

Technical Information

Proline Promag W 400

Electromagnetic flowmeter



Sensor with EN ISO 12944 corrosion protection and state-of-the-art transmitter for Water & Wastewater

Application

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

Device properties

- International drinking water approvals
- Degree of protection IP68 (Type 6P enclosure)
- Approved for custody transfer to MI-001/OIML R49
- Transmitter housing made of durable polycarbonate or aluminum
- WLAN access
- 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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

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About this document

Symbols used









Electrical symbols

Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current
	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	Protective Earth (PE) A terminal which must be connected to ground prior to establishing any other connections. The ground terminals are situated inside and outside the device: <ul style="list-style-type: none"> ▪ Inner ground terminal: Connects the protective earth to the mains supply. ▪ Outer ground terminal: Connects the device to the plant grounding system.




Communication symbols

Symbol	Meaning
	Wireless Local Area Network (WLAN) Communication via a wireless, local network.
	Bluetooth Wireless data transmission between devices over a short distance.
	LED Light emitting diode is off.
	LED Light emitting diode is on.
	LED Light emitting diode is flashing.

Symbols for certain types of information

Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.
	Preferred Procedures, processes or actions that are preferred.
	Forbidden Procedures, processes or actions that are forbidden.
	Tip Indicates additional information.
	Reference to documentation.
	Reference to page.
	Reference to graphic.
	Visual inspection.

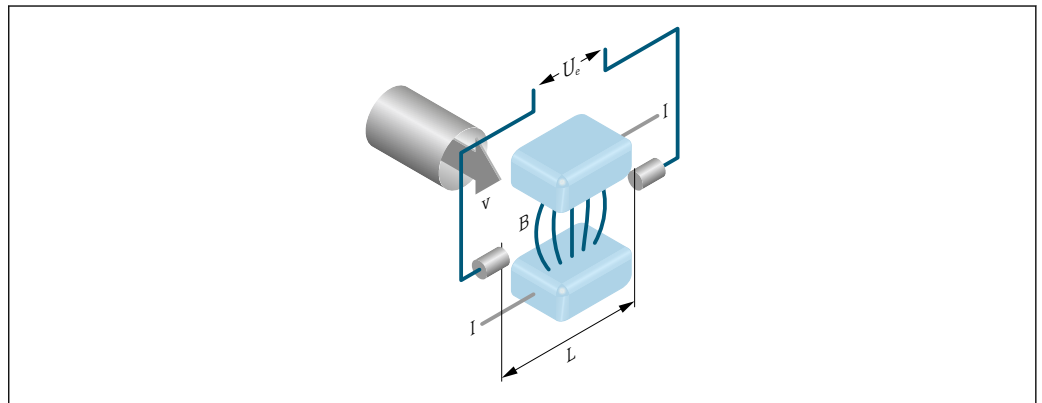
Symbols in graphics

Symbol	Meaning
1, 2, 3, ...	Item numbers
1, 2, 3, ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
	Hazardous area
	Safe area (non-hazardous area)
	Flow direction

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.



A0028962

- 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 $Q = A \cdot v$

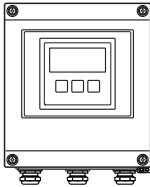
Measuring system

The device consists of a transmitter and a sensor.

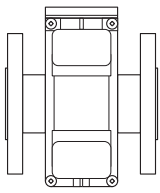
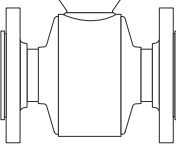
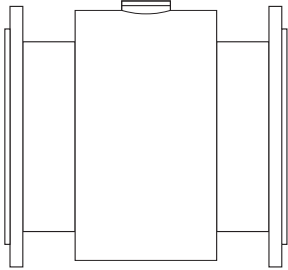
Two device versions are available:

- Compact version – transmitter and sensor form a mechanical unit.
- Remote version - transmitter and sensor are mounted in separate locations.

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 - Aluminum, AlSi10Mg, coated ■ Remote version: wall-mount housing <ul style="list-style-type: none"> - Polycarbonate plastic - Aluminum, AlSi10Mg, coated <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) ■ Also for device version with PROFIBUS DP output: <ul style="list-style-type: none"> - Via PDM driver for Siemens automation system
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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>	<ul style="list-style-type: none"> ■ Nominal diameter range: DN 25 to 2000 (1 to 78") ■ Materials: <ul style="list-style-type: none"> - Sensor housing: aluminum, AlSi10Mg, coated; carbon steel with protective varnish - Sensor connection housing (standard): aluminum, AlSi10Mg, coated - Sensor connection housing (option): polycarbonate - Measuring tubes ¹⁾: <ul style="list-style-type: none"> DN 25 to 300 (1 to 12"): stainless steel, 1.4301/1.4306/304/304L DN 350 to 2000 (14 to 78"): stainless steel, 1.4301/304 - Liner: hard rubber, polyurethane - Electrodes: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum - Process connections: <ul style="list-style-type: none"> Stainless steel, 1.4404/1.4571/F316L Carbon steel, A105/A181/A515(70)/FE410WB/P250GH/ P235 GH/P265GH/S235JRG2/S235JR+N/S275JR - Seals: as per DIN EN 1514-1 Form IBC - Ground disks: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum
<p><i>Fixed flange: DN 25 to 300 (1 to 12")</i></p>  <p style="text-align: right; font-size: small;">A0022673</p>	
<p><i>Fixed flange: DN 350 to 2000 (14 to 78")</i></p>  <p style="text-align: right; font-size: small;">A0017041</p>	

1) For carbon steel flange material with Al/Zn protective coating (DN 25 to 300 (1 to 12")), protective varnish (IP68) (DN 50 to 300 (2 to 12")) or protective varnish ≥ DN 350 (14")

WLAN passphrase

A connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface which can be ordered as an option is protected by the network key. The WLAN authentication of the network key complies with the IEEE 802.11 standard.

When the device is delivered, the network key is pre-defined depending on the device. It can be changed via the **WLAN settings** submenu in the **WLAN passphrase** parameter.

General notes on the use of passwords

- The access code and network key supplied with the device should be changed during commissioning.
- Follow the general rules for generating a secure password when defining and managing the access code or network key.
- The user is responsible for the management and careful handling of the access code and network key.

Access via fieldbus

When communicating via fieldbus, access to the device parameters can be restricted to "Read only" access. The option can be changed in the **Fieldbus writing access** parameter.

This does not affect cyclic measured value transmission to the higher-order system, which is always guaranteed.



For detailed information, see the "Description of Device Parameters" document pertaining to the device → 128

Access via Web server

The device can be operated and configured via a Web browser with the integrated Web server. The connection is via the service interface (CDI-RJ45) or the WLAN interface. For device versions with the EtherNet/IP and PROFINET communication protocols, the connection can also be established via the terminal connection for signal transmission with EtherNet/IP or PROFINET (RJ45 connector).

The Web server is enabled when the device is delivered. The Web server can be disabled if necessary (e.g. after commissioning) via the **Web server functionality** parameter.

The device and status information can be hidden on the login page. This prevents unauthorized access to the information.



For detailed information, see the "Description of Device Parameters" document pertaining to the device → 128

Input

Measured variable

Direct measured variables

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



In custody transfer: only volume flow

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 $\mu\text{S}/\text{cm}$ for liquids in general

Flow characteristic values in SI units ¹⁾

Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.3/10 m/s) [m ³ /h]	Factory settings		
[mm]	[in]		Full scale value current output (v ~ 2.5 m/s) [m ³ /h]	Pulse value (~ 2 pulse/s) [m ³]	Low flow cut off (v ~ 0.04 m/s) [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
–	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

1) Order code for "Design", option A "Insertion length short ISO/DVGW until DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long ISO/DVGW until DN400, DN450-2000 1:1.3"

Flow characteristic values in SI units ¹⁾

Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.12/5 m/s)	Factory settings		
[mm]	[in]		Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 4 pulse/s)	Low flow cut off (v ~ 0.01 m/s)
		[m ³ /h]	[m ³ /h]	[m ³]	[m ³ /h]
50	2	15 to 600 dm ³ /min	300 dm ³ /min	1.25 dm ³	1.25 dm ³ /min
65	–	25 to 1 000 dm ³ /min	500 dm ³ /min	2 dm ³	2 dm ³ /min
80	3	35 to 1 500 dm ³ /min	750 dm ³ /min	3 dm ³	3.25 dm ³ /min
100	4	60 to 2 400 dm ³ /min	1 200 dm ³ /min	5 dm ³	4.75 dm ³ /min
125	–	90 to 3 700 dm ³ /min	1 850 dm ³ /min	8 dm ³	7.5 dm ³ /min
150	6	145 to 5 400 dm ³ /min	2 500 dm ³ /min	10 dm ³	11 dm ³ /min
200	8	220 to 9 400 dm ³ /min	5 000 dm ³ /min	20 dm ³	19 dm ³ /min
250	10	20 to 850	500	0.03	1.75
300	12	35 to 1 300	750	0.05	2.75

- 1) Order code for "Design", option C "Insertion length short ISO/DVGW until DN300, w/o inlet and outlet runs, constricted meas.tube"

Flow characteristic values in US units ¹⁾

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



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]
32	800	2 450 to 80 000	19 500	200	300
36	900	3 100 to 100 000	24 000	225	360
40	1000	3 800 to 125 000	30 000	250	480
42	-	4 200 to 135 000	33 000	250	600
48	1200	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
-	1400	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
-	1600	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	1800	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
-	2000	20 to 700 Mgal/d	175 Mgal/d	0.0010 Mgal/d	2.9 Mgal/d

- 1) Order code for "Design", option A "Insertion length short ISO/DVGW until DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long ISO/DVGW until DN400, DN450-2000 1:1.3"

Flow characteristic values in US units ¹⁾


Nominal diameter		Recommended flow min./max. full scale value (v ~ 0.12/5 m/s)	Factory settings		
[in]	[mm]		Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 4 pulse/s)	Low flow cut off (v ~ 0.01 m/s)
		[gal/min]	[gal/min]	[gal]	[gal/min]
2	50	4 to 160	75	0.3	0.35
-	65	7 to 260	130	0.5	0.6
3	80	10 to 400	200	0.8	0.8
4	100	16 to 650	300	1.2	1.25
-	125	24 to 1000	450	1.8	2
6	150	40 to 1400	600	2.5	3
8	200	60 to 2500	1200	5	5
10	250	90 to 3700	1500	6	8
12	300	155 to 5700	2400	9	12

- 1) Order code for "Design", option C "Insertion length short ISO/DVGW until DN300, w/o inlet and outlet runs, constricted meas.tube"

 To calculate the measuring range, use the *Applicator* sizing tool →  127

Recommended measuring range

"Flow limit" section →  45

 For custody transfer, the applicable approval determines the permitted measuring range, the pulse value and the low flow cut off.

Operable flow range

Over 1000 : 1

i For custody transfer, the operable flow range is 100 : 1 to 250 : 1, depending on the nominal diameter. Further details are specified by the applicable approval.

Input signal**External measured values**

i Various pressure transmitters and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section → [127](#)

It is recommended to read in external measured values to calculate the following measured variables:
Corrected volume flow

HART protocol

The measured values are written from the automation system to the measuring device via the HART protocol. The pressure transmitter must support the following protocol-specific functions:

- HART protocol
- Burst mode

Digital communication

The measured values can be written from the automation system to the measuring via:

- PROFIBUS DP
- Modbus RS485
- EtherNet/IP

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 (no flow) ▪ 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 ▪ Electronic 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"> ▪ DC 30 V ▪ 250 mA
Voltage drop	For 25 mA: ≤ DC 2 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 ▪ Conductivity ▪ Flow velocity ▪ Electronic 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 - Conductivity - Flow velocity - Totalizer 1-3 - Electronic temperature ▪ Flow direction monitoring ▪ Status <ul style="list-style-type: none"> - Empty pipe detection - Low flow cut off

PROFIBUS DP

Signal encoding	NRZ code
Data transfer	9.6 kBaud...12 MBaud

Modbus RS485

Physical interface	In accordance with EIA/TIA-485-A standard
Terminating resistor	Integrated, can be activated via DIP switch on the transmitter electronics module

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 to 20 mA*4 to 20 mA*

Failure mode	Choose from: <ul style="list-style-type: none"> ▪ 4 to 20 mA in accordance with NAMUR recommendation NE 43 ▪ 4 to 20 mA in accordance with US ▪ Min. value: 3.59 mA ▪ Max. value: 22.5 mA ▪ Freely definable value between: 3.59 to 22.5 mA ▪ Actual value ▪ Last valid value
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0 to 20 mA

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

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 ▪ 0 Hz ▪ Defined value: 0 to 12 500 Hz
Switch output	
Failure mode	Choose from: <ul style="list-style-type: none"> ▪ Current status ▪ Open ▪ Closed

PROFIBUS DP

Status and alarm messages	Diagnostics in accordance with PROFIBUS PA Profile 3.02
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Modbus RS485

Failure mode	Choose from: <ul style="list-style-type: none"> ▪ NaN value instead of current value ▪ Last valid value
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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

Interface/protocol

- Via digital communication:
 - HART protocol
 - PROFIBUS DP
 - Modbus RS485
 - EtherNet/IP
- Via service interface
 - CDI-RJ45 service interface
 - WLAN interface

Plain text display	With information on cause and remedial measures
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 Additional information on remote operation →  117

Web server

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

Status information	Status indicated by various light emitting diodes The following information is displayed depending on the device version: <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	0x69
HART protocol revision	7
Device description files (DTM, DD)	Information and files under: www.endress.com
HART load	Min. 250 Ω
Dynamic variables	<p>Read out the dynamic variables: HART command 3 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 ▪ Conductivity ▪ Flow velocity ▪ Electronic 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 ▪ Conductivity ▪ Flow velocity ▪ Electronic temperature ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3
Device variables	<p>Read out the device variables: HART command 9 The device variables are permanently assigned.</p> <p>A maximum of 8 device variables can be transmitted:</p> <ul style="list-style-type: none"> ▪ 0 = volume flow ▪ 1 = mass flow ▪ 2 = conductivity ▪ 3 = flow velocity ▪ 4 = electronic temperature ▪ 5 = totalizer 1 ▪ 6 = totalizer 2 ▪ 7 = totalizer 3

PROFIBUS DP

Manufacturer ID	0x11
Ident number	0x1562
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: <ul style="list-style-type: none"> ▪ www.endress.com ▪ www.profibus.org
Output values (from measuring device to automation system)	<p>Analog input 1 to 4</p> <ul style="list-style-type: none"> ▪ Mass flow ▪ Volume flow ▪ Flow velocity ▪ Conductivity ▪ Electronic temperature <p>Digital input 1 to 2</p> <ul style="list-style-type: none"> ▪ Empty pipe detection ▪ Low flow cut off ▪ Verification status <p>Totalizer 1 to 3</p> <ul style="list-style-type: none"> ▪ Mass flow ▪ Volume flow


<p>Input values (from automation system to measuring device)</p>	<p>Analog output 1 (fixed assignment) External density</p> <p>Digital output 1 to 2 (fixed assignment)</p> <ul style="list-style-type: none"> ▪ Digital output 1: switch positive zero return on/off ▪ Digital output 2: start verification <p>Totalizer 1 to 3</p> <ul style="list-style-type: none"> ▪ Totalize ▪ Reset and hold ▪ Preset and hold ▪ Stop ▪ Operating mode configuration: <ul style="list-style-type: none"> - Net flow total - Forward flow total - Reverse flow total
<p>Supported functions</p>	<ul style="list-style-type: none"> ▪ Identification & Maintenance Simplest device identification on the part of the control system and nameplate ▪ PROFIBUS upload/download Reading and writing parameters is up to ten times faster with PROFIBUS upload/download ▪ Condensed status Simplest and self-explanatory diagnostic information by categorizing diagnostic messages that occur
<p>Configuration of the device address</p>	<ul style="list-style-type: none"> ▪ DIP switches on the I/O electronics module ▪ Via operating tools (e.g. FieldCare)

Modbus RS485

<p>Protocol</p>	<p>Modbus Applications Protocol Specification V1.1</p>
<p>Device type</p>	<p>Slave</p>
<p>Slave address range</p>	<p>1 to 247</p>
<p>Broadcast address range</p>	<p>0</p>
<p>Function codes</p>	<ul style="list-style-type: none"> ▪ 03: Read holding register ▪ 04: Read input register ▪ 06: Write single registers ▪ 08: Diagnostics ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers
<p>Broadcast messages</p>	<p>Supported by the following function codes:</p> <ul style="list-style-type: none"> ▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers
<p>Supported baud rate</p>	<ul style="list-style-type: none"> ▪ 1 200 BAUD ▪ 2 400 BAUD ▪ 4 800 BAUD ▪ 9 600 BAUD ▪ 19 200 BAUD ▪ 38 400 BAUD ▪ 57 600 BAUD ▪ 115 200 BAUD
<p>Data transfer mode</p>	<ul style="list-style-type: none"> ▪ ASCII ▪ RTU
<p>Data access</p>	<p>Each device parameter can be accessed via Modbus RS485.</p> <p> For Modbus register information</p>

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) ▪ Custom Add-on Profile 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) ▪ Custom Add-on Profile 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:	0x64	32

Input Assembly	<ul style="list-style-type: none"> ■ Current device diagnostics ■ Volume flow ■ Mass flow ■ Conductivity ■ 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:	0x65	88
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0xC7	-
	T → O configuration:	0x65	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 ■ Mass flow ■ Electronic temperature ■ Conductivity ■ Totalizer 1 to 3 ■ Flow velocity ■ Volume flow unit ■ Mass flow unit ■ Temperature unit ■ Conductivity unit ■ Unit totalizer 1-3 ■ Flow velocity unit ■ Verification result ■ Verification status <p> The range of options increases if the measuring device has one or more application packages.</p>		
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 ■ Activation verification ■ Start verification 		

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 ▪ Conductivity ▪ Temperature unit ▪ 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

The sensor can be ordered with terminals.

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 ½" ▪ Option D: thread NPT ½"

Supply voltage

Order code "Power supply"	Terminal numbers	terminal voltage		Frequency range
Option L (wide range power unit)	1 (L+/L), 2 (L-/N)	DC 24 V	±25%	-
		AC 24 V	±25%	50/60 Hz, ±4 Hz
		AC 100 to 240 V	-15 to +10%	50/60 Hz, ±4 Hz

Signal transmission 0-20 mA/4-20 mA HART and 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

Transmitter: PROFIBUS DP

The sensor can be ordered with terminals.

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 ½" ■ Option D: thread NPT ½"

Supply voltage

Order code "Power supply"	Terminal numbers	terminal voltage		Frequency range
Option L (wide range power unit)	1 (L+/L), 2 (L-/N)	DC 24 V	±25%	–
		AC 24 V	±25%	50/60 Hz, ±4 Hz
		AC 100 to 240 V	–15 to +10%	50/60 Hz, ±4 Hz

PROFIBUS DP signal transmission

Order code for "Output" and "Input"	Terminal numbers	
	26 (RxD/TxD-P)	27 (RxD/TxD-N)
Option L	B	A
Order code for "Output": Option L: PROFIBUS DP, for use in non-hazardous areas and Zone 2/div. 2		

Transmitter: Modbus RS485

The sensor can be ordered with terminals.

