

Technical Information

Proline Promag W 400

Electromagnetic flowmeter



The flowmeter with integrated web server and a sensor with EN ISO 12944 corrosion protection

Application

- The electromagnetic measuring principle is unaffected by pressure, temperature and flow profile
- The specialist in the water and wastewater industry for the most demanding applications

Device properties

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

Your benefits

- For direct underground installation or permanent underwater use
- Safe, reliable long-term operation – robust and completely welded sensor
- Energy-saving flow measurement – no pressure loss due to cross-section constriction
- Maintenance-free – no moving parts
- Safe operation – no need to open the device due to display with touch control, background lighting
- Time-saving local operation without additional software and hardware – integrated web server
- Integrated verification – Heartbeat Technology™







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Document information

Symbols used


Electrical symbols



Symbol	Meaning
 A0011197	Direct current A terminal to which DC voltage is applied or through which direct current flows.
 A0011198	Alternating current A terminal to which alternating voltage is applied or through which alternating current flows.
 A0017381	Direct current and alternating current <ul style="list-style-type: none"> ▪ A terminal to which alternating voltage or DC voltage is applied. ▪ A terminal through which alternating current or direct current flows.
 A0011200	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
 A0011199	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.
 A0011201	Equipotential connection A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.

Symbols for certain types of information

Symbol	Meaning
 A0011182	Allowed Indicates procedures, processes or actions that are allowed.
 A0011183	Preferred Indicates procedures, processes or actions that are preferred.
 A0011184	Forbidden Indicates procedures, processes or actions that are forbidden.
 A0011193	Tip Indicates additional information.
 A0011194	Reference to documentation Refers to the corresponding device documentation.
 A0011195	Reference to page Refers to the corresponding page number.
 A0011196	Reference to graphic Refers to the corresponding graphic number and page number.

Symbols in graphics

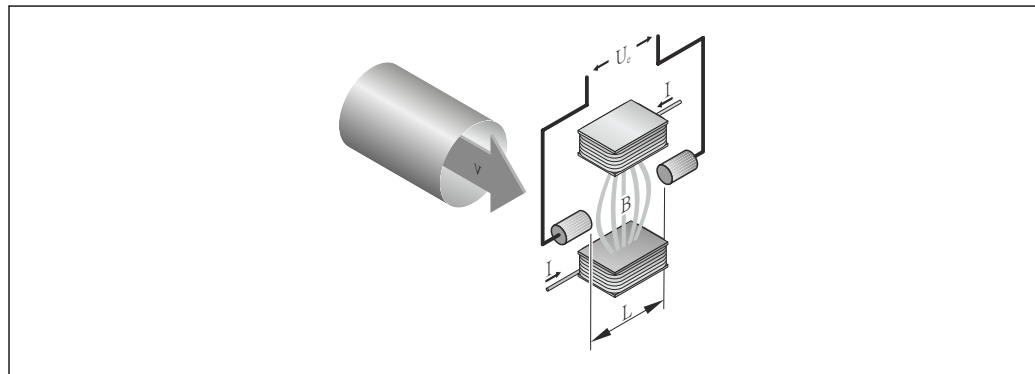
Symbol	Meaning
1, 2, 3, ...	Item numbers
1., 2., 3., ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
 A0013441	Flow direction

Symbol	Meaning
 A0011187	Hazardous area Indicates a hazardous area.
 A0011188	Safe area (non-hazardous area) Indicates a non-hazardous area.

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.



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

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

Formulae for calculation

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

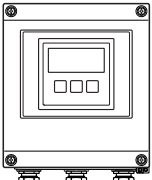
Measuring system

The device consists of a transmitter and a sensor.

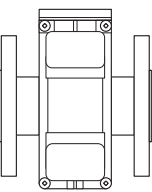
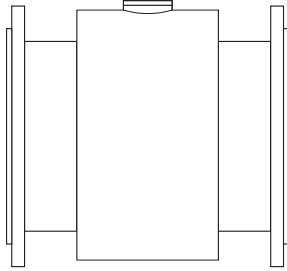
Two device versions are available:

- Compact version - the transmitter and sensor form a mechanical unit.
- Remote version – the transmitter and sensor are mounted separately from one another.

Transmitter

<p>Promag 400</p>  <p style="text-align: right; font-size: small;">A0017117</p>	<p>Device versions and materials</p> <ul style="list-style-type: none"> ■ Compact version: compact housing <ul style="list-style-type: none"> - Polycarbonate plastic - Coated aluminum AlSi10Mg ■ Remote version: wall-mount housing <ul style="list-style-type: none"> - Polycarbonate plastic - Coated aluminum AlSi10Mg <p>Configuration:</p> <ul style="list-style-type: none"> ■ External operation via four-line, illuminated local display with touch control and guided menus ("Make-it-run" wizards) for applications ■ Via operating tools (e.g. FieldCare) ■ Via Web browser (e.g. Microsoft Internet Explorer) ■ Also for device version with EtherNet/IP output: <ul style="list-style-type: none"> - Via Add-on Profile Level 3 for automation system from Rockwell Automation - Via Electronic Data Sheet (EDS)
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Sensor

<p>Promag W</p> <p><i>Fixed flange: DN 25 to 300 (1 to 12")</i></p>  <p style="text-align: right; font-size: small;">A0017040</p>	<p>Nominal diameter range: DN 25 to 2000 (1 to 78")</p> <p>Materials:</p> <ul style="list-style-type: none"> ■ Sensor housing: coated aluminum AlSi10Mg, carbon steel with protective varnish ■ Sensor connection housing: coated aluminum AlSi10Mg, polycarbonate ■ Measuring tube: stainless steel 1.4301 (304), 1.4306 (304L); for flanges made of carbon steel with Al/Zn protective coating or protective varnish ■ Liner: hard rubber, polyurethane ■ Seals: as per DIN EN 1514-1 ■ Electrodes: 1.4435 (304L), Alloy C22, tantalum ■ Ground disks: 1.4435 (316L), Alloy C22, tantalum
<p><i>Fixed flange: DN 350 to 2000 (14 to 78")</i></p>  <p style="text-align: right; font-size: small;">A0017041</p>	

Safety

IT security

We only provide a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

Endress+Hauser can be contacted to provide support in performing this task.

Input

Measured variable

Direct measured variables

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



In custody transfer: only volume flow and electrical conductivity

Calculated measured variables

Mass flow

Measuring range

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

Electrical conductivity: 5 to $10\,000$ $\mu\text{S}/\text{cm}/\text{cm}$

Flow characteristic values in SI units



Nominal diameter		Recommended flow min./max. full scale value ($v \sim 0.3/10$ m/s)	Factory settings		
[mm]	[in]		Full scale value current output ($v \sim 2.5$ m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off ($v \sim 0.04$ m/s)
		[m ³ /h]	[m ³ /h]	[m ³]	[m ³ /h]
25	1	9 to 300 dm ³ /min	75 dm ³ /min	0.5 dm ³	1 dm ³ /min
32	–	15 to 500 dm ³ /min	125 dm ³ /min	1 dm ³	2 dm ³ /min
40	1 ½	25 to 700 dm ³ /min	200 dm ³ /min	1.5 dm ³	3 dm ³ /min
50	2	35 to 1 100 dm ³ /min	300 dm ³ /min	2.5 dm ³	5 dm ³ /min
65	–	60 to 2 000 dm ³ /min	500 dm ³ /min	5 dm ³	8 dm ³ /min
80	3	90 to 3 000 dm ³ /min	750 dm ³ /min	5 dm ³	12 dm ³ /min
100	4	145 to 4 700 dm ³ /min	1 200 dm ³ /min	10 dm ³	20 dm ³ /min
125	–	220 to 7 500 dm ³ /min	1 850 dm ³ /min	15 dm ³	30 dm ³ /min
150	6	20 to 600	150	0.025	2.5
200	8	35 to 1 100	300	0.05	5
250	10	55 to 1 700	500	0.05	7.5
300	12	80 to 2 400	750	0.1	10
350	14	110 to 3 300	1 000	0.1	15
375	15	140 to 4 200	1 200	0.15	20
400	16	140 to 4 200	1 200	0.15	20
450	18	180 to 5 400	1 500	0.25	25
500	20	220 to 6 600	2 000	0.25	30
600	24	310 to 9 600	2 500	0.3	40
700	28	420 to 13 500	3 500	0.5	50
750	30	480 to 15 000	4 000	0.5	60
800	32	550 to 18 000	4 500	0.75	75
900	36	690 to 22 500	6 000	0.75	100
1 000	40	850 to 28 000	7 000	1	125
–	42	950 to 30 000	8 000	1	125
1 200	48	1 250 to 40 000	10 000	1.5	150
–	54	1 550 to 50 000	13 000	1.5	200
1 400	–	1 700 to 55 000	14 000	2	225

Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.3/10 m/s)	Factory settings		
[mm]	[in]		Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
		[m ³ /h]	[m ³ /h]	[m ³]	[m ³ /h]
-	60	1 950 to 60 000	16 000	2	250
1 600	-	2 200 to 70 000	18 000	2.5	300
-	66	2 500 to 80 000	20 500	2.5	325
1 800	72	2 800 to 90 000	23 000	3	350
-	78	3 300 to 100 000	28 500	3.5	450
2 000	-	3 400 to 110 000	28 500	3.5	450

Flow characteristic values in US units

Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.3/10 m/s)	Factory settings		
[in]	[mm]		Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
		[gal/min]	[gal/min]	[gal]	[gal/min]
1	25	2.5 to 80	18	0.2	0.25
-	32	4 to 130	30	0.2	0.5
1 ½	40	7 to 190	50	0.5	0.75
2	50	10 to 300	75	0.5	1.25
-	65	16 to 500	130	1	2
3	80	24 to 800	200	2	2.5
4	100	40 to 1 250	300	2	4
-	125	60 to 1 950	450	5	7
6	150	90 to 2 650	600	5	12
8	200	155 to 4 850	1 200	10	15
10	250	250 to 7 500	1 500	15	30
12	300	350 to 10 600	2 400	25	45
14	350	500 to 15 000	3 600	30	60
15	375	600 to 19 000	4 800	50	60
16	400	600 to 19 000	4 800	50	60
18	450	800 to 24 000	6 000	50	90
20	500	1 000 to 30 000	7 500	75	120
24	600	1 400 to 44 000	10 500	100	180
28	700	1 900 to 60 000	13 500	125	210
30	750	2 150 to 67 000	16 500	150	270
32	800	2 450 to 80 000	19 500	200	300
36	900	3 100 to 100 000	24 000	225	360
40	1 000	3 800 to 125 000	30 000	250	480
42	-	4 200 to 135 000	33 000	250	600
48	1 200	5 500 to 175 000	42 000	400	600
54	-	9 to 300 MGal/d	75 MGal/d	0.0005 MGal/d	1.3 MGal/d

Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.3/10 m/s)	Factory settings		
			Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
-	1 400	10 to 340 MGal/d	85 MGal/d	0.0005 MGal/d	1.3 MGal/d
60	-	12 to 380 MGal/d	95 MGal/d	0.0005 MGal/d	1.3 MGal/d
-	1 600	13 to 450 MGal/d	110 MGal/d	0.0008 MGal/d	1.7 MGal/d
66	-	14 to 500 MGal/d	120 MGal/d	0.0008 MGal/d	2.2 MGal/d
72	1 800	16 to 570 MGal/d	140 MGal/d	0.0008 MGal/d	2.6 MGal/d
78	-	18 to 650 MGal/d	175 MGal/d	0.0010 MGal/d	3.0 MGal/d
-	2 000	20 to 700 MGal/d	175 MGal/d	0.0010 MGal/d	2.9 MGal/d

 To calculate the measuring range, use the *Applicator* sizing tool (→  88)


Recommended measuring range

"Flow limit" section (→  35)

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

Operable flow range

Over 1000 : 1

-  In custody transfer:
- 160 : 1 for DN 25 to 500 (1 to 20")
 - 100 : 1 for DN 600 to 800 (24 to 32")

Further details are laid down by the applicable approval.

Input signal

Status input

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

Output

Output signal

Current output

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

Resolution	0.5 µA
Damping	Adjustable: 0.07 to 999 s
Assignable measured variables	<ul style="list-style-type: none"> ▪ Volume flow ▪ Mass flow ▪ Flow velocity ▪ Conductivity ▪ Electronics temperature

Pulse/frequency/switch output

Function	<ul style="list-style-type: none"> ▪ With the order code for "Output; Input", option H: output 2 can be set as a pulse or frequency output ▪ With the order code for "Output; Input", option I: output 2 and 3 can be set as a pulse, frequency or switch output ▪ With the order code for "Output; Input", option J: output 2 firmly assigned as certified pulse output
Version	Passive, open collector
Maximum input values	<ul style="list-style-type: none"> ▪ DC30 V ▪ 250 mA
Voltage drop	For 25 mA: ≤ DC2 V
Pulse output	
Pulse width	Adjustable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Adjustable
Assignable measured variables	<ul style="list-style-type: none"> ▪ Volume flow ▪ Mass flow
Frequency output	
Output frequency	Adjustable: 0 to 12 500 Hz
Damping	Adjustable: 0 to 999 s
Pulse/pause ratio	1:1
Assignable measured variables	<ul style="list-style-type: none"> ▪ Volume flow ▪ Mass flow ▪ Flow velocity ▪ Conductivity ▪ Electronics temperature
Switch output	
Switching behavior	Binary, conductive or non-conductive
Switching delay	Adjustable: 0 to 100 s
Number of switching cycles	Unlimited
Assignable functions	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ Diagnostic behavior ▪ Limit value: <ul style="list-style-type: none"> - Off - Volume flow - Mass flow - Flow velocity - Conductivity - Totalizer 1-3 - Electronics temperature ▪ Flow direction monitoring ▪ Status <ul style="list-style-type: none"> - Empty pipe detection - Low flow cut off

EtherNet/IP

Standards	In accordance with IEEE 802.3
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Signal on alarm

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

Current output*4-20 mA*

Failure mode	Selectable (as per NAMUR recommendation NE 43): <ul style="list-style-type: none"> ▪ Minimum value: 3.6 mA ▪ Maximum value: 22 mA ▪ Defined value: 3.59 to 22.5 mA ▪ Actual value ▪ Last valid value
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0-20 mA

Failure mode	Choose from: <ul style="list-style-type: none"> ▪ Maximum alarm: 22 mA ▪ Defined value: 0 to 22.5 mA
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HART

Device diagnostics	Device condition can be read out via HART Command 48
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Pulse/frequency/switch output

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

EtherNet/IP

Device diagnostics	Device condition can be read out in Input Assembly
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Local display

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




Status signal as per NAMUR recommendation NE 107

Operating tool

- Via digital communication:
HART protocol
- Via service interface

Plain text display	With information on cause and remedial measures
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 Additional information on remote operation (→  84)

Web browser

Plain text display	With information on cause and remedial measures
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Light emitting diodes (LED)

Status information	<p>Status indicated by various light emitting diodes</p> <p>The following information is displayed depending on the device version:</p> <ul style="list-style-type: none"> ▪ Supply voltage active ▪ Data transmission active ▪ Device alarm/error has occurred ▪ EtherNet/IP network available ▪ EtherNet/IP connection established
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Low flow cut off The switch points for low flow cut off are user-selectable.

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

- Inputs
- Outputs
- Power supply

Protocol-specific data HART

Manufacturer ID	0x11
Device type ID	0x67
HART protocol revision	6.0
Device description files (DTM, DD)	Information and files under: www.endress.com
HART load	Min. 250 Ω
Dynamic variables	<p>The measured variables can be freely assigned to the dynamic variables.</p> <p>Measured variables for PV (primary dynamic variable)</p> <ul style="list-style-type: none"> ▪ Off ▪ Volume flow ▪ Mass flow ▪ Flow velocity ▪ Electronics temperature <p>Measured variables for SV, TV, QV (secondary, tertiary and quaternary dynamic variable)</p> <ul style="list-style-type: none"> ▪ Volume flow ▪ Mass flow ▪ Flow velocity ▪ Conductivity ▪ Electronics temperature ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3

EtherNet/IP

Protocol	<ul style="list-style-type: none"> ▪ The CIP Networks Library Volume 1: Common Industrial Protocol ▪ The CIP Networks Library Volume 2: EtherNet/IP Adaptation of CIP 		
Communication type	<ul style="list-style-type: none"> ▪ 10Base-T ▪ 100Base-TX 		
Device profile	Generic device (product type: 0x2B)		
Manufacturer ID	0x49E		
Device type ID	0x1067		
Baud rates	Automatic ¹⁹ / ₁₀₀ Mbit with half-duplex and full-duplex detection		
Polarity	Auto-polarity for automatic correction of crossed TxD and RxD pairs		
Supported CIP connections	Max. 3 connections		
Explicit connections	Max. 6 connections		
I/O connections	Max. 6 connections (scanner)		
Configuration options for measuring device	<ul style="list-style-type: none"> ▪ DIP switches on the electronics module for IP addressing ▪ Manufacturer-specific software (FieldCare) ▪ Add-on Profile Level 3 for Rockwell Automation control systems ▪ Web browser ▪ Electronic Data Sheet (EDS) integrated in the measuring device 		
Configuration of the EtherNet interface	<ul style="list-style-type: none"> ▪ Speed: 10 MBit, 100 MBit, auto (factory setting) ▪ Duplex: half-duplex, full-duplex, auto (factory setting) 		
Configuration of the device address	<ul style="list-style-type: none"> ▪ DIP switches on the electronics module for IP addressing (last octet) ▪ DHCP ▪ Manufacturer-specific software (FieldCare) ▪ Add-on Profile Level 3 for Rockwell Automation control systems ▪ Web browser ▪ EtherNet/IP tools, e.g. RSLinx (Rockwell Automation) 		
Device Level Ring (DLR)	No		
Fix Input			
RPI	5 ms to 10 s (factory setting: 20 ms)		
Exclusive Owner Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0x66	56
	T → O configuration:	0x64	32
Exclusive Owner Multicast		Instance	Size [byte]
	Instance configuration:	0x69	-
	O → T configuration:	0x66	56
	T → O configuration:	0x64	32
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0xC7	-
	T → O configuration:	0x64	32
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x69	-
	O → T configuration:	0xC7	-
	T → O configuration:	0x65	32

Input Assembly	<ul style="list-style-type: none"> ■ Current device diagnostics ■ Volume flow ■ Mass flow ■ Temperature ■ Totalizer 1 ■ Totalizer 2 ■ Totalizer 3 		
Configurable Input			
RPI	5 ms to 10 s (factory setting: 20 ms)		
Exclusive Owner Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0x66	56
	T → O configuration:	0x65	88
Exclusive Owner Multicast		Instance	Size [byte]
	Instance configuration:	0x69	-
	O → T configuration:	0x66	56
	T → O configuration:	0x64	88
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0xC7	-
	T → O configuration:	0x64	88
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x69	-
	O → T configuration:	0xC7	-
	T → O configuration:	0x65	88
Configurable Input Assembly	<ul style="list-style-type: none"> ■ Volume flow ■ Temperature ■ Mass flow ■ Totalizer 1 to 3 ■ Flow velocity ■ Volume flow unit ■ Temperature unit ■ Mass flow unit ■ Unit totalizer 1-3 ■ Flow velocity unit 		
Fix Output			
Output Assembly	<ul style="list-style-type: none"> ■ Activation of reset totalizers 1-3 ■ Activation of reference density compensation ■ Reset totalizers 1-3 ■ External density ■ Density unit ■ Temperature unit 		

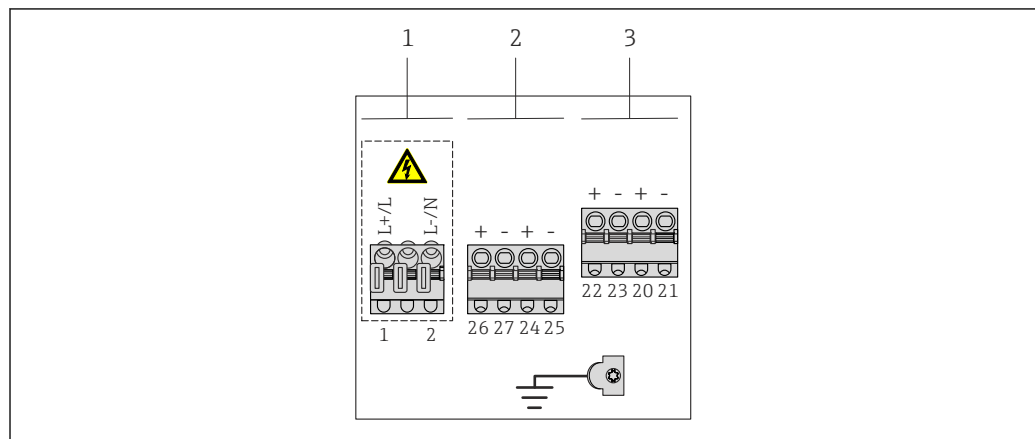
Configuration	
Configuration Assembly	<p>Only the most common configurations are listed below.</p> <ul style="list-style-type: none"> ▪ Software write protection ▪ Mass flow unit ▪ Mass unit ▪ Volume flow unit ▪ Volume unit ▪ Density unit ▪ Reference density unit ▪ Temperature unit ▪ Length ▪ Totalizer 1-3: <ul style="list-style-type: none"> - Assignment - Unit - Operating mode - Failure mode ▪ Alarm delay

Power supply

Terminal assignment

Transmitter

0-20 mA/4-20 mA HART connection version with additional outputs and inputs



- 1 Supply voltage
- 2 Output 1 (26/27) and output 2 (24/25)
- 3 Output 3 (22/23) and input 1 (20/21)

Supply voltage

Order code for "Power supply"	Terminal numbers	
	1 (L+/L)	2 (L-/N)
Option L (wide range power unit)	AC100 to 240 V	
	AC/DC24 V	

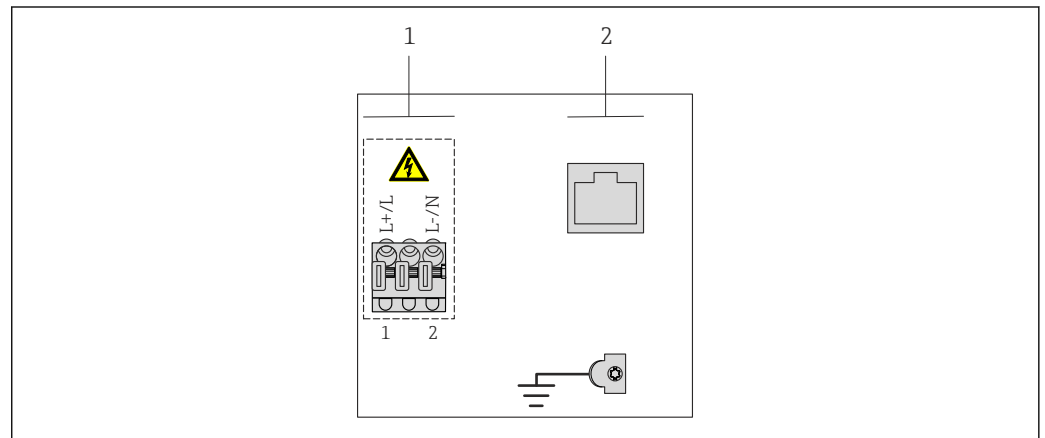
Signal transmission 0-20 mA/4-20 mA HART with additional outputs and inputs

Order code for "Output" and "Input"	Terminal numbers							
	Output 1		Output 2		Output 3		Input	
	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
Option H	<ul style="list-style-type: none"> 4-20 mA HART (active) 0-20 mA (active) 		Pulse/frequency output (passive)			Switch output (passive)		-
Option I	<ul style="list-style-type: none"> 4-20 mA HART (active) 0-20 mA (active) 		Pulse/frequency/switch output (passive)			Pulse/frequency/switch output (passive)		Status input
Option J	<ul style="list-style-type: none"> 4-20 mA HART (active) 0-20 mA (active) 		Permanently assigned Pulse output adjusted (passive)			Pulse/frequency/switch output (passive)		Status input

EtherNet/IP connection version

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

Connection methods available		Possible options for order code "Electrical connection"
Outputs	Power supply	
Terminals	Terminals	<ul style="list-style-type: none"> Option A: coupling M20x1 Option B: thread M20x1 Option C: thread G 1/2" Option D: thread NPT 1/2"
Device plug (→ 16)	Terminals	<ul style="list-style-type: none"> Option L: plug M12x1 + thread NPT 1/2" Option N: plug M12x1 + coupling M20 Option P: plug M12x1 + thread G 1/2" Option U: plug M12x1 + thread M20



A0020428

- 1 Supply voltage (wide range power unit)
- 2 EtherNet/IP

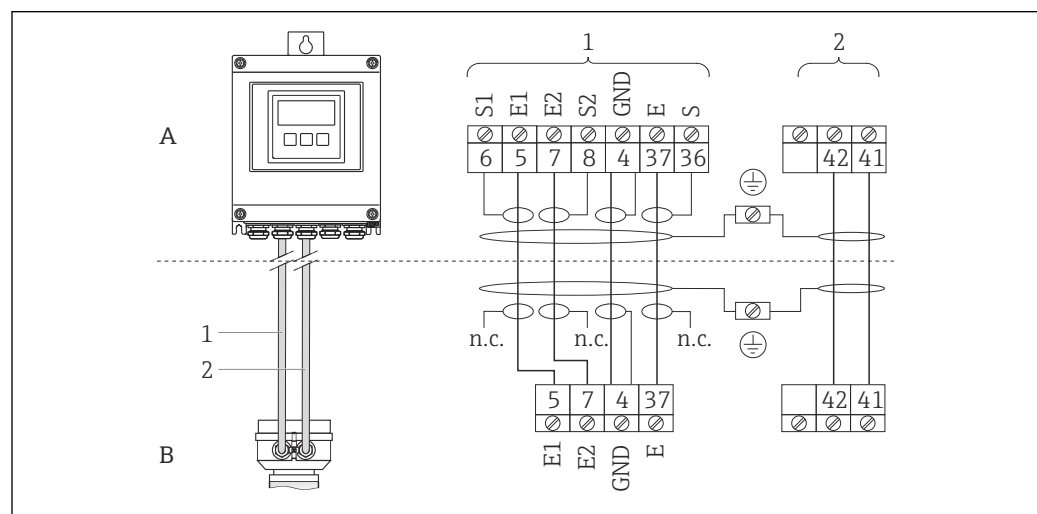
Supply voltage

Order code for "Power supply"	Terminal numbers	
	1 (L+/L)	2 (L-/N)
Option L (wide range power unit)	AC100 to 240 V	
	AC/DC24 V	

EtherNet/IP signal transmission

Order code for "Output"	Connection via
Option N	EtherNet/IP connector

Remote version



A0020534

1 Remote version terminal assignment

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

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

Pin assignment, device plug

i Order codes for the M12x1 plug, see the "Order code for **electrical connection**" column: EtherNet/IP (→ 15)

EtherNet/IP

EtherNet/IP (on the device side)

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

- i** Recommended plug:
- Binder, series 763, part no. 99 3729 810 04
 - Phoenix, part no. 1543223 SACC-M12MSD-4Q
 - When using the device in a hazardous location: Use a suitably certified plug.

