

CE approval

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 symbol

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

Ex approval

Information about currently available Ex versions (ATEX, FM, CSA, IECEx, NEPSI 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.

Drinking water approval

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

Other standards and guidelines

- EN 60529
  Degrees of protection by housing (IP code)
- EN 61010-1
  Safety requirements for electrical equipment for measurement, control and laboratory use
- 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
  Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.

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

Note!
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 specific order codes on request.

Device-specific accessories

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

Measuring principle-specific accessories

Accessory	Description
Mounting kit for Promag D as wafer version	Consisting of: ▪ Mounting bolts ▪ Nuts incl. washers ▪ Flange seals ▪ Centering sleeves (if required for the flange)
Seal set for Promag D as wafer version	Consisting of two flange seals.
Mounting set for remote version, aluminum field housing	Mounting kit suitable for pipe and wall mounting.
Cable for remote version	Coil and signal cables, different lengths available
Process display RIA45	Multifunctional 1-channel display unit: ▪ Universal input ▪ Transmitter power supply ▪ Limit relay ▪ Analog output

Accessory	Description
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.
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.
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.

Communication-specific accessories

Accessory	Description
HART Communicator Field Xpert handheld terminal	Handheld terminal for remote configuration and for obtaining measured values via the HART current output (4 to 20 mA) and FOUNDATION Fieldbus. 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

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.
FXA193	Service interface from the device to the PC for operation via FieldCare.

Documentation

- Flow measuring technology (FA005D/06/EN)
- Operating Instructions Promag 10 (BA00082D/06/EN)

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