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 ½" ■ Option D: thread NPT ½"

Supply voltage

Order code "Power supply"	Terminal numbers	terminal voltage		Frequency range
Option L (wide range power unit)	1 (L+/L), 2 (L-/N)	DC 24 V	±25%	–
		AC 24 V	±25%	50/60 Hz, ±4 Hz
		AC 100 to 240 V	–15 to +10%	50/60 Hz, ±4 Hz

Signal transmission Modbus RS485

Order code for "Output" and "Input"	Terminal numbers	
	26 (+)	27 (-)
Option M	B	A

Transmitter: EtherNet/IP

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 ½" ▪ Option D: thread NPT ½"
Device plug	terminals	<ul style="list-style-type: none"> ▪ Option L: plug M12x1 + thread NPT ½" ▪ Option N: plug M12x1 + coupling M20 ▪ Option P: plug M12x1 + thread G ½" ▪ Option U: plug M12x1 + thread M20

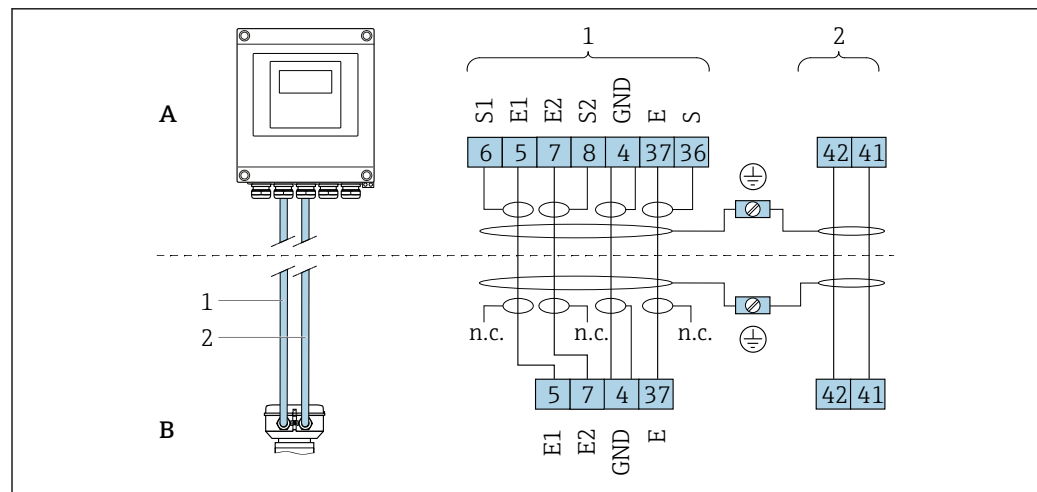
Supply voltage

Order code "Power supply"	Terminal numbers	terminal voltage		Frequency range
Option L (wide range power unit)	1 (L+/L), 2 (L-/N)	DC 24 V	±25%	-
		AC 24 V	±25%	50/60 Hz, ±4 Hz
		AC 100 to 240 V	-15 to +10%	50/60 Hz, ±4 Hz

EtherNet/IP signal transmission

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

Remote version



2 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

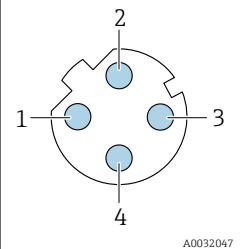
Terminal No. and cable colors: 6/5 = brown; 7/8 = white; 4 = green; 36/37 = yellow

Pin assignment, device plug

Order codes for the M12x1 connectors, see the "Order code for electrical connection" column: EtherNet/IP → 22

EtherNet/IP

Device plug for signal transmission (device side)

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



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	DC 24 V	±25%	-
	AC 24 V	±25%	50/60 Hz, ±4 Hz
	AC 100 to 240 V	-15 to +10%	50/60 Hz, ±4 Hz

Power consumption

Order code for "Output"	Maximum power consumption
Option H: 4-20mA HART, pulse/frequency/switch output, switch output	30 VA/8 W
Option I: 4-20mA HART, 2 x pulse/frequency/switch output, status input	30 VA/8 W
Option J: 4-20mA HART, certified pulse output, pulse/frequency/switch output, status input	30 VA/8 W
Option L: PROFIBUS DP	30 VA/8 W
Option M: Modbus RS485	30 VA/8 W
Option N: EtherNet/IP	30 VA/8 W

Current consumption

Transmitter

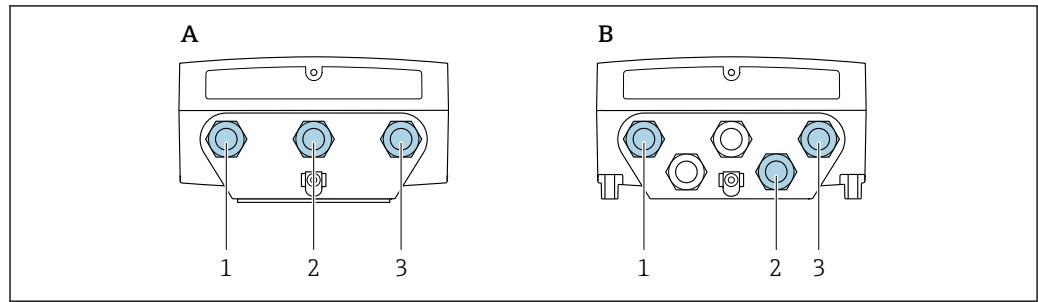
Order code for "Power supply"	Maximum Current consumption	Maximum switch-on current
Option L: AC 100 to 240 V	145 mA	25 A (< 5 ms)
Option L: AC/DC 24 V	350 mA	27 A (< 5 ms)

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



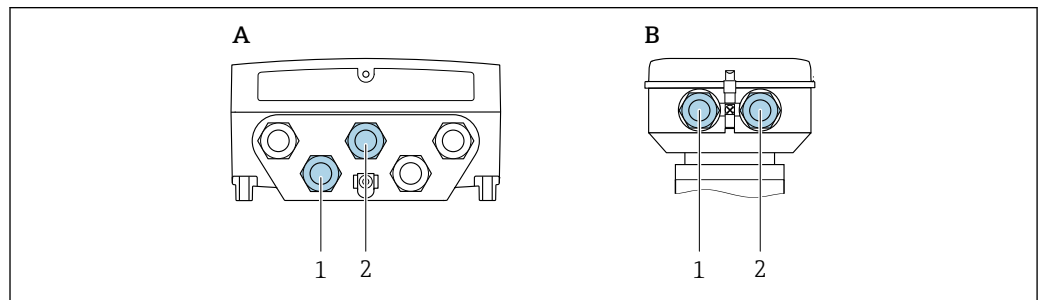
A0032041

■ 3 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
 3 Cable entry for signal transmission

Remote version connection

Connecting cable



A0032042

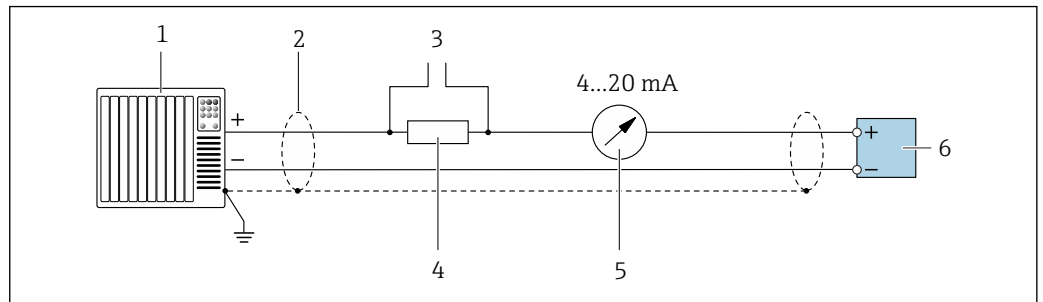
■ 4 Connecting cable connection: electrode and coil current cable

- 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 .

Connection examples

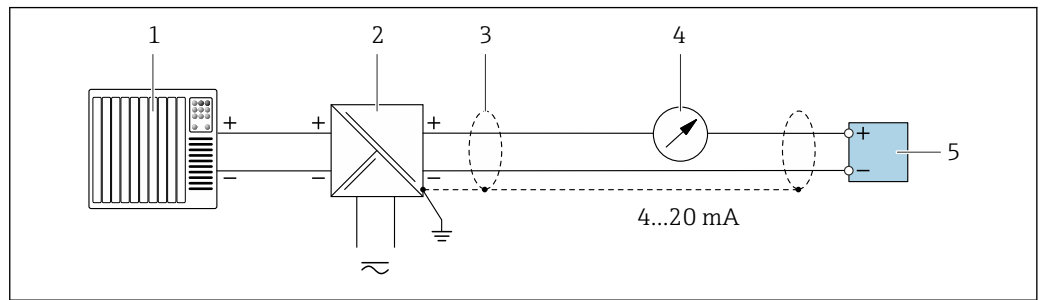
Current output 4 to 20 mA HART



A0029055

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

- 1 Automation system with current input (e.g. PLC)
- 2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 30
- 3 Connection for HART operating devices → 117
- 4 Resistor for HART communication ($\geq 250 \Omega$): observe maximum load → 12
- 5 Analog display unit: observe maximum load → 12
- 6 Transmitter

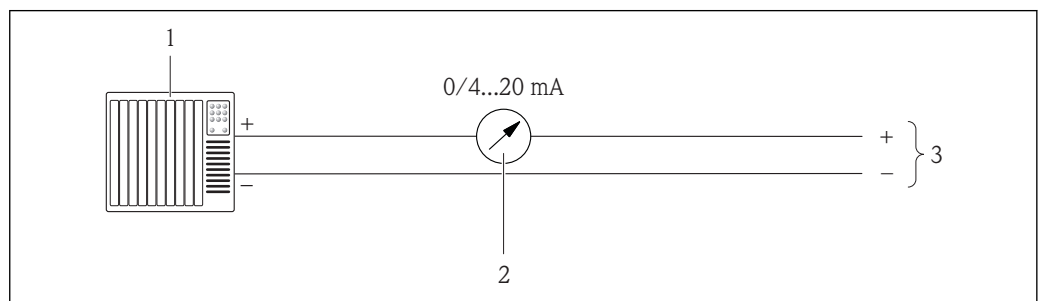


A0028762

6 Connection example for 4 to 20 mA HART current output (passive)

- 1 Automation system with current input (e.g. PLC)
- 2 Power supply
- 3 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 30
- 4 Analog display unit: observe maximum load → 12
- 5 Transmitter

Current output 4-20 mA

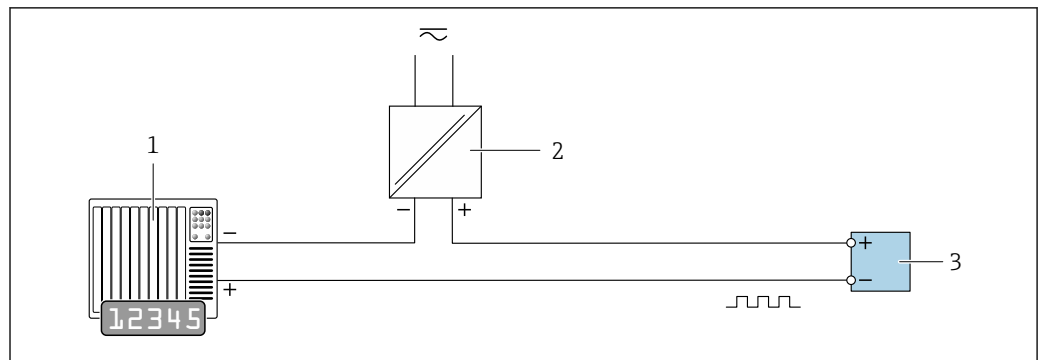


A0017162

7 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
- 3 Transmitter

Pulse/frequency output

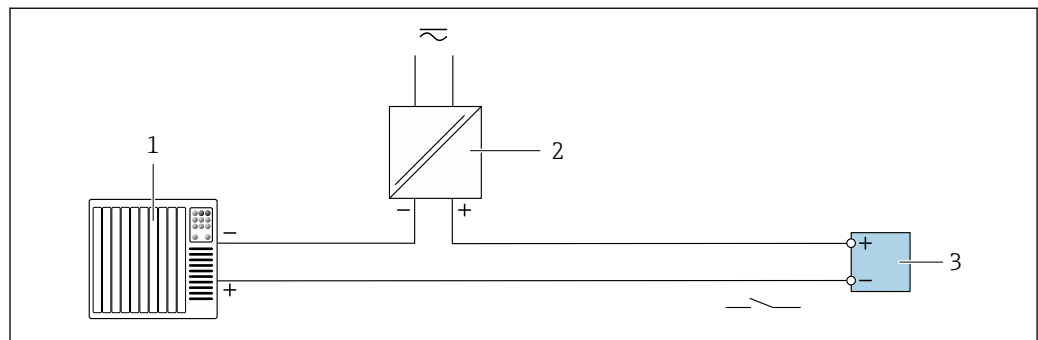


A0028761

8 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 → 13

Switch output

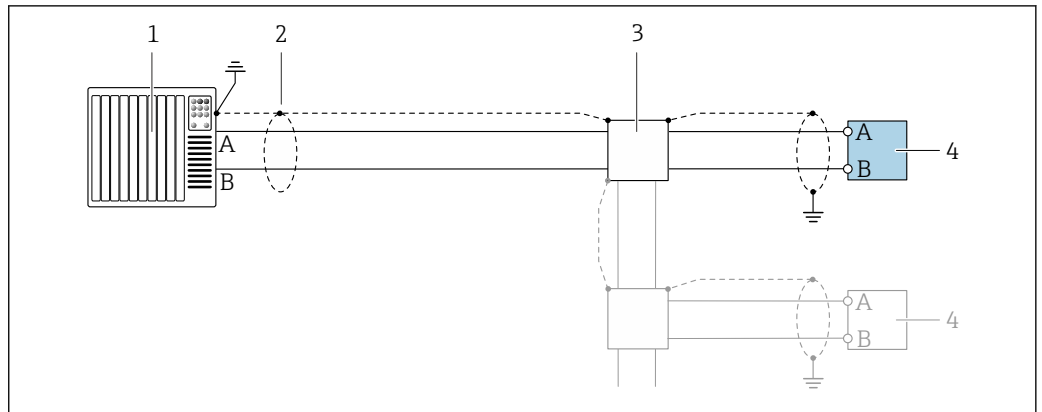


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9 Connection example for switch output (passive)

- 1 Automation system with switch input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values → 13

PROFIBUS DP



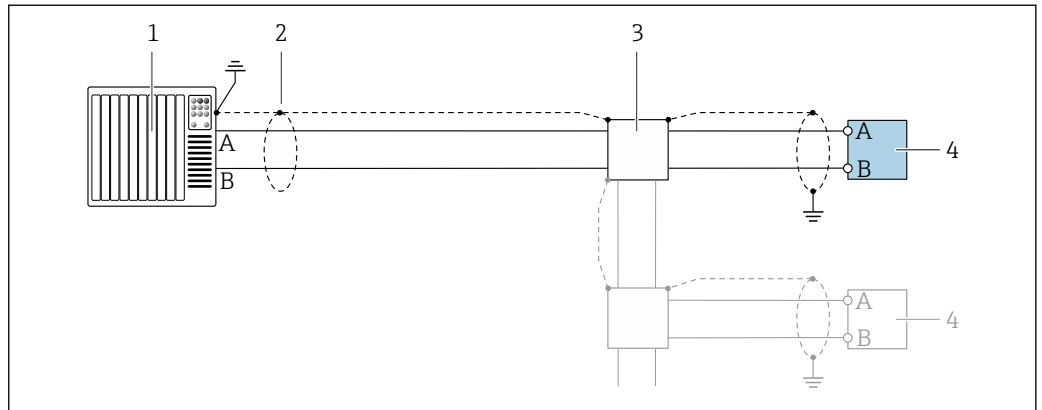
A0028765

10 Connection example for PROFIBUS DP, non-hazardous area and Zone 2/Div. 2

- 1 Control system (e.g. PLC)
- 2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 3 Transmitter

i If baud rates > 1.5 Mbaud an EMC cable entry must be used and the cable shield must continue as far as the terminal wherever possible.

Modbus RS485

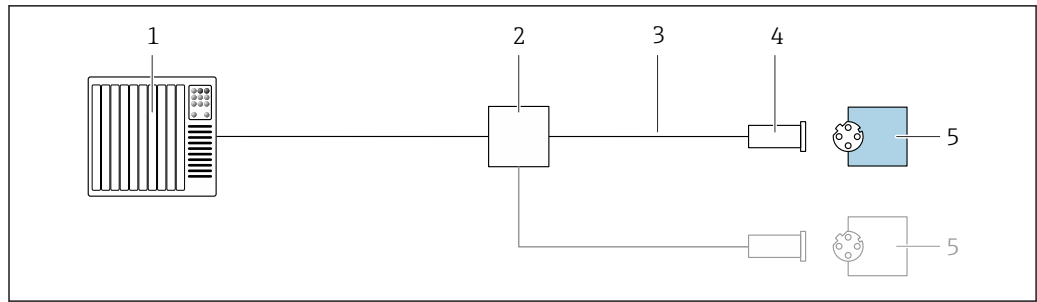


A0028765

11 Connection example for Modbus RS485, non-hazardous area and Zone 2/Div. 2

- 1 Control system (e.g. PLC)
- 2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
- 3 Distribution box
- 4 Transmitter

EtherNet/IP

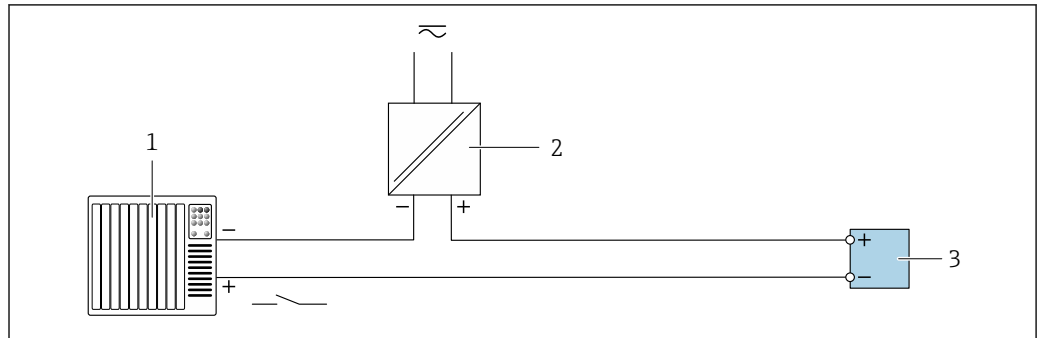


A0028767

12 Connection example for EtherNet/IP

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

Status input



A0028764

13 Connection example for status input

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

Potential equalization

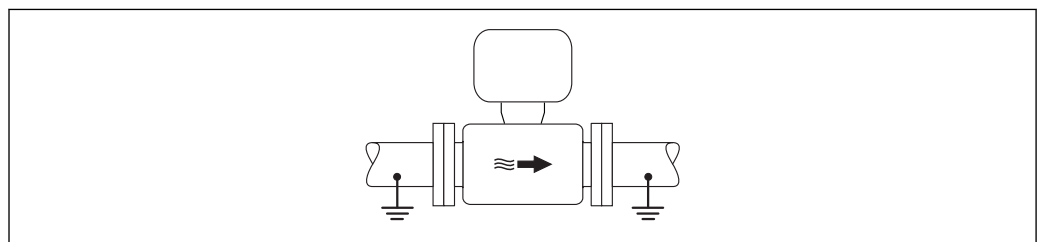
Requirements

Please consider the following to ensure correct measurement:

- Same electrical potential for the medium and sensor
- Remote version: same electrical potential for the sensor and transmitter
- Company-internal grounding concepts
- Pipe material and grounding

Connection example, standard scenario

Metal, grounded pipe



A0016315

14 Potential equalization via measuring tube

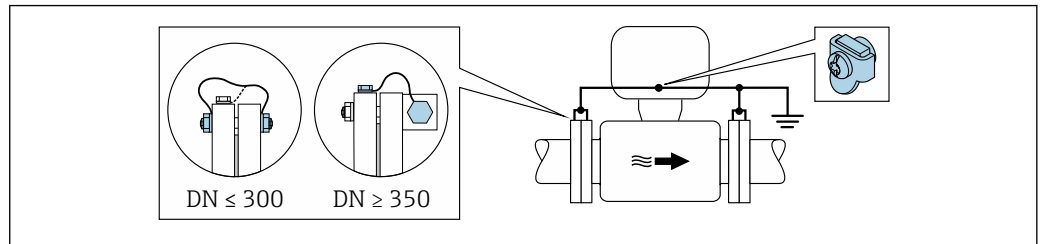
Connection example in special situations

Unlined and ungrounded metal pipe

This connection method also applies in situations where:

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

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



15 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 ≤ 300 (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws.
 - If DN ≥ 350 (14"): Mount the ground cable directly on the metal transport bracket.