Supply voltage

Transmitter

Order code for "Power supply"	Terminal voltage	Frequency range
Option L	AC100 to 240 V	50/ 60 Hz, ±4 Hz
	AC/DC24 V	50/ 60 Hz, ±4 Hz

Power consumption

Order code for "Output"	Maximum Power consumption
Option L	30 VA/8 W
Option N	30 VA/8 W

Current consumption

Transmitter

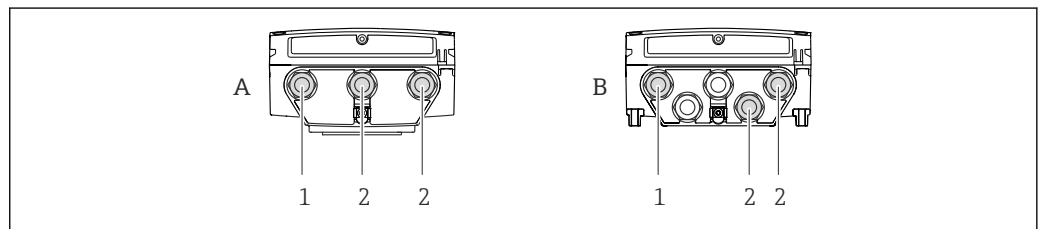
Order code for "Power supply"	Maximum Current consumption	Maximum switch-on current
Option L: AC 100 to 240 V	145 mA	25 A (< 5 ms)
Option L: AC/DC 24 V	350 mA	27 A (< 5 ms)

Power supply failure

- Totalizers stop at the last value measured.
- Configuration is retained in the plug-in memory (HistoROM DAT).
- Error messages (incl. total operated hours) are stored.

Electrical connection

Connecting the transmitter



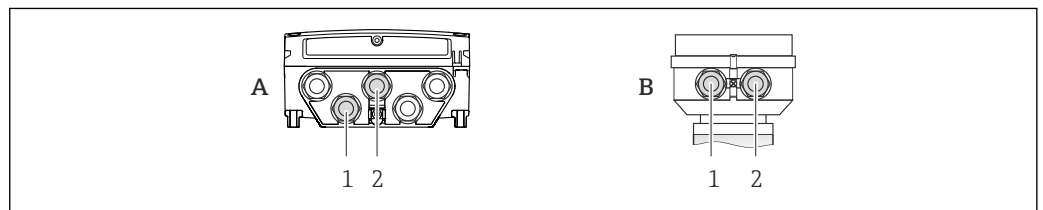
A0017113

2 Supply voltage and signal transmission connection

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

Remote version connection

Connecting cable



A0017267

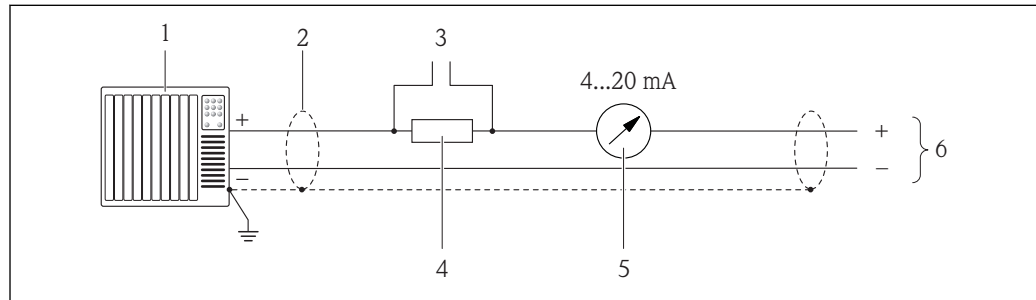
3 Connecting cable connection: electrode and coil current cable

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

- Fix the cable run or route it in an armored conduit.
Cable movements can influence the measuring signal especially in the case of low fluid conductivities.
- Route the cable well clear of electrical machines and switching elements.
- Ensure potential equalization between sensor and transmitter (→ 20).

Connection examples

Current output 4-20 mA HART

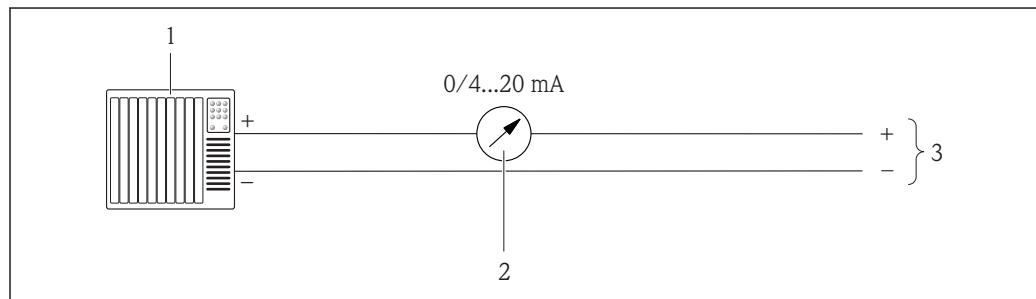


A0016800

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

- 1 Automation system with current input (e.g. PLC)
- 2 Cable shield, observe cable specifications (→ 22)
- 3 Connection for HART operating devices (→ 84)
- 4 Resistor for HART communication ($\geq 250 \Omega$): observe maximum load (→ 8)
- 5 Analog display unit: observe maximum load (→ 8)
- 6 Transmitter

Current output 4-20 mA

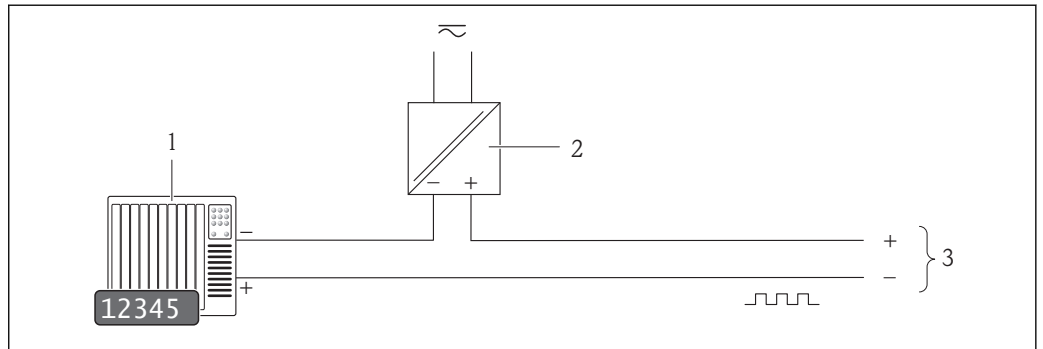


A0017162

5 Connection example for 0-20 mA current output (active) and 4-20 mA current output (active)

- 1 Automation system with current input (e.g. PLC)
- 2 Analog display unit: observe maximum load (→ 8)
- 3 Transmitter

Pulse/frequency output

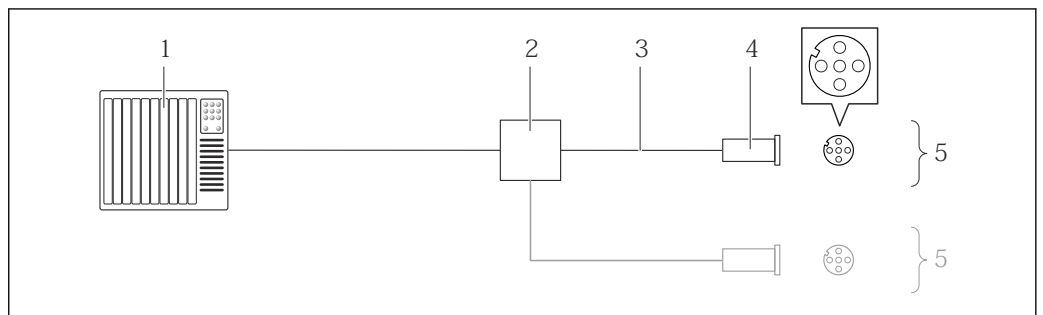


A0016801

6 Connection example for pulse/frequency output (passive)

- 1 Automation system with pulse/frequency input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: observe input values (→ 9)

EtherNet/IP

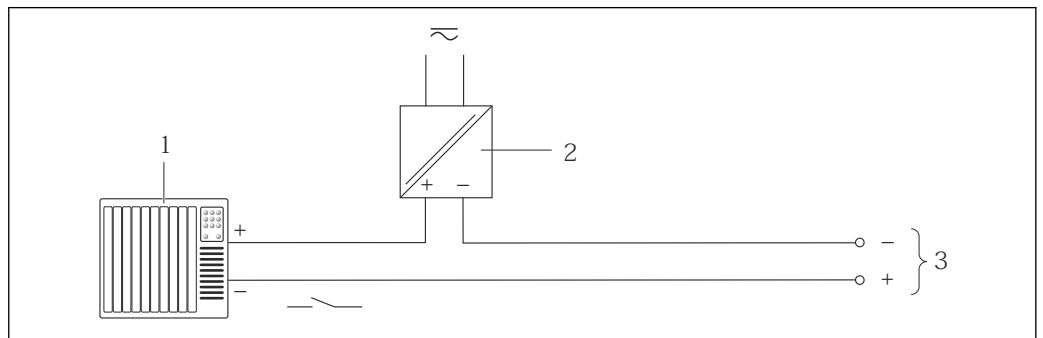


A0016805

7 Connection example for EtherNet/IP

- 1 Control system (e.g. PLC)
- 2 Ethernet switch
- 3 Observe cable specifications (→ 22)
- 4 Device plug
- 5 Transmitter

Status input



A0017163

8 Connection example for status input

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

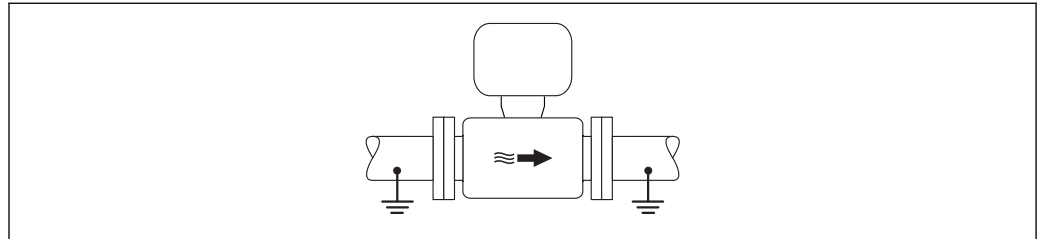
Potential equalization**Requirements**

Please consider the following to ensure correct measurement:

- Same electrical potential for the fluid and sensor
- Company-internal grounding concepts
- Pipe material and grounding

Connection examples for standard situations

Metal, grounded pipe



A0016315

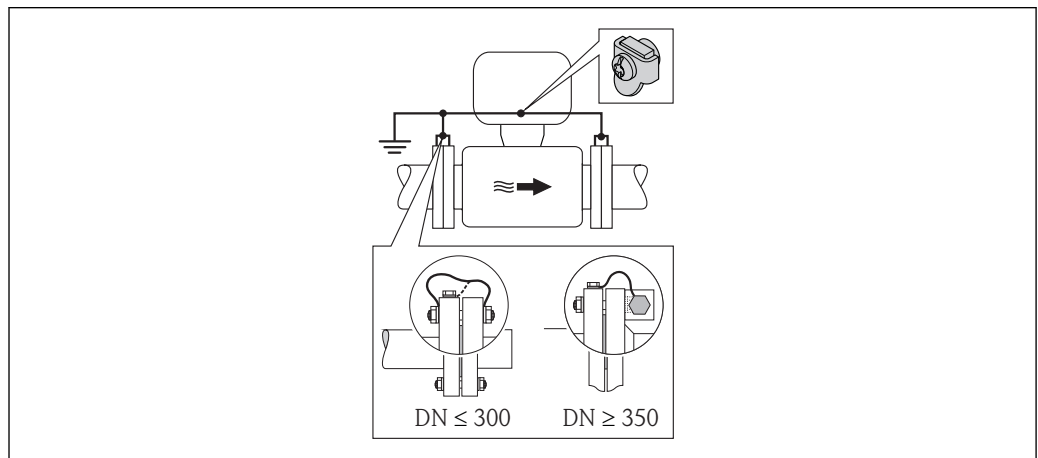
9 Potential equalization via measuring tube

Connection example in special situations

Unlined and ungrounded metal pipe

This connection method also applies in situations where:

- The customary potential equalization is not used
- Equalizing currents are present




A0016317

10 Potential equalization via ground terminal and pipe flanges

Note the following when installing:

- Connect both sensor flanges to the pipe flange via a ground cable and ground them.
- Connect the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for the purpose. To mount the ground cable:
 - If $DN \leq 300$ (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws.
 - If $DN \geq 350$ (14"): Mount the ground cable directly on the metal transport bracket.

Ground cable	Copper wire, at least 6 mm ² (0.0093 in ²)
---------------------	---

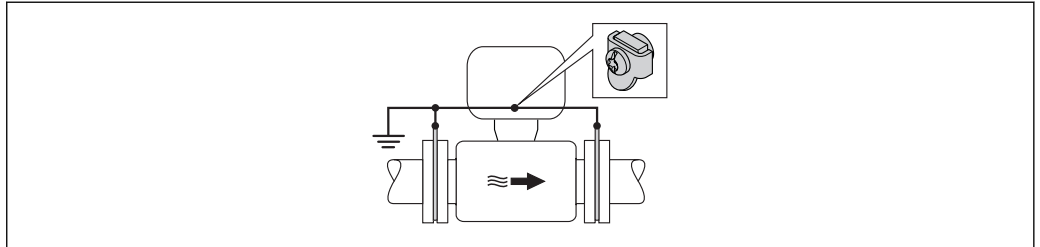
 For remote device versions, the ground terminal in the example always refers to the sensor and **not** to the transmitter.

i The necessary ground cable can be ordered from Endress+Hauser .

Plastic pipe or pipe with insulating liner

This connection method also applies in situations where:

- The customary potential equalization is not used
- Equalizing currents are present



A0016318

11 Potential equalization via ground terminal and ground disks

Note the following when installing:

The ground disks must be connected to the ground terminal via the ground cable and be connected to ground potential.

Ground cable	Copper wire, at least 6 mm ² (0.0093 in ²)
---------------------	---

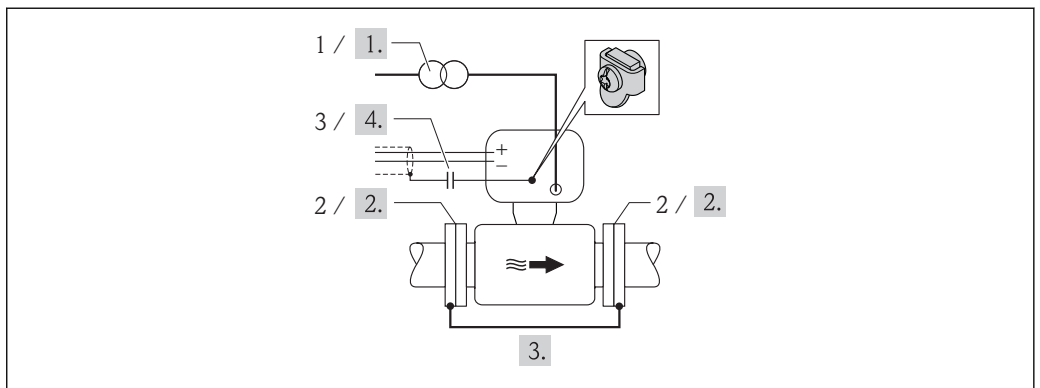
i For remote device versions, the ground terminal in the example always refers to the sensor and **not** to the transmitter.

i The ground cable and ground disks can be ordered from Endress+Hauser (→ **87**).

Pipe with a cathodic protection unit

This connection method is only used if the following two conditions are met:

- Metal pipe without liner or pipe with electrically conductive liner
- Cathodic protection is integrated in the personal protection equipment



A0016319


12 Potential equalization and cathodic protection


- 1 Isolation transformer power supply
- 2 Electrically isolated from the pipe
- 3 Capacitor

Ground cable	Copper wire, at least 6 mm ² (0.0093 in ²)
---------------------	---

1. Connect the measuring device to the power supply such that it is floating in relation to the protective ground.

2. Install the sensor in the pipe in a way that provides electrical insulation.
3. Connect the two flanges of the pipe to one another via a ground cable.
4. Guide the shield of the signal lines through a capacitor.

 For remote device versions, the ground terminal in the example always refers to the sensor and **not** to the transmitter.

 The necessary ground cable can be ordered from Endress+Hauser .

Terminals

Transmitter

- Supply voltage cable: plug-in spring terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)
- Signal cable: plug-in spring terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)
- Electrode cable: spring terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)
- Coil current cable: spring terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)

Sensor connection housing

Spring terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)


Cable entries

Cable entry thread

- M20 x 1.5
- Via adapter:
 - NPT ½"
 - G ½"

Cable gland

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

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

Cable specification

Permitted temperature range

- -40 °C (-40 °F) to +80 °C (+176 °F)
- Minimum requirement: cable temperature range \geq ambient temperature +20 K

Power supply cable

Standard installation cable is sufficient.

Signal cable

Current output

- For 0-20 mA and 4-20 mA: standard installation cable is sufficient.
- For 4-20 mA HART: Shielded cable recommended. Observe grounding concept of the plant.

Pulse/frequency/switch output


Standard installation cable is sufficient.

Status input

Standard installation cable is sufficient.

EtherNet/IP

The standard ANSI/TIA/EIA-568-B.2 Annex specifies CAT 5 as the minimum category for a cable used for EtherNet/IP. CAT 5e and CAT 6 are recommended.

 For more information on planning and installing EtherNet/IP networks, please refer to the "Media Planning and Installation Manual. EtherNet/IP" of the ODVA Organization.

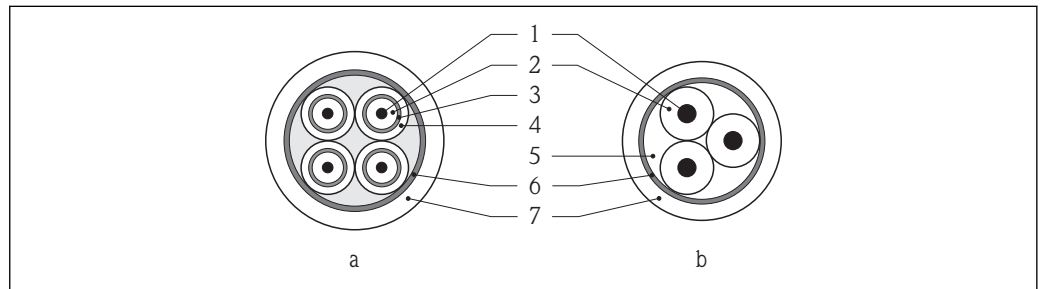
Connecting cable for remote version

Electrode cable

Standard cable	3 × 0.38 mm ² (20 AWG) with common, braided copper shield (ϕ ~ 7 mm (0.28")) and individually shielded cores
Cable for empty pipe detection (EPD)	4 × 0.38 mm ² (20 AWG) with common, braided copper shield (ϕ ~ 7 mm (0.28")) and individually 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)

Coil current cable

Standard cable	2 × 0.75 mm ² (18 AWG) with common, braided copper shield (ϕ ~ 7 mm (0.28")) and individually shielded cores
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)
Test voltage for cable insulation	≤ AC 1433 V r.m.s. 50/60 Hz or ≥ DC 2026 V



13 Cable cross-section

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

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

Reinforced connecting cable

Use in the following situations:

- When laying the cable directly in the ground
- Where there is a risk of damage from rodents
- If using the device below IP68 degree of protection

- i** The reinforced connecting cable with an additional, reinforcing metal braid can be ordered from Endress+Hauser .

Operation in zones of severe electrical interference

The measuring system meets the general safety requirements (→  85) and EMC specifications (→  32).

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

Performance characteristics


Reference operating conditions



In accordance with DIN EN 29104

- Fluid temperature: $+28 \pm 2$ °C ($+82 \pm 4$ °F)
- Ambient temperature range: $+22 \pm 2$ °C ($+72 \pm 4$ °F)
- Warm-up period: 30 min

Installation

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

 No special requirements must be observed at the inlet and outlet runs to keep within the in-service maximum permissible errors for custody transfer.

 To calculate the measuring range, use the *Applicator* sizing tool (→  88)


Maximum measured error

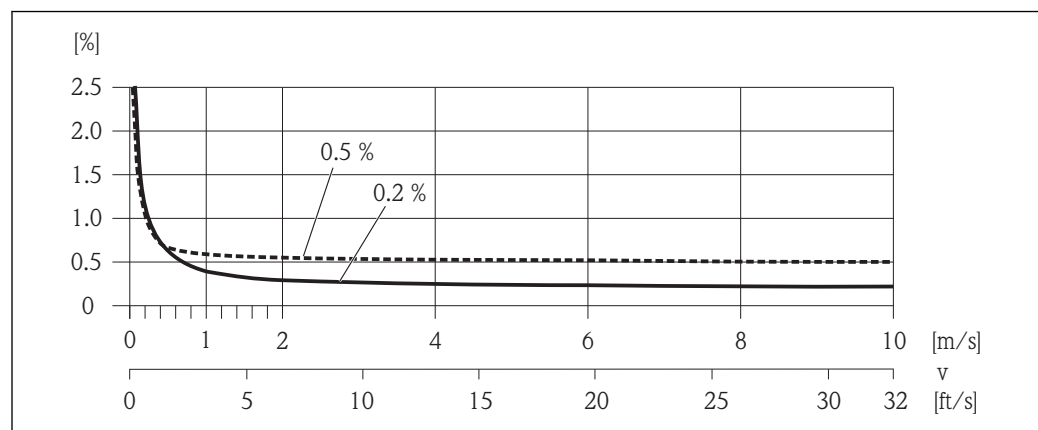
Error limits under reference operating conditions

o.r. = of reading

Volume flow

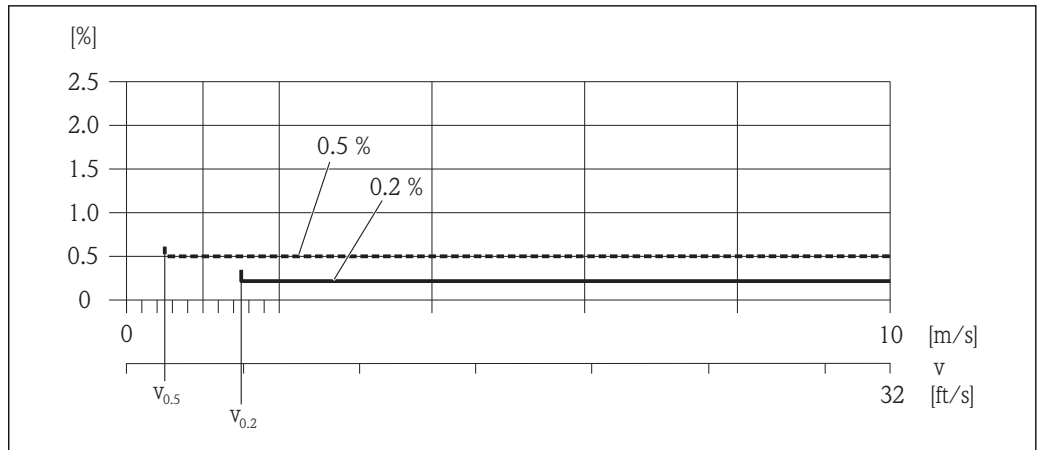
- ± 0.5 % o.r. ± 1 mm/s (0.04 in/s)
- Optional: ± 0.2 % o.r. ± 2 mm/s (0.08 in/s)

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



 14 Maximum measured error in % o.r.

A0005531



A0017051

15 Flat Spec in % o.r.

Flat Spec flow values 0.5 %

Nominal diameter		v _{0.5}	
[mm]	[in]	[m/s]	[ft/s]
25 to 600	1 to 24	0.5	1.64

Flat Spec flow values 0.2 %

Nominal diameter		v _{0.2}	
[mm]	[in]	[m/s]	[ft/s]
25 to 600	1 to 24	1.5	4.92

Electrical conductivity

Max. measured error not specified.

Accuracy of outputs

o.r. = of reading; o.f.s. = of full scale value

The outputs have the following base accuracy specifications.

Current output

Accuracy	Max. ±0.025 % o.f.s. or ±5 µA
-----------------	-------------------------------

Pulse/frequency output

Accuracy	Max. ±50 ppm o.r.
-----------------	-------------------

Repeatability

o.r. = of reading

Volume flow

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

Electrical conductivity

Max. ±5 % o.r.

Influence of ambient temperature

o.r. = of reading; o.f.s. = of full scale value

Current output

Temperature coefficient	Typically ±50 ppm/°C o.r. or ±1 µA/°C
--------------------------------	---------------------------------------

Pulse/frequency output

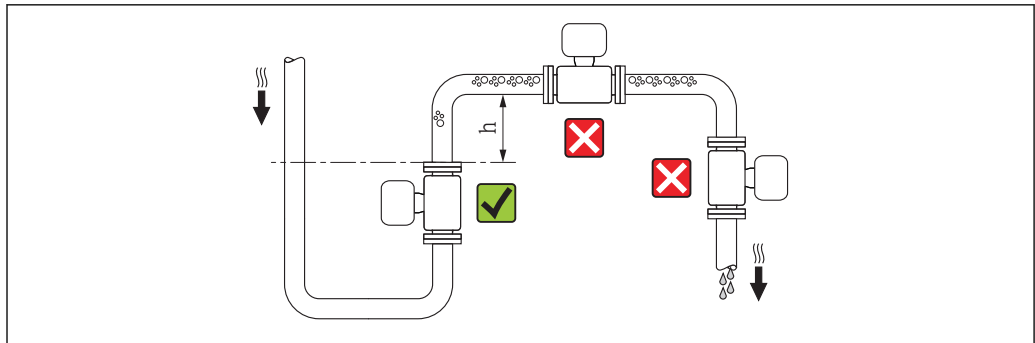
Temperature coefficient	Max. ± 0.5 ppm v.M./°C
--------------------------------	----------------------------

Installation

No special measures such as supports are necessary. External forces are absorbed by the construction of the device.

Mounting location

Preferably install the sensor in an ascending pipe, and ensure a sufficient distance to the next pipe elbow: $h \geq 2 \times DN$





A0017061

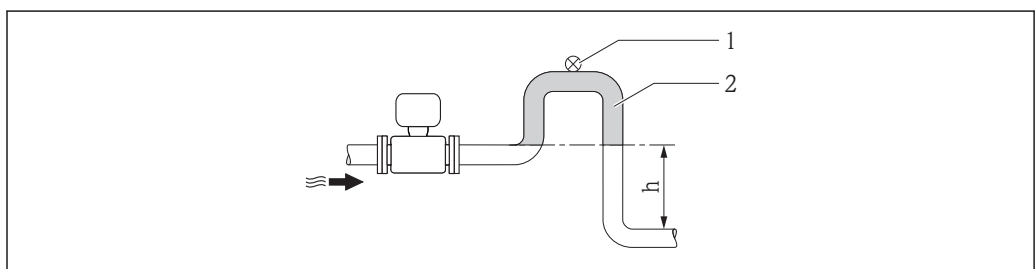
To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:

- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.


Installation in down pipes

Install a siphon or a vent valve downstream of the sensor in down pipes whose length $h \geq 5$ 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.

 For information on the liner's resistance to partial vacuum (\rightarrow  35)



A0017064

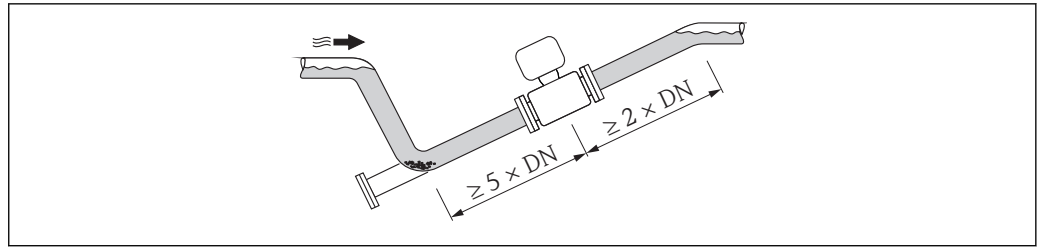
 16 Installation in a down pipe

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

Installation in partially filled pipes

A partially filled pipe with a gradient necessitates a drain-type configuration. The empty pipe detection (EPD) function offers additional protection by detecting empty or partially filled pipes.

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

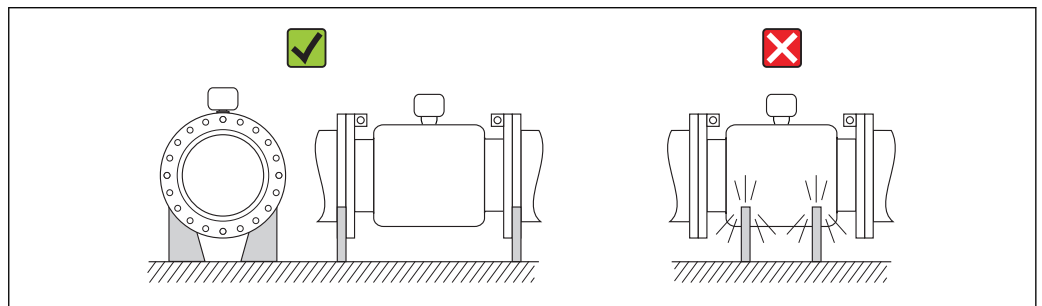


A0017063

For very heavy sensors

If the nominal diameter $DN \geq 350$ (14 in), mount the sensor on a foundation of adequate load-bearing strength.

Do not support the weight of the sensor on the metal casing as this could damage the metal casing and the internal magnetic coils.



A0016276

Orientation

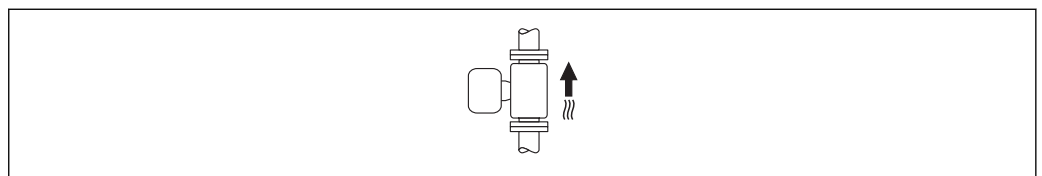
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

An optimum orientation position helps avoid gas and air accumulations and deposits in the measuring tube.

The measuring device also offers the empty pipe detection function to detect partially filled measuring pipes in the event of outgassing fluids or variable process pressures.

Vertical

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

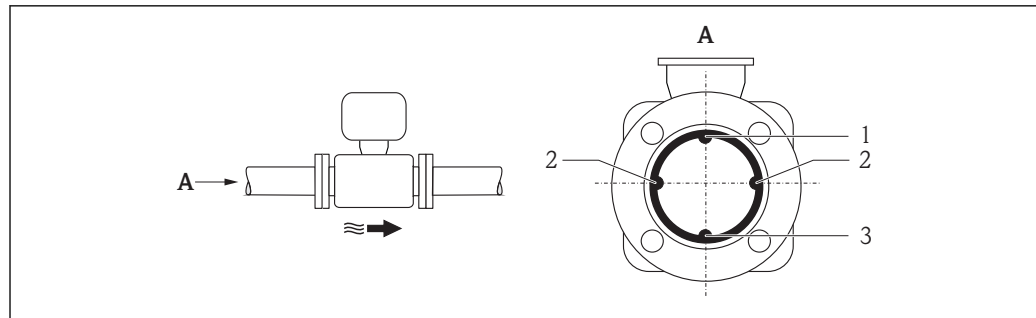


A0015591

Horizontal

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

i With horizontal orientation, empty pipe detection only works if the transmitter housing is pointing upwards as otherwise there is no guarantee that the empty pipe detection function will actually respond to a partially filled or empty measuring tube.



A0016260

17 Horizontal orientation

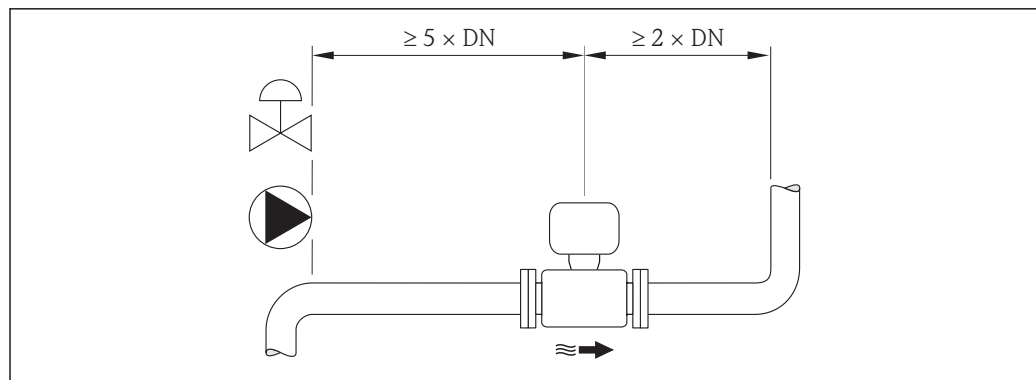
- 1 EPD electrode for empty pipe detection
- 2 Measuring electrodes for signal detection
- 3 Reference electrode for potential equalization

Inlet and outlet runs

If possible, install the sensor upstream from fittings such as valves, T-pieces or elbows.

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

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



A0016275

i No special requirements must be observed at the inlet and outlet runs to keep within the in-service maximum permissible errors for custody transfer.

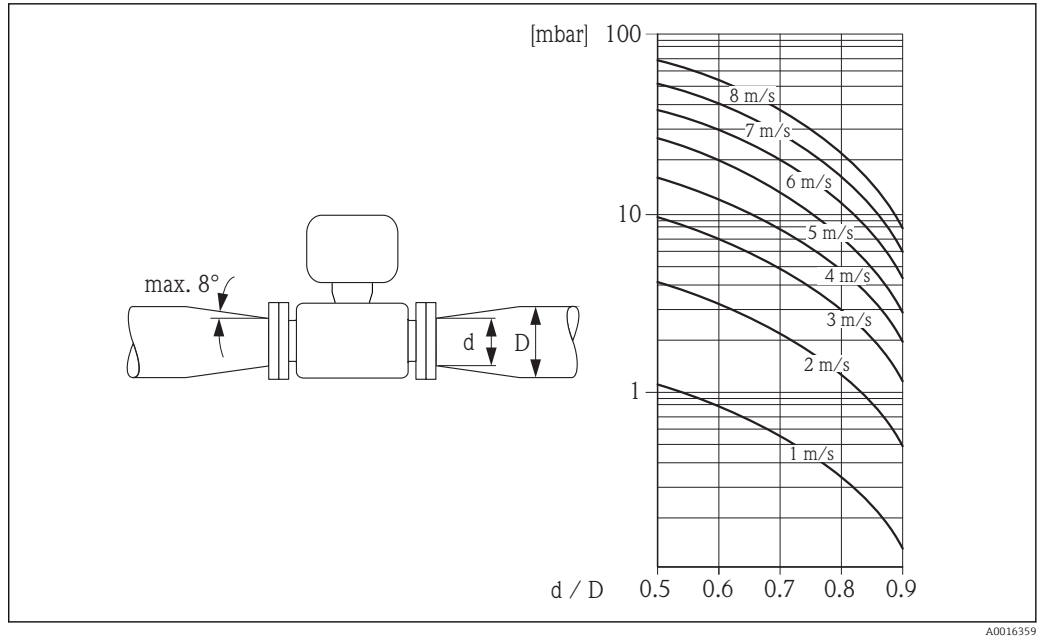
Adapters

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:

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

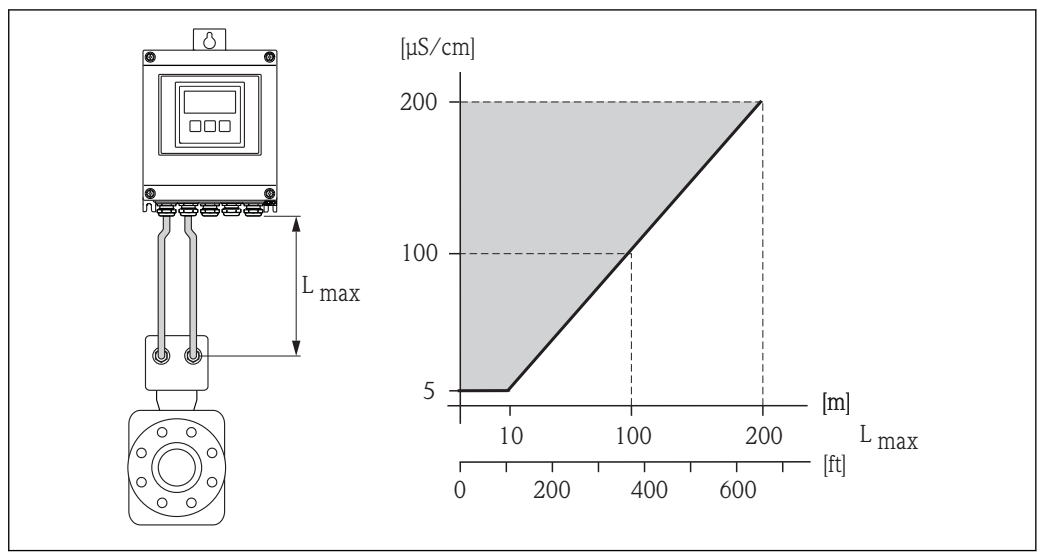
i The nomogram only applies to liquids with a viscosity similar to that of water.



A0016359

Length of connecting cable

To ensure correct measuring results when using the remote version, observe the maximum permitted cable length L_{max} . This length is determined by the conductivity of the fluid.
 If measuring liquids in general: 5 $\mu S/cm$



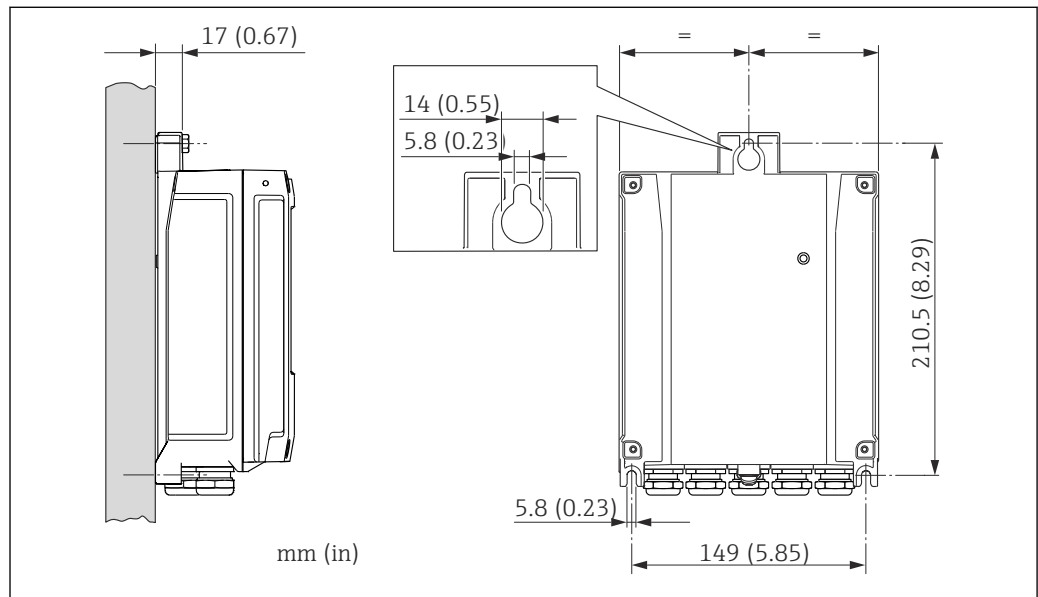
A0016359

18 Permitted length of connecting cable for remote version

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

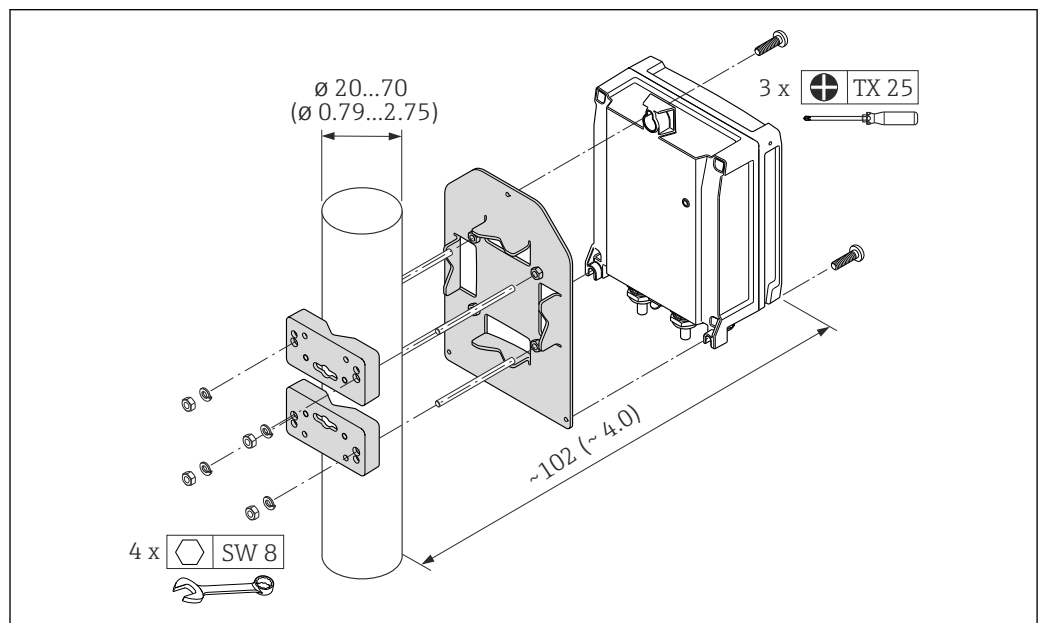
Installing the wall-mount housing

Wall mounting



A0020523

Pipe mounting



A0020705


i A separate mounting kit can be ordered from Endress+Hauser for pipe mounting (→ 87).

Special mounting instructions

Display protection

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

Environment

Ambient temperature range	Transmitter	-40 to +60 °C (-40 to +140 °F)
	Local display	-20 to +60 °C (-4 to +140 °F), the readability of the display may be impaired at temperatures outside the temperature range.
	Sensor	<ul style="list-style-type: none"> ■ Flange material carbon steel: -10 to +60 °C (+14 to +140 °F) ■ Flange material stainless steel: -40 to +60 °C (-40 to +140 °F) <p>Mount the transmitter separately from the sensor if both the ambient and fluid temperatures are high.</p>
	Liner	Do not exceed or fall below the permitted temperature range of the liner (→  32).

If operating outdoors:

- Install the measuring device in a shady location.
- Avoid direct sunlight, particularly in warm climatic regions.
- Avoid direct exposure to weather conditions.
- Protect the display against impact.
- Protect the display from abrasion by sand in desert areas.

 A display protector can be ordered from Endress+Hauser: "Accessories" section (→  87)

Storage temperature	<p>The storage temperature corresponds to the operating temperature range of the measuring transmitter and the appropriate measuring sensors.</p> <ul style="list-style-type: none"> ■ Protect the measuring device against direct sunlight during storage in order to avoid unacceptably high surface temperatures. ■ Select a storage location where moisture cannot collect in the measuring device as fungus or bacteria infestation can damage the liner. ■ If protection caps or protective covers are mounted these should never be removed before installing the measuring device.
----------------------------	---

Atmosphere	<p>If a plastic transmitter housing is permanently exposed to certain steam and air mixtures, this can damage the housing.</p>
-------------------	--

 If you are unsure, please contact your Endress+Hauser Sales Center for clarification.

Degree of protection	<p>Transmitter</p> <ul style="list-style-type: none"> ■ As standard: IP66/67, type 4X enclosure ■ When housing is open: IP20, type 1 enclosure <p>Sensor</p> <ul style="list-style-type: none"> ■ As standard: IP66/67, type 4X enclosure ■ Optionally available for remote version: <ul style="list-style-type: none"> - IP66/67, type 4X enclosure; fully welded, with protective varnish EN ISO 12944 C5-M. Suitable for use in corrosive atmospheres. - IP68, type 6P enclosure; fully welded, with protective varnish as per EN ISO 12944 C5-M. Suitable for permanent immersion in water ≤3 m (10 ft) or 48 hours at depths ≤10 m (30 ft). - IP68, type 6P enclosure; fully welded, with protective varnish as per EN ISO 12944 Im2/Im3. Suitable for permanent immersion in saline water ≤3 m (10 ft) or 48 hours at depths ≤10 m (30 ft) or in buried applications.
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Shock resistance	Acceleration up to 2 g following IEC 60068-2-6
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Vibration resistance	Acceleration up to 2 g following IEC 60068-2-6
-----------------------------	--

Mechanical load	<ul style="list-style-type: none"> ■ Protect the transmitter housing against mechanical effects, such as shock or impact; the use of the remote version is sometimes preferable. ■ Never use the transmitter housing as a ladder or climbing aid.
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Electromagnetic compatibility (EMC)

- As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)
- Complies with emission limits for industry as per EN 55011 (Class A)



 Details are provided in the Declaration of Conformity.

Process**Medium temperature range**

- 0 to +80 °C (+32 to +176 °F) for hard rubber, DN 50 to 2000 (2 to 78")
- -20 to +50 °C (-4 to +122 °F) for polyurethane, DN 25 to 1200 (1 to 48")

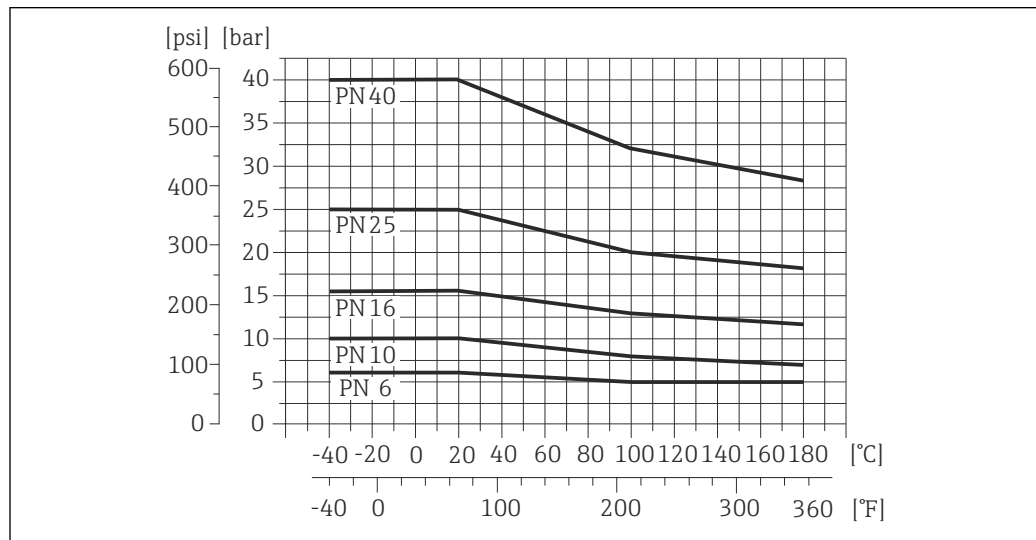
Conductivity

≥ 5 µS/cm for liquids in general


 Note that in the case of the remote version, the requisite minimum conductivity also depends on the cable length (→  29).

Pressure-temperature ratings

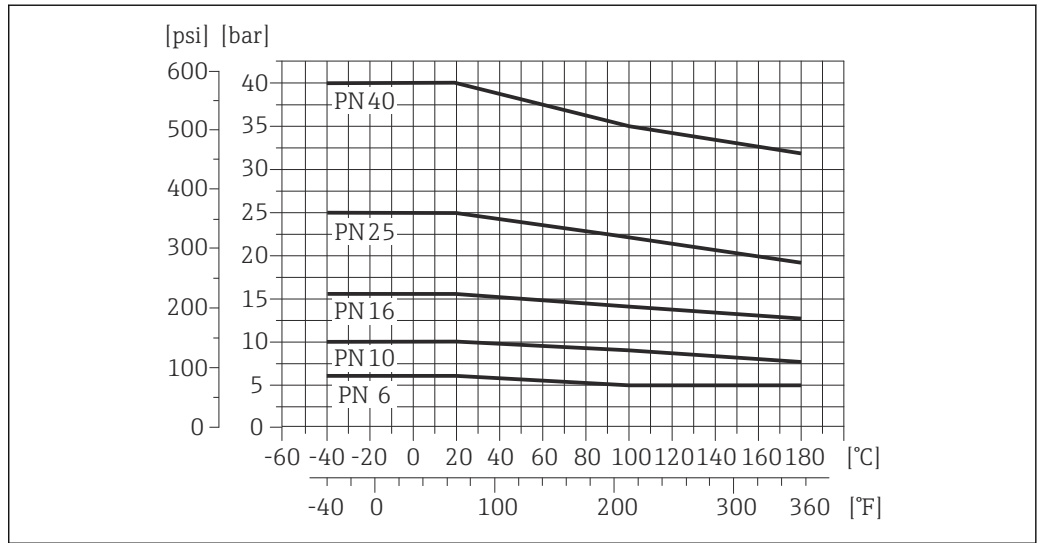
The following material load diagrams refer to the entire device and not just the process connection.

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

A0021188-EN

 19 Fixed flange PN 6/10/16/25/40, materials C22, FE 410W B and S235JRG2, DN 25 to 2000 (1 to 78")

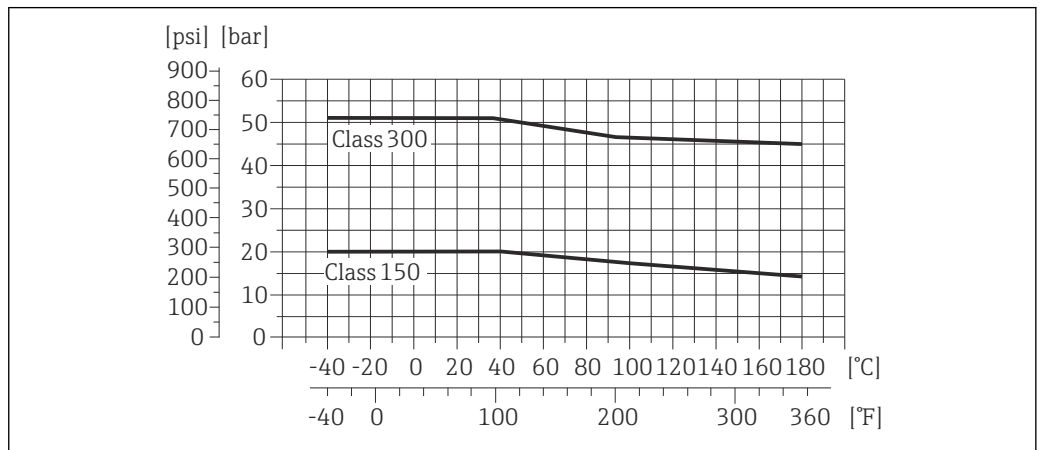
Flange connection according to EN 1092-1 (DIN 2501)



A0021184-EN

20 Fixed flange PN 6/10/16/25/40, material 1.4571 (316L), DN 25 to 2000 (1 to 78")

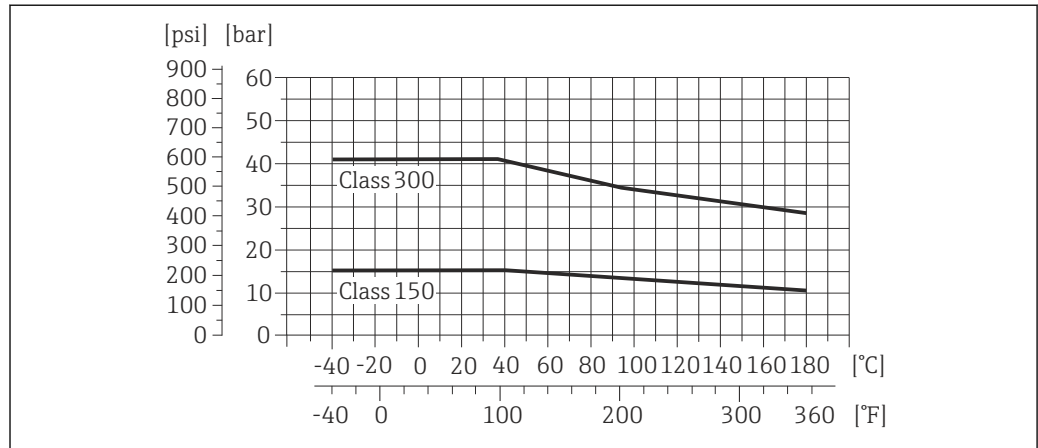
Flange connection according to ASME B16.5



A0021182-EN

21 Fixed flange Class 150/300, material A105, DN 25 to 600 (1 to 24")

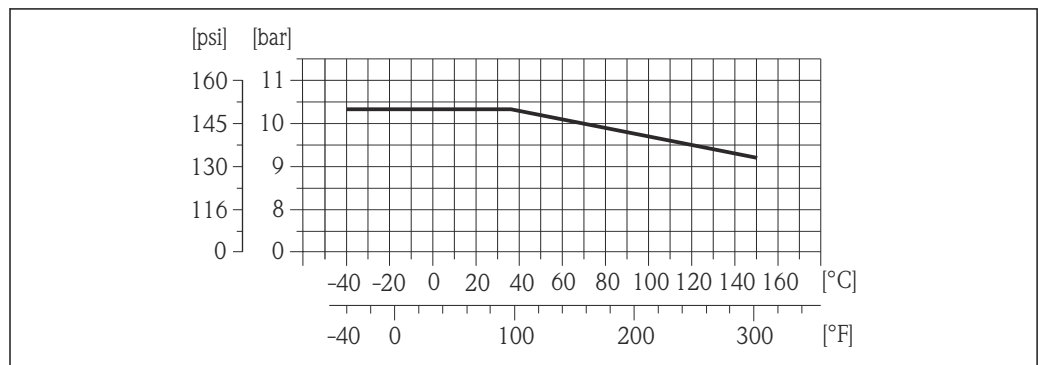
Flange connection according to ASME B16.5