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

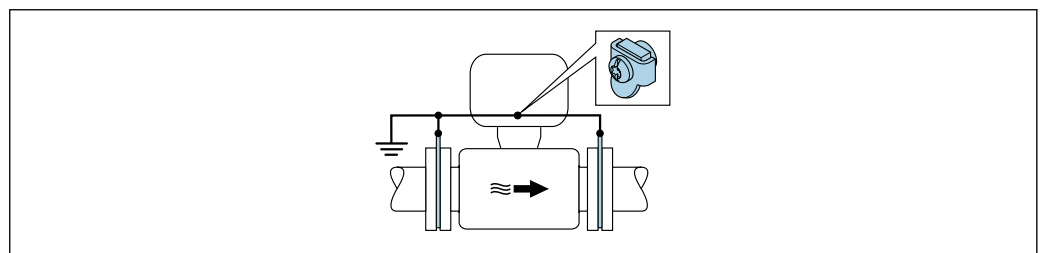
i You can order the necessary ground cable from Endress+Hauser: → 126.

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

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



16 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.

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

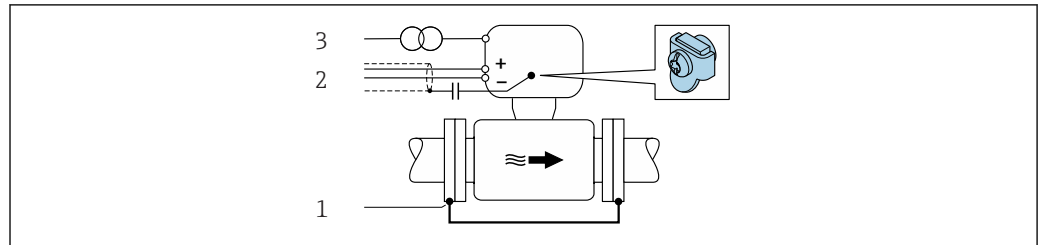
i The ground cable and ground disks can be ordered from Endress+Hauser → 126.

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

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



A0030377

- 1 Connection of the two flanges of the pipe via a ground cable
- 2 Signal line shielding via a capacitor
- 3 Measuring device connected to power supply such that it is floating in relation to the protective ground (isolation transformer)

Note the following when installing:

The sensor is installed in the pipe in a way that provides electrical insulation.

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

i You can order the necessary ground cable from Endress+Hauser: → [126](#).

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)

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

Cable specification**Permitted temperature range**

- The installation guidelines that apply in the country of installation must be observed.
- The cables must be suitable for the minimum and maximum temperatures to be expected.

Power supply cable

Standard installation cable is sufficient.

Signal cable

Current output 0/4 to 20 mA

Standard installation cable is sufficient.

Current output 4 to 20 mA HART

A shielded cable is recommended. Observe grounding concept of the plant.

Pulse/frequency/switch output

Standard installation cable is sufficient.

Status input

Standard installation cable is sufficient.

PROFIBUS DP

The IEC 61158 standard specifies two types of cable (A and B) for the bus line which can be used for every transmission rate. Cable type A is recommended.

Cable type	A
Characteristic impedance	135 to 165 Ω at a measuring frequency of 3 to 20 MHz
Cable capacitance	< 30 pF/m
Wire cross-section	> 0.34 mm ² (22 AWG)
Cable type	Twisted pairs
Loop resistance	≤ 110 Ω/km
Signal damping	Max. 9 dB over the entire length of the cable cross-section
Shield	Copper braided shielding or braided shielding with foil shield. When grounding the cable shield, observe the grounding concept of the plant.

Modbus RS485

The EIA/TIA-485 standard specifies two types of cable (A and B) for the bus line which can be used for every transmission rate. Cable type A is recommended.

Cable type	A
Characteristic impedance	135 to 165 Ω at a measuring frequency of 3 to 20 MHz
Cable capacitance	< 30 pF/m
Wire cross-section	> 0.34 mm ² (22 AWG)
Cable type	Twisted pairs
Loop resistance	≤ 110 Ω/km
Signal damping	Max. 9 dB over the entire length of the cable cross-section
Shield	Copper braided shielding or braided shielding with foil shield. When grounding the cable shield, observe the grounding concept of the plant.

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 ODVA Organization

Connecting cable for remote version

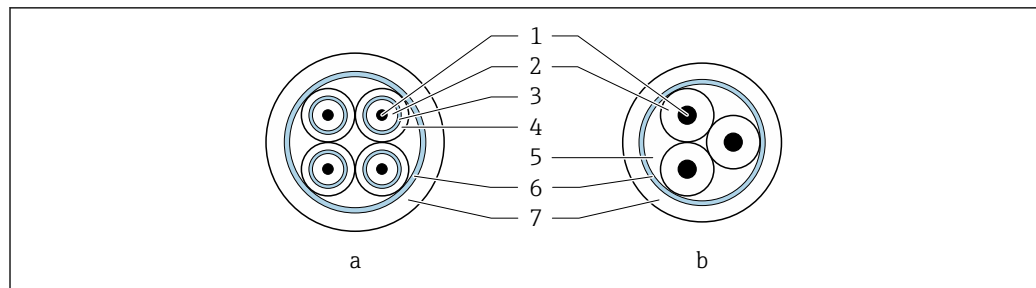
Electrode cable

Standard cable	3 × 0.38 mm ² (20 AWG) with common, braided copper shield (φ ~9.5 mm (0.37 in)) and individual shielded cores
Cable for empty pipe detection (EPD)	4 × 0.38 mm ² (20 AWG) with common, braided copper shield (φ ~9.5 mm (0.37 in)) and individual shielded cores

Conductor resistance	≤50 Ω/km (0.015 Ω/ft)
Capacitance: core/shield	≤420 pF/m (128 pF/ft)
Operating temperature	-20 to +80 °C (-68 to +176 °F)

Coil current cable

Standard cable	3 × 0.75 mm ² (18 AWG) with common, braided copper shield (φ ~9 mm (0.35 in))
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



17 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 cables

Reinforced connecting cables with an additional, reinforcing metal braid should be used for:

- 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 Reinforced connecting cables 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 → 124 and EMC specifications → 42.

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

- Error limits following DIN EN 29104, in future ISO 20456
- Water, typically +15 to +45 °C (+59 to +113 °F); 0.5 to 7 bar (73 to 101 psi)
- Data as indicated in the calibration protocol
- Accuracy based on accredited calibration rigs according to ISO 17025

Maximum measured error

Error limits under reference operating conditions

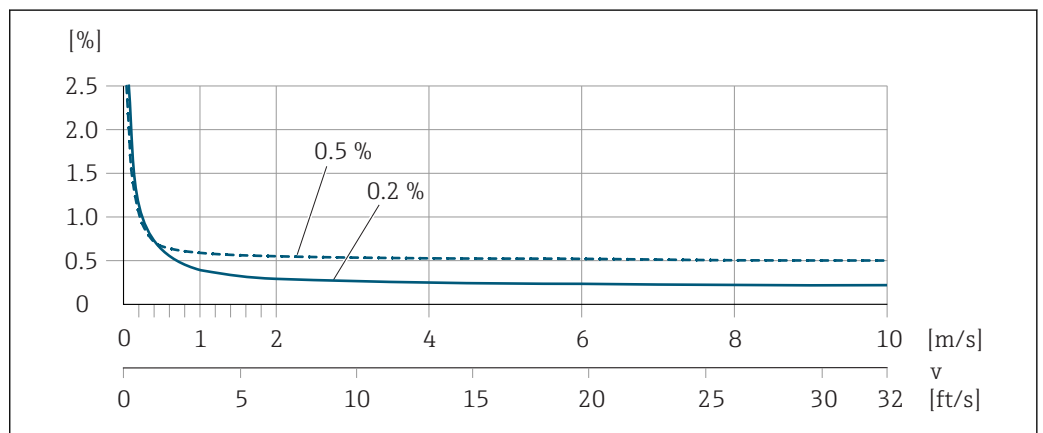
o.r. = of reading

Volume flow

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

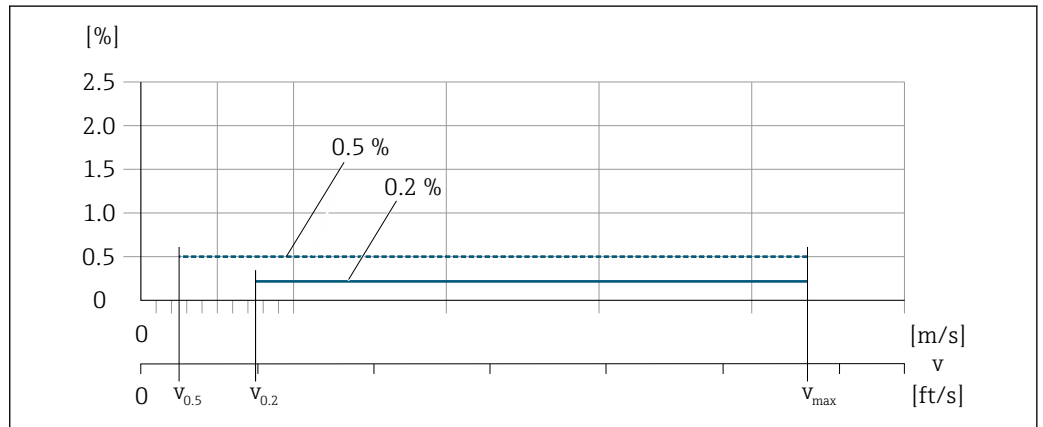


Fluctuations in the supply voltage do not have any effect within the specified range.



A0032069

18 Maximum measured error in % o.r.



A0017051

19 Flat Spec in % o.r.

Flat Spec flow values 0.5 %

Nominal diameter		$v_{0.5}$		v_{max}	
[mm]	[in]	[m/s]	[ft/s]	[m/s]	[ft/s]
25 to 600 ¹⁾	1 to 24	0.5	1.64	10	32
50 to 300 ²⁾	2 to 12	0.25	0.82	5	16

- 1) Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"
- 2) Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Flat Spec flow values 0.2 %

Nominal diameter		$v_{0.2}$		v_{max}	
[mm]	[in]	[m/s]	[ft/s]	[m/s]	[ft/s]
25 to 600 ¹⁾	1 to 24	1.5	4.92	10	32
50 to 300 ²⁾	2 to 12	0.6	1.97	4	13

- 1) Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"
- 2) Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Electrical conductivity

Max. measured error not specified.

Accuracy of outputs

The outputs have the following base accuracy specifications.

Current output

Accuracy	Max. $\pm 5 \mu\text{A}$
-----------------	--------------------------

Pulse/frequency output

o.r. = of reading

Accuracy	Max. $\pm 50 \text{ ppm o.r.}$ (over the entire ambient temperature range)
-----------------	--

Repeatability

o.r. = of reading

Volume flow

max. $\pm 0.1 \%$ o.r. $\pm 0.5 \text{ mm/s}$ (0.02 in/s)

Electrical conductivity

Max. $\pm 5 \%$ o.r.

Influence of ambient temperature**Current output**

o.r. = of reading

Temperature coefficient	Max. $\pm 0.005 \%$ o.r./ $^{\circ}\text{C}$
--------------------------------	--

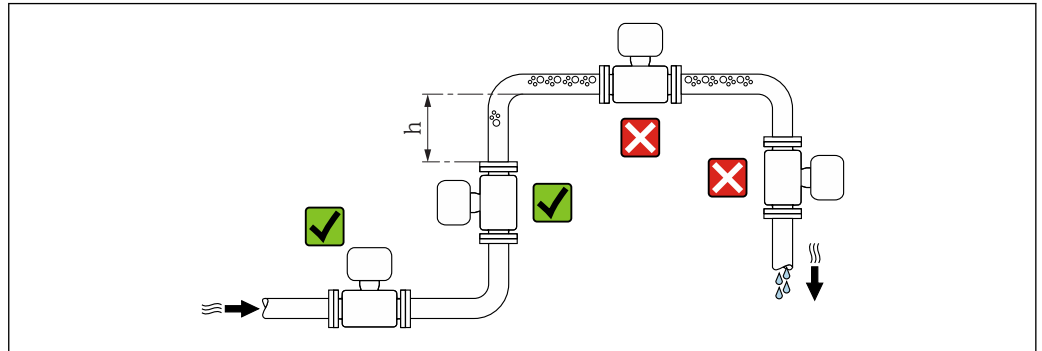
Pulse/frequency output

Temperature coefficient	No additional effect. Included in accuracy.
--------------------------------	---

Installation

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

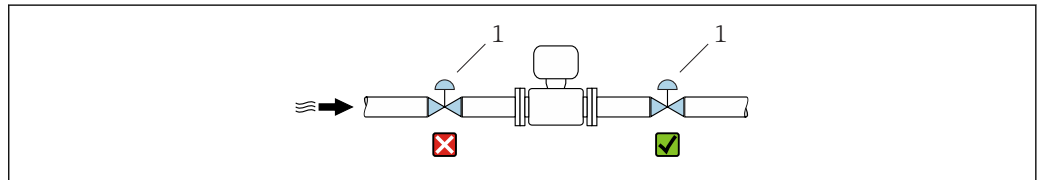
Mounting location



A0029343

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

i Not necessary in the case of order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"



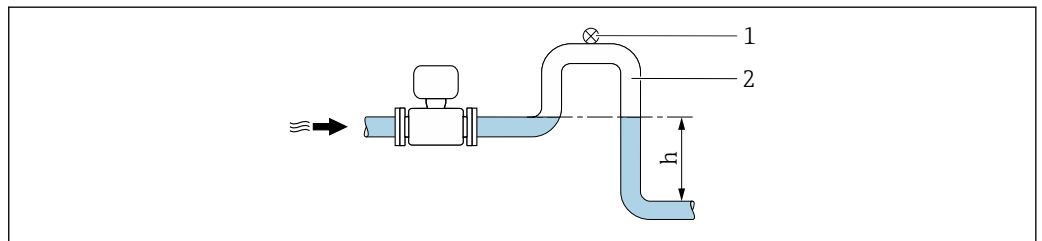
A0033017

20 Installation of the sensor after a control valve is not recommended

1 Control valve

Installation in down pipes

Install a siphon with 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.



A0028981

21 Installation in a down pipe

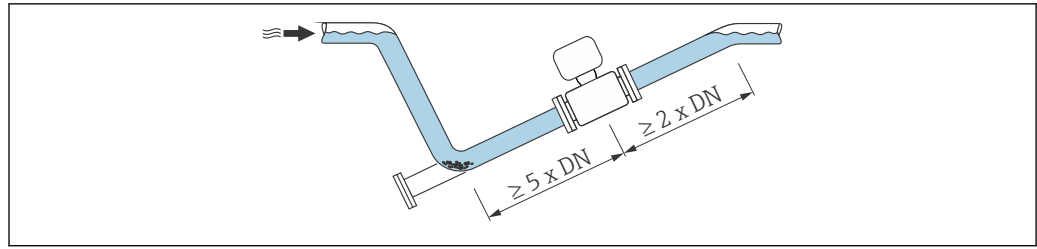
1 Vent valve

2 Pipe siphon

h Length of down pipe

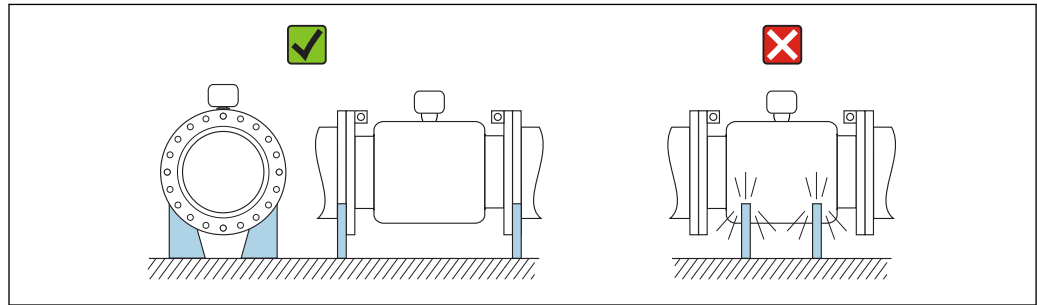
Installation in partially filled pipes

A partially filled pipe with a gradient necessitates a drain-type configuration.



A0029257

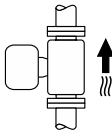
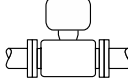
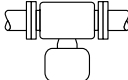

For heavy sensors DN ≥ 350 (14")



A0016276

Orientation

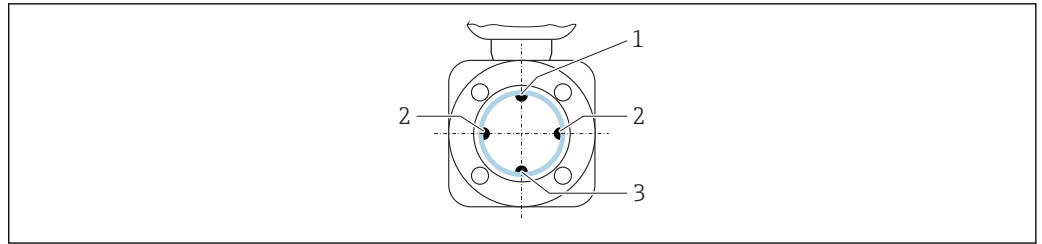
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

Orientation		Recommendation
A	Vertical orientation	 A0015591 ✓✓
B	Horizontal orientation, transmitter at top	 A0015589 ✓✓ ¹⁾
C	Horizontal orientation, transmitter at bottom	 A0015590 ✓✓ ^{2) 3)}
D	Horizontal orientation, transmitter at side	 A0015592 ✗

- 1) Applications with low process temperatures may decrease the ambient temperature. To maintain the minimum ambient temperature for the transmitter, this orientation is recommended.
- 2) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.
- 3) To prevent the electronics module from overheating in the case of a sharp rise in temperature (e.g. CIP- or SIP processes), install the device with the transmitter component pointing downwards.

Horizontal

- Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.
- 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.