A0021185-EN

22 Fixed flange Class 150/300, material 316L, DN 25 to 600 (1 to 24")

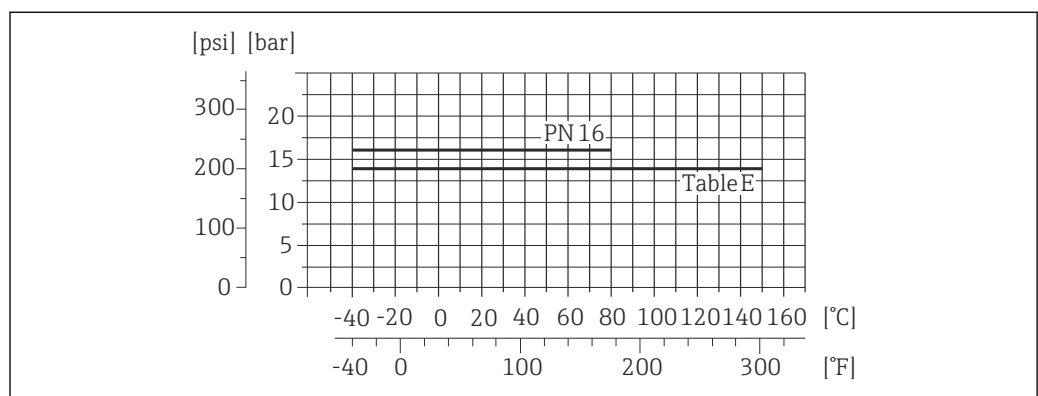
Flange connection according to AWWA C207



A0021409-EN

23 Fixed flange Class D, material 1.0425 (316L) (P265GH), DN 1200 to 1800 (48 to 72")

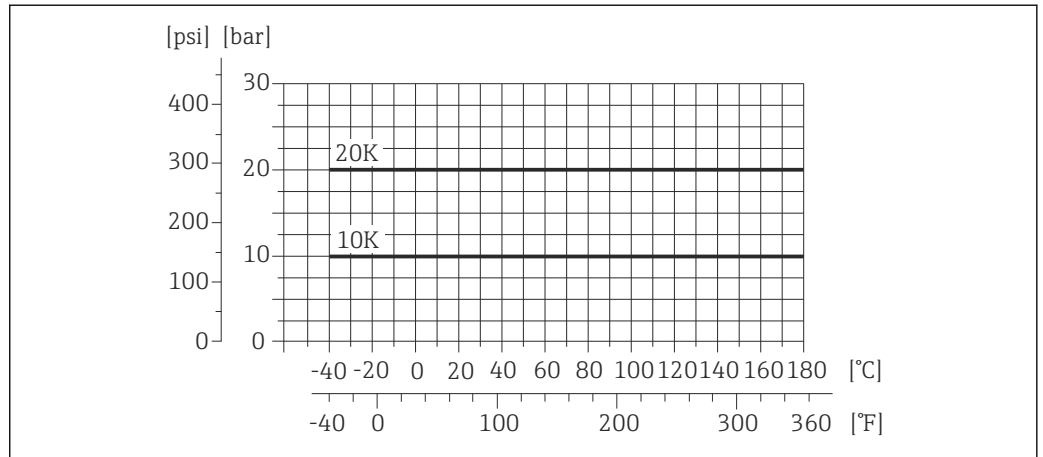
Flange connection according to AS 2129 and AS 4087



A0021189-EN

24 Fixed flange Table E, materials A105, S235JRG2 and S275JR, DN 50 to 1200 (2 to 48"); fixed flange PN 16, materials A105, S275JR, DN 50 to 1200 (2 to 48")

Flange connection according to JIS B2220



A0021183-EN

25 Fixed flange 10K/20K, materials H11, S235JRG2 and 1.0425 (316L), DN 25 to 300 (1 to 12")

Pressure tightness

Liner: hard rubber

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:		
[mm]	[in]	+25 °C (+77 °F)	+50 °C (+122 °F)	+80 °C (+176 °F)
50...2000	2...78	0 (0)	0 (0)	0 (0)

Liner: polyurethane

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:	
[mm]	[in]	+25 °C (+77 °F)	+50 °C (+122 °F)
25...1200	1...48	0 (0)	0 (0)

Flow limit

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). Also match the velocity of flow (v) to the physical properties of the fluid:

- v < 2 m/s (6.56 ft/s): for abrasive fluids (e.g. potter's clay, lime milk, ore slurry)
- v > 2 m/s (6.56 ft/s): for fluids producing buildup (e.g. wastewater sludges)

i For an overview of the measuring range full scale values, see the "Measuring range" section (→ 6)

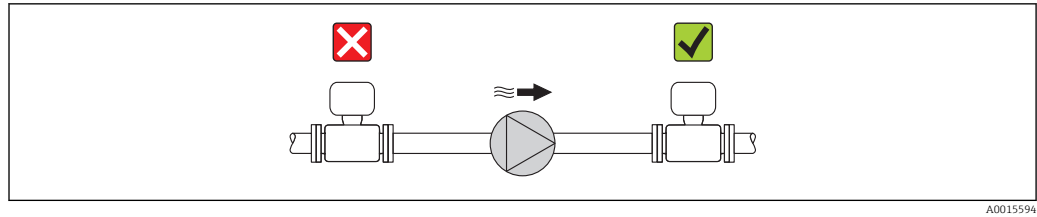
i For custody transfer, the applicable approval determines the permitted measuring range.

Pressure loss

- No pressure loss occurs if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545 (→ 28)

System pressure

- Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.
- Furthermore, install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.
- **i** For information on the liner's resistance to partial vacuum (→ 35)
- For information on the measuring system's resistance to vibration and shock (→ 31), (→ 31)



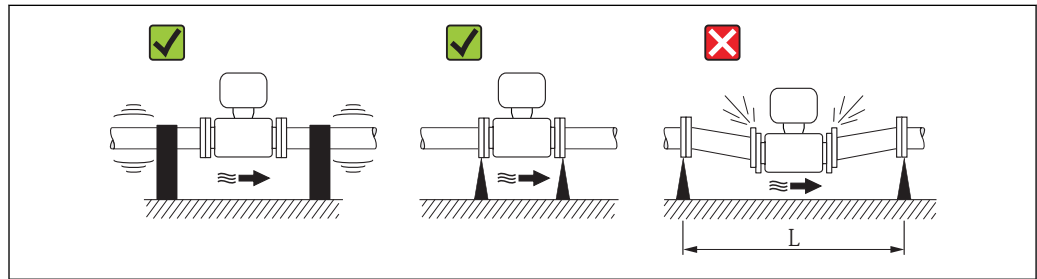
A0015594

Vibrations

In the event of very strong vibrations, the pipe and sensor must be supported and fixed.

It is also advisable to mount the sensor and transmitter separately.

i For information on the permitted resistance to vibration and shock (→ 31), (→ 31)



A0016266

26 Measures to prevent vibration of the device

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

Custody transfer measurement

As an option, Promag W 400 is tested in accordance with OIML R49 and has an EC type-examination certificate according to Measuring Instruments Directive 2004/22/EC (MID) for service subject to legal metrological control ("custody transfer") for cold water (Annex MI-001).

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

The device is used with a legally controlled totalizer on the local display and optionally with a legally controlled pulse output.

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

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

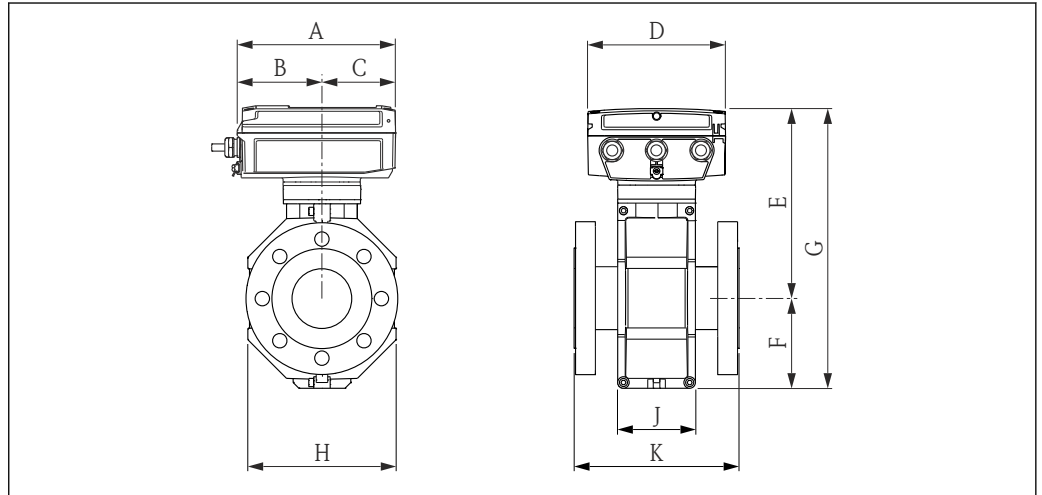
- i** ▪ After putting the device into circulation or after sealing the device, operation is only possible to a limited extent.
- Detailed ordering information is available from your local Endress+Hauser sales center for national approvals as cold water meters based on OIML R49.

Mechanical construction

Design, dimensions

Compact version

Order code for "Housing", option M "Compact, polycarbonate" or option A "Compact, coated aluminum" with DN 25 to 300 (1 to 12")



A0020352

Dimensions in SI units

DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	J [mm]	K ²⁾ [mm]
25	193	103	90	167	222	84	306	120	94	200
32	193	103	90	167	222	84	306	120	94	200
40	193	103	90	167	222	84	306	120	94	200
50	193	103	90	167	222	84	306	120	94	200
65	193	103	90	167	247	109	356	180	94	200
80	193	103	90	167	247	109	356	180	94	200
100	193	103	90	167	247	109	356	180	94	250
125	193	103	90	167	287	150	437	260	140	250
150	193	103	90	167	287	150	437	260	140	300
200	193	103	90	167	312	180	492	324	156	350
250	193	103	90	167	337	205	542	400	166	450
300	193	103	90	167	362	230	592	460	166	500

- 1) EN (DIN), AS, JIS; For flanges according to AS, only nominal diameters DN 80, 100 and 150 to 300 are available.
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Dimensions in US units

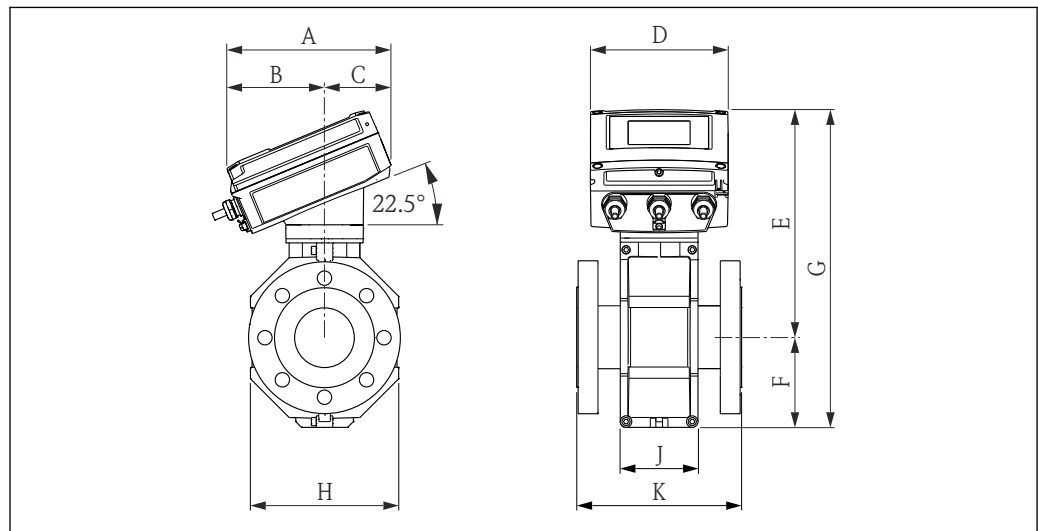
DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	J [in]	K ²⁾ [in]
1	7.60	4.06	3.54	6.57	8.74	3.31	12.1	4.72	3.70	7.87
1 ½	7.60	4.06	3.54	6.57	8.74	3.31	12.1	4.72	3.70	7.87
2	7.60	4.06	3.54	6.57	8.74	3.31	12.1	4.72	3.70	7.87

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
3	7.60	4.06	3.54	6.57	9.72	4.29	14.0	7.09	3.70	7.87
4	7.60	4.06	3.54	6.57	9.72	4.29	14.0	7.09	3.70	9.84
6	7.60	4.06	3.54	6.57	11.3	5.91	17.2	10.2	5.51	11.8
8	7.60	4.06	3.54	6.57	12.3	7.09	19.4	12.8	6.14	13.8
10	7.60	4.06	3.54	6.57	13.3	8.07	21.4	15.8	6.14	17.7
12	7.60	4.06	3.54	6.57	14.3	9.06	23.4	18.1	6.54	19.7

1) ASME

2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Order code for "Housing", option Q "Compact, polycarbonate, inclined" or option R "Compact, coated aluminum, inclined" with DN 25 to 300 (1 to 12")



A0020353

Dimensions in SI units

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	199	119	80	167	267	84	351	120	94	200
32	199	119	80	167	267	84	351	120	94	200
40	199	119	80	167	267	84	351	120	94	200
50	199	119	80	167	267	84	351	120	94	200
65	199	119	80	167	292	109	401	180	94	200
80	199	119	80	167	292	109	401	180	94	200
100	199	119	80	167	292	109	401	180	94	250
125	199	119	80	167	332	150	482	260	140	250
150	199	119	80	167	332	150	482	260	140	300
200	199	119	80	167	357	180	537	324	156	350

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
250	199	119	80	167	382	205	587	400	166	450
300	199	119	80	167	407	230	637	460	166	500

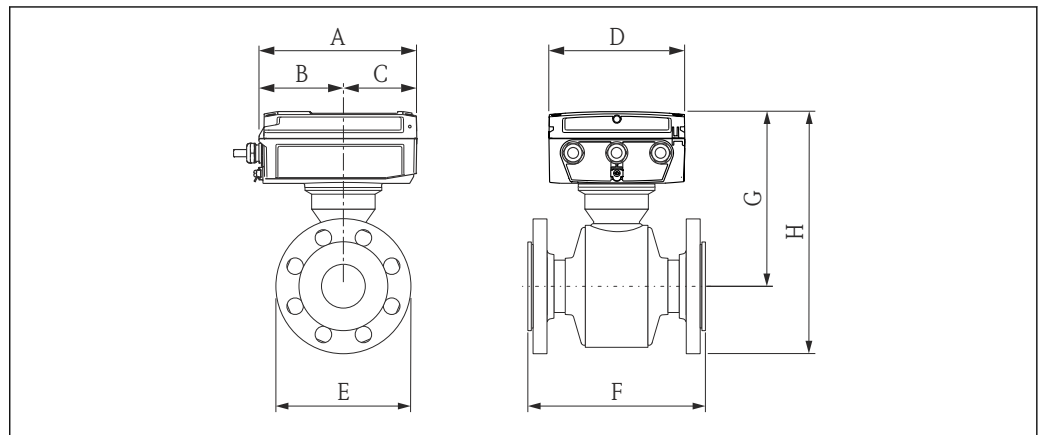
- 1) EN (DIN), AS, JIS; For flanges according to AS, only nominal diameters DN 80, 100 and 150 to 300 are available.
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Dimensions in US units

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	7.83	4.69	3.15	6.57	10.5	3.31	13.8	4.72	3.70	7.87
1 ½	7.83	4.69	3.15	6.57	10.5	3.31	13.8	4.72	3.70	7.87
2	7.83	4.69	3.15	6.57	10.5	3.31	13.8	4.72	3.70	7.87
3	7.83	4.69	3.15	6.57	11.5	4.29	15.8	7.09	3.70	7.87
4	7.83	4.69	3.15	6.57	11.5	4.29	15.8	7.09	3.70	9.84
6	7.83	4.69	3.15	6.57	13.1	5.91	19.0	10.2	5.51	11.8
8	7.83	4.69	3.15	6.57	14.0	7.09	21.1	12.8	6.14	13.8
10	7.83	4.69	3.15	6.57	15.0	8.07	23.1	15.8	6.14	17.7
12	7.83	4.69	3.15	6.57	16.0	9.06	25.1	18.1	6.54	19.7

- 1) ASME
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Order code for "Calibration flow", options H and K, or order code for "Sensor option", option CA "Corrosion protection" (IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M) with DN 25 to 300 (1 to 12"); order code for "Housing", option M "Compact, polycarbonate" or option A "Compact, coated aluminum"



A0021328

Dimensions in SI units

DN	A	B	C	D	F	G
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	193	103	90	167	200	188
32	193	103	90	167	200	188
40	193	103	90	167	200	188

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]
50	193	103	90	167	200	188
65	193	103	90	167	200	200
80	193	103	90	167	200	205
100	193	103	90	167	250	218
125	193	103	90	167	250	231
150	193	103	90	167	300	252
200	193	103	90	167	350	278
250	193	103	90	167	450	311
300	193	103	90	167	500	336

Dimension E										
DN [mm]	EN (DIN)				ASME		AS		JIS	
	PN 10 [mm]	PN 16 [mm]	PN 25 [mm]	PN 40 [mm]	Class 150 [mm]	Class 300 [mm]	Table E [mm]	PN 16 [mm]	10K [mm]	20K [mm]
25	-	-	-	140	140	140	140	-	140	140
32	-	-	-	140	-	-	-	-	140	140
40	-	-	-	150	140	155	-	-	140	140
50	-	-	-	165	153	165	150	150	155	155
65	-	185	-	185	-	-	-	-	175	175
80	-	200	-	200	191	210	185	185	185	200
100	-	220	-	325	229	254	215	215	210	225
125	-	250	-	270	-	-	-	-	250	270
150	-	285	-	300	280	318	280	280	280	305
200	340	340	360	-	343	-	335	335	330	350
250	395	405	425	-	407	-	405	405	400	430
300	445	460	485	-	483	-	455	455	445	480

Dimension H										
DN [mm]	EN (DIN)				ASME		AS		JIS	
	PN 10 [mm]	PN 16 [mm]	PN 25 [mm]	PN 40 [mm]	Class 150 [mm]	Class 300 [mm]	Table E [mm]	PN 16 [mm]	10K [mm]	20K [mm]
25	-	-	-	258	258	258	258	-	258	258
32	-	-	-	258	-	-	-	-	258	258
40	-	-	-	262	258	265	-	-	258	258
50	-	-	-	270	263	270	262	262	265	265
65	-	293	-	293	-	-	-	-	288	288
80	-	305	-	305	300	309	298	298	298	305
100	-	328	-	380	331	344	325	325	323	330
125	-	355	-	365	-	-	-	-	355	365
150	-	394	-	402	391	410	393	393	393	404

Dimension H										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
200	448	448	458	-	448	-	445	445	443	452
250	508	513	523	-	514	-	513	513	511	526
300	558	566	578	-	578	-	563	563	558	576

Dimensions in US units

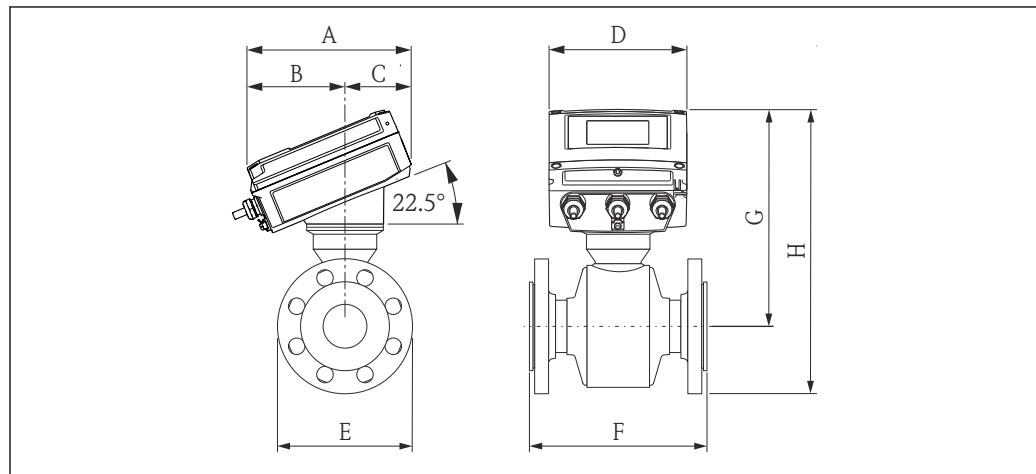
DN	A	B	C	D	F	G
[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	7.60	4.06	3.54	6.57	7.87	7.40
2	7.60	4.06	3.54	6.57	7.87	7.40
3	7.60	4.06	3.54	6.57	7.87	8.07
4	7.60	4.06	3.54	6.57	9.84	8.58
6	7.60	4.06	3.54	6.57	11.8	9.92
8	7.60	4.06	3.54	6.57	13.8	10.9
10	7.60	4.06	3.54	6.57	17.7	12.2
12	7.60	4.06	3.54	6.57	19.7	13.2

Dimension E										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	-	-	-	5.51	5.51	5.51	5.51	-	5.51	5.51
2	-	-	-	6.50	6.02	6.50	5.91	5.91	6.10	6.10
3	-	7.87	-	7.87	7.52	8.27	7.28	7.28	7.28	7.87
4	-	8.66	-	12.8	9.02	10.0	8.46	8.46	8.27	8.86
6	-	11.2	-	11.8	11.0	12.5	11.0	11.0	11.0	12.0
8	13.4	13.4	14.2	-	13.5	-	13.2	13.2	13.0	13.8
10	15.6	15.9	16.7	-	16.0	-	15.9	15.9	15.8	16.9
12	17.5	18.1	19.1	-	19.0	-	17.9	17.9	17.5	18.9

Dimension H										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	-	-	-	10.2	10.2	10.2	10.2	-	10.2	10.2
2	-	-	-	10.6	10.4	10.6	10.3	10.3	10.4	10.4
3	-	12	-	12	11.8	12.2	11.7	11.7	11.7	12
4	-	12.9	-	15	13	13.5	12.8	12.8	12.7	13

Dimension H										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
6	-	15.5	-	15.8	15.4	16.1	15.5	15.5	15.5	15.9
8	17.6	17.6	18	-	17.6	-	17.5	17.5	17.4	17.8
10	20	20.2	20.6	-	20.2	-	20.2	20.2	20.1	20.7
12	22	22.3	22.8	-	22.8	-	22.2	22.2	22	22.7

Order code for "Calibration flow", options H and K, or order code for "Sensor option", option CA
 "Corrosion protection" (IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M) with
 DN 25 to 300 (1 to 12"); order code for "Housing", option Q "Compact, polycarbonate, inclined" or
 option R "Compact, coated aluminum, inclined"



A0021329

Dimensions in SI units

DN	A	B	C	D	F	G
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	199	119	80	167	200	232
32	199	119	80	167	200	232
40	199	119	80	167	200	232
50	199	119	80	167	200	232
65	199	119	80	167	200	244
80	199	119	80	167	200	249
100	199	119	80	167	250	262
125	199	119	80	167	250	275
150	199	119	80	167	300	296
200	199	119	80	167	350	322
250	199	119	80	167	450	355
300	199	119	80	167	500	380

Dimension E										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	-	-	-	140	140	140	140	-	140	140
32	-	-	-	140	-	-	-	-	140	140
40	-	-	-	150	140	155	-	-	140	140
50	-	-	-	165	153	165	150	150	155	155
65	-	185	-	185	-	-	-	-	175	175
80	-	200	-	200	191	210	185	185	185	200
100	-	220	-	325	229	254	215	215	210	225
125	-	250	-	270	-	-	-	-	250	270
150	-	285	-	300	280	318	280	280	280	305
200	340	340	360	-	343	-	335	335	330	350
250	395	405	425	-	407	-	405	405	400	430
300	445	460	485	-	483	-	455	455	445	480

Dimension H										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	-	-	-	302	302	302	302	-	302	302
32	-	-	-	302	-	-	-	-	302	302
40	-	-	-	307	302	310	-	-	302	302
50	-	-	-	315	309	315	307	307	310	310
65	-	337	-	337	-	-	-	-	332	332
80	-	349	-	349	345	354	342	342	342	349
100	-	372	-	425	377	389	370	370	367	375
125	-	400	-	410	-	-	-	-	400	410
150	-	439	-	446	436	455	436	436	436	449
200	492	492	502	-	494	-	490	490	487	497
250	553	558	568	-	559	-	558	558	555	570
300	603	610	623	-	622	-	608	608	603	620

Dimensions in US units

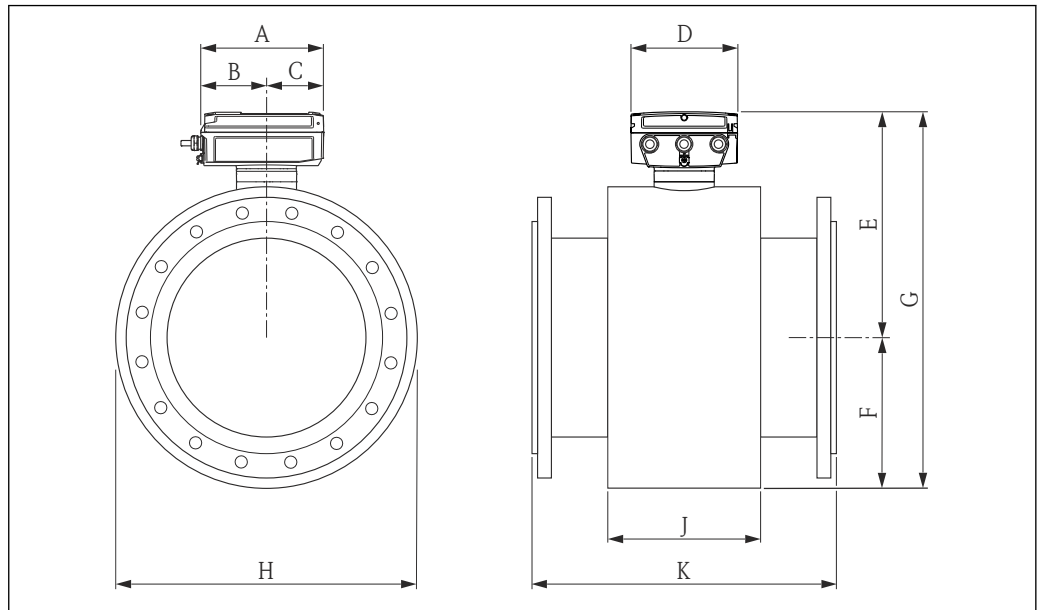
DN	A	B	C	D	F	G
[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	7.83	4.69	3.15	6.57	7.87	9.13
2	7.83	4.69	3.15	6.57	7.87	9.13
3	7.83	4.69	3.15	6.57	7.87	9.80
4	7.83	4.69	3.15	6.57	9.84	10.3
6	7.83	4.69	3.15	6.57	11.8	11.7

DN [in]	A [in]	B [in]	C [in]	D [in]	F [in]	G [in]
8	7.83	4.69	3.15	6.57	13.8	12.7
10	7.83	4.69	3.15	6.57	17.7	14.0
12	7.83	4.69	3.15	6.57	19.7	15.0

Dimension E										
DN [in]	EN (DIN)				ASME		AS		JIS	
	PN 10 [in]	PN 16 [in]	PN 25 [in]	PN 40 [in]	Class 150 [in]	Class 300 [in]	Table E [in]	PN 16 [in]	10K [in]	20K [in]
1	-	-	-	5.51	5.51	5.51	5.51	-	5.51	5.51
2	-	-	-	6.50	6.02	6.50	5.91	5.91	6.10	6.10
3	-	7.87	-	7.87	7.52	8.27	7.28	7.28	7.28	7.87
4	-	8.66	-	12.8	9.02	10.0	8.46	8.46	8.27	8.86
6	-	11.2	-	11.8	11.0	12.5	11.0	11.0	11.0	12.0
8	13.4	13.4	14.2	-	13.5	-	13.2	13.2	13.0	13.8
10	15.6	15.9	16.7	-	16.0	-	15.9	15.9	15.7	16.9
12	17.5	18.1	19.1	-	19.0	-	17.9	17.9	17.5	18.9

Dimension H										
DN [in]	EN (DIN)				ASME		AS		JIS	
	PN 10 [in]	PN 16 [in]	PN 25 [in]	PN 40 [in]	Class 150 [in]	Class 300 [in]	Table E [in]	PN 16 [in]	10K [in]	20K [in]
1	-	-	-	11.9	11.9	11.9	11.9	-	11.9	11.9
2	-	-	-	12.4	12.2	12.4	12.1	12.1	12.2	12.2
3	-	13.7	-	13.7	13.6	13.9	13.5	13.5	13.5	13.7
4	-	14.6	-	16.7	14.8	15.3	14.6	14.6	14.4	14.8
6	-	17.3	-	17.6	17.2	17.9	17.2	17.2	17.2	17.7
8	19.4	19.4	19.8	-	19.4	-	19.3	19.3	19.2	19.6
10	21.8	22.0	22.4	-	22.0	-	22.0	22.0	21.9	22.4
12	23.7	24.0	24.5	-	24.5	-	23.9	23.9	23.7	24.4

Order code for "Housing", option M "Compact, polycarbonate" or option A "Compact, coated aluminum" with DN 350 to 2000 (14 to 78")



Dimensions in SI units

DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	J [mm]	K ²⁾ [mm]
350	193	103	90	167	432	282	714	276	564	550
375	193	103	90	167	458	308	766	276	616	600
400	193	103	90	167	458	308	766	276	616	600
450	193	103	90	167	483	333	816	292	666	650
500	193	103	90	167	508	359	867	292	717	650
600	193	103	90	167	560	410	970	402	821	780
700	193	103	90	167	662	512	1174	589	1024	910
750	193	103	90	167	662	512	1174	626	1024	975
800	193	103	90	167	683	534	1217	647	1067	1040
900	193	103	90	167	760	610	1370	785	1220	1170
1000	193	103	90	167	836	686	1522	862	1372	1300
1050	193	103	90	167	862	712	1574	912	1424	1365
1200	193	103	90	167	961	811	1772	992	1622	1560
1350	193	103	90	167	1062	912	1974	1252	1824	1755
1400	193	103	90	167	1137	987	2124	1252	1974	1820
1500	193	103	90	167	1161	1011	2172	1392	2022	1950
1600	193	103	90	167	1206	1056	2262	1482	2112	2080
1650	193	103	90	167	1243	1093	2336	1482	2186	2145

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
1800	193	103	90	167	1338	1188	2526	1632	2376	2340
2000	193	103	90	167	1388	1238	2626	1732	2476	2600

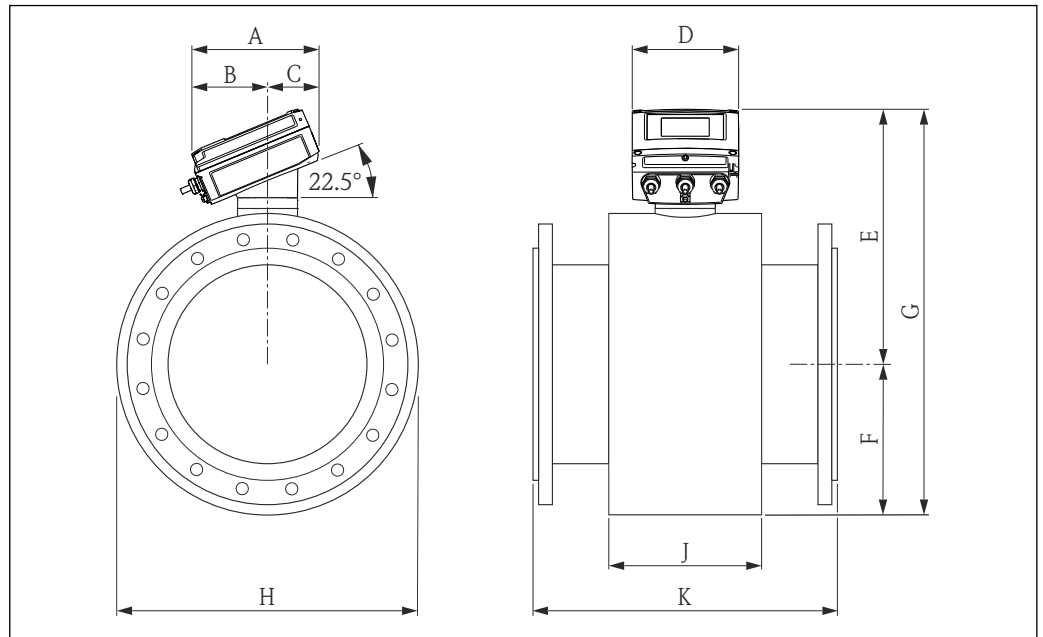
- 1) EN (DIN), AS; For flanges according to AS, only nominal diameters DN 350, 400, 500 and 600 are available.
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Dimensions in US units

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
14	7.60	4.06	3.54	6.57	17.0	11.1	28.1	10.9	22.2	21.7
15	7.60	4.06	3.54	6.57	18.0	12.1	30.1	10.9	24.2	23.6
16	7.60	4.06	3.54	6.57	18.0	12.1	30.1	10.9	24.2	23.6
18	7.60	4.06	3.54	6.57	19.0	13.1	32.1	11.5	26.2	25.6
20	7.60	4.06	3.54	6.57	20.0	14.1	34.1	11.5	28.2	25.6
24	7.60	4.06	3.54	6.57	22.1	16.2	38.3	15.8	32.3	30.7
28	7.60	4.06	3.54	6.57	26.1	20.1	46.2	23.2	40.3	35.8
30	7.60	4.06	3.54	6.57	26.1	20.1	46.2	24.6	40.3	38.4
32	7.60	4.06	3.54	6.57	26.9	21.0	47.9	25.5	42.0	40.9
36	7.60	4.06	3.54	6.57	29.9	24.0	53.9	30.9	48.0	46.0
40	7.60	4.06	3.54	6.57	32.9	27.0	59.9	33.9	54.0	51.2
42	7.60	4.06	3.54	6.57	33.9	28.0	61.9	35.9	56.0	53.7
48	7.60	4.06	3.54	6.57	37.8	31.9	69.7	39.0	63.8	61.4
54	7.60	4.06	3.54	6.57	41.8	35.9	77.7	42.3	71.8	69.1
60	7.60	4.06	3.54	6.57	45.7	39.8	85.5	54.8	79.6	76.8
66	7.60	4.06	3.54	6.57	48.9	43.0	91.9	58.4	86.0	84.4
72	7.60	4.06	3.54	6.57	52.7	46.8	99.5	64.2	93.5	92.1
78	7.60	4.06	3.54	6.57	54.7	48.7	103.4	68.2	97.5	102.3

- 1) ASME, AWWA; flanges ≤ 24 in only available according to ASME, flanges ≥ 28 in only available according to AWWA.
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Order code for "Housing", option Q "Compact, polycarbonate, inclined" or option R "Compact, coated aluminum, inclined" with DN 350 to 2000 (14 to 78")



Dimensions in SI units

DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	J [mm]	K ²⁾ [mm]
350	199	119	80	167	477	282	759	276	564	550
375	199	119	80	167	503	308	811	276	616	600
400	199	119	80	167	503	308	811	276	616	600
450	199	119	80	167	528	333	861	292	666	650
500	199	119	80	167	553	359	912	292	717	650
600	199	119	80	167	605	410	1015	402	821	780
700	199	119	80	167	707	512	1219	589	1024	910
750	199	119	80	167	707	512	1219	626	1024	975
800	199	119	80	167	728	534	1262	647	1067	1040
900	199	119	80	167	805	610	1415	785	1220	1170
1000	199	119	80	167	881	686	1567	862	1372	1300
1050	199	119	80	167	907	712	1619	912	1424	1365
1200	199	119	80	167	1006	811	1817	992	1622	1560
1350	199	119	80	167	1107	912	2019	1252	1824	1755
1400	199	119	80	167	1182	987	2169	1252	1974	1820
1500	199	119	80	167	1206	1011	2217	1392	2022	1950
1600	199	119	80	167	1251	1056	2307	1482	2112	2080
1650	199	119	80	167	1288	1093	2381	1482	2186	2145

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
1800	199	119	80	167	1383	1188	2571	1632	2376	2340
2000	199	119	80	167	1433	1238	2671	1732	2476	2600

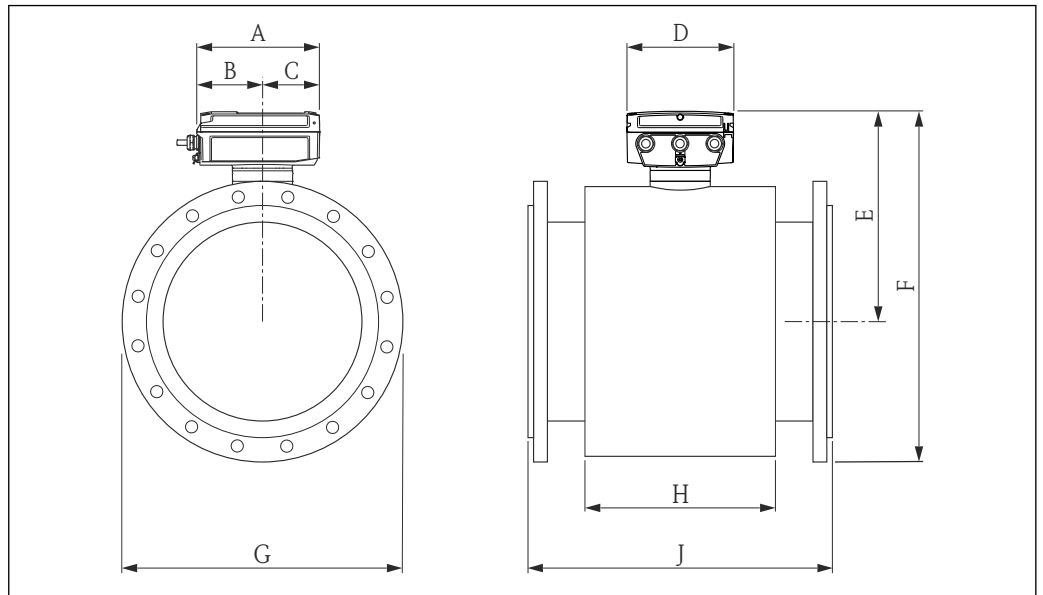
- 1) EN (DIN), AS; For flanges according to AS, only nominal diameters DN 350, 400, 500 and 600 are available.
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Dimensions in US units

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
14	7.83	4.69	3.15	6.57	18.8	11.1	29.9	10.9	22.2	21.7
15	7.83	4.69	3.15	6.57	19.8	12.1	31.9	10.9	24.2	23.6
16	7.83	4.69	3.15	6.57	19.8	12.1	31.9	10.9	24.2	23.6
18	7.83	4.69	3.15	6.57	20.8	13.1	33.9	11.5	26.2	25.6
20	7.83	4.69	3.15	6.57	21.8	14.1	35.9	11.5	28.2	25.6
24	7.83	4.69	3.15	6.57	23.8	16.2	40.0	15.8	32.3	30.7
28	7.83	4.69	3.15	6.57	27.8	20.2	48.0	23.2	40.3	35.8
30	7.83	4.69	3.15	6.57	27.8	20.2	48.0	24.6	40.3	38.4
32	7.83	4.69	3.15	6.57	28.7	21.0	49.7	25.5	42.0	40.9
36	7.83	4.69	3.15	6.57	32.7	24.0	55.7	30.9	48.0	46.0
40	7.83	4.69	3.15	6.57	34.7	27.0	61.7	33.9	54.0	51.2
42	7.83	4.69	3.15	6.57	35.7	28.0	63.7	35.9	56.0	53.7
48	7.83	4.69	3.15	6.57	39.6	31.9	71.5	39.0	63.8	61.4
54	7.83	4.69	3.15	6.57	43.6	35.9	79.5	42.3	71.8	69.1
60	7.83	4.69	3.15	6.57	47.5	39.8	87.3	54.8	79.6	76.8
66	7.83	4.69	3.15	6.57	50.7	43.0	93.7	58.4	86.0	84.4
72	7.83	4.69	3.15	6.57	54.4	46.8	101.2	64.2	93.5	92.1
78	7.83	4.69	3.15	6.57	56.4	48.8	105.2	68.2	97.5	102.3

- 1) ASME, AWWA; flanges ≤ 24 in only available according to ASME, flanges ≥ 28 in only available according to AWWA.
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Order code for "Housing", option M "Compact, polycarbonate" or option A "Compact, coated aluminum";
 order code for "Design", option A Insertion length short" with DN 350 to 2000 (14 to 78")



A0017153

Dimensions in SI units

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	H [mm]	J [mm]
350	193	103	90	167	386	290	550
375	193	103	90	167	412	290	600
400	193	103	90	167	412	290	600
450	193	103	90	167	440	290	600
500	193	103	90	167	465	290	600
600	193	103	90	167	506	290	600
700	193	103	90	167	571	424	700
750	193	103	90	167	608	454	750
800	193	103	90	167	627	500	800
900	193	103	90	167	677	580	900
1000	193	103	90	167	727	660	1000
1050	193	103	90	167	763	755	1050
1200	193	103	90	167	841	828	1200
1350	193	103	90	167	953	1008	1350
1400	193	103	90	167	953	1008	1400
1500	193	103	90	167	1053	1147	1500
1600	193	103	90	167	1053	1147	1600
1650	193	103	90	167	1104	1284	1650
1800	193	103	90	167	1161	1379	1800
2000	193	103	90	167	1272	1569	2000

DN [mm]	Dimension F					Dimension G				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]
350	631	638	702	653	648	490	505	520	533	525
375	-	-	-	-	687	-	-	-	-	550
400	682	694	760	710	702	540	565	580	597	580
450	737	747	823	757	760	595	615	640	635	640
500	787	800	926	814	817	645	670	715	699	705
600	883	896	1026	912	918	755	780	840	813	825
700	1001	1018	1145	1034	1026	860	895	910	927	910
750	-	-	-	1100	1106	-	-	-	984	995
800	1115	1135	1240	1157	1157	975	1015	1025	1060	1060
900	1215	1235	1240	1261	1265	1075	1115	1125	1168	1175
1000	1315	1342	1355	1372	1355	1175	1230	1225	1289	1255
1050	-	-	-	1436	-	-	-	-	1346	-
1200	1544	1569	1584	1597	1586	1405	1455	1255	1511	1490
1350	-	-	-	1795	-	-	-	-	1683	-
1400	1768	1791	1796	-	-	1630	1675	1685	-	-
1500	-	-	-	1980	-	-	-	-	1854	-
1600	1968	2011	2019	-	-	1830	1915	1930	-	-
1650	-	-	-	2120	-	-	-	-	2032	-
1800	2183	2218	2226	2259	-	2045	2115	2130	2197	-
2000	2404	2434	2444	2453	-	2265	2325	2345	2362	-

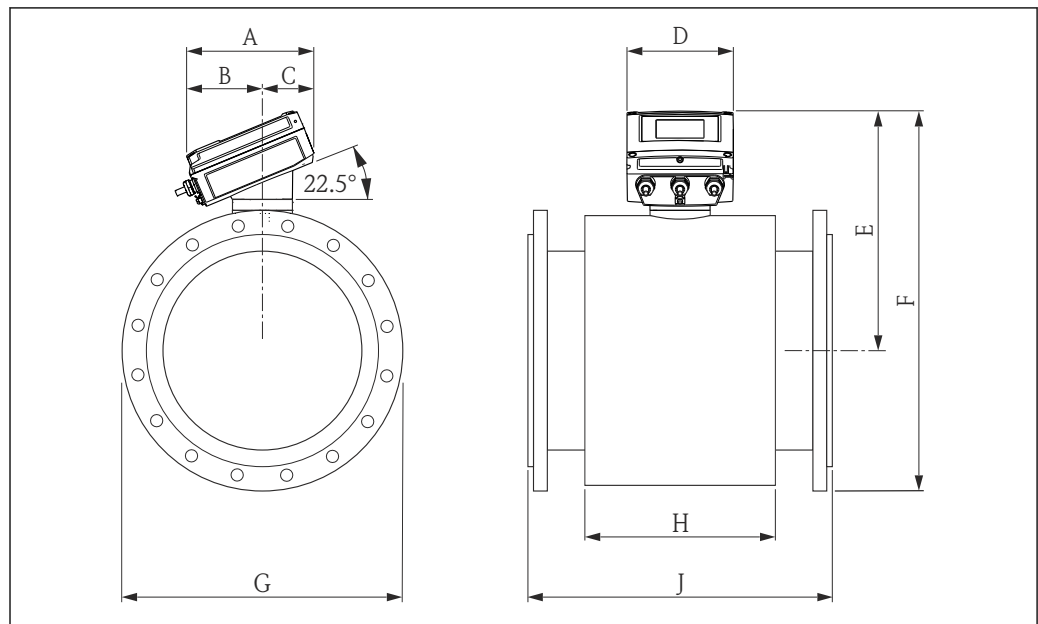
Dimensions in US units

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	H [in]	J [in]
14	7.60	4.06	3.54	6.57	15.2	11.4	21.6
15	7.60	4.06	3.54	6.57	16.2	11.4	23.6
16	7.60	4.06	3.54	6.57	16.2	11.4	23.6
18	7.60	4.06	3.54	6.57	17.3	11.4	23.6
20	7.60	4.06	3.54	6.57	18.3	11.4	23.6
24	7.60	4.06	3.54	6.57	19.9	11.4	23.6
28	7.60	4.06	3.54	6.57	22.5	16.7	27.6
30	7.60	4.06	3.54	6.57	23.9	17.9	29.5
32	7.60	4.06	3.54	6.57	24.7	19.7	31.5
36	7.60	4.06	3.54	6.57	26.6	22.8	35.4
40	7.60	4.06	3.54	6.57	28.6	26.0	39.4
42	7.60	4.06	3.54	6.57	30.0	29.7	41.3
48	7.60	4.06	3.54	6.57	33.1	32.6	47.2
54	7.60	4.06	3.54	6.57	37.5	39.7	53.1
60	7.60	4.06	3.54	6.57	41.4	45.2	59.0

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	H [in]	J [in]
66	7.60	4.06	3.54	6.57	43.4	50.6	64.9
72	7.60	4.06	3.54	6.57	45.7	54.3	70.8
78	7.60	4.06	3.54	6.57	50.1	61.8	78.7

DN [in]	Dimension F					Dimension G				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]
14	24.8	25.1	27.6	25.7	25.5	19.3	19.9	20.5	21.0	20.7
15	-	-	-	-	27	-	-	-	-	21.7
16	26.8	27.3	30.0	27.0	27.6	21.3	22.2	22.8	23.5	22.8
18	29.0	29.4	32.4	29.8	29.9	23.4	24.2	25.2	25.0	25.2
20	31.0	31.5	36.5	32.0	32.1	25.4	26.4	28.1	27.5	27.8
24	34.7	35.3	40.4	35.9	36.1	29.7	30.7	33.1	32.0	32.5
28	39.4	40.1	45.1	40.7	40.4	33.9	35.2	35.8	36.5	35.8
30	-	-	-	43.3	43.5	-	-	-	38.7	39.2
32	43.9	44.7	48.8	45.5	45.5	38.4	40.0	40.4	41.7	41.7
36	47.8	48.6	48.8	49.6	49.8	42.3	43.9	44.3	46.0	46.3
40	51.7	52.8	53.4	54.0	53.3	46.3	48.4	48.2	50.7	49.4
42	-	-	-	56.5	-	-	-	-	53.0	-
48	60.8	61.7	62.4	62.9	62.4	55.3	57.3	49.4	59.5	58.7
54	-	-	-	70.6	-	-	-	-	66.3	-
60	-	-	-	77.9	-	-	-	-	73.0	-
66	-	-	-	83.4	-	-	-	-	80.0	-
72	85.9	87.3	87.6	88.9	-	80.5	83.3	83.9	86.5	-
78	94.6	95.8	96.2	96.6	-	89.2	91.5	92.3	93.0	-

Order code for "Housing", option Q "Compact, polycarbonate, inclined" or option R "Compact, coated aluminum, inclined"; order code for "Design", option A "Insertion length short" with DN 350 to 2000 (14 to 78")



A0020393

Dimensions in SI units

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	H [mm]	J [mm]
350	199	119	80	167	431	290	550
375	199	119	80	167	457	290	600
400	199	119	80	167	457	290	600
450	199	119	80	167	485	290	600
500	199	119	80	167	510	290	600
600	199	119	80	167	551	290	600
700	199	119	80	167	616	424	700
750	199	119	80	167	653	454	750
800	199	119	80	167	672	500	800
900	199	119	80	167	722	580	900
1000	199	119	80	167	772	660	1000
1050	199	119	80	167	808	755	1050
1200	199	119	80	167	886	828	1200
1350	199	119	80	167	998	1008	1350
1400	199	119	80	167	953	1008	1400
1500	199	119	80	167	1098	1147	1500
1600	199	119	80	167	1098	1147	1600
1650	199	119	80	167	1149	1284	1650
1800	199	119	80	167	1206	1379	1800
2000	199	119	80	167	1317	1569	2000

DN [mm]	Dimension F					Dimension G				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]
350	676	683	618	698	693	490	505	520	533	525
375	-	-	-	-	732	-	-	-	-	550
400	727	739	672	755	747	540	565	580	597	580
450	782	792	732	802	805	595	615	640	635	640
500	832	845	795	859	862	645	670	715	699	705
600	928	941	898	957	963	755	780	840	813	825
700	1046	1063	1008	1079	1071	860	895	910	927	910
750	-	-	-	1145	1151	-	-	-	984	995
800	1160	1180	1112	1202	1202	975	1015	1025	1060	1060
900	1260	1280	1212	1306	1310	1075	1115	1125	1168	1175
1000	1360	1387	1327	1417	1400	1175	1230	1225	1289	1255
1050	-	-	-	1481	-	-	-	-	1346	-
1200	1589	1614	1556	1642	1631	1405	1455	1255	1511	1490
1350	-	-	-	1840	-	-	-	-	1683	-
1400	1813	1836	1768	-	-	1630	1675	1685	-	-
1500	-	-	-	2025	-	-	-	-	1854	-
1600	2013	2056	1991	-	-	1830	1915	1930	-	-
1650	-	-	-	2165	-	-	-	-	2032	-
1800	2228	2263	2198	2304	-	2045	2115	2130	2197	-
2000	2449	2479	2416	2498	-	2265	2325	2345	2362	-

Dimensions in US units

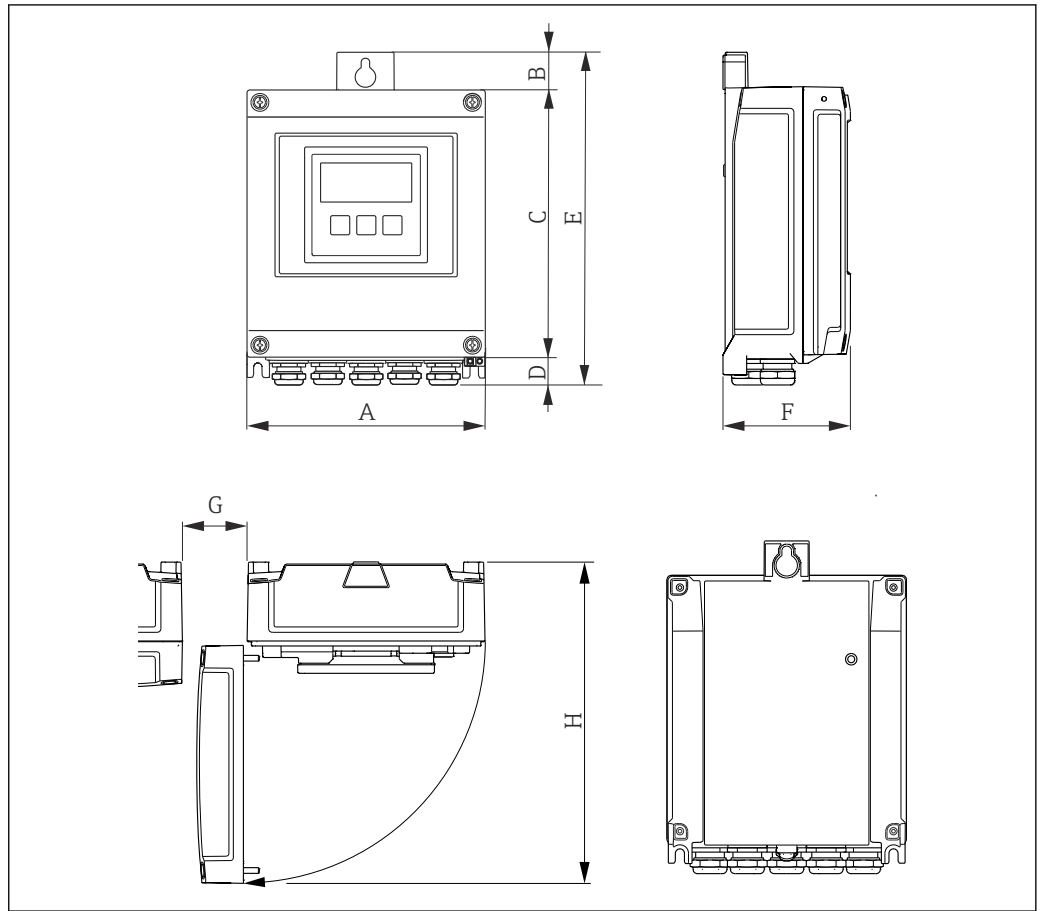
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	H [in]	J [in]
14	7.83	4.69	3.15	6.57	17.0	11.4	21.6
15	7.83	4.69	3.15	6.57	18.0	11.4	23.6
16	7.83	4.69	3.15	6.57	18.0	11.4	23.6
18	7.83	4.69	3.15	6.57	19.1	11.4	23.6
20	7.83	4.69	3.15	6.57	20.1	11.4	23.6
24	7.83	4.69	3.15	6.57	21.7	11.4	23.6
28	7.83	4.69	3.15	6.57	24.3	16.7	27.6
30	7.83	4.69	3.15	6.57	25.7	17.9	29.5
32	7.83	4.69	3.15	6.57	26.5	19.7	31.5
36	7.83	4.69	3.15	6.57	28.4	22.8	35.4
40	7.83	4.69	3.15	6.57	30.4	26.0	39.4
42	7.83	4.69	3.15	6.57	31.8	29.7	41.3
48	7.83	4.69	3.15	6.57	34.9	32.6	47.2
54	7.83	4.69	3.15	6.57	39.3	39.7	53.1
60	7.83	4.69	3.15	6.57	43.2	45.2	59.0