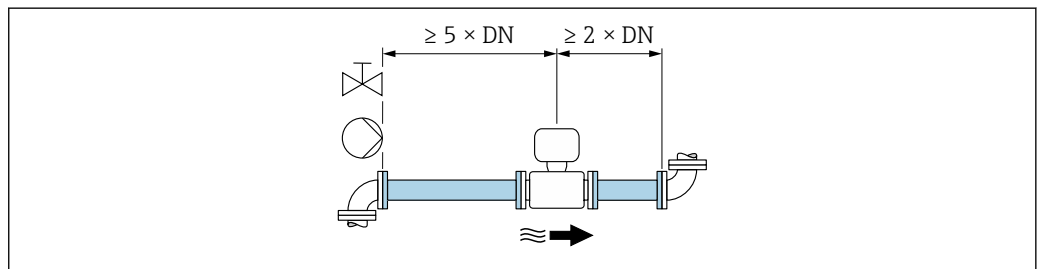


A0029344

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

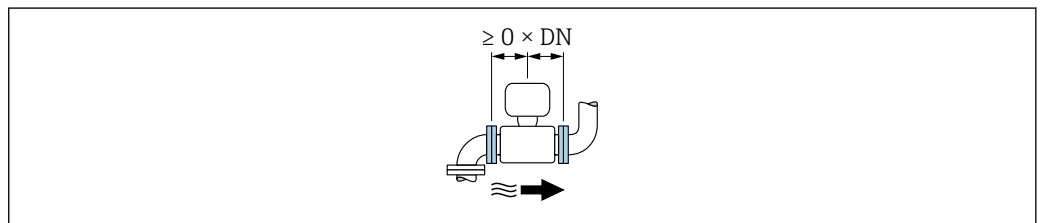
Inlet and outlet runs

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:



A0028997

- 22 Order code for "Design", option A "Insertion length short, ISO/DVGW until DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW until DN400, DN450-2000 1:1.3"



A0032859

- 23 Order code for "Design", option C "Insertion length short ISO/DVGW until DN300, w/o inlet and outlet runs, constricted meas.tube"

i To keep within the in-service maximum permissible errors for custody transfer no additional requirements apply with regard to the graphic illustrated above.

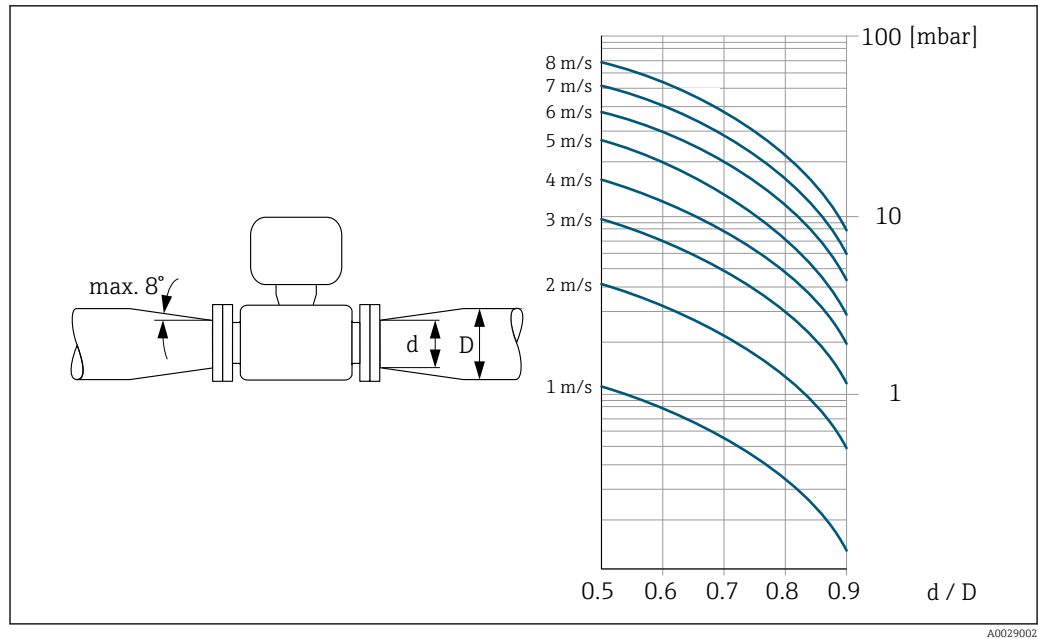
Adapters

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:

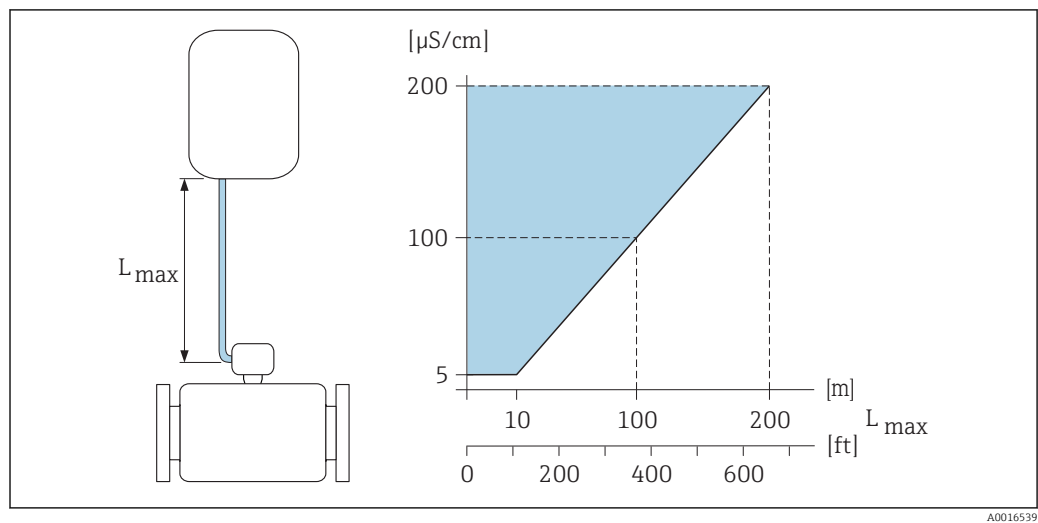
- Calculate the ratio of the diameters d/D .
- From the nomogram read off the pressure loss as a function of flow velocity (downstream from the reduction) and the d/D ratio.

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



Length of connecting cable

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

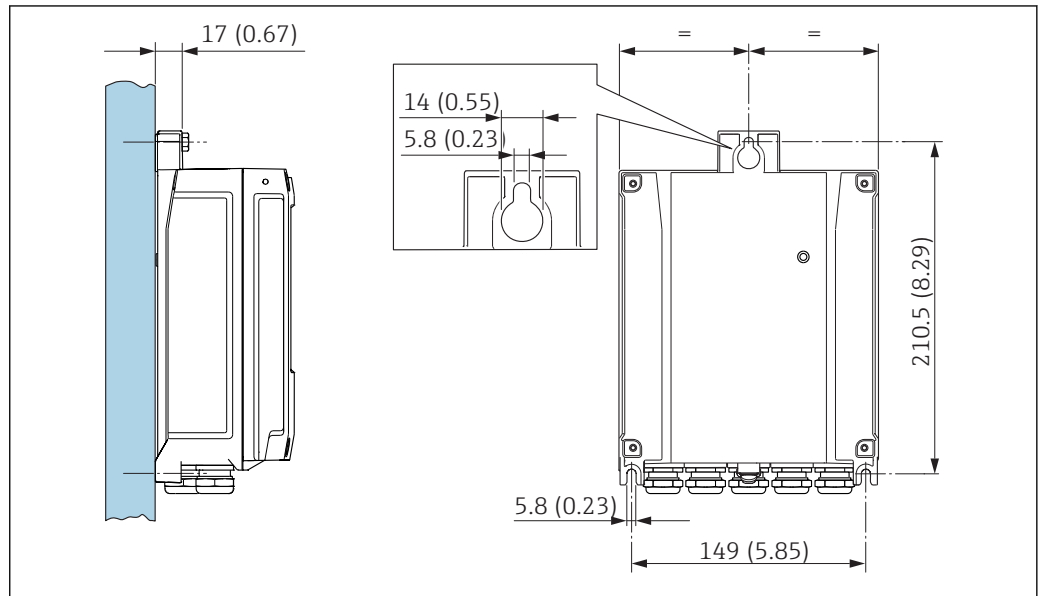


24 Permitted length of connecting cable for remote version

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

Mounting the transmitter housing

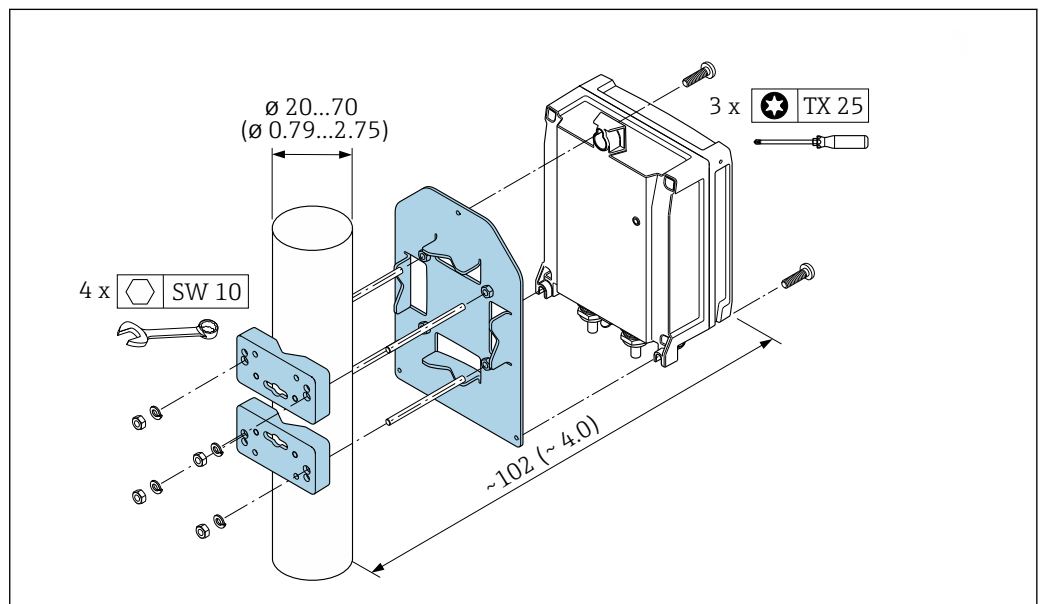
Wall mounting



A0020523

25 Engineering unit mm (in)

Post mounting



A0029051

26 Engineering unit mm (in)

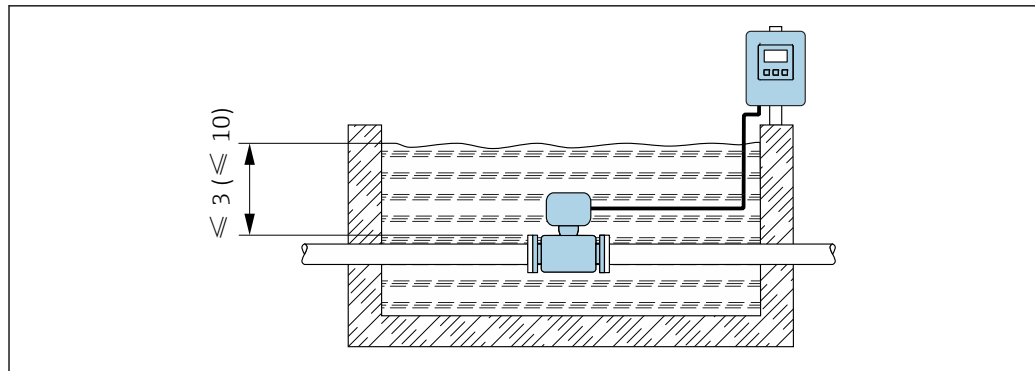
Special mounting instructions

Display protection

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


Permanent immersion in water

A fully welded remote version with IP68 protection is optionally available for permanent immersion in water ≤ 3 m (10 ft) or in exceptional cases for use for up to 48 hours at ≤ 10 m (30 ft). The measuring device meets the requirements of corrosion categories C5-M and Im1/Im2/Im3. The fully welded design along with the connection compartment sealing system ensure that moisture cannot enter the measuring device.



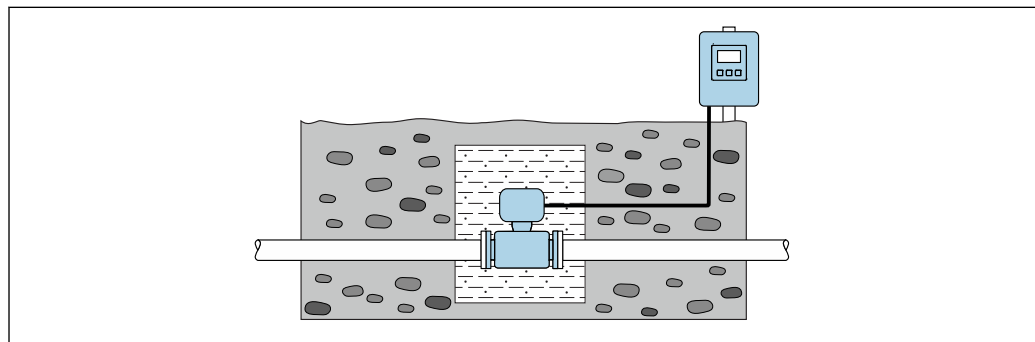
A0029320

 27 Engineering unit in m(ft)

 Replacement of cable gland on connection housing

Buried applications

A remote version with IP68 protection is optionally available for buried applications. The measuring device satisfies the certified corrosion protection Im1/Im2/Im3 in accordance with EN ISO 12944. It can be used directly underground without the need for additional protective measures. The device is mounted in accordance with the usual regional installation regulations (e.g. EN DIN 1610).



A0029321



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"> ■ Process connection material, carbon steel: -10 to +60 °C (+14 to +140 °F) ■ Process connection 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 .

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.

- If the compact version of the device is insulated at low temperatures, the insulation must also include the device neck.
- Protect the display against impact.
- Protect the display from abrasion by sand in desert areas.


 You can order a display guard from Endress+Hauser : →  126

Temperature tables

 Observe the interdependencies between the permitted ambient and fluid temperatures when operating the device in hazardous areas.

 For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.


Storage temperature

The storage temperature corresponds to the operating temperature range of the measuring transmitter and the appropriate measuring sensors. →  40

- 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

If a plastic transmitter housing is permanently exposed to certain steam and air mixtures, this can damage the housing.

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

Degree of protection

Transmitter

- As standard: IP66/67, type 4X enclosure
- When housing is open: IP20, type 1 enclosure

Sensor

- As standard: IP66/67, type 4X enclosure
- Optionally available for remote version:
 - 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 up to 48 hours at depths ≤ 10 m (30 ft).
 - IP68, type 6P enclosure; fully welded, with protective varnish as per EN ISO 12944 Im1/Im2/Im3. Suitable for permanent immersion in saline water ≤ 3 m (10 ft) or up to 48 hours at depths ≤ 10 m (30 ft) or in buried applications.

Vibration resistance

Compact version

- Vibration, sinusoidal according to IEC 60068-2-6
 - 2 to 8.4 Hz, 3.5 mm peak
 - 8.4 to 2 000 Hz, 1 g peak
- Vibration broad-band random, according to IEC 60068-2-64
 - 10 to 200 Hz, 0.003 g²/Hz
 - 200 to 2 000 Hz, 0.001 g²/Hz
 - Total: 1.54 g rms

Remote version

- Vibration, sinusoidal according to IEC 60068-2-6
 - 2 to 8.4 Hz, 7.5 mm peak
 - 8.4 to 2 000 Hz, 2 g peak
- Vibration broad-band random, according to IEC 60068-2-64
 - 10 to 200 Hz, 0.01 g²/Hz
 - 200 to 2 000 Hz, 0.003 g²/Hz
 - Total: 2.70 g rms

Shock resistance

Shock, half-sine according to IEC 60068-2-27
6 ms 50 g

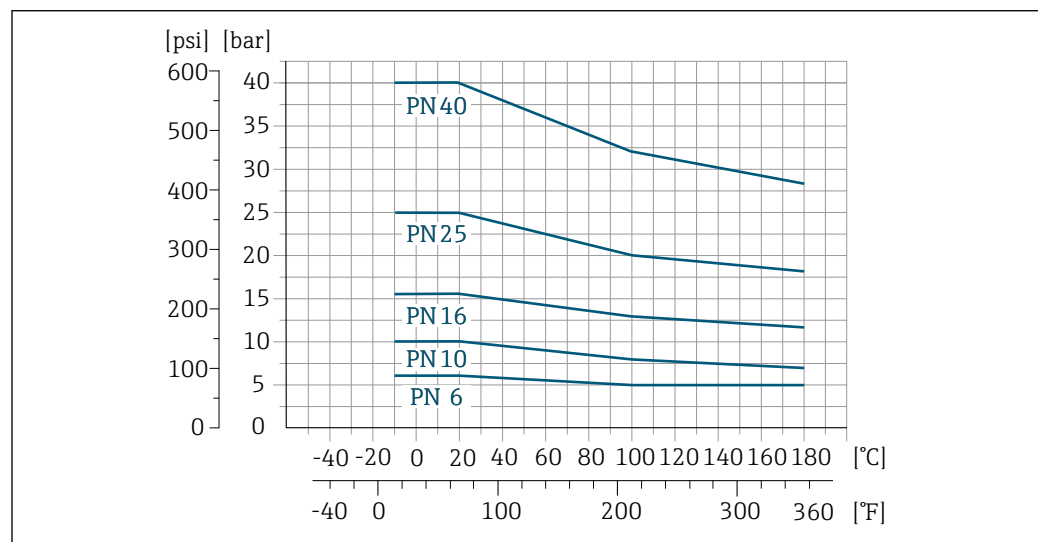
Impact resistance	Rough handling shocks according to IEC 60068-2-31
Mechanical load	<ul style="list-style-type: none"> Protect the transmitter housing against mechanical effects, such as shock or impact; the use of the remote version is sometimes preferable. Never use the transmitter housing as a ladder or climbing aid.
Electromagnetic compatibility (EMC)	<ul style="list-style-type: none"> As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21) Complies with emission limits for industry as per EN 55011 (Class A) Device version with PROFIBUS DP: Complies with emission limits for industry as per EN 50170 Volume 2, IEC 61784 <p>i The following applies for PROFIBUS DP: If baud rates > 1.5 Mbaud, an EMC cable entry must be used and the cable shield must continue as far as the terminal wherever possible.</p> <p>i Details are provided in the Declaration of Conformity.</p>

Process

Medium temperature range	<ul style="list-style-type: none"> 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") <p>i In custody transfer mode, the permitted fluid temperature is 0 to +50 °C (+32 to +122 °F).</p>
Conductivity	<p>≥ 5 µS/cm for liquids in general. Stronger filter damping is required for very low conductivity values.</p> <p>i Note that in the case of the remote version, the requisite minimum conductivity also depends on the cable length → 38.</p>

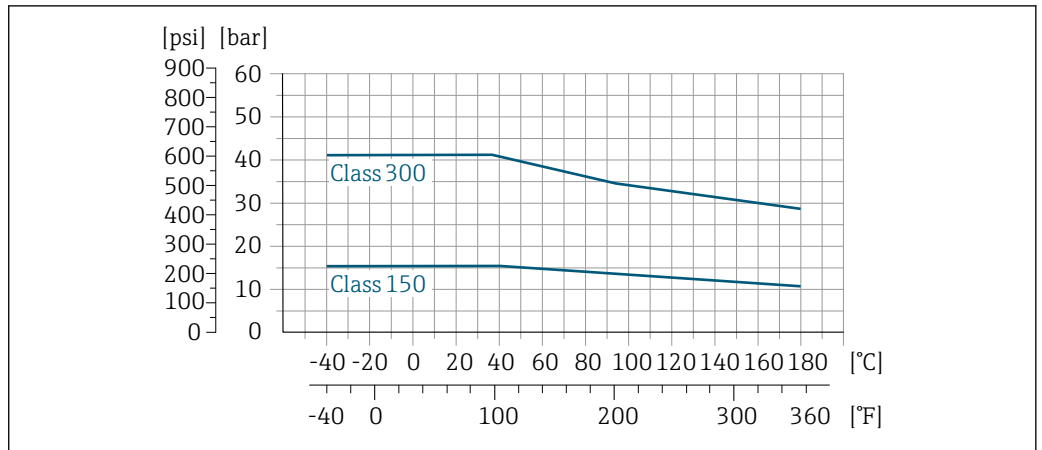
Pressure-temperature ratings The following pressure/temperature diagrams apply to all pressure-bearing parts of the device and not just the process connection. The diagrams show the maximum permissible medium pressure depending on the specific medium temperature.