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	H [in]	J [in]
66	7.83	4.69	3.15	6.57	45.2	50.6	64.9
72	7.83	4.69	3.15	6.57	47.5	54.3	70.8
78	7.83	4.69	3.15	6.57	51.9	61.8	78.7

DN [in]	Dimension F					Dimension G				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]
14	26.6	26.9	24.3	27.5	27.3	19.3	19.9	20.5	21.0	20.7
15	-	-	-	-	28.8	-	-	-	-	21.7
16	28.6	29.1	26.5	28.8	29.4	21.3	22.2	22.8	23.5	22.8
18	30.8	31.2	28.8	31.6	31.7	23.4	24.2	25.2	25.0	25.2
20	32.8	33.3	31.3	33.8	33.9	25.4	26.4	28.1	27.5	27.8
24	36.5	37.1	35.4	37.7	37.9	29.7	30.7	33.1	32.0	32.5
28	41.2	41.9	39.7	42.5	42.2	33.9	35.2	35.8	36.5	35.8
30	-	-	-	45.1	45.3	-	-	-	38.7	39.2
32	45.7	46.5	43.8	47.3	47.3	38.4	40.0	40.4	41.7	41.7
36	49.6	50.4	47.7	51.4	49.8	42.3	43.9	44.3	46.0	46.3
40	53.5	54.6	52.2	55.8	55.1	46.3	48.4	48.2	50.7	49.4
42	-	-	-	58.3	-	-	-	-	53.0	-
48	62.6	63.5	61.3	64.7	64.2	55.3	57.3	49.4	59.5	58.7
54	-	-	-	72.4	-	-	-	-	66.3	-
60	-	-	-	79.7	-	-	-	-	73.0	-
66	-	-	-	85.2	-	-	-	-	80.0	-
72	87.7	89.1	86.5	90.7	-	80.5	83.3	83.9	86.5	-
78	96.4	97.6	95.1	98.4	-	89.2	91.5	92.3	93.0	-

Transmitter remote version

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



A0020522

Dimensions in SI units

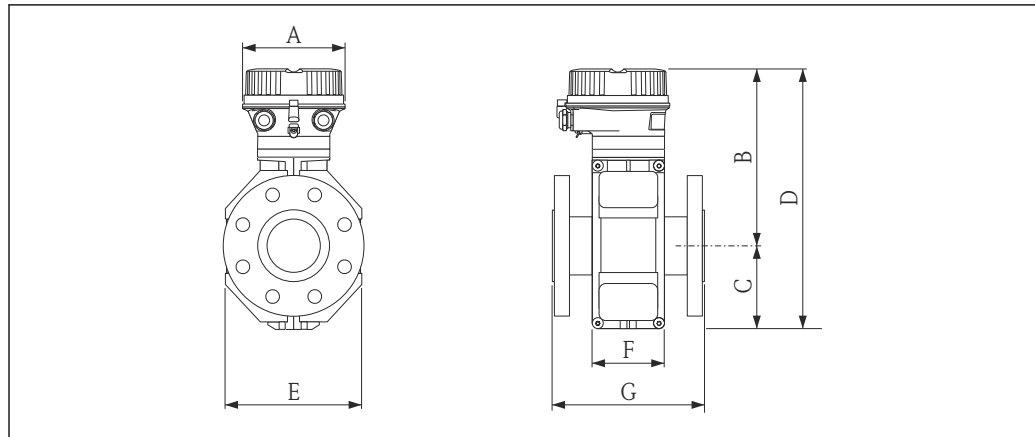
A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]
167	24	187	21	232	80	50	240

Dimensions in US units

A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]
6.57	0.94	7.36	0.83	9.13	3.15	1.97	9.5

Sensor remote version

DN 25 to 300 (1 to 12")



A0017282

Dimensions in SI units

DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G ²⁾ [mm]
25	136	207	84	291	120	94	200
32	136	207	84	291	120	94	200
40	136	207	84	291	120	94	200
50	136	207	84	291	120	94	200
65	136	232	109	341	180	94	200
80	136	232	109	341	180	94	200
100	136	232	109	341	180	94	250
125	136	272	150	422	260	140	250
150	136	272	150	422	260	140	300
200	136	297	180	477	324	156	350
250	136	322	205	527	400	156	450
300	136	347	230	577	460	166	500

- 1) EN (DIN), AS, JIS; For flanges according to AS, only nominal diameters DN 80, 100 and 150 to 300 are available.
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Dimensions in US units

DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ²⁾ [in]
1	5.35	8.15	3.31	11.5	4.72	3.70	7.87
1 ½	5.35	8.15	3.31	11.5	4.72	3.70	7.87
2	5.35	8.15	3.31	11.5	4.72	3.70	7.87
3	5.35	9.13	4.29	13.4	7.09	3.70	7.87
4	5.35	9.13	4.29	13.4	7.09	3.70	9.84
6	5.35	10.7	5.91	16.6	10.2	5.51	11.8
8	5.35	11.7	7.09	18.8	12.8	6.14	13.8

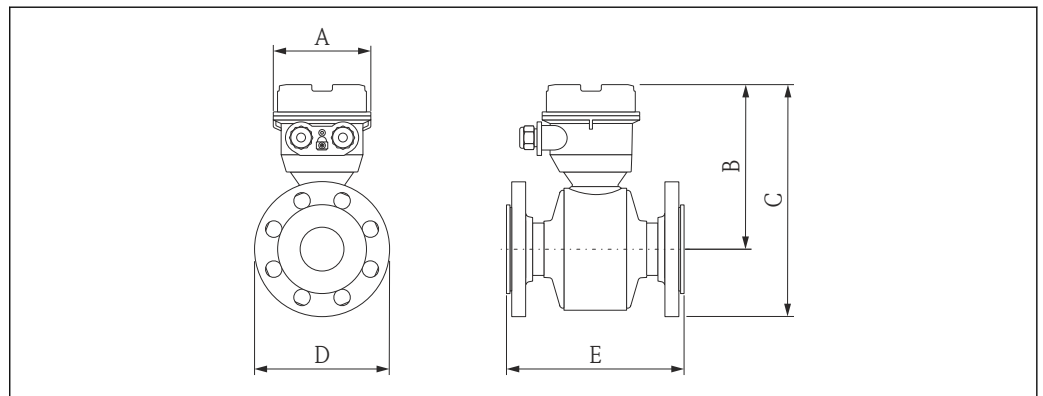
DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ²⁾ [in]
10	5.35	12.7	8.07	20.8	15.8	6.14	17.7
12	5.35	13.7	9.06	22.8	18.1	6.54	19.7

1) ASME

2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Order code for "Sensor option", option CA...CE "Corrosion protection" with DN 25 to 300 (1 to 12")

Option	Description
CA	IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M
CB	IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 C5-M
CC	IP68, Type 6P, cust. potted; corrosion protection EN ISO 12944 C5-M
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/3
CE	Buried IP68, Type 6P, cust. potted; corrosion protection EN ISO 12944 Im2/3



A0020399

Dimensions in SI units

DN [mm]	A [mm]	B [mm]	E [mm]
25	112	189	200
32	112	189	200
40	112	189	200
50	112	189	200
65	112	202	200
80	112	207	200
100	112	219	250
125	112	232	250
150	112	254	300
200	112	279	350
250	112	313	450
300	112	338	500

Dimension C										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	-	-	-	260	260	260	260	-	260	260
32	-	-	-	260	-	-	-	-	260	260
40	-	-	-	264	260	267	-	-	260	260
50	-	-	-	272	265	272	264	264	267	267
65	-	295	-	295	-	-	-	-	290	290
80	-	307	-	307	302	311	300	300	300	307
100	-	330	-	382	333	346	327	327	325	332
125	-	357	-	367	-	-	-	-	357	367
150	-	396	-	404	393	412	395	395	395	406
200	450	450	460	-	450	-	447	447	445	454
250	510	515	525	-	516	-	515	515	513	528
300	560	568	580	-	580	-	565	565	560	578

Dimension D										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	-	-	-	140	140	140	140	-	140	140
32	-	-	-	140	-	-	-	-	140	140
40	-	-	-	150	140	155	-	-	140	140
50	-	-	-	165	152.4	165	150	150	155	155
65	-	185	-	185	-	-	-	-	175	175
80	-	200	-	200	190.5	209.6	185	185	185	200
100	-	220	-	325	228.6	254	215	215	210	225
125	-	250	-	270	-	-	-	-	250	270
150	-	285	-	300	279.4	317.5	280	280	280	305
200	340	340	360	-	342.9	-	335	335	330	350
250	395	405	425	-	406.4	-	405	405	400	430
300	445	460	485	-	482.6	-	455	455	445	480

Dimensions in US units

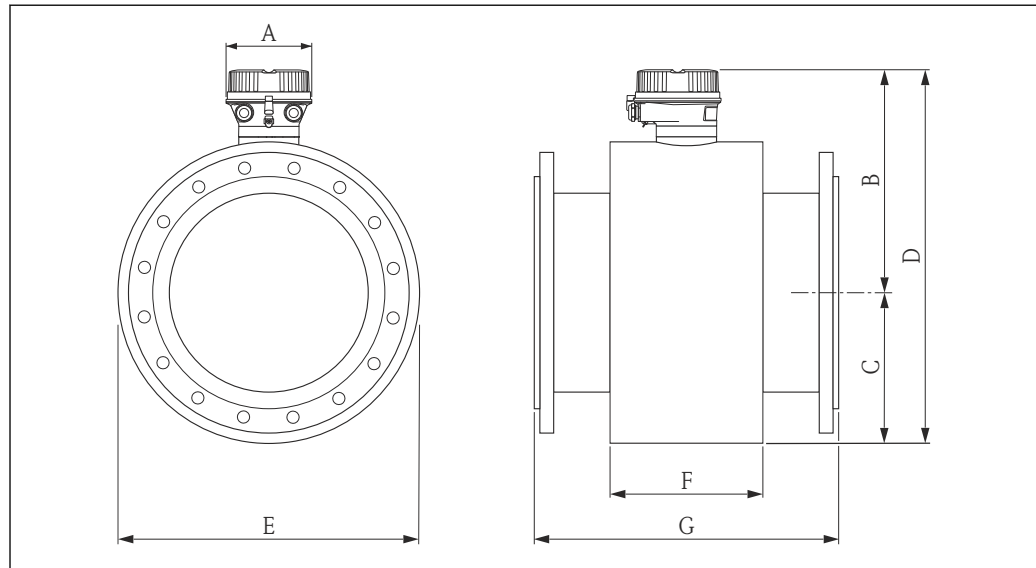
DN	A	B	E
[in]	[in]	[in]	[in]
1	4.41	7.44	7.87
2	4.41	7.44	7.87
3	4.41	8.15	7.87
4	4.41	8.62	9.84
6	4.41	10.0	11.8

DN [in]	A [in]	B [in]	E [in]
8	4.41	11.0	13.8
10	4.41	12.3	17.7
12	4.41	13.3	19.7

Dimension C										
DN [in]	EN (DIN)				ASME		AS		JIS	
	PN 10 [in]	PN 16 [in]	PN 25 [in]	PN 40 [in]	Class 150 [in]	Class 300 [in]	Table E [in]	PN 16 [in]	10K [in]	20K [in]
1	-	-	-	10.2	10.2	10.2	10.2	-	10.2	10.2
2	-	-	-	10.7	10.4	10.7	10.4	10.4	10.5	10.5
3	-	12.1	-	12.1	11.9	12.2	11.8	11.8	11.8	12.1
4	-	13.0	-	15.0	13.1	13.6	12.9	12.9	12.8	13.1
6	-	15.6	-	15.9	15.5	16.2	15.6	15.6	15.6	16.0
8	17.7	17.7	18.1	-	17.7	-	17.6	17.6	17.5	17.9
10	20.1	20.3	20.7	-	20.3	-	20.3	20.3	20.2	20.8
12	22.0	22.4	22.8	-	22.8	-	22.2	22.2	22.0	22.8

Dimension D										
DN [in]	EN (DIN)				ASME		AS		JIS	
	PN 10 [in]	PN 16 [in]	PN 25 [in]	PN 40 [in]	Class 150 [in]	Class 300 [in]	Table E [in]	PN 16 [in]	10K [in]	20K [in]
1	-	-	-	5.51	5.51	5.51	5.51	-	5.51	5.51
2	-	-	-	6.50	6.00	6.50	5.91	5.91	6.10	6.10
3	-	7.87	-	7.87	7.5	8.25	7.28	7.28	7.28	7.87
4	-	8.66	-	12.8	9.00	10.0	8.46	8.46	8.27	8.86
6	-	11.2	-	11.8	11.0	12.5	11.0	11.0	11.0	12.0
8	13.4	13.4	14.2	-	13.5	-	13.2	13.2	13.0	13.8
10	15.6	15.9	16.7	-	16.0	-	15.9	15.9	15.8	16.9
12	17.5	18.1	19.1	-	19.0	-	17.9	17.9	17.5	18.9

DN 350 to 2000 (14 to 78")



A0017283

Dimensions in SI units

DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G ²⁾ [mm]
350	136	407	282	689	564	276	550
375	136	433	308	741	616	276	600
400	136	433	308	741	616	276	600
450	136	458	333	791	666	292	650
500	136	483	359	842	717	292	650
600	136	535	411	946	821	402	780
700	136	637	512	1149	1024	589	910
750	136	637	512	1149	1024	626	975
800	136	658	534	1192	1067	647	1040
900	136	735	610	1345	1220	785	1170
1000	136	811	686	1497	1372	862	1300
1050	136	837	712	1549	1424	912	1365
1200	136	936	811	1747	1622	992	1560
1350	136	1037	912	1949	1824	1252	1755
1400	136	1112	987	2099	1974	1252	1820
1500	136	1136	1011	2147	2022	1392	1950
1600	136	1181	1056	2237	2112	1482	2080
1650	136	1218	1093	2311	2186	1482	2145
1800	136	1313	1188	2501	2376	1632	2340
2000	136	1363	1238	2601	2476	1732	2600

1) EN (DIN), AS; For flanges according to AS, only nominal diameters DN 350, 400, 500 and 600 are available.

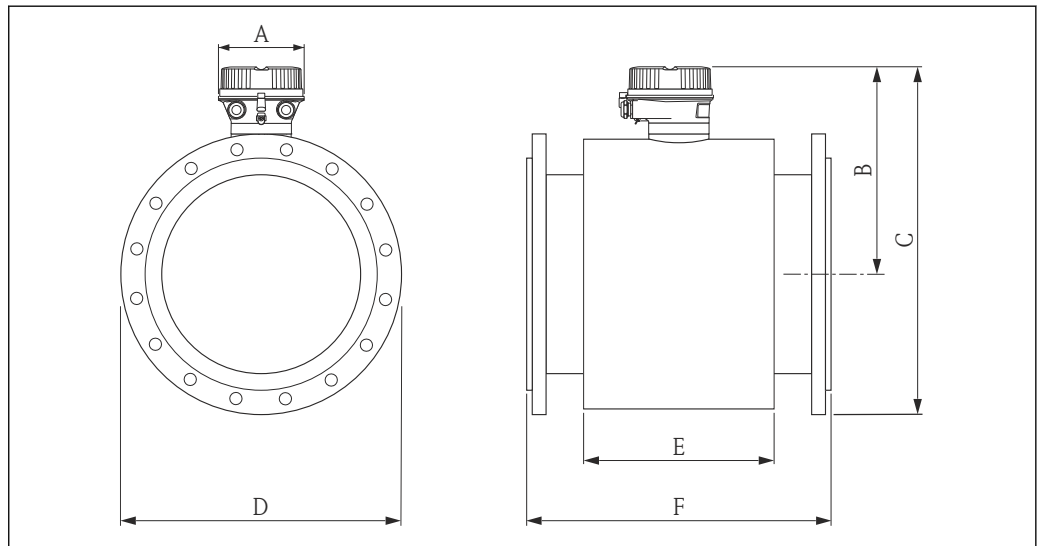
2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Dimensions in US units

DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ²⁾ [in]
14	5.35	16.0	11.1	29.3	22.2	10.9	21.7
15	5.35	17.0	12.1	31.3	24.2	10.9	23.6
16	5.35	17.0	12.1	31.3	24.2	10.9	23.6
18	5.35	18.0	13.1	33.3	26.2	11.5	25.6
20	5.35	19.0	14.1	35.3	28.2	11.5	25.6
24	5.35	21.1	16.2	39.4	32.3	15.8	30.7
28	5.35	25.1	20.1	45.2	40.3	23.2	35.8
30	5.35	25.1	20.1	45.2	40.3	24.6	38.4
32	5.35	25.9	21.0	46.9	42.0	25.5	40.9
36	5.35	28.9	24.0	52.9	48.0	30.9	46.0
40	5.35	31.9	27.0	58.9	54.0	33.9	51.2
42	5.35	32.9	28.0	60.9	56.0	35.9	53.7
48	5.35	36.8	31.9	68.7	63.8	39.0	61.4
54	5.35	40.8	35.9	76.7	71.8	42.3	69.1
60	5.35	44.7	39.8	84.5	79.6	54.8	76.8
66	5.35	47.9	43.0	91.0	86.0	58.4	84.4
72	5.35	51.7	46.8	98.4	93.5	64.2	92.1
78	5.35	53.6	48.7	102.4	97.5	68.2	102.3

- 1) ASME, AWWA; flanges ≤ 24 in only available according to ASME, flanges ≥ 28 in only available according to AWWA.
- 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Order code for "Design", option A "Insertion length short" with DN 350 to 2000 (14 to 78")



A0017284

Dimensions in SI units

DN [mm]	A [mm]	B [mm]	E [mm]	F [mm]
350	136	358	290	550
375	136	384	290	600
400	136	384	290	600
450	136	412	290	600
500	136	437	290	600
600	136	478	290	600
700	136	543	424	700
750	136	579	454	750
800	136	599	500	800
900	136	649	580	900
1000	136	699	660	1000
1050	136	735	755	1050
1200	136	813	828	1200
1350	136	925	1008	1350
1400	136	925	1008	1400
1500	136	1025	1147	1500
1600	136	1025	1147	1600
1650	136	1076	1284	1650
1800	136	1133	1379	1800
2000	136	1244	1569	2000

DN [mm]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]
350	603	610	616	625	620	490	505	520	533	525
375	-	-	-	-	659	-	-	-	-	550
400	654	666	672	682	674	540	565	580	597	580
450	709	719	729	729	732	595	615	640	635	640
500	759	772	791	786	789	645	670	715	699	705
600	855	868	903	884	890	755	780	840	813	825
700	973	990	1009	1006	998	860	895	910	927	910
750	-	-	-	1072	1078	-	-	-	984	995
800	1087	1107	1123	1129	1129	975	1015	1025	1060	1060
900	1187	1207	1223	1233	1237	1075	1115	1125	1168	1175
1000	1287	1314	1338	1344	1327	1175	1230	1225	1289	1255
1050	-	-	-	1408	-	-	-	-	1346	-
1200	1516	1541	1567	1569	1558	1405	1455	1255	1511	1490
1350	-	-	-	1767	-	-	-	-	1683	-
1400	1740	1763	1779	-	-	1630	1675	1685	-	-

DN [mm]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]
1500	-	-	-	1952	-	-	-	-	1854	-
1600	1940	1983	2002	-	-	1830	1915	1930	-	-
1650	-	-	-	2092	-	-	-	-	2032	-
1800	2155	2190	2209	2231	-	2045	2115	2130	2197	-
2000	2376	2406	2427	2425	-	2265	2325	2345	2362	-

Dimensions in US units

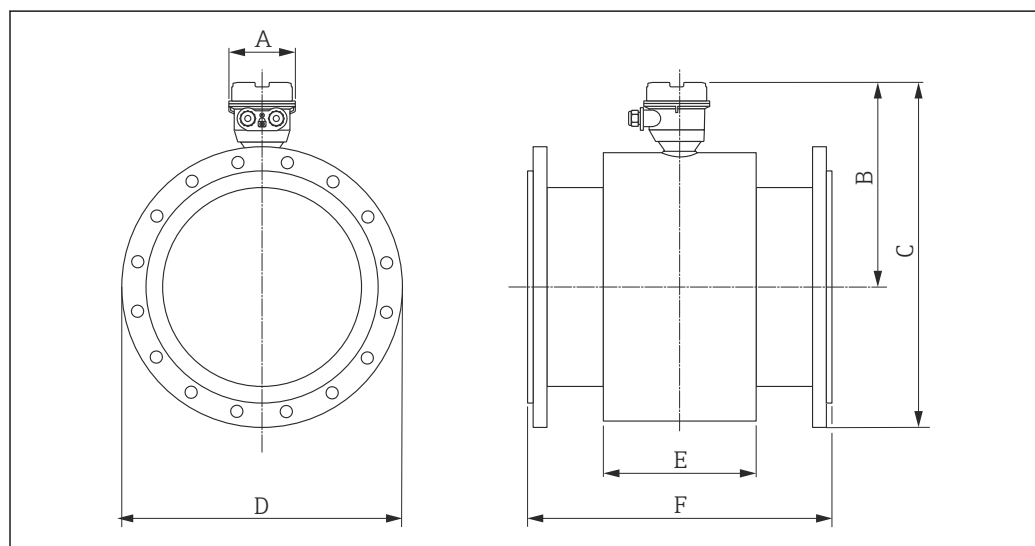
DN [in]	A [in]	B [in]	E [in]	F [in]
14	5.35	14.1	11.4	21.6
15	5.35	15.1	11.4	23.6
16	5.35	15.1	11.4	23.6
18	5.35	16.2	11.4	23.6
20	5.35	17.2	11.4	23.6
24	5.35	18.8	11.4	23.6
28	5.35	21.6	16.7	27.6
30	5.35	23.0	17.9	29.5
32	5.35	23.6	19.7	31.5
36	5.35	25.6	22.8	35.4
40	5.35	27.5	26.0	39.4
42	5.35	28.9	29.7	41.3
48	5.35	32.0	32.6	47.2
54	5.35	36.4	39.6	53.1
60	5.35	40.4	45.2	59.0
66	5.35	42.4	50.6	64.9
72	5.35	44.6	54.2	70.8
78	5.35	49.0	61.8	78.7

DN [in]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]
14	23.7	24.0	24.3	24.6	24.4	19.3	19.9	20.5	21.0	20.7
15	-	-	-	-	25.9	-	-	-	-	21.7
16	25.8	26.2	26.5	26.9	26.5	21.3	22.2	22.8	23.5	22.8
18	27.9	28.3	28.7	28.7	28.8	23.4	24.2	25.2	25.0	25.2
20	29.9	30.4	31.1	30.9	31.1	25.4	26.4	28.1	27.5	27.8
24	33.7	34.2	35.6	34.8	35.0	29.7	30.7	33.1	32.0	32.5
28	38.5	39.2	39.7	39.8	39.5	33.9	35.2	35.8	36.5	35.8

DN [in]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]
30	-	-	-	42.4	42.4	-	-	-	38.7	39.2
32	43.0	43.8	44.2	44.6	44.6	38.4	40.0	40.4	41.7	41.7
36	46.9	47.7	48.2	48.7	48.9	42.3	43.9	44.3	46.0	46.3
40	50.8	51.9	52.7	53.1	52.4	46.3	48.4	48.2	50.7	49.4
42	-	-	-	55.6	-	-	-	-	53.0	-
48	59.9	60.8	61.7	62.0	61.5	55.3	57.3	49.4	59.5	58.7
54	-	-	-	69.6	-	-	-	-	66.3	-
60	-	-	-	76.9	-	-	-	-	73.0	-
66	-	-	-	82.4	-	-	-	-	80.0	-
72	84.9	86.3	87.0	87.9	-	80.5	83.3	83.9	86.5	-
78	93.6	94.7	95.6	95.5	-	89.2	91.5	92.3	93.0	-

Order code for "Design", option A "Insertion length short" with DN 450 to 2000 (18 to 78") and order code for "Sensor option", option CA...CE "Corrosion protection" with DN 350 to 2000 (14 to 78")

Option	Description
CA	IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M
CB	IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 C5-M
CC	IP68, Type 6P, cust. potted; corrosion protection EN ISO 12944 C5-M
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/3
CE	Buried IP68, Type 6P, cust. potted; corrosion protection EN ISO 12944 Im2/3



A0018158

Dimensions in SI units

DN [mm]	A [mm]	B [mm]	E [mm]	F [mm]
350	112	350	290	550
375	112	376	290	600
400	112	376	290	600
450	112	403	290	600
500	112	428	290	600
600	112	478	290	600
700	112	549	424	700
750	112	586	454	750
800	112	605	500	800
900	112	655	580	900
1000	112	705	660	1000
1050	112	741	755	1050
1200	112	819	828	1200
1350	112	931	1008	1350
1400	112	931	1008	1400
1500	112	1031	1147	1500
1600	112	1031	1147	1600
1650	112	1082	1284	1650
1800	112	1139	1379	1800
2000	112	1250	1569	2000

DN [mm]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]
350	595	603	610	-	613	490	505	520	-	525
375	-	-	-	-	651	-	-	-	-	550
400	646	659	666	-	666	540	565	580	-	580
450	701	711	723	-	723	595	615	640	-	640
500	751	763	786	-	781	645	670	715	-	705
600	856	868	898	-	891	755	780	840	-	825
700	979	996	1004	1012	1004	860	895	910	927	910
750	-	-	-	1078	1084	-	-	-	984	995
800	1093	1113	1118	1135	1135	975	1015	1025	1060	1060
900	1193	1213	1218	1239	1243	1075	1115	1125	1168	1175
1000	1293	1320	1333	1350	1333	1175	1230	1225	1289	1255
1050	-	-	-	1414	-	-	-	-	1346	-
1200	1522	1547	1562	1575	1564	1405	1455	1255	1511	1490
1350	-	-	-	1773	-	-	-	-	1683	-
1400	1746	1769	1774	-	-	1630	1675	1685	-	-

DN [mm]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]
1500	-	-	-	1958	-	-	-	-	1854	-
1600	1946	1989	1997	-	-	1830	1915	1930	-	-
1650	-	-	-	2098	-	-	-	-	2032	-
1800	2161	2196	2204	2237	-	2045	2115	2130	2197	-
2000	2382	2412	2422	2431	-	2265	2325	2345	2362	-

Dimensions in US units

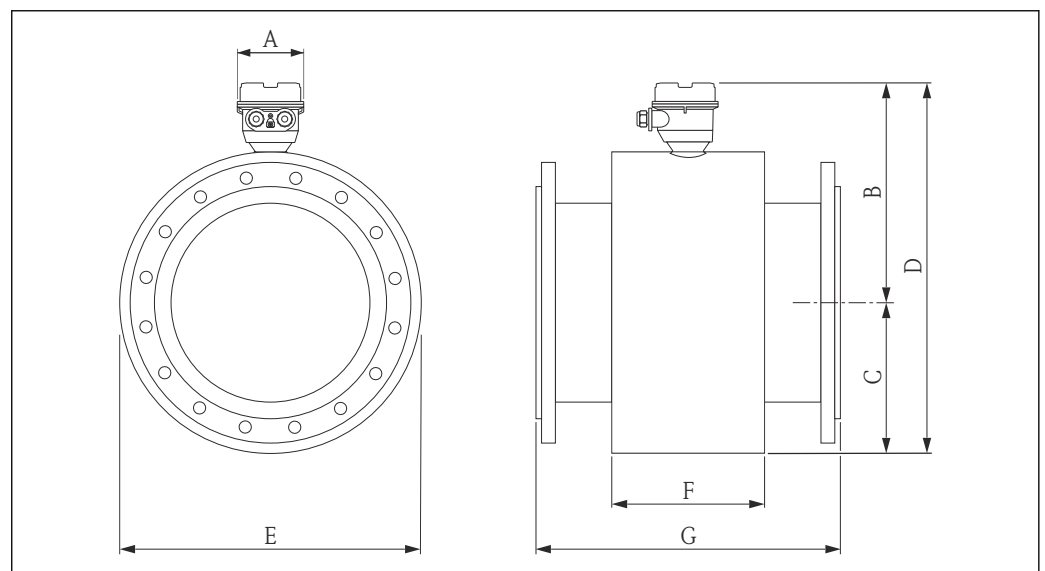
DN [in]	A [in]	B [in]	E [in]	F [in]
14	4.41	13.8	11.4	21.7
15	4.41	14.8	11.4	23.6
16	4.41	14.8	11.4	23.6
18	4.41	15.9	11.4	23.6
20	4.41	16.9	11.4	23.6
24	4.41	18.8	11.4	23.6
28	4.41	21.6	16.7	27.6
30	4.41	23.1	17.9	29.5
32	4.41	23.8	19.7	31.5
36	4.41	25.8	22.8	35.4
40	4.41	27.8	26.0	39.4
42	4.41	29.2	29.7	41.3
48	4.41	32.2	32.6	47.2
54	4.41	36.7	39.7	53.2
60	4.41	40.6	45.2	59.1
66	4.41	42.6	50.6	65.0
72	4.41	44.8	54.3	70.9
78	4.41	49.2	61.8	78.7

DN [in]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]
14	23.4	23.7	24.0	-	24.1	19.3	19.9	20.5	-	20.7
15	-	-	-	-	25.6	-	-	-	-	21.7
16	25.4	25.9	26.2	-	26.2	21.3	22.2	22.8	-	22.8
18	27.6	28.0	28.5	-	28.5	23.4	24.2	25.2	-	25.2
20	29.6	30.0	30.9	-	30.7	25.4	26.4	28.1	-	27.8
24	33.7	34.2	35.4	-	35.1	29.7	30.7	33.1	-	32.5
28	38.5	39.2	39.5	39.8	39.5	33.9	35.2	35.8	36.5	35.8

DN [in]	Dimension C					Dimension D				
	EN (DIN)			ASME	AS	EN (DIN)			ASME	AS
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]
30	-	-	-	42.4	42.7	-	-	-	38.7	39.2
32	43.0	43.8	44.0	44.7	44.7	38.4	40.0	40.4	41.7	41.7
36	47.0	47.8	48.0	48.8	48.9	42.3	43.9	44.3	46.0	46.3
40	50.9	52.0	52.5	53.1	52.5	46.3	48.4	48.2	50.7	49.4
42	-	-	-	55.7	-	-	-	-	53.0	-
48	59.9	60.9	61.5	62.0	61.6	55.3	57.3	49.4	59.5	58.7
54	-	-	-	69.8	-	-	-	-	66.3	-
60	-	-	-	77.1	-	-	-	-	73.0	-
66	-	-	-	82.6	-	-	-	-	80.0	-
72	85.1	86.5	86.8	88.1	-	80.5	83.3	83.9	86.5	-
78	93.8	95.0	95.4	95.7	-	89.2	91.5	92.3	93.0	-

Order code for "Sensor option", option CA...CE "Corrosion protection" with DN 350 to 2000 (14 to 78")

Option	Description
CA	IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M
CB	IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 C5-M
CC	IP68, Type 6P, cust. potted; corrosion protection EN ISO 12944 C5-M
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/3
CE	Buried IP68, Type 6P, cust. potted; corrosion protection EN ISO 12944 Im2/3



A0020435

Dimensions in SI units

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G¹⁾ [mm]
350	112	395	282	677	564	276	550
375	112	421	308	729	616	276	600
400	112	421	308	729	616	276	600
450	112	446	333	779	666	292	650
500	112	472	359	830	717	292	650
600	112	524	411	934	821	402	780
700	112	625	512	1137	1024	589	910
750	112	625	512	1137	1024	626	975
800	112	647	534	1180	1067	647	1040
900	112	723	610	1333	1220	785	1170
1000	112	799	686	1485	1372	862	1300
1050	112	825	712	1537	1424	912	1365
1200	112	924	811	1735	1622	992	1560
1350	112	1025	912	1937	1824	1252	1755
1400	112	1100	987	2087	1974	1252	1820
1500	112	1124	1011	2135	2022	1392	1950
1600	112	1169	1056	2225	2112	1482	2080
1650	112	1206	1093	2299	2186	1482	2145
1800	112	1301	1188	2489	2376	1632	2340
2000	112	1351	1238	2589	2476	1732	2600

1) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Dimensions in US units

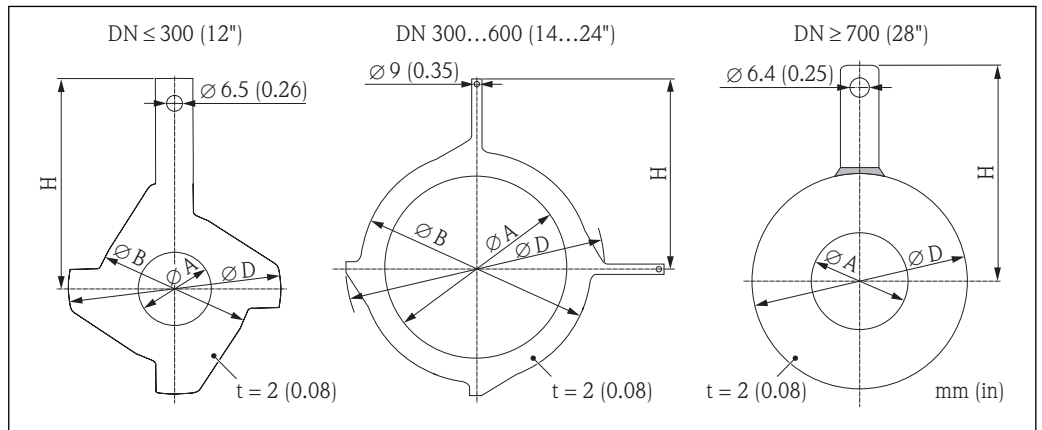
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G¹⁾ [in]
14	4.41	15.6	11.1	26.7	22.2	10.9	21.7
15	4.41	16.6	12.1	28.7	24.2	10.9	23.6
16	4.41	16.6	12.1	28.7	24.2	10.9	23.6
18	4.41	17.6	13.1	30.7	26.2	11.5	25.6
20	4.41	18.6	14.1	32.7	28.2	11.5	25.6
24	4.41	20.6	16.2	36.8	32.3	15.8	30.7
28	4.41	24.6	20.2	44.8	40.3	23.2	35.8
30	4.41	24.6	20.2	44.8	40.3	24.6	38.4
32	4.41	25.5	21.0	46.5	42.0	25.5	40.9
36	4.41	28.5	24.0	52.5	48.0	30.9	46.0
40	4.41	31.5	27.0	58.5	54.0	33.9	51.2
42	4.41	32.5	28.0	60.5	56.0	35.9	53.7
48	4.41	36.4	31.9	68.3	63.8	39.0	61.4
54	4.41	40.4	35.9	76.3	71.8	42.3	69.1
60	4.41	44.3	39.8	84.1	79.6	54.8	76.8

DN	A	B	C	D	E	F	G ¹⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
66	4.41	47.5	43.0	90.5	86.0	58.4	84.4
72	4.41	51.2	46.8	98.0	93.5	64.2	92.1
78	4.41	53.2	48.7	101.9	97.5	68.2	102.3

1) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Accessories

Ground disks for flange connections



A0015442

Dimensions in SI and US units

DN		Pressure rating	A		B		D		H	
[mm]	[in]		[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]
25	1	1)	26	1.02	62	2.44	77.5	3.05	87.5	3.44
32	1 ¼	1)	35	1.38	80	3.15	87.5	3.44	94.5	3.72
40	1 ½	1)	41	1.61	82	3.23	101	3.98	103	4.06
50	2	1)	52	2.05	101	3.98	115.5	4.55	108	4.25
65	2 ½	1)	68	2.68	121	4.76	131.5	5.18	118	4.65
80	3	1)	80	3.15	131	5.16	154.5	6.08	135	5.31
100	4	1)	104	4.09	156	6.14	186.5	7.34	153	6.02
125	5	1)	130	5.12	187	7.36	206.5	8.13	160	6.30
150	6	1)	158	6.22	217	8.54	256	10.1	184	7.24
200	8	1)	206	8.11	267	10.5	288	11.3	205	8.07
250	10	1)	260	10.2	328	12.9	359	14.1	240	9.45
300	12	1)	312	12.3	375	14.8	413	16.3	273	10.8
350	14	DIN, PN 6	343	13.5	433	16.5	479	18.9	365	14.4
350	14	DIN, PN 10	343	13.5	400	15.8	479	18.9	365	14.4
350	14	ASME, Class 150	343	13.5	400	15.8	479	18.9	365	14.4
400	16	DIN, PN 6	393	15.5	470	18.5	542	21.3	395	15.6
400	16	DIN, PN 10	393	15.5	469	18.5	542	21.3	395	15.6

DN		Pressure rating	A		B		D		H	
[mm]	[in]		[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]
400	16	ASME, Class 150	393	15.5	469	18.5	542	21.3	395	15.6
450	18	DIN, PN 6	439	17.3	525	20.7	583	23.0	417	16.4
450	18	DIN, PN 10	439	17.3	535	21.1	583	23.0	417	16.4
450	18	ASME, Class 150	439	17.3	535	21.1	583	23.0	417	16.4
500	20	DIN, PN 6	493	19.4	575	23.3	650	25.6	460	18.1
500	20	DIN, PN 10	493	19.4	588	23.2	650	25.6	460	18.1
500	20	ASME, Class 150	493	19.4	588	23.2	650	25.6	460	18.1
600	24	DIN, PN 6	593	23.4	676	27.3	766	30.2	522	20.6
600	24	DIN, PN 10	593	23.4	688	27.1	766	30.2	522	20.6
600	24	ASME, Class 150	593	23.4	688	27.1	766	30.2	522	20.6
700	28	DIN, PN 6	697	27.4	-	-	786	30.9	460	18.1
700	28	DIN, PN 10	693	27.3	-	-	813	32.0	480	18.9
700	28	AS, PN 16	687	27.1	-	-	807	31.8	490	19.3
700	28	AWWA, Class D	693	27.3	-	-	832	32.8	494	19.5
750	30	AWWA, Class D	743	29.3	-	-	833	32.8	523	20.6
800	32	DIN, PN 6	799	31.5	-	-	893	35.2	520	20.5
800	32	DIN, PN 10	795	31.3	-	-	920	36.2	540	21.3
800	32	AS, PN 16	789	31.1	-	-	914	36.0	550	21.7
800	32	AWWA, Class D	795	31.3	-	-	940	37.0	561	22.1
900	36	DIN, PN 6	897	35.3	-	-	993	39.1	570	22.4
900	36	DIN, PN 10	893	35.2	-	-	1020	40.2	590	23.2
900	36	AS, PN 16	886	34.9	-	-	1014	39.9	595	23.4
900	36	AWWA, Class D	893	35.2	-	-	1048	41.3	615	24.2
1000	40	DIN, PN 6	999	39.3	-	-	1093	43.0	620	24.4
1000	40	DIN, PN 10	995	39.2	-	-	1127	44.4	650	25.6
1000	40	AS, PN 16	988	38.9	-	-	1131	44.5	660	26.0
1000	40	AWWA, Class D	995	39.2	-	-	1163	45.8	675	26.6
1050	42	AWWA, Class D	1044	41.1	-	-	1220	48.0	704	27.7
1200	48	DIN, PN 6	1203	47.4	-	-	1310	51.6	733	28.9

- 1) Ground disks can be used for all the flange standards/pressure ratings which can be supplied in the standard version.

Weight

Compact version

Weight data:

- Including the transmitter
 - Polycarbonate plastic: 1.3 kg (2.9 lbs)
 - Aluminum: 2.0 kg (4.4 lbs)
- Excluding packaging material

Weight in SI units

Nominal diameter		EN (DIN), AS ¹⁾		ASME, AWWA		JIS	
[mm]	[in]	Pressure rating	[kg] ²⁾	Pressure rating	[kg] ²⁾	Pressure rating	[kg] ²⁾
25	1	PN 40	5	Class 150	5	10K	5
32	-	PN 40	6	Class 150	-	10K	5
40	1 ½	PN 40	8	Class 150	8	10K	6
50	2	PN 40	9	Class 150	9	10K	7
65	-	PN 16	10	Class 150	-	10K	9
80	3	PN 16	12	Class 150	12	10K	11
100	4	PN 16	14	Class 150	14	10K	13
125	-	PN 16	20	Class 150	-	10K	19
150	6	PN 16	24	Class 150	24	10K	23
200	8	PN 10	43	Class 150	43	10K	40
250	10	PN 10	63	Class 150	73	10K	68
300	12	PN 10	68	Class 150	108	10K	70
350	14	PN 6	105	Class 150	175		
375	15	PN 6	120	Class 150	-		
400	16	PN 6	120	Class 150	205		
450	18	PN 6	161	Class 150	255		
500	20	PN 6	156	Class 150	285		
600	24	PN 6	208	Class 150	405		
700	28	PN 6	304	Class D	400		
-	30	PN 6	-	Class D	460		
800	32	PN 6	357	Class D	550		
900	36	PN 6	485	Class D	800		
1000	40	PN 6	589	Class D	900		
-	42	PN 6	-	Class D	1100		
1200	48	PN 6	850	Class D	1400		
-	54	PN 6	-	Class D	2200		
1400	-	PN 6	1300	Class D	-		
-	60	PN 6	-	Class D	2700		
1600	-	PN 6	1700	Class D	-		
-	66	PN 6	-	Class D	3700		
1800	72	PN 6	2200	Class D	4100		
-	78	PN 6	-	Class D	4600		
2000	-	PN 6	2800	Class D	-		

- 1) Flanges according to AS are only available for DN 80, 100, 150 to 400, 500 and 600.
- 2) Values with polycarbonate plastic transmitter; values for aluminum transmitter: + 0.7 kg

Order code for "Design", option A "Insertion length short" with DN 450 to 2000 (18 to 78")

Nominal diameter		EN (DIN)						ASME, AWWA		AS			
[mm]	[in]	Pressure rating	[kg] ¹⁾	Pressure rating	[kg] ¹⁾	Pressure rating	[kg] ¹⁾	Pressure rating	[kg] ¹⁾	Pressure rating	[kg] ¹⁾	Pressure rating	[kg] ¹⁾
450	18	PN 6	100	PN 10	113	PN 16	139	Class 150	192	PN 16	134	Table E	144
500	20	PN 6	115	PN 10	133	PN 16	179	Class 150	229	PN 16	183	Table E	183
600	24	PN 6	156	PN 10	163	PN 16	224	Class 150	303	PN 16	261	Table E	261
700	28	PN 6	191	PN 10	241	PN 16	288	Class D	267	PN 16	368	Table E	347
750	30	PN 6	-	PN 10	-	PN 16	-	Class D	319	PN 16	446	Table E	434
800	32	PN 6	241	PN 10	316	PN 16	350	Class D	384	PN 16	504	Table E	494
900	36	PN 6	309	PN 10	394	PN 16	441	Class D	471	PN 16	703	Table E	691
1000	40	PN 6	360	PN 10	469	PN 16	563	Class D	588	PN 16	760	Table E	762
1050	42	PN 6	-	PN 10	-	PN 16	-	Class D	671	PN 16	-	Table E	-
1200	48	PN 6	530	PN 10	718	PN 16	840	Class D	902	PN 16	1220	Table E	1238
-	54	PN 6	-	PN 10	-	PN 16	-	Class D	1274	PN 16	-	Table E	-
1400	-	PN 6	785	PN 10	1115	PN 16	1201	Class D	-	PN 16	-	Table E	-
-	60	PN 6	-	PN 10	-	PN 16	-	Class D	1595	PN 16	-	Table E	-
1600	-	PN 6	1059	PN 10	1625	PN 16	1842	Class D	-	PN 16	-	Table E	-
1650	66	PN 6	-	PN 10	-	PN 16	-	Class D	2132	PN 16	-	Table E	-
1800	72	PN 6	1419	PN 10	2108	PN 16	2354	Class D	2569	PN 16	-	Table E	-
2000	78	PN 6	1878	PN 10	2631	PN 16	2926	Class D	3114	PN 16	-	Table E	-

1) Values with polycarbonate plastic transmitter; values for aluminum transmitter: + 0.7 kg

Order code for "Calibration flow", options H and K, or order code for "Calibration flow": H/K or "Sensor option", option CA "Corrosion protection" (IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M) with DN 25 to 300 (1 to 12")

Nominal diameter		EN (DIN), AS ¹⁾		ASME		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
25	1	PN 40	9	Class 150	8	10K	9
32	-	PN 40	10	Class 150	-	10K	10
40	1 ½	PN 40	11	Class 150	9	10K	10
50	2	PN 40	12	Class 150	11	10K	11
65	-	PN 16	13	Class 150	-	10K	12
80	3	PN 16	15	Class 150	15	10K	13
100	4	PN 16	17	Class 150	19	10K	15
125	-	PN 16	22	Class 150	-	10K	20
150	6	PN 16	27	Class 150	28	10K	25
200	8	PN 10	38	Class 150	44	10K	34
250	10	PN 10	51	Class 150	61	10K	50
300	12	PN 10	60	Class 150	86	10K	57

1) For flanges according to AS, DN 65 and 125 are not available.

Weight in US units

Nominal diameter		ASME, AWWA	
[mm]	[in]	Pressure rating	[lbs] ¹⁾
25	1	Class 150	11
40	1 ½	Class 150	18
50	2	Class 150	20
80	3	Class 150	26
100	4	Class 150	31
150	6	Class 150	53
200	8	Class 150	95
250	10	Class 150	161
300	12	Class 150	238
350	14	Class 150	386
400	16	Class 150	452
450	18	Class 150	562
500	20	Class 150	628
600	24	Class 150	893
700	28	Class D	882
-	30	Class D	1014
800	32	Class D	1213
900	36	Class D	1764
1000	40	Class D	1985
-	42	Class D	2426
1200	48	Class D	3087
-	54	Class D	4851
-	60	Class D	5954
-	66	Class D	8159
1800	72	Class D	9041
-	78	Class D	10143

1) Values with polycarbonate plastic transmitter; values for aluminum transmitter: + 1.45 lbs

Order code for "Design", option A "Insertion length short" with DN 450 to 2000 (18 to 78")

Nominal diameter		ASME, AWWA	
[mm]	[in]	Pressure rating	[lbs] ¹⁾
450	18	Class 150	423
500	20	Class 150	505
600	24	Class 150	668
700	28	Class D	589
750	30	Class D	703
800	32	Class D	847
900	36	Class D	1039
1000	40	Class D	1297
-	42	Class D	1480

Nominal diameter		ASME, AWWA	
[mm]	[in]	Pressure rating	[lbs] ¹⁾
1 200	48	Class D	1989
-	54	Class D	2809
-	60	Class D	3517
1 650	66	Class D	4701
1 800	72	Class D	5665
2 000	78	Class D	6866

1) Values with polycarbonate plastic transmitter; values for aluminum transmitter: + 1.45 lbs

Order code for "Sensor option", option CA "Corrosion protection" (IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M) with DN 25 to 300 (1 to 12")

Nominal diameter		ASME, AWWA	
[mm]	[in]	Pressure rating	[lbs]
25	1	Class 150	17.6
40	1 ½	Class 150	19.8
50	2	Class 150	24.3
80	3	Class 150	33.1
100	4	Class 150	41.9
150	6	Class 150	61.7
200	8	Class 150	97.0
250	10	Class 150	134.5
300	12	Class 150	189.6

Transmitter remote version

Wall-mount housing

Depends on the material of the wall-mount housing:

- Polycarbonate plastic: 1.3 kg (2.9 lb)
- Aluminum: 2.0 kg (4.4 lb)

Sensor remote version

Weight data:

- Including sensor connection housing
- Excluding the connecting cable
- Excluding packaging material

Weight in SI units

Nominal diameter		EN (DIN), AS ¹⁾		ASME, AWWA		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
25	1	PN 40	5	Class 150	5	10K	5
32	-	PN 40	6	Class 150	-	10K	5
40	1 ½	PN 40	7	Class 150	7	10K	6
50	2	PN 40	9	Class 150	9	10K	7
65	-	PN 16	10	Class 150	-	10K	9
80	3	PN 16	12	Class 150	12	10K	11
100	4	PN 16	14	Class 150	14	10K	13

Nominal diameter		EN (DIN), AS ¹⁾		ASME, AWWA		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
125	-	PN 16	20	Class 150	-	10K	19
150	6	PN 16	24	Class 150	24	10K	23
200	8	PN 10	43	Class 150	43	10K	40
250	10	PN 10	63	Class 150	73	10K	67
300	12	PN 10	68	Class 150	108	10K	70
350	14	PN 6	103	Class 150	173		
375	15	PN 6	118	Class 150	-		
400	16	PN 6	118	Class 150	203		
450	18	PN 6	159	Class 150	253		
500	20	PN 6	154	Class 150	283		
600	24	PN 6	206	Class 150	403		
700	28	PN 6	302	Class D	398		
-	30	PN 6	-	Class D	458		
800	32	PN 6	355	Class D	548		
900	36	PN 6	483	Class D	798		
1000	40	PN 6	587	Class D	898		
-	42	PN 6	-	Class D	1098		
1200	48	PN 6	848	Class D	1398		
-	54	PN 6	-	Class D	2198		
1400	-	PN 6	1298	Class D	-		
-	60	PN 6	-	Class D	2698		
1600	-	PN 6	1698	Class D	-		
-	66	PN 6	-	Class D	3698		
1800	72	PN 6	2198	Class D	4098		
-	78	PN 6	-	Class D	4598		
2000	-	PN 6	2798	Class D	-		

1) Flanges according to AS are only available for DN 80, 100, 150 to 400, 500 and 600.

Order code for "Design", option A "Insertion length short" with DN 450 to 2000 (18 to 78")

Nominal diameter		EN (DIN)						ASME, AWWA		AS			
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
450	18	PN 6	98	PN 10	111	PN 16	139	Class 150	190	PN 16	132	Table E	1
500	20	PN 6	113	PN 10	131	PN 16	179	Class 150	227	PN 16	181	Table E	1
600	24	PN 6	154	PN 10	161	PN 16	224	Class 150	301	PN 16	259	Table E	2
700	28	PN 6	190	PN 10	240	PN 16	288	Class D	266	PN 16	367	Table E	3
750	30	PN 6	-	PN 10	-	PN 16	-	Class D	318	PN 16	445	Table E	4
800	32	PN 6	240	PN 10	315	PN 16	350	Class D	383	PN 16	503	Table E	4
900	36	PN 6	308	PN 10	393	PN 16	441	Class D	470	PN 16	702	Table E	6

Nominal diameter		EN (DIN)						ASME, AWWA		AS			
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
1000	40	PN 6	359	PN 10	468	PN 16	563	Class D	587	PN 16	759	Table E	761
1050	42	PN 6	-	PN 10	-	PN 16	-	Class D	670	PN 16	-	Table E	-
1200	48	PN 6	529	PN 10	717	PN 16	840	Class D	901	PN 16	1219	Table E	1237
-	54	PN 6	-	PN 10	-	PN 16	-	Class D	1273	PN 16	-	Table E	-
1400	-	PN 6	784	PN 10	1114	PN 16	1200	Class D	-	PN 16	-	Table E	-
-	60	PN 6	-	PN 10	-	PN 16	-	Class D	1594	PN 16	-	Table E	-
1600	-	PN 6	1058	PN 10	1624	PN 16	1841	Class D	-	PN 16	-	Table E	-
1650	66	PN 6	-	PN 10	-	PN 16	-	Class D	2131	PN 16	-	Table E	-
1800	72	PN 6	1418	PN 10	2107	PN 16	2353	Class D	2568	PN 16	-	Table E	-
2000	78	PN 6	1877	PN 10	2630	PN 16	2925	Class D	3113	PN 16	-	Table E	-

Order code for "Calibration flow", options H and K, or order code "Sensor option", option CA "Corrosion protection" (IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M) with DN 25 to 300 (1 to 12")

Nominal diameter		EN (DIN), AS ¹⁾		ASME		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
25	1	PN 40	6.5	Class 150	6	10K	6.5
32	-	PN 40	8	Class 150	-	10K	7.5
40	1 ½	PN 40	8.5	Class 150	7	10K	7.5
50	2	PN 40	10	Class 150	9	10K	9
65	-	PN 16	11	Class 150	-	10K	10
80	3	PN 16	13	Class 150	13	10K	11
100	4	PN 16	15	Class 150	17	10K	13
125	-	PN 16	20	Class 150	-	10K	18
150	6	PN 16	25	Class 150	26	10K	23
200	8	PN 10	36	Class 150	42	10K	32
250	10	PN 10	49	Class 150	59	10K	48
300	12	PN 10	58	Class 150	84	10K	55

1) For flanges according to AS, DN 65 and 125 are not available.