Process connection: fixed flange according to EN 1092-1 (DIN 2501)



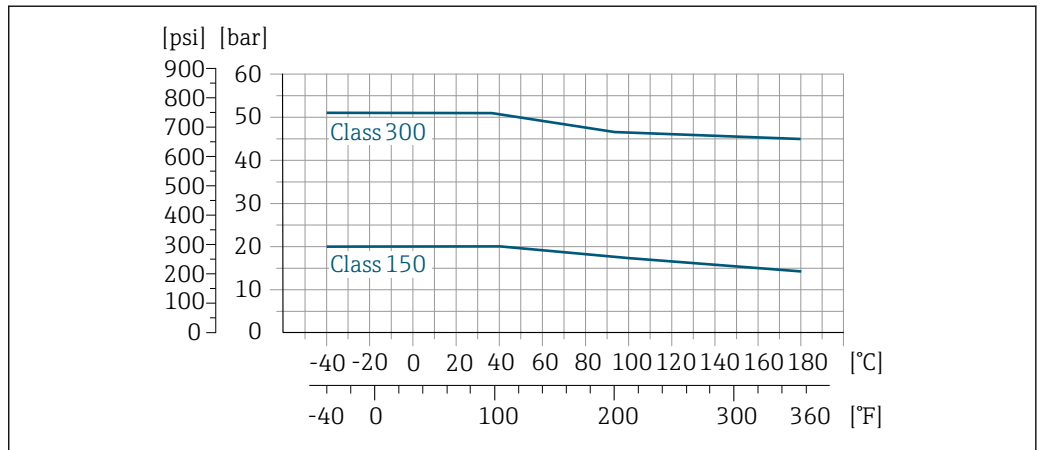
28 Process connection material: stainless steel, 1.4404/1.4571/F316L; carbon steel, A105/FE410WB/P250GH/S235JRG2/S235JR+N

Process connection: fixed flange according to ASME B16.5



A0029394-EN

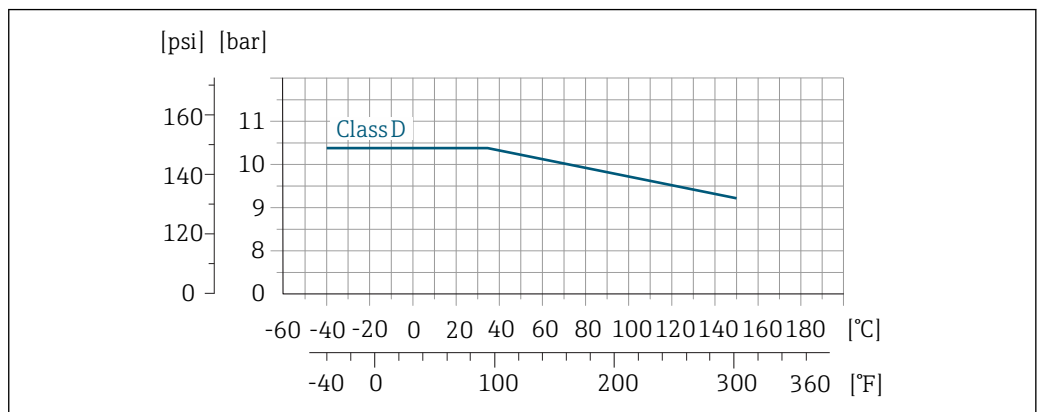
29 Process connection material: stainless steel, F316L similar to 1.4404



A0029393-EN

30 Process connection material: carbon steel, A105/A515(70)

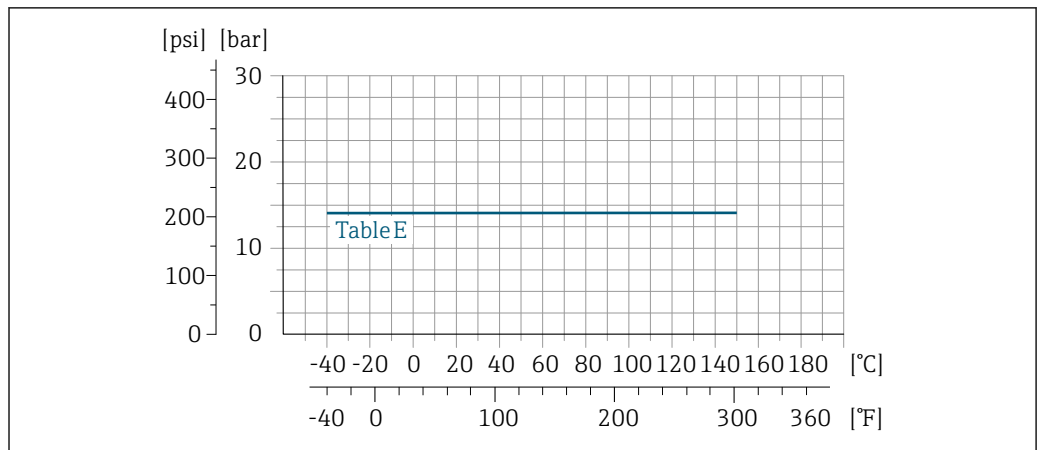
Process connection: fixed flange according to AWWA C207



A0029818-EN

31 Process connection material: carbon steel, A105/A181/P265GH/S275JR

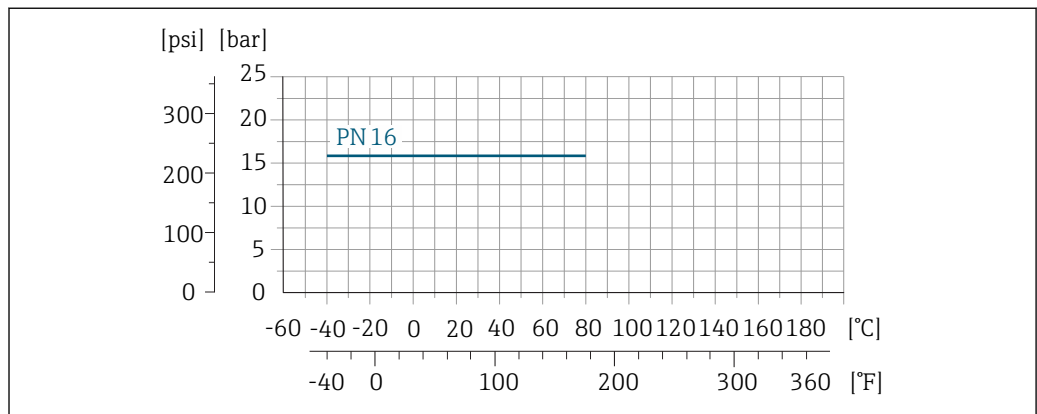
Process connection: fixed flange according to AS 2129



A0029398-EN

32 Process connection material: carbon steel, A105/FE410WB/P235GH/P265GH/S235JRG2

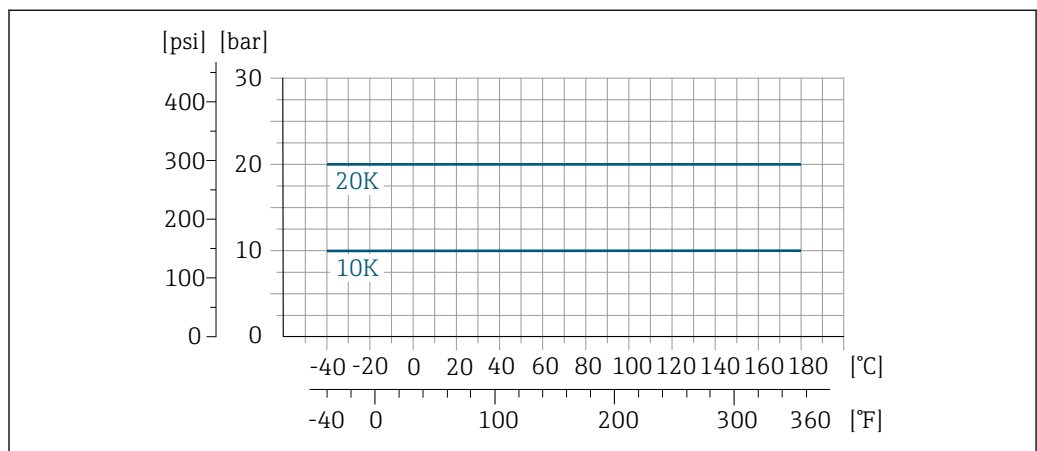
Process connection: fixed flange according to AS 4087



A0029317-EN

33 Process connection material: carbon steel, A105/P265GH/S275JR

Process connection: fixed flange according to JIS B2220



A0029397-EN

34 Process connection material: stainless steel, F316L similar to 1.4404; carbon steel, A105/A350LF2

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 sludge)



A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter.



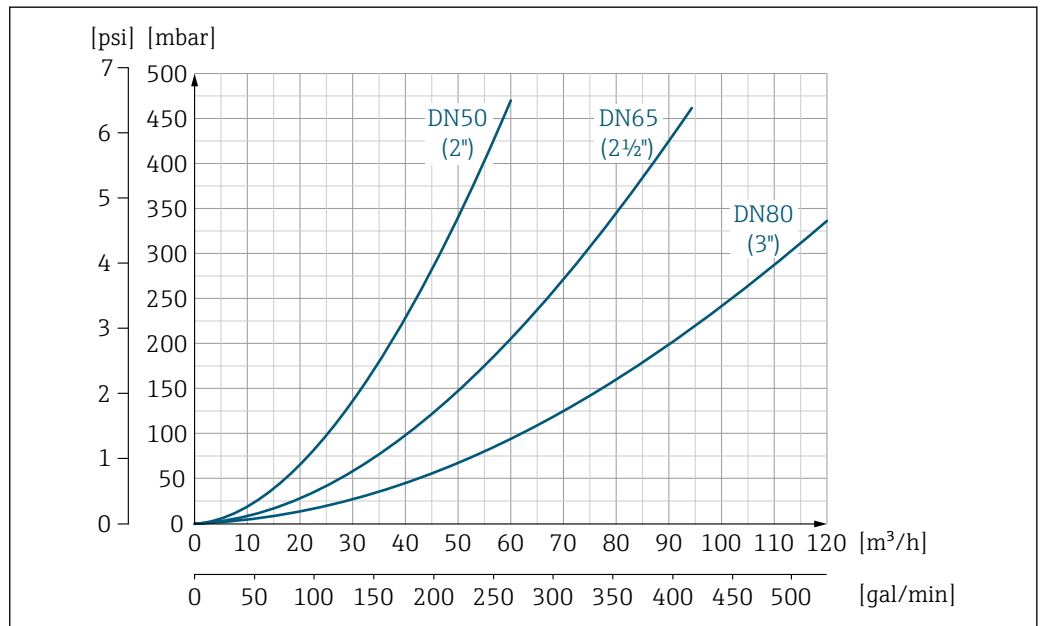
For an overview of the full scale values for the measuring range, see the "Measuring range" section → 8



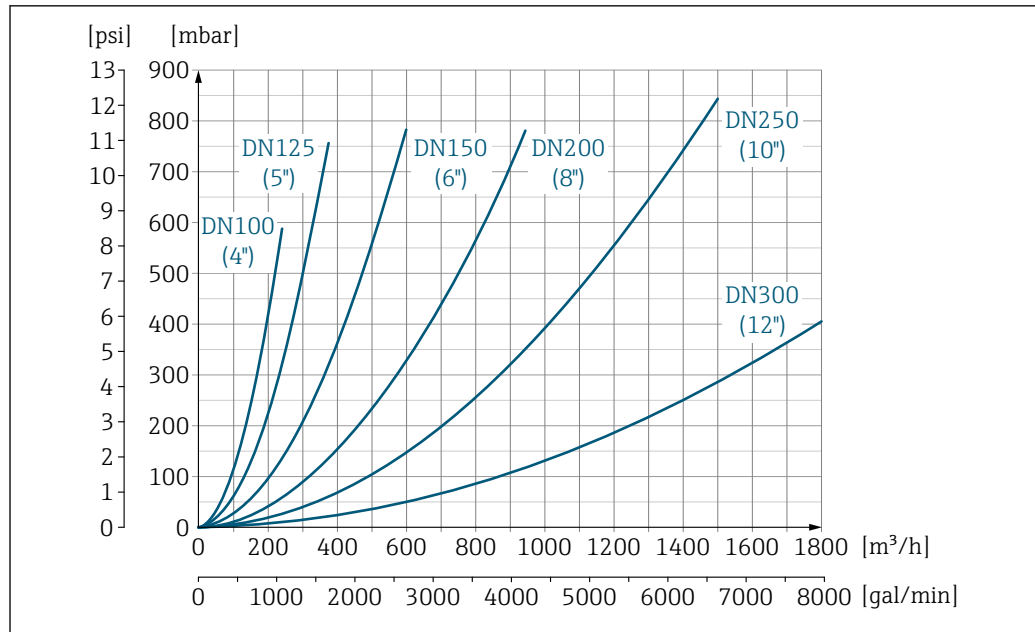
For custody transfer, the applicable approval determines the permitted measuring range.

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 → 37



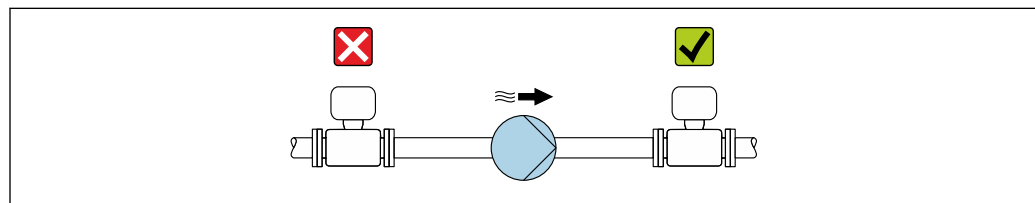
35 Pressure loss DN 50 to 80 (2 to 3") in the case of order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"



A0032668-EN

36 Pressure loss DN 100 to 300 (4 to 12") in the case of order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

System pressure



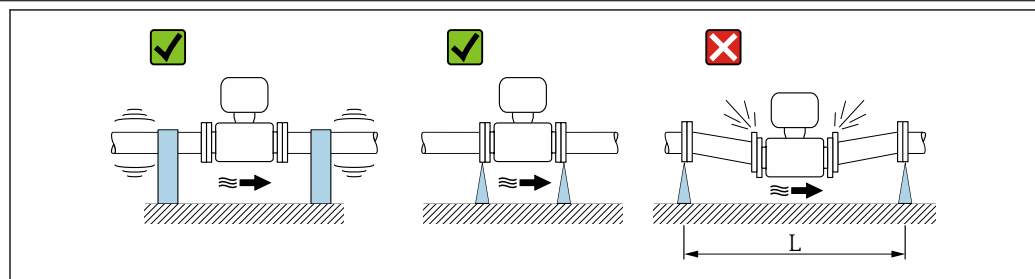
A0028777

Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.

i Furthermore, install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.

- i** ■ Information on the liner's resistance to partial vacuum → 45
- i** ■ Information on the shock resistance of the measuring system → 42
- Information on the vibration resistance of the measuring system → 41

Vibrations



A0029004

37 Measures to avoid device vibrations ($L > 10\text{ m}$ (33 ft))

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** ■ Information on the shock resistance of the measuring system → 42
- Information on the vibration resistance of the measuring system → 41

Custody transfer mode

The measuring device is optionally tested in accordance with OIML R137 and has an EU type-examination certificate according to Measuring Instruments Directive 2014/32/EU for service subject to legal metrological control ("custody transfer") for cold water (Annex III).

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 legally controlled outputs.

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.

After putting the device into circulation or after sealing the device, operation is only possible to a limited extent.

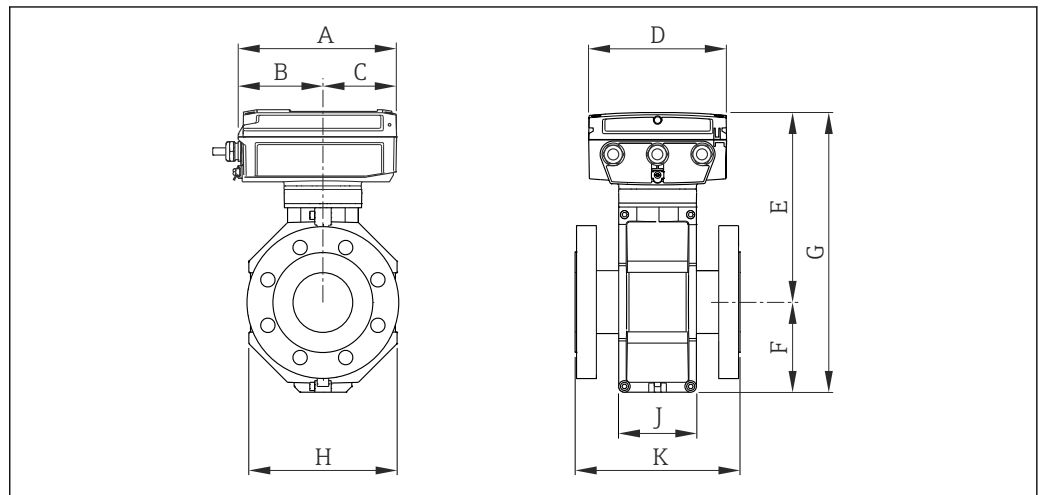
Detailed ordering information is available from your local Endress+Hauser sales center for national approvals (outside Europe) as cold water meters based on OIML R49.

Mechanical construction

Dimensions in SI units

Compact version

Order code for "Housing", option M "Compact, polycarbonate" or option A "Compact, aluminum, coated"



A0020352

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

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	201	84	285	120	94	200
32	193	103	90	167	201	84	285	120	94	200
40	193	103	90	167	201	84	285	120	94	200
50	193	103	90	167	201	84	285	120	94	200
65	193	103	90	167	226	109	335	180	94	200
80	193	103	90	167	226	109	335	180	94	200
100	193	103	90	167	226	109	335	180	94	250

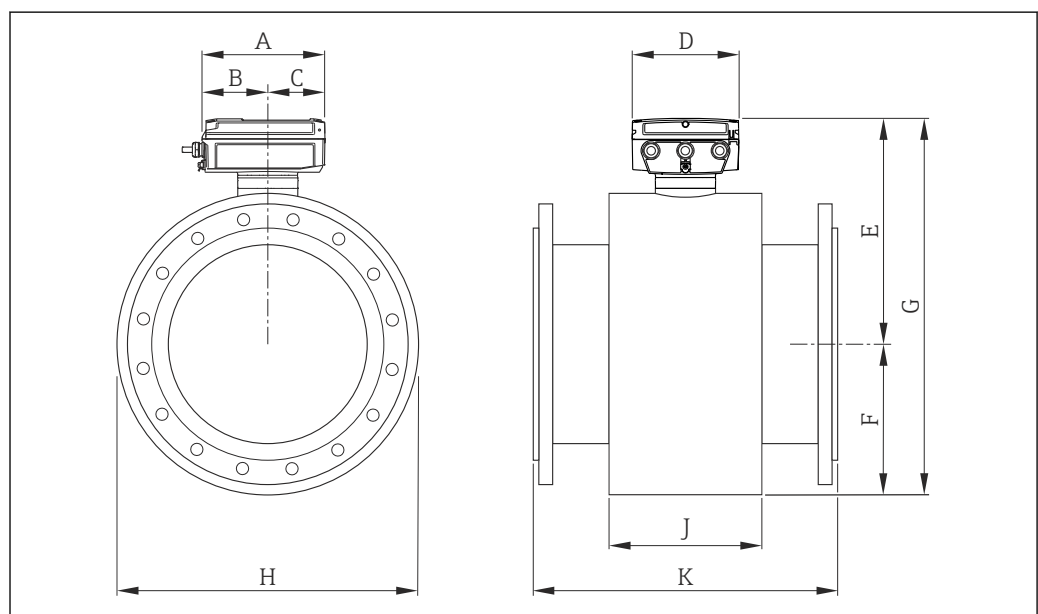
DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
125	193	103	90	167	266	150	416	260	140	250
150	193	103	90	167	266	150	416	260	140	300
200	193	103	90	167	291	180	471	324	156	350
250	193	103	90	167	316	205	521	400	166	450
300	193	103	90	167	341	230	571	460	166	500

- 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.

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
50	193	103	90	167	201	84	285	120	94	200
65	193	103	90	167	201	84	285	120	94	200
80	193	103	90	167	226	109	335	180	94	200
100	193	103	90	167	226	109	335	180	94	250
125	193	103	90	167	226	109	335	180	94	250
150	193	103	90	167	226	109	335	180	94	300
200	193	103	90	167	266	150	416	260	140	350
250	193	103	90	167	266	150	416	260	140	450
300	193	103	90	167	291	180	471	324	156	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.

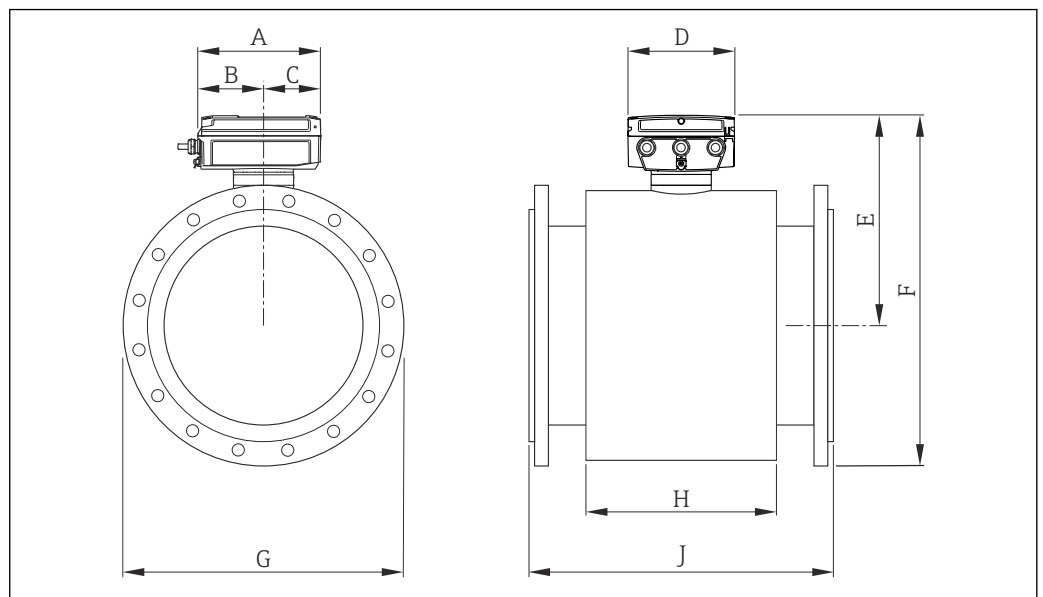


A0017154

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
350	193	103	90	167	432	282	714	564	288	550
375	193	103	90	167	458	308	766	616	288	600
400	193	103	90	167	458	308	766	616	288	600
450	193	103	90	167	483	333	816	666	292	650
500	193	103	90	167	508	359	867	717	292	650
600	193	103	90	167	560	410	970	821	402	780
700	193	103	90	167	662	512	1174	1024	589	910
750	193	103	90	167	662	512	1174	1024	626	975
800	193	103	90	167	683	534	1217	1067	647	1040
900	193	103	90	167	760	610	1370	1220	785	1170
1000	193	103	90	167	836	686	1522	1372	862	1300
1050	193	103	90	167	862	712	1574	1424	912	1365
1200	193	103	90	167	961	811	1772	1622	992	1560
1350	193	103	90	167	1062	912	1974	1824	1252	1755
1400	193	103	90	167	1137	987	2124	1974	1252	1820
1500	193	103	90	167	1161	1011	2172	2022	1392	1950
1600	193	103	90	167	1206	1056	2262	2112	1482	2080
1650	193	103	90	167	1243	1093	2336	2186	1482	2145
1800	193	103	90	167	1338	1188	2526	2376	1632	2340
2000	193	103	90	167	1388	1238	2626	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.

Order code for "Housing", option M "Compact, polycarbonate" or option A "Compact, aluminum, coated";
 order code for "Design", option A "Insertion length short"

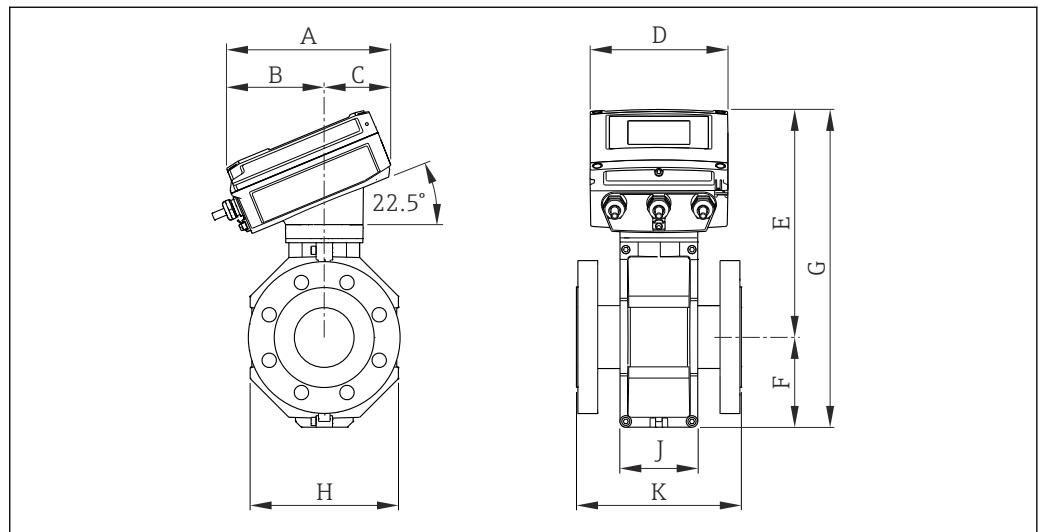


DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	H [mm]	J [mm]
350	193	103	90	167	386	290	550
375	193	103	90	167	412	290	600
400	193	103	90	167	412	290	600
450	193	103	90	167	440	290	600
500	193	103	90	167	465	290	600
600	193	103	90	167	506	290	600
700	193	103	90	167	571	424	700
750	193	103	90	167	608	454	750
800	193	103	90	167	627	500	800
900	193	103	90	167	677	580	900
1000	193	103	90	167	727	664	1000
1050	193	103	90	167	763	759	1050
1200	193	103	90	167	841	832	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	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	10K [mm]	20K [mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	10K [mm]	20K [mm]
350	631	638	702	653	648	603	653	490	505	520	533	525	490	540
375	-	-	-	-	687	-	-	-	-	-	-	550	-	-
400	682	694	760	710	702	673	718	540	565	580	597	580	560	605
450	737	747	823	757	760	733	788	595	615	640	635	640	620	675
500	787	800	926	814	817	788	843	645	670	715	699	705	675	730
600	883	896	1026	912	918	908	958	755	780	840	813	825	795	845
700	1001	1018	1145	1034	1026	1018	-	860	895	910	927	910	905	-
750	-	-	-	1100	1106	1083	-	-	-	-	984	995	970	-
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	1255	1289	1255	-	-
1050	-	-	-	1436	-	-	-	-	-	-	1346	-	-	-
1200	1544	1569	1584	1597	1586	-	-	1405	1455	1485	1511	1490	-	-
1350	-	-	-	1795	-	-	-	-	-	-	1683	-	-	-
1400	1768	1791	1796	-	-	-	-	1630	1675	1685	-	-	-	-
1500	-	-	-	1980	-	-	-	-	-	-	1854	-	-	-

DN	Dimension F							Dimension G						
	EN (DIN)			ASME	AS	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6	PN 10	PN 16	AWWA		10K	20K	PN 6	PN 10	PN 16	AWWA		10K	20K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
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	-	-	-

Order code for "Housing", option Q "Compact, polycarbonate, inclined" or option R "Compact, aluminum, coated, inclined"



A0020353

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

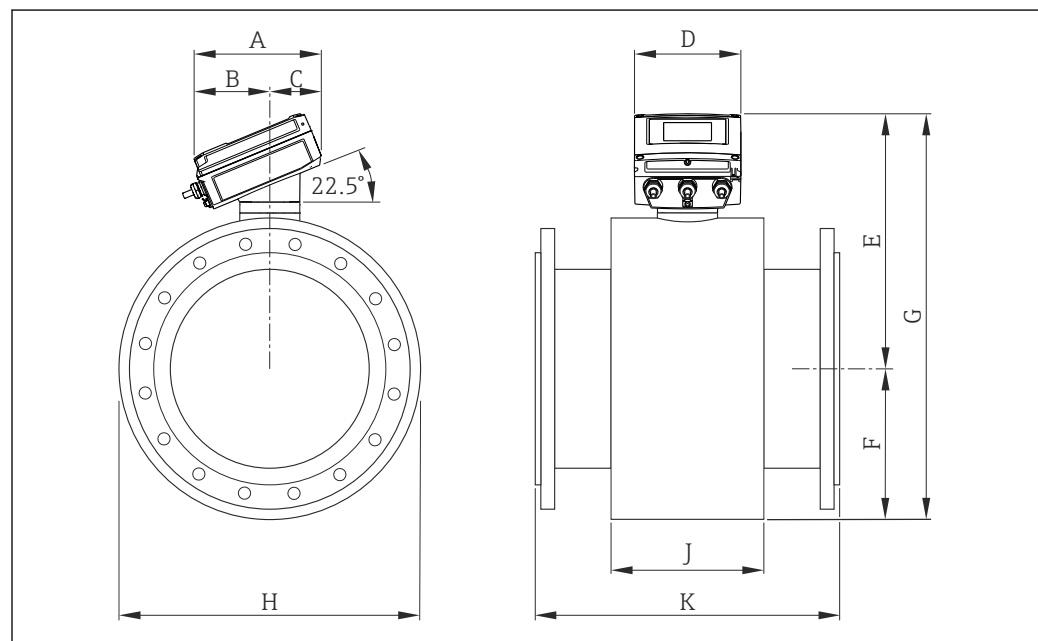
DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	199	119	80	167	248	84	332	120	94	200
32	199	119	80	167	248	84	332	120	94	200
40	199	119	80	167	248	84	332	120	94	200
50	199	119	80	167	248	84	332	120	94	200
65	199	119	80	167	273	109	382	180	94	200
80	199	119	80	167	273	109	382	180	94	200
100	199	119	80	167	273	109	382	180	94	250
125	199	119	80	167	313	150	463	260	140	250
150	199	119	80	167	313	150	463	260	140	300
200	199	119	80	167	338	180	518	324	156	350
250	199	119	80	167	363	205	568	400	166	450
300	199	119	80	167	388	230	618	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.

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
50	199	119	80	167	248	84	332	120	94	200
65	199	119	80	167	248	84	332	120	94	200
80	199	119	80	167	273	109	382	180	94	200
100	199	119	80	167	273	109	382	180	94	250
125	199	119	80	167	273	109	382	180	94	250
150	199	119	80	167	273	109	382	180	94	300
200	199	119	80	167	313	150	463	260	140	350
250	199	119	80	167	313	150	463	260	140	450
300	199	119	80	167	338	180	518	324	156	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.

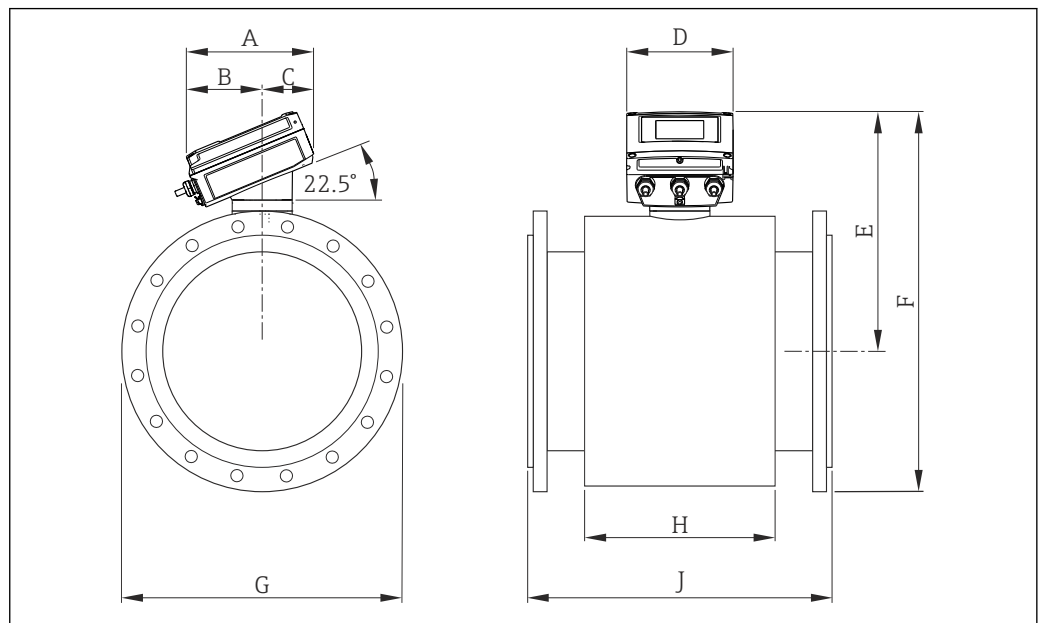


DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
350	199	119	80	167	477	282	759	564	288	550
375	199	119	80	167	503	308	811	616	288	600
400	199	119	80	167	503	308	811	616	288	600
450	199	119	80	167	528	333	861	666	292	650
500	199	119	80	167	553	359	912	717	292	650
600	199	119	80	167	605	410	1015	821	402	780
700	199	119	80	167	707	512	1219	1024	589	910
750	199	119	80	167	707	512	1219	1024	626	975
800	199	119	80	167	728	534	1262	1067	647	1040

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
900	199	119	80	167	805	610	1415	1220	785	1170
1000	199	119	80	167	881	686	1567	1372	862	1300
1050	199	119	80	167	907	712	1619	1424	912	1365
1200	199	119	80	167	1006	811	1817	1622	992	1560
1350	199	119	80	167	1107	912	2019	1824	1252	1755
1400	199	119	80	167	1182	987	2169	1974	1252	1820
1500	199	119	80	167	1206	1011	2217	2022	1392	1950
1600	199	119	80	167	1251	1056	2307	2112	1482	2080
1650	199	119	80	167	1288	1093	2381	2186	1482	2145
1800	199	119	80	167	1383	1188	2571	2376	1632	2340
2000	199	119	80	167	1433	1238	2671	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.

Order code for "Housing", option Q "Compact, polycarbonate, inclined" or option R "Compact, aluminum, coated, inclined"; order code for "Design", option A "Insertion length short"



DN	A	B	C	D	E	H	J
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[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

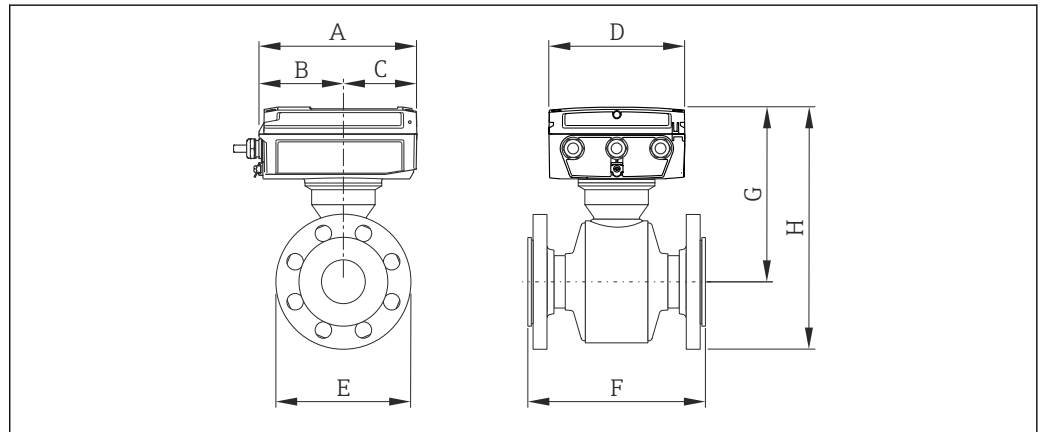
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	H [mm]	J [mm]
750	199	119	80	167	653	454	750
800	199	119	80	167	672	500	800
900	199	119	80	167	722	580	900
1000	199	119	80	167	772	664	1000
1050	199	119	80	167	808	759	1050
1200	199	119	80	167	886	832	1200
1350	199	119	80	167	998	1008	1350
1400	199	119	80	167	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	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	10K [mm]	20K [mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	10K [mm]	20K [mm]
350	676	683	618	698	693	603	653	490	505	520	533	525	490	540
375	-	-	-	-	732	-	-	-	-	-	-	550	-	-
400	727	739	672	755	747	673	718	540	565	580	597	580	560	605
450	782	792	732	802	805	733	788	595	615	640	635	640	620	675
500	832	845	795	859	862	788	843	645	670	715	699	705	675	730
600	928	941	898	957	963	908	958	755	780	840	813	825	795	845
700	1046	1063	1008	1079	1071	1018	-	860	895	910	927	910	905	-
750	-	-	-	1145	1151	1083	-	-	-	-	984	995	970	-
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	-	-	-

Order code for "Sensor option", option CA in combination with order code for "Calibration flow", options A/B/D/E/F/G/H/K/M/N



- Order code for "Calibration flow", options A/B/D/E/F/G/H/K/M/N available for order in conjunction with order code for "Housing", option M "Compact, polycarbonate"
- Order code for "Calibration flow", options H/K also available for order in conjunction with order code for "Housing", option A "Compact, aluminum, coated"