Weight in US units

Nominal diameter		ASME, AWWA	
[mm]	[in]	Pressure rating	[lbs]
25	1	Class 150	11
40	1 ½	Class 150	15
50	2	Class 150	20
80	3	Class 150	26
100	4	Class 150	31
150	6	Class 150	53
200	8	Class 150	95

Nominal diameter		ASME, AWWA	
[mm]	[in]	Pressure rating	[lbs]
250	10	Class 150	161
300	12	Class 150	238
350	14	Class 150	381
400	16	Class 150	448
450	18	Class 150	558
500	20	Class 150	624
600	24	Class 150	889
700	28	Class D	878
-	30	Class D	1010
800	32	Class D	1208
900	36	Class D	1760
1000	40	Class D	1980
-	42	Class D	2421
1200	48	Class D	3083
-	54	Class D	4847
-	60	Class D	5949
-	66	Class D	8154
1800	72	Class D	9036
-	78	Class D	10139

Order code for "Design", option A "Insertion length short" with DN 450 to 2000 (18 to 78")

Nominal diameter		ASME, AWWA	
[mm]	[in]	Pressure rating	[lbs]
450	18	Class 150	420
500	20	Class 150	501
600	24	Class 150	664
700	28	Class D	587
750	30	Class D	701
800	32	Class D	845
900	36	Class D	1036
1000	40	Class D	1294
-	42	Class D	1477
1200	48	Class D	1987
-	54	Class D	1273
-	60	Class D	3515
1650	66	Class D	4699
1800	72	Class D	5662
2000	78	Class D	6864

Order code for "Sensor option", option CA "Corrosion protection" (IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M) with DN 25 to 300 (1 to 12")

Nominal diameter		ASME, AWWA	
[mm]	[in]	Pressure rating	[lbs]
25	1	Class 150	13
40	1 ½	Class 150	15.5
50	2	Class 150	20
80	3	Class 150	29
100	4	Class 150	37
150	6	Class 150	57
200	8	Class 150	93
250	10	Class 150	130
300	12	Class 150	185

Measuring tube specification

Nominal diameter		Pressure rating				Measuring tube internal diameter			
[mm]	[in]	EN (DIN)	ASME AWWA	AS 2129 AS 4087	JIS	Hard rubber		Polyurethane	
						[mm]	[in]	[mm]	[in]
25	1	PN 40	Class 150	-	20K	-	-	24	0.94
32	-	PN 40	-	-	20K	-	-	32	1.26
40	1 ½	PN 40	Class 150	-	20K	-	-	38	1.50
50	2	PN 40	Class 150	Table E, PN 16	10K	50	1.97	50	1.97
65	-	PN 16	-	-	10K	66	2.60	66	2.60
80	3	PN 16	Class 150	Table E, PN 16	10K	79	3.11	79	3.11
100	4	PN 16	Class 150	Table E, PN 16	10K	102	4.02	102	4.02
125	-	PN 16	-	-	10K	127	5.00	127	5.00
150	6	PN 16	Class 150	Table E, PN 16	10K	156	6.14	156	6.14
200	8	PN 10	Class 150	Table E, PN 16	10K	204	8.03	204	8.03
250	10	PN 10	Class 150	Table E, PN 16	10K	258	10.2	258	10.2
300	12	PN 10	Class 150	Table E, PN 16	10K	309	12.2	309	12.2
350	14	PN 6	Class 150	Table E, PN 16	-	342	13.5	342	13.5
375	15	-	-	PN 16	-	392	15.4	-	-
400	16	PN 6	Class 150	Table E, PN 16	-	392	15.4	392	15.4
450	18	PN 6	Class 150	-	-	437	17.2	437	17.2
500	20	PN 6	Class 150	Table E, PN 16	-	492	19.4	492	19.4
600	24	PN 6	Class 150	Table E, PN 16	-	594	23.4	594	23.4
700	28	PN 6	Class D	Table E, PN 16	-	692	27.2	692	27.2
750	30	-	Class D	Table E, PN 16	-	742	29.2	742	29.2
800	32	PN 6	Class D	Table E, PN 16	-	794	31.3	794	31.3
900	36	PN 6	Class D	Table E, PN 16	-	891	35.1	891	35.1
1000	40	PN 6	Class D	Table E, PN 16	-	994	39.1	994	39.1
-	42	-	Class D	-	-	1043	41.1	1043	41.1
1200	48	PN 6	Class D	Table E, PN 16	-	1197	47.1	1197	47.1
-	54	-	Class D	-	-	1339	52.7	-	-

Nominal diameter		Pressure rating				Measuring tube internal diameter			
		EN (DIN)	ASME AWWA	AS 2129 AS 4087	JIS	Hard rubber		Polyurethane	
[mm]	[in]					[mm]	[in]	[mm]	[in]
1400	-	PN 6	-	-	-	1402	55.2	-	-
-	60	-	Class D	-	-	1492	58.7	-	-
1600	-	PN 6	-	-	-	1600	63.0	-	-
-	66	-	Class D	-	-	1638	64.5	-	-
1800	72	PN 6	Class D	-	-	1786	70.3	-	-
2000	78	PN 6	Class D	-	-	1989	78.3	-	-

Materials

Transmitter housing

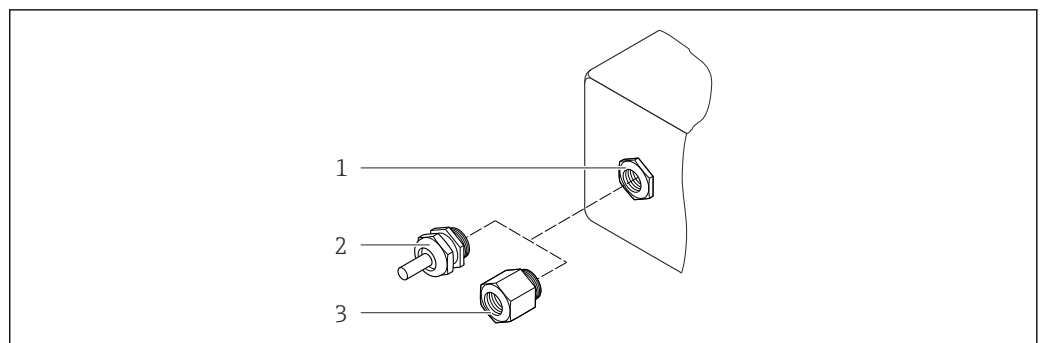
Order code for "Housing"

- Compact version, standard:
 - Option **A**: coated aluminum AlSi10Mg
 - Option **M**: polycarbonate plastic
- Compact version, inclined:
 - Option **Q**: polycarbonate plastic
 - Option **R**: coated aluminum AlSi10Mg
- Remote version (wall-mount housing):
 - Option **N**: polycarbonate plastic
 - Option **P**: coated aluminum AlSi10Mg

Window material

Transmitter housing material	Window material
Polycarbonate plastic	Plastic
Aluminum AlSi10Mg	Glass

Cable entries/cable glands



27 Possible cable entries/cable glands

- 1 Cable entry in transmitter housing, wall-mount housing or connection housing with internal thread M20 x 1.5
- 2 Cable gland M20 x 1.5
- 3 Adapter for cable entry with internal thread G 1/2" or NPT 1/2"

Compact and remote versions and sensor connection housing

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

Device plug

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

Connecting cable for remote version

Electrode and coil current cable

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

Sensor housing

- DN 25 to 300 (1 to 12"): aluminum coated AlSi10Mg
- DN 50 to 300 (2 to 12"): carbon steel with protective varnish (IP68)
- DN 350 to 2000 (14 to 78"): carbon steel with protective varnish

Sensor connection housing

- Standard: aluminum coated AlSi10Mg (IP66/67)
- Optional:
 - Polycarbonate for IP68 with DN 50 to 300 (2 to 12")
 - Polycarbonate for order code "Sensor option", option CA...CE "Corrosion protection" with DN 350 to 2000 (14 to 78")

Sensor cable entries

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

The various cable entries are suitable for hazardous and non-hazardous areas.

Electrical connection	Material
Cable gland M20 × 1.5	Nickel-plated brass Plastic ¹⁾
Thread G ½" via adapter	Nickel-plated brass
Thread NPT ½" via adapter	Nickel-plated brass

1) Only DN 50 to 300 (2 to 12"), fully welded (for sensor option CA...CE)

Measuring tubes

- DN 25 to 300 (1 to 12"): stainless steel 202, 1.4301 (304), 1.4306 (304L); for carbon steel flanges with Al/Zn protective coating
- DN 50 to 300 (2 to 12"): stainless steel 202, 1.4301 (304), 1.4306 (304L); for carbon steel flanges with protective varnish (IP68)
- DN 350 to 2000 (14 to 78"): stainless steel 202, 1.4301 (304), 1.4306 (304L); for carbon steel flanges with protective varnish

Liner

- DN 25 to 1200 (1 to 48"): polyurethane
- DN 50 to 2000 (2 to 78"): hard rubber

Electrodes

1.4435 (304L), Alloy C22, tantalum

Process connections

EN 1092-1 (DIN 2501)

- DN 25 to 2000 (1 to 78")¹⁾: 1.4571 (316L), C22, FE 410W B, 1.0038/S235JRG2
- DN 450 to 2000 (18 to 78")²⁾: 1.0038/S235JRG2, A105

ASME B16.5

- DN 25 to 600 (1 to 24")¹⁾: A105, 316L
- DN 350 to 2000 (14 to 78")²⁾: A105

AWWA C207

- DN 1200 to 1800 (48 to 72"): 1.0425/P265GH (316L)
- DN 1200 to 2000 (48 to 78")²⁾: 1.0044/S275JR, 1.0425/P265GH (316L), A105, A181

AS 2129

- DN 50 to 1200 (2 to 48"): A105, 1.0038/S235JRG2, 1.0044/S275JR
- DN 350 to 1200 (14 to 48")²⁾: 1.0038/S235JRG2, 1.0345/P235GH, 1.0425/P265GH (316L), A105, FE 410 WB

AS 4087

- DN 50 to 1200 (2 to 48"): A105, 1.0044/S275JR
- DN 350 to 1200 (14 to 48")²⁾: 1.0044/S275JR, 1.0425/P265GH (316L), A105

JIS B2220

DN 25 to 300 (1 to 12")¹⁾: HII, 1.0038/S235JRG2, 1.0425 (316L)

Seals

In accordance with DIN EN 1514-1

Accessories

Display protection

Stainless steel 1.4301

Ground disks

1.4435 (316L), Alloy C22, tantalum

Fitted electrodes

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

- 1.4435 (304L)
- Alloy C22
- Tantalum

1) DN ≤ 300 (12") with Al/Zn protective coating, DN ≥ 350 (14") with protective varnish

2) Order code for "Design", option A "Insertion length short"

Optionally available with DN 350 to 2000 (14 to 78"):
Exchangeable measuring electrodes made from 1.4435 (304L)

Process connections

Flange connections:

- EN 1092-1 (DIN 2501) ³⁾
 - DN ≤ 300 (12"): fixed flange (PN 10/16/25/40) = form A
 - DN ≥ 350 (14"): fixed flange (PN 6/10/16/25) = flat face
 - DN 450 to 2000 (18 to 78") ⁴⁾: fixed flange (PN 6/10/16) = flat face
- ASME B16.5
 - DN 25 to 600 (1 to 24"): fixed flange (Class 150)
 - DN 350 to 2000 (14 to 78") ⁴⁾: fixed flange (Class 150)
 - DN 25 to 150 (1 to 6"): fixed flange (Class 300)
- AWWA C207
 - DN 1200 to 1800 (48 to 72"): fixed flange (Class D)
 - DN 1200 to 2000 (48 to 78") ⁴⁾: fixed flange (Class D)
- AS 2129
 - DN 50 to 1200 (2 to 48"): fixed flange (Table E)
 - DN 350 to 1200 (14 to 48") ⁴⁾: fixed flange (Table E)
- AS 4087
 - DN 50 to 1200 (2 to 48"): fixed flange (PN 16)
 - DN 350 to 1200 (14 to 48") ⁴⁾: fixed flange (PN 16)
- JIS B2220
 - DN 50 to 300 (2 to 12"): fixed flange (10K)
 - DN 25 to 300 (1 to 12"): fixed flange (20K)



For information on the materials of the process connections (→ 81)

Surface roughness

Electrodes with 1.4435 (304L), Alloy C22, tantalum:
≤ 0.3 to 0.5 μm (11.8 to 19.7 in)
(All data relate to parts in contact with fluid)

Operability

Operating concept

Operator-oriented menu structure for user-specific tasks

- Commissioning
- Operation
- Diagnostics
- Expert level

Rapid and safe commissioning

- Guided menus ("Make-it-run" wizards) for applications
- Menu guidance with brief explanations of the individual parameter functions

Reliable operation


- Operation in the following languages:
 - Via local display:
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech
 - Via "FieldCare" operating tool:
English, German, French, Spanish, Italian, Dutch, Chinese, Japanese
 - Via Web browser:
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech
- Uniform operating philosophy applied to device, operating tools and Web browser
- If replacing the electronic module, transfer the device configuration via the plug-in memory (HistoROM DAT) which contains the process and measuring device data and the event logbook. No need to reconfigure.

3) Dimensions as per DIN 2501, DN 65 (2 1/2") PN 16 and DN 600 (24") PN 16 only as per EN 1092-1

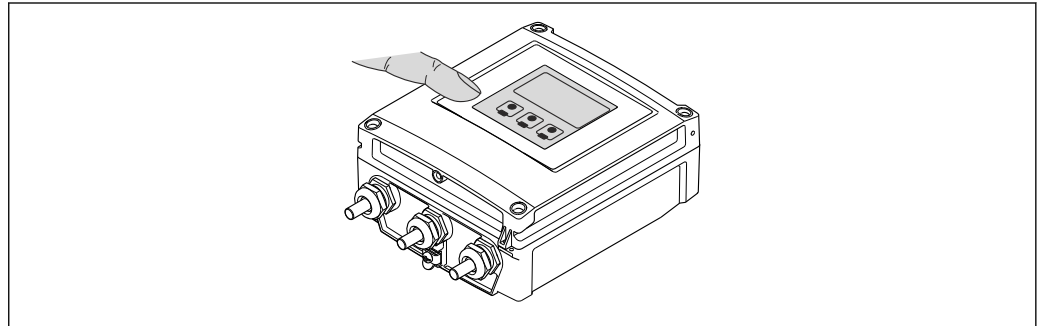
4) Order code for "Design", option A "Insertion length short"

Efficient diagnostics increase measurement availability

- Troubleshooting measures can be called up via the device, operating tools and Web browser
- Diverse simulation options, logbook for events that occur and optional line recorder functions

 In custody transfer mode, operation is only possible to a limited extent once the device has been put into circulation or has been lead-sealed.

Local operation






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Display elements

- 4-line display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: -20 to +50 °C (-4 to +122 °F)
The readability of the display may be impaired at temperatures outside the temperature range.

Operating elements

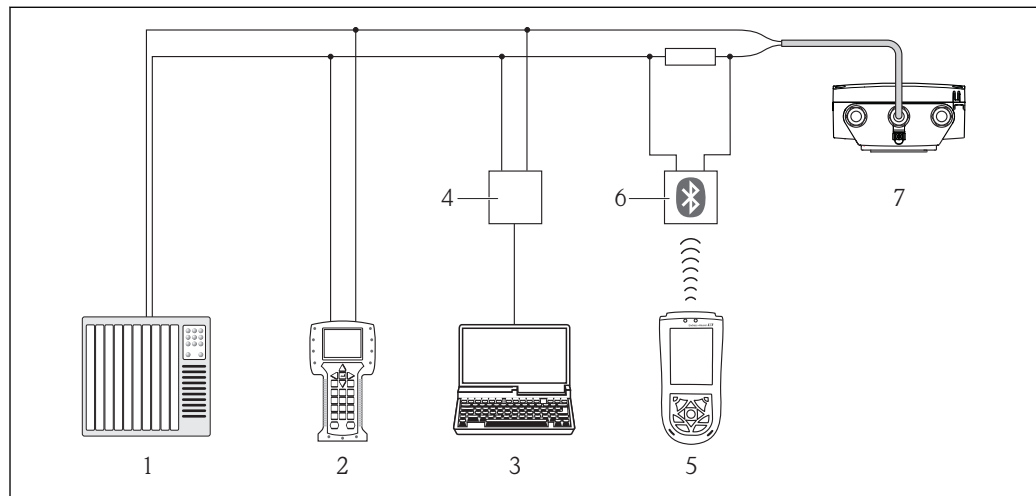
External operation via touch control; 3 optical keys: , , 

Additional functionality

- Data backup function
The device configuration can be saved in the display module.
- Data comparison function
The device configuration saved in the display module can be compared to the current device configuration.
- Data transfer function
The transmitter configuration can be transmitted to another device using the display module.

Remote operation

Via HART protocol

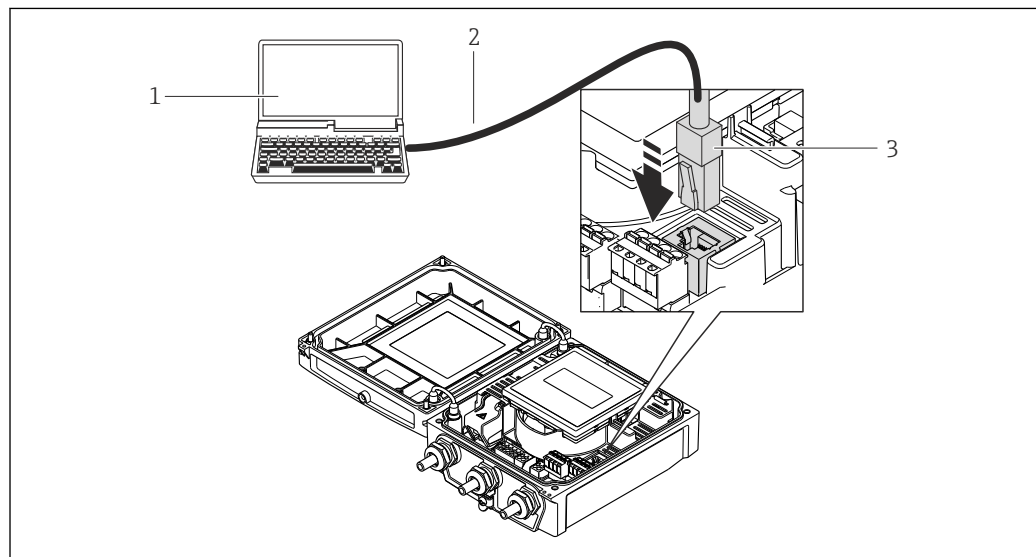


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28 Options for remote operation via HART protocol

- 1 Control system (e.g. PLC)
- 2 Field Communicator 475
- 3 Computer with operating tool (e.g. FieldCare, AMS Device Manager, SIMATIC PDM)
- 4 Commubox FXA195 (USB)
- 5 Field Xpert SFX100
- 6 VIATOR Bluetooth modem with connecting cable
- 7 Transmitter

Via service interface (CDI-RJ45)

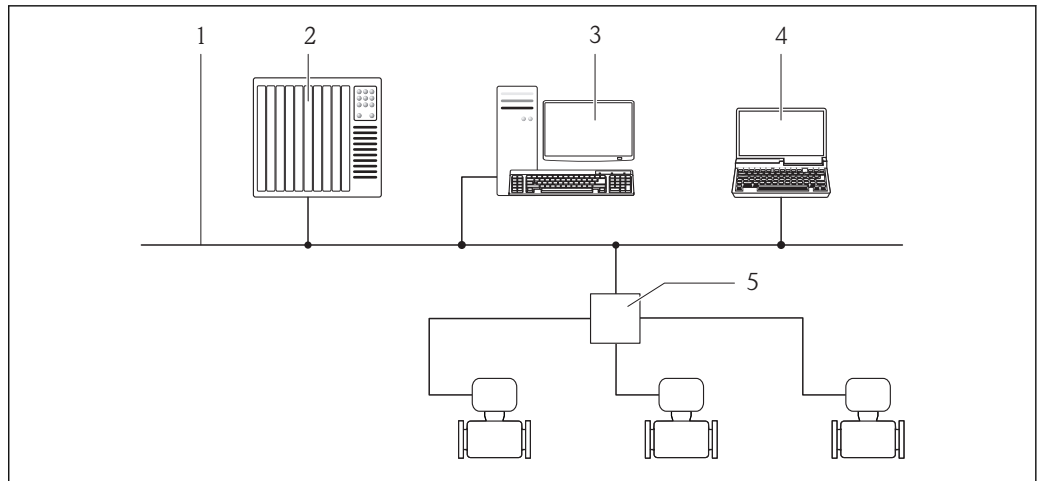


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- 1 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated device Web server or with "FieldCare" operating tool with COM DTM "CDI Communication TCP/IP"
- 2 Standard Ethernet connecting cable with RJ45 plug
- 3 Service interface (CDI -RJ45) of the measuring device with access to the integrated Web server

Via Ethernet network

This communication interface is present in the following device version:
Order code for "Output", option N: EtherNet/IP



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

Certificates and approvals

CE mark	<p>The measuring system is in conformity with the statutory requirements of the applicable EC Directives. These are listed in the corresponding EC Declaration of Conformity along with the standards applied.</p> <p>Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.</p>
C-Tick symbol	<p>The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".</p>
Drinking water approval	<ul style="list-style-type: none"> ■ ACS ■ KTW/W270 ■ NSF 61 ■ WRAS BS 6920
EtherNet/IP certification	<p>The measuring device is certified and registered by the ODVA (Open Device Vendor Association). The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ■ Certified in accordance with the ODVA Conformance Test ■ EtherNet/IP Performance Test ■ EtherNet/IP PlugFest compliance ■ The device can also be operated with certified devices of other manufacturers (interoperability)
Measuring instrument approval	<p>Promag W 400 is (optionally) approved as a cold water meter (MI-001) for volume measurement in service subject to legal metrological control in accordance with the European Measuring Instruments Directive 2004/22/EC (MID).</p> <p>Promag W 400 is qualified to OIML R49 and has an OIML Certificate of Conformity (optional).</p>
Other standards and guidelines	<ul style="list-style-type: none"> ■ EN 60529 Degrees of protection by housing (IP code) ■ EN 61010-1 Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures. ■ IEC/EN 61326 Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements)

- ANSI/ISA-61010-1 (82.02.01): 2004
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General Requirements
- CAN/CSA-C22.2 No. 61010-1-04
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General Requirements
- NAMUR NE 21
Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment.
- NAMUR NE 32
Data Retention in the Event of a Power Failure in Field and Control Instruments with Microprocessors
- NAMUR NE 43
Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53
Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 105
Specifications for Integrating Fieldbus Devices in Engineering Tools for Field Devices
- NAMUR NE 107
Self-monitoring and diagnosis of field devices
- NAMUR NE 131
Requirements for field devices for standard applications

Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: www.endress.com/worldwide

Product Configurator - the tool for individual product configuration

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

Application packages

Many different application packages are available to enhance the functionality of the device. Such packages might be needed to address safety aspects or specific application requirements.

The application packages can be ordered from Endress+Hauser either directly with the device or subsequently. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Cleaning

Package	Description
Electrode cleaning circuit (ECC)	The electrode cleaning circuit (ECC) function has been developed to have a solution for applications where magnetite (Fe_3O_4) deposits frequently occur (e.g. hot water). Since magnetite is highly conductive this build up leads to measuring errors and ultimately to the loss of signal. The option is designed to AVOID build up of highly conductive matter and thin layers (typically magnetite).

Diagnostics functions

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

Heartbeat Technology


Package	Description
Heartbeat Verification +Monitoring	<p>Heartbeat Monitoring: Continuously supplies monitoring data, which are characteristic of the measuring principle, for an external condition monitoring system. This makes it possible to:</p> <ul style="list-style-type: none"> ▪ Draw conclusions - using these data and other information - about the impact the measuring application has on the measuring performance over time. ▪ Schedule servicing in time. ▪ Monitor the product quality, e.g. gas pockets. <p>Heartbeat Verification: Makes it possible to check the device functionality on demand when the device is installed, without having to interrupt the process.</p> <ul style="list-style-type: none"> ▪ Access via onsite operation or other interfaces (requires no on-site presence). ▪ End-to-end, traceable documentation of the verification results and verification report. ▪ Extension of calibration intervals.

Accessories


Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Device-specific accessories







For the transmitter

Accessories	Description
Display protection	<p>Is used to protect the display against impact or scoring from sand in desert areas.</p> <p> For details, see Special Documentation SD00333F</p>
Connecting cable for remote version	Coil current and electrode cables, various lengths, reinforced cables available on request.
Ground cable	Set, consisting of two ground cables for potential equalization.
Pipe mounting set	Pipe mounting set for transmitter.
Compact → remote conversion kit	For converting a compact device version to a remote device version.
Promag 50/53 → Promag 400 conversion kit	For converting a Promag with transmitter 50/53 to a Promag 400.

For the sensor


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

Communication-specific accessories


Accessories	Description
Commubox FXA195 HART	<p>For intrinsically safe HART communication with FieldCare via the USB interface.</p> <p> For details, see "Technical Information" TI00404F</p>
HART Loop Converter HMX50	<p>Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values.</p> <p> For details, see "Technical Information" TI00429F and Operating Instructions BA00371F</p>
Wireless HART adapter SWA70	<p>Is used for the wireless connection of field devices. The WirelessHART adapter can be easily integrated into field devices and existing infrastructures, offers data protection and transmission safety and can be operated in parallel with other wireless networks with minimum cabling complexity.</p> <p> For details, see Operating Instructions BA00061S</p>
Fieldgate FXA320	<p>Gateway for the remote monitoring of connected 4-20 mA measuring devices via a Web browser.</p> <p> For details, see "Technical Information" TI00025S and Operating Instructions BA00053S</p>
Fieldgate FXA520	<p>Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser.</p> <p> For details, see "Technical Information" TI00025S and Operating Instructions BA00051S</p>
Field Xpert SFX100	<p>Compact, flexible and robust industry handheld terminal for remote configuration and for obtaining measured values via the HART current output (4-20 mA).</p> <p> For details, see Operating Instructions BA00060S</p>

Service-specific accessories

Accessories	Description
Applicator	<p>Software for selecting and sizing Endress+Hauser measuring devices:</p> <ul style="list-style-type: none"> ■ Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, accuracy or process connections. ■ Graphic illustration of the calculation results <p>Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.</p> <p>Applicator is available:</p> <ul style="list-style-type: none"> ■ Via the Internet: https://wapps.endress.com/applicator ■ On CD-ROM for local PC installation.

W@M	<p>Life cycle management for your plant</p> <p>W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant device information, such as the device status, spare parts and device-specific documentation, is available for every device over the entire life cycle.</p> <p>The application already contains the data of your Endress+Hauser device. Endress+Hauser also takes care of maintaining and updating the data records.</p> <p>W@M is available:</p> <ul style="list-style-type: none"> ▪ Via the Internet: www.endress.com/lifecyclemanagement ▪ On CD-ROM for local PC installation.
FieldCare	<p>FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.</p> <p> For details, see Operating Instructions BA00027S and BA00059S</p>

System components

Accessories	Description
Memograph M graphic display recorder	<p>The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick.</p> <p> For details, see "Technical Information" TI00133R and Operating Instructions BA00247R</p>

Documentation




The following document types are available:

- On the CD-ROM supplied with the device
- In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download

Standard documentation

Communication	Document type	Documentation code
HART	Operating Instructions	BA01063D
EtherNet/IP	Operating Instructions	BA01214D
- - - -	Brief Operating Instructions	KA01114D

Supplementary device-dependent documentation

Document type	Approval	Documentation code
Special Documentation	Heartbeat Technology	SD01183D
Special Documentation	Information on Custody Transfer Measurement	SD01230D
Installation Instructions		Specified for each individual accessory (→  87)

Registered trademarks

HART®

Registered trademark of the HART Communication Foundation, Austin, USA

EtherNet/IP™

Trademark of ODVA, Inc.

Microsoft®

Registered trademark of the Microsoft Corporation, Redmond, Washington, USA

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