A0021328

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]
25	193	103	90	167	200	211
32	193	103	90	167	200	211
40	193	103	90	167	200	211
50	193	103	90	167	200	211
65	193	103	90	167	200	224
80	193	103	90	167	200	229
100	193	103	90	167	250	241
125	193	103	90	167	250	254
150	193	103	90	167	300	276
200	193	103	90	167	350	301
250	193	103	90	167	450	335
300	193	103	90	167	500	360

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]
50	193	103	90	167	200	211
65	193	103	90	167	200	224
80	193	103	90	167	200	229
100	193	103	90	167	250	229
125	193	103	90	167	250	229
150	193	103	90	167	300	241
200	193	103	90	167	350	254

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]
250	193	103	90	167	450	276
300	193	103	90	167	500	301

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	-	235	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


Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

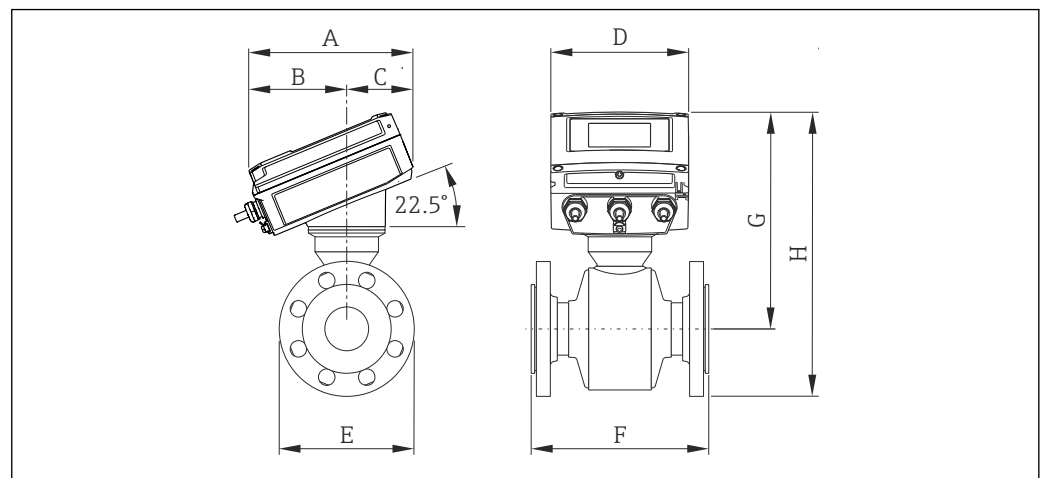
Dimension H										
DN [mm]	EN (DIN)				ASME		AS		JIS	
	PN 10 [mm]	PN 16 [mm]	PN 25 [mm]	PN 40 [mm]	Class 150 [mm]	Class 300 [mm]	Table E [mm]	PN 16 [mm]	10K [mm]	20K [mm]
25	-	-	-	282	281	258	-	-	282	258
32	-	-	-	282	-	-	-	-	282	258
40	-	-	-	286	281	265	-	-	282	258
50	-	-	-	294	286	270	-	-	289	265
65	-	316	-	-	-	-	-	-	311	288
80	-	329	-	-	324	309	321	321	321	305
100	-	351	-	-	356	344	349	349	346	330
125	-	379	-	-	-	-	-	-	379	365
150	-	418	-	-	416	410	416	416	416	404
200	448	471	458	-	474	-	469	469	466	452
250	508	537	523	-	537	-	537	537	535	526
300	558	590	578	-	602	-	587	587	582	576

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Dimension H						
DN [mm]	EN (DIN)		ASME	AS		JIS
	PN 16 [mm]	PN 40 [mm]	Class 150 [mm]	Table E [mm]	PN 16 [mm]	10K [mm]
50	-	294	286	-	-	289
65	316	-	-	-	-	311
80	329	-	324	321	321	321
100	334	-	339	331	331	329
125	354	-	-	-	-	354
150	384	-	381	381	381	381
200	424	-	427	422	422	419
250	478	-	478	478	478	476
300	531	-	544	529	529	524

Order code for "Sensor option", option CA in combination with order code for "Calibration flow", options A/B/D/E/F/G/H/K/M/N

-  Order code for "Calibration flow", options A/B/D/E/F/G/H/K/M/N available for order in conjunction with order code for "Housing", option Q "Compact, polycarbonate, inclined"
- Order code for "Calibration flow", options H/K also available for order in conjunction with order code for "Housing", option R "Compact, aluminum, coated, inclined"



A0021329

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]
25	199	119	80	167	200	268
32	199	119	80	167	200	268
40	199	119	80	167	200	268
50	199	119	80	167	200	268
65	199	119	80	167	200	281
80	199	119	80	167	200	286
100	199	119	80	167	250	298

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]
125	199	119	80	167	250	311
150	199	119	80	167	300	333
200	199	119	80	167	350	358
250	199	119	80	167	450	392
300	199	119	80	167	500	417

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]
50	199	119	80	167	200	268
65	199	119	80	167	200	281
80	199	119	80	167	200	286
100	199	119	80	167	250	281
125	199	119	80	167	250	286
150	199	119	80	167	300	298
200	199	119	80	167	350	311
250	199	119	80	167	450	333
300	199	119	80	167	500	358

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	-	235	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

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

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	-	-	-	338	336	312	-	-	338	312
32	-	-	-	338	-	-	-	-	338	312
40	-	-	-	343	336	320	-	-	338	312
50	-	-	-	351	343	325	-	-	346	320
65	-	373	-	-	-	-	-	-	368	342
80	-	386	-	-	381	364	378	378	378	359
100	-	408	-	-	413	399	406	406	403	385
125	-	436	-	-	-	-	-	-	436	420
150	-	475	-	-	473	465	473	473	473	459
200	502	528	512	-	531	-	526	526	523	507
250	563	594	578	-	594	-	594	594	592	580
300	613	647	633	-	659	-	644	644	639	630

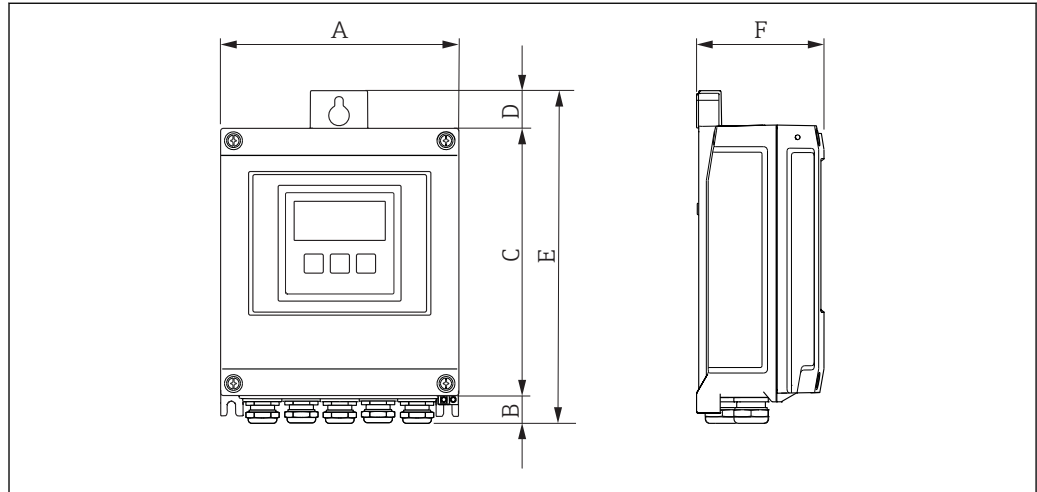
Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Dimension H						
DN	EN (DIN)		ASME	AS		JIS
	PN 16	PN 40	Class 150	Table E	PN 16	10K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
50	-	351	345	-	-	346
65	373	-	-	-	-	368
80	386	-	382	378	378	378
100	391	-	396	388	388	386
125	411	-	-	-	-	411
150	441	-	438	438	438	438
200	481	-	483	479	479	476
250	535	-	537	536	536	533
300	588	-	600	586	586	581

Remote version

Transmitter remote version

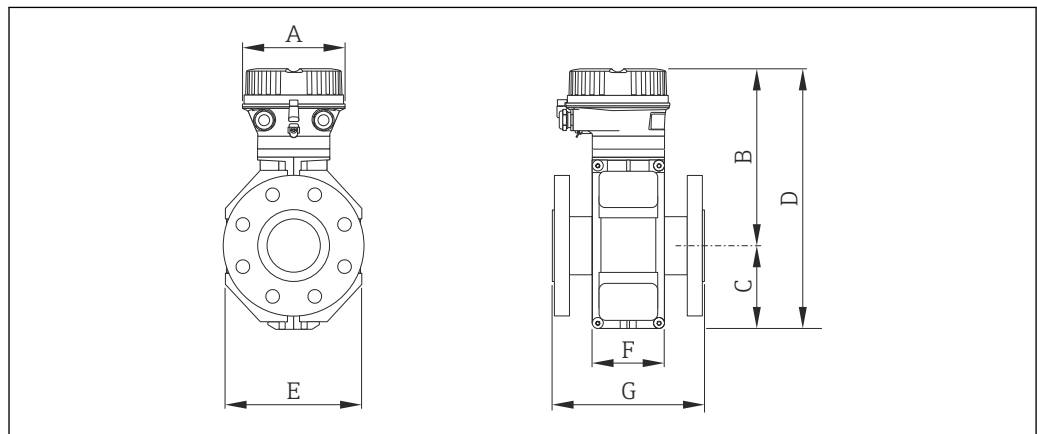
Order code for "Housing", option N "Remote, polycarbonate" or option P "Remote, aluminum coated"



A0020522

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
167	21	187	24	232	80

Sensor remote version



A0017282

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G ²⁾ [mm]
25	136	200	84	284	120	94	200
32	136	200	84	284	120	94	200
40	136	200	84	284	120	94	200
50	136	200	84	284	120	94	200
65	136	225	109	334	180	94	200
80	136	225	109	334	180	94	200

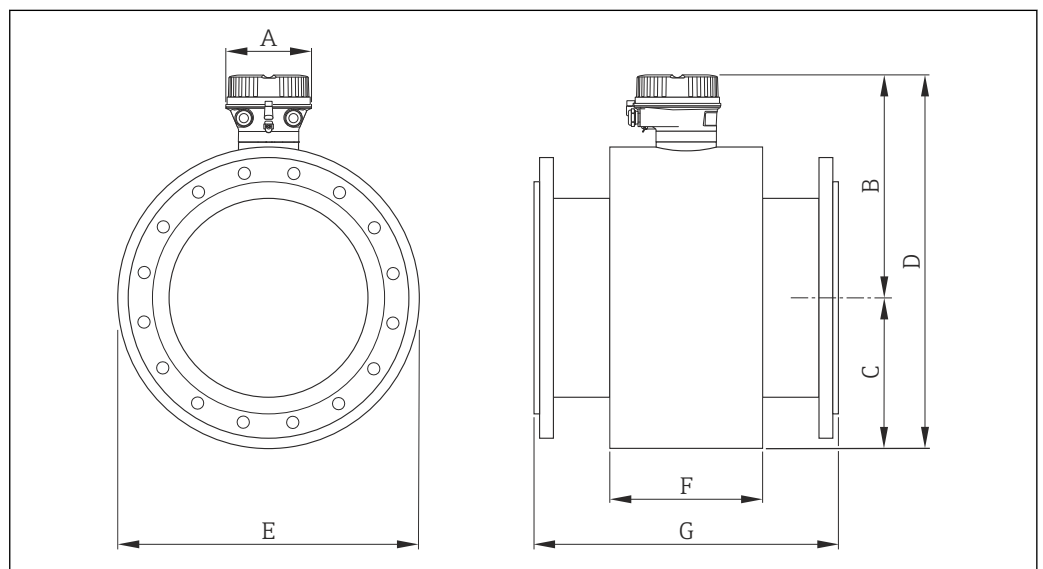
DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G ²⁾ [mm]
100	136	225	109	334	180	94	250
125	136	265	150	415	260	140	250
150	136	265	150	415	260	140	300
200	136	290	180	470	324	156	350
250	136	315	205	520	400	156	450
300	136	340	230	570	460	166	500

- 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.

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G ²⁾ [mm]
50	136	200	84	284	120	94	200
65	136	200	84	284	120	94	200
80	136	225	109	334	180	94	200
100	136	225	109	334	180	94	250
125	136	225	109	334	180	94	250
150	136	225	109	334	180	94	300
200	136	265	150	415	260	140	350
250	136	265	150	415	260	140	450
300	136	290	180	470	324	156	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.

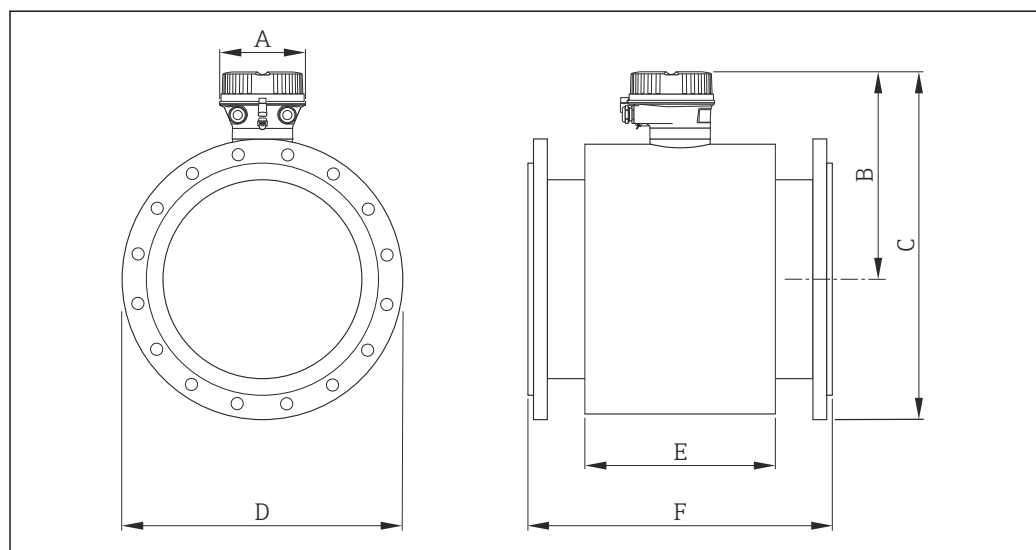


A0017283

DN ¹⁾ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G ²⁾ [mm]
350	136	407	282	689	564	288	550
375	136	433	308	741	616	288	600
400	136	433	308	741	616	288	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.

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



A0017284

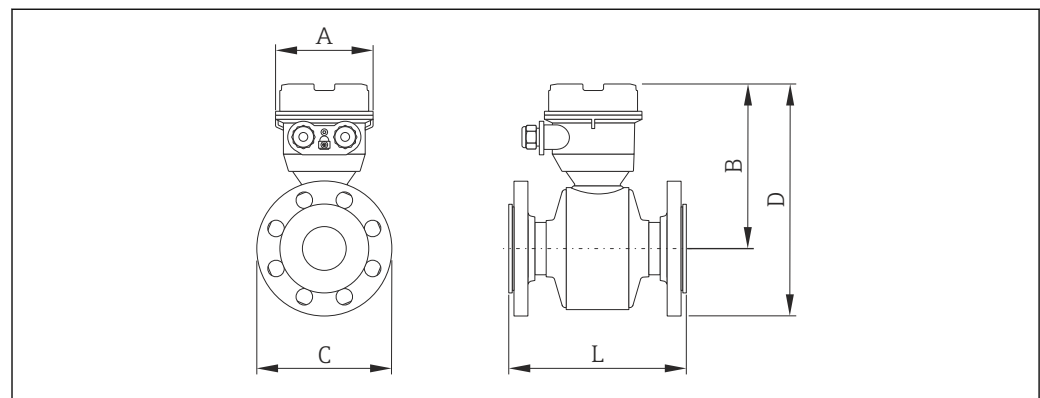
DN [mm]	A [mm]	B [mm]	E [mm]	F [mm]
350	136	358	290	550
375	136	384	290	600
400	136	384	290	600
450	136	412	290	600
500	136	437	290	600
600	136	478	290	600
700	136	543	424	700
750	136	579	454	750
800	136	599	500	800
900	136	649	580	900
1000	136	699	664	1000
1050	136	735	759	1050
1200	136	813	832	1200
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	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	10K [mm]	20K [mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	[mm]	10K [mm]
350	603	610	616	625	620	603	653	490	505	520	533	525	490	540
375	-	-	-	-	659	-	-	-	-	-	-	550	-	-
400	654	666	672	682	674	673	718	540	565	580	597	580	560	605
450	709	719	729	729	732	733	788	595	615	640	635	640	620	675
500	759	772	791	786	789	788	843	645	670	715	699	705	675	730
600	855	868	903	884	890	908	958	755	780	840	813	825	795	845
700	973	990	1009	1006	998	1018	-	860	895	910	927	910	905	-
750	-	-	-	1072	1078	1083	-	-	-	-	984	995	970	-
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	-	-	-	-
1500	-	-	-	1952	-	-	-	-	-	-	1854	-	-	-

DN [mm]	Dimension C							Dimension D						
	EN (DIN)			ASME	AS	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]		10K [mm]	20K [mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]		10K [mm]	20K [mm]
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	-	-	-

Order code for "Sensor option", option CA...CE "Corrosion protection"

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/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 Im2/Im3



A0020399

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

DN [mm]	A [mm]	B [mm]	L [mm]
25	112	188	200
32	112	188	200
40	112	188	200
50	112	188	200
65	112	201	200
80	112	206	200
100	112	218	250
125	112	231	250
150	112	253	300
200	112	278	350
250	112	312	450
300	112	337	500

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN [mm]	A [mm]	B [mm]	L [mm]
50	112	188	200
65	112	201	200
80	112	206	200
100	112	201	250
125	112	206	250
150	112	218	300
200	112	231	350
250	112	253	450
300	112	278	500

Dimension C										
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	110	140	140	-	140	140
32	-	-	-	140	-	-	-	-	140	140
40	-	-	-	150	125	155	-	-	140	140
50	-	-	-	165	150	165	150	150	155	155
65	-	185	-	185	-	-	-	-	175	175
80	-	200	-	200	190	209.6	185	185	185	200
100	-	220	-	325	230	254	215	215	210	225
125	-	250	-	270	-	-	-	-	250	270
150	-	285	-	300	280	317.5	280	280	280	305
200	340	340	360	-	345	-	335	335	330	350
250	395	405	425	-	405	-	405	405	400	430
300	445	460	485	-	485	-	455	455	445	480

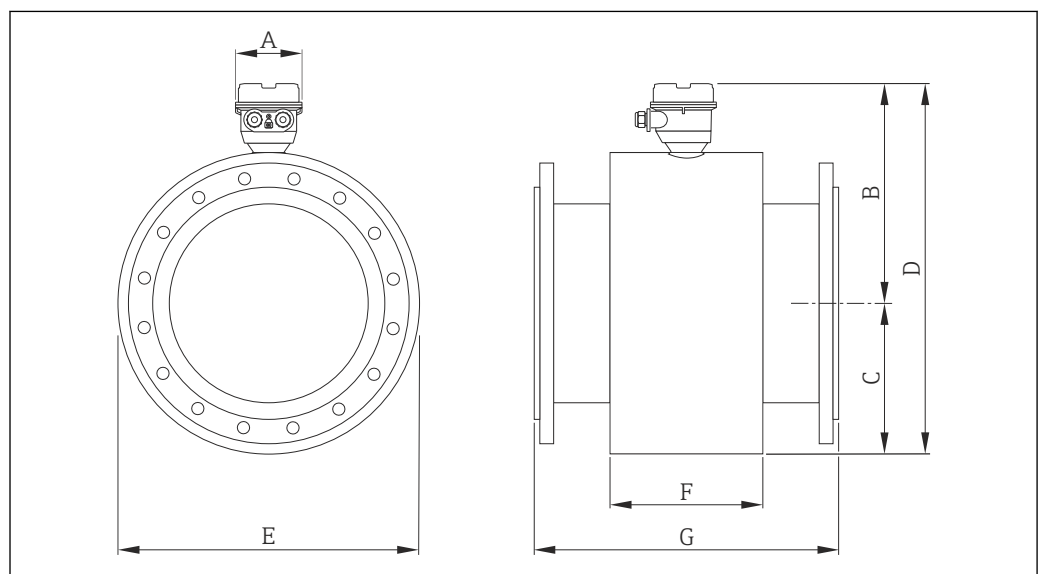
Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

Dimension D										
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	-	-	-	259	258	260	-	-	259	260
32	-	-	-	259	-	-	-	-	259	260
40	-	-	-	263	258	267	-	-	259	260
50	-	-	-	271	263	272	-	-	266	267
65	-	293	-	-	-	-	-	-	288	290
80	-	306	-	-	301	311	298	298	298	307

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]
100	-	328	-	-	333	346	326	326	323	332
125	-	356	-	-	-	-	-	-	356	367
150	-	395	-	-	393	412	393	393	393	406
200	450	448	460	-	451	-	446	446	443	454
250	510	514	525	-	514	-	514	514	512	528
300	560	567	580	-	579	-	564	564	559	578

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Dimension D						
DN	EN (DIN)		ASME	AS		JIS
	PN 16	PN 40		Table E	PN 16	
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
50	-	271	263	-	-	266
65	293	-	-	-	-	288
80	306	-	301	298	298	298
100	311	-	316	308	308	306
125	331	-	-	-	-	331
150	361	-	358	358	358	358
200	401	-	404	399	399	396
250	455	-	455	455	455	453
300	508	-	521	506	506	501



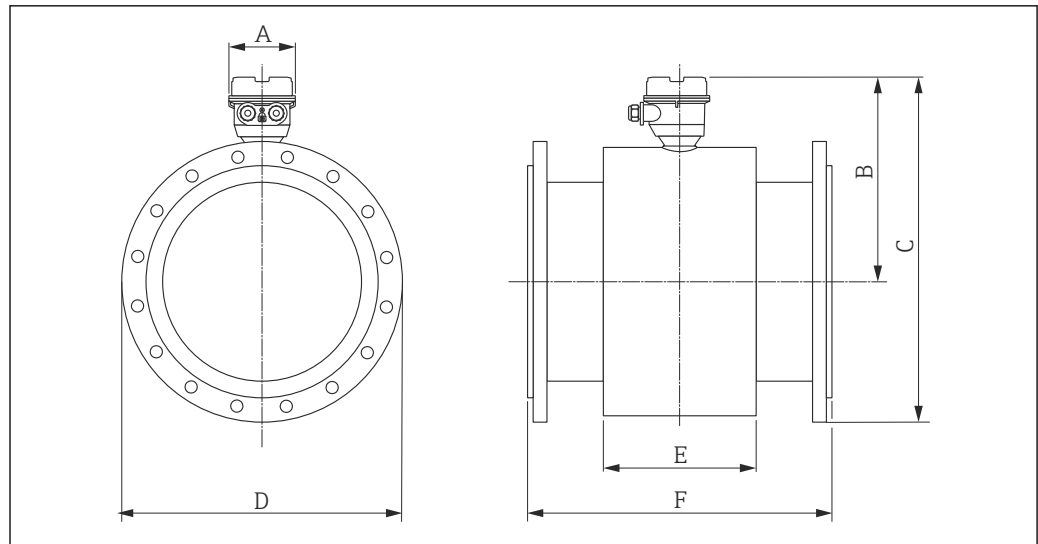
A0020435

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G ¹⁾ [mm]
350	112	395	282	677	564	288	550
375	112	421	308	729	616	288	600
400	112	421	308	729	616	288	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.

Order code for "Design", option A "Insertion length short" and order code for "Sensor option", option CA...CE "Corrosion protection"

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/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 Im2/Im3



A0018156

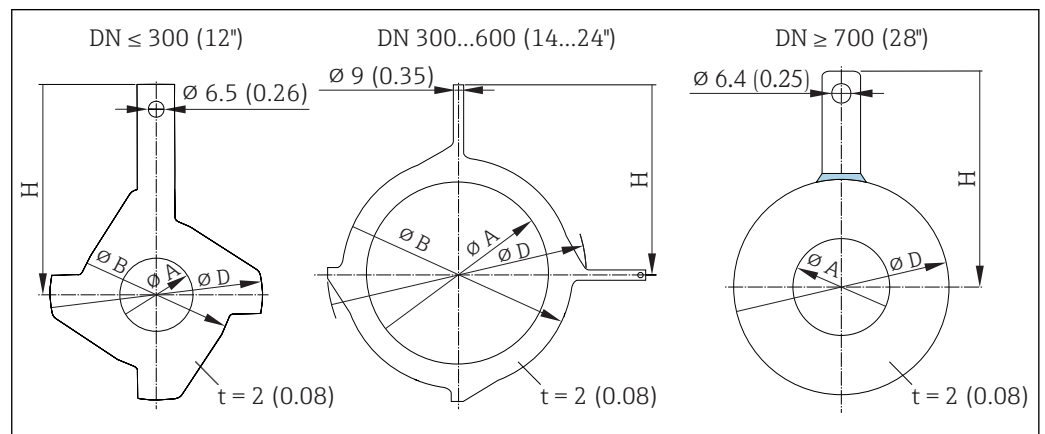
DN [mm]	A [mm]	B [mm]	E [mm]	F [mm]
350	112	350	290	550
375	112	376	290	600
400	112	376	290	600
450	112	403	290	600
500	112	428	290	600
600	112	478	290	600
700	112	549	424	700
750	112	586	454	750
800	112	605	500	800
900	112	655	580	900
1000	112	705	664	1000
1050	112	741	759	1050
1200	112	819	832	1200
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	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	10K [mm]	20K [mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	[mm]	10K [mm]
350	595	603	610	-	613	603	653	490	505	520	-	525	490	540
375	-	-	-	-	651	-	-	-	-	-	-	550	-	-

DN [mm]	Dimension C								Dimension D							
	EN (DIN)			ASME	AS	JIS		EN (DIN)			ASME	AS	JIS			
	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	10K [mm]	20K [mm]	PN 6 [mm]	PN 10 [mm]	PN 16 [mm]	AWWA [mm]	[mm]	10K [mm]	20K [mm]		
400	646	659	666	-	666	673	718	540	565	580	-	580	560	605		
450	701	711	723	-	723	733	788	595	615	640	-	640	620	675		
500	751	763	786	-	781	788	843	645	670	715	-	705	675	730		
600	856	868	898	-	891	908	958	755	780	840	-	825	795	845		
700	979	996	1004	1012	1004	1018	-	860	895	910	927	910	905	-		
750	-	-	-	1078	1084	1083	-	-	-	-	984	995	970	-		
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	-	-	-	-		
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	-	-	-		

Accessories

Ground disks for flange connections



38 Engineering unit mm (in)

DN [mm]	Pressure rating	A [mm]	B [mm]	D [mm]	H [mm]
25	1)	26	62	77.5	87.5
32	1)	35	80	87.5	94.5
40	1)	41	82	101	103

DN [mm]	Pressure rating	A [mm]	B [mm]	D [mm]	H [mm]
50	¹⁾	52	101	115.5	108
65	¹⁾	68	121	131.5	118
80	¹⁾	80	131	154.5	135
100	¹⁾	104	156	186.5	153
125	¹⁾	130	187	206.5	160
150	¹⁾	158	217	256	184
200	¹⁾	206	267	288	205
250	¹⁾	260	328	359	240
300	¹⁾	312	375	413	273
350	DIN, PN 6	343	433	479	365
350	DIN, PN 10	343	400	479	365
350	ASME, Class 150	343	400	479	365
400	DIN, PN 6	393	470	542	395
400	DIN, PN 10	393	469	542	395
400	ASME, Class 150	393	469	542	395
450	DIN, PN 6	439	525	583	417
450	DIN, PN 10	439	535	583	417
450	ASME, Class 150	439	535	583	417
500	DIN, PN 6	493	575	650	460
500	DIN, PN 10	493	588	650	460
500	ASME, Class 150	493	588	650	460
600	DIN, PN 6	593	676	766	522
600	DIN, PN 10	593	688	766	522
600	ASME, Class 150	593	688	766	522
700	DIN, PN 6	697	-	786	460
700	DIN, PN 10	693	-	813	480
700	AS, PN 16	687	-	807	490
700	AWWA, Class D	693	-	832	494
750	AWWA, Class D	743	-	833	523
800	DIN, PN 6	799	-	893	520
800	DIN, PN 10	795	-	920	540
800	AS, PN 16	789	-	914	550
800	AWWA, Class D	795	-	940	561
900	DIN, PN 6	897	-	993	570
900	DIN, PN 10	893	-	1020	590
900	AS, PN 16	886	-	1014	595
900	AWWA, Class D	893	-	1048	615
1000	DIN, PN 6	999	-	1093	620
1000	DIN, PN 10	995	-	1127	650

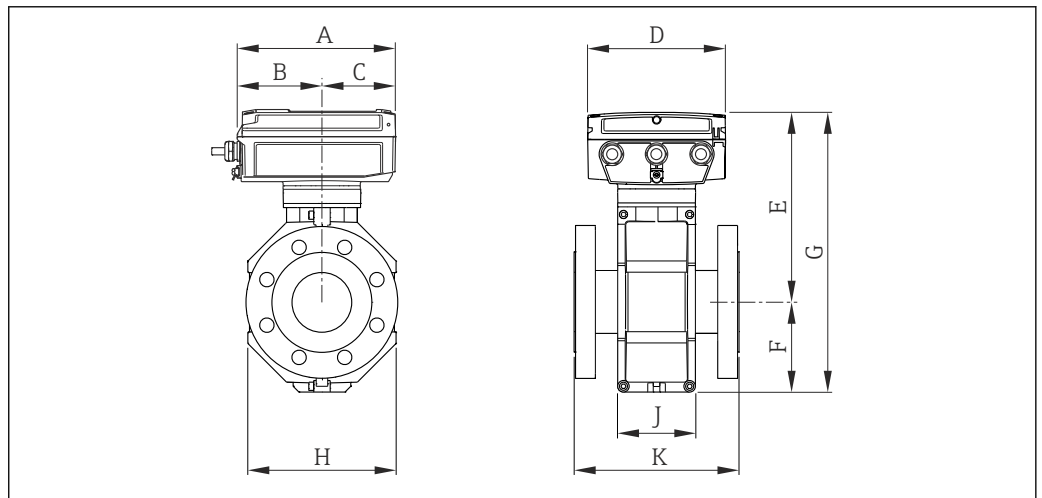
DN [mm]	Pressure rating	A [mm]	B [mm]	D [mm]	H [mm]
1000	AS, PN 16	988	-	1131	660
1000	AWWA, Class D	995	-	1163	675
1050	AWWA, Class D	1044	-	1220	704
1200	DIN, PN 6	1203	-	1310	733

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

Dimensions in US units

Compact version

Order code for "Housing", option M "Compact, polycarbonate" or option A "Compact, aluminum, coated"



A0020352

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

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	7.91	3.31	11.2	4.72	3.70	7.87
1 ½	7.60	4.06	3.54	6.57	7.91	3.31	11.2	4.72	3.70	7.87
2	7.60	4.06	3.54	6.57	7.91	3.31	11.2	4.72	3.70	7.87
3	7.60	4.06	3.54	6.57	8.90	4.29	13.2	7.09	3.70	7.87
4	7.60	4.06	3.54	6.57	8.90	4.29	13.2	7.09	3.70	9.84
6	7.60	4.06	3.54	6.57	10.5	5.91	16.4	10.2	5.51	11.8
8	7.60	4.06	3.54	6.57	11.5	7.09	18.5	12.8	6.14	13.8
10	7.60	4.06	3.54	6.57	12.4	8.07	20.5	15.8	6.14	17.7
12	7.60	4.06	3.54	6.57	13.4	9.06	22.5	18.1	6.54	19.7

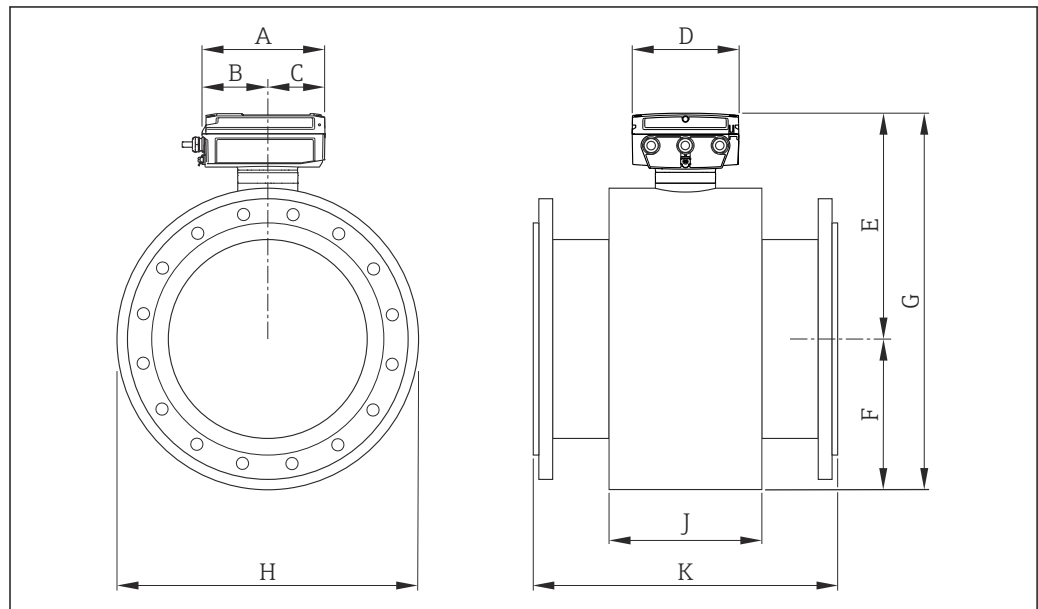
- 1) ASME
 2) The length is independent of the selected pressure rating. Length in accordance with DVGW/ISO.

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
2	7.60	4.06	3.54	6.57	7.91	3.31	11.2	4.72	3.70	7.87
3	7.60	4.06	3.54	6.57	8.90	4.29	13.2	7.09	3.70	7.87
4	7.60	4.06	3.54	6.57	8.90	4.29	13.2	7.09	3.70	9.84
6	7.60	4.06	3.54	6.57	8.90	4.29	13.2	7.09	3.70	11.8
8	7.60	4.06	3.54	6.57	10.5	5.91	16.4	10.2	5.51	13.8
10	7.60	4.06	3.54	6.57	10.5	5.91	16.4	10.2	5.51	17.7
12	7.60	4.06	3.54	6.57	11.5	7.09	18.5	12.8	6.14	19.7

1) ASME

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



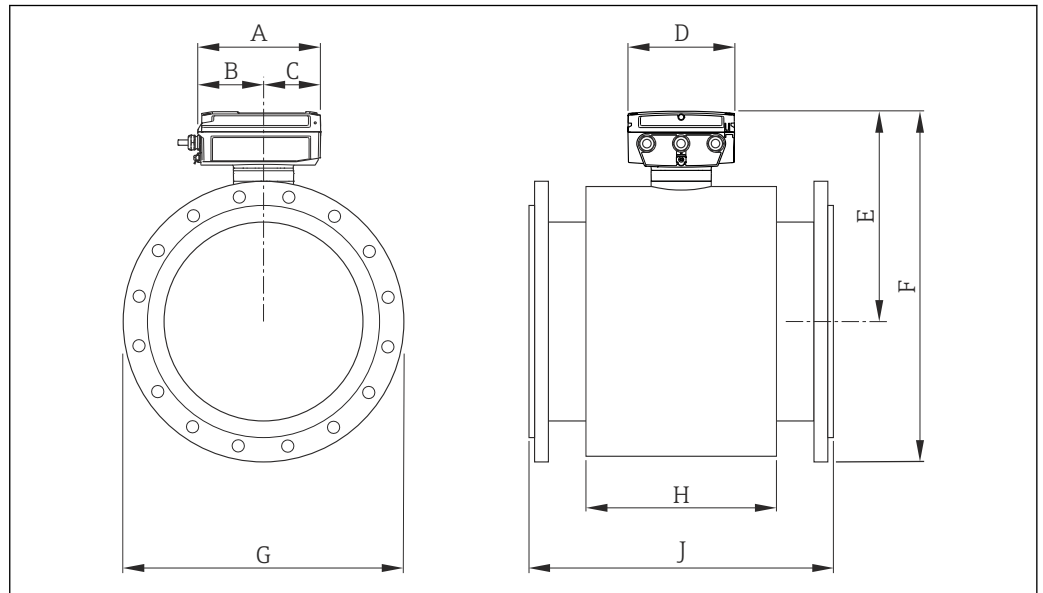
A0017154

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	22.2	11.3	21.7
15	7.60	4.06	3.54	6.57	18.0	12.1	30.1	24.2	11.3	23.6
16	7.60	4.06	3.54	6.57	18.0	12.1	30.1	24.2	11.3	23.6
18	7.60	4.06	3.54	6.57	19.0	13.1	32.1	26.2	11.5	25.6
20	7.60	4.06	3.54	6.57	20.0	14.1	34.1	28.2	11.5	25.6
24	7.60	4.06	3.54	6.57	22.1	16.2	38.3	32.3	15.8	30.7
28	7.60	4.06	3.54	6.57	26.1	20.1	46.2	40.3	23.2	35.8
30	7.60	4.06	3.54	6.57	26.1	20.1	46.2	40.3	24.6	38.4
32	7.60	4.06	3.54	6.57	26.9	21.0	47.9	42.0	25.5	40.9
36	7.60	4.06	3.54	6.57	29.9	24.0	53.9	48.0	30.9	46.0
40	7.60	4.06	3.54	6.57	32.9	27.0	59.9	54.0	33.9	51.2
42	7.60	4.06	3.54	6.57	33.9	28.0	61.9	56.0	35.9	53.7

DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	J [in]	K ²⁾ [in]
48	7.60	4.06	3.54	6.57	37.8	31.9	69.7	63.8	39.0	61.4
54	7.60	4.06	3.54	6.57	41.8	35.9	77.7	71.8	42.3	69.1
60	7.60	4.06	3.54	6.57	45.7	39.8	85.5	79.6	54.8	76.8
66	7.60	4.06	3.54	6.57	48.9	43.0	91.9	86.0	58.4	84.4
72	7.60	4.06	3.54	6.57	52.7	46.8	99.5	93.5	64.2	92.1
78	7.60	4.06	3.54	6.57	54.7	48.7	103.4	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 "Housing", option M "Compact, polycarbonate" or option A "Compact, aluminum, coated";
order code for "Design", option A "Insertion length short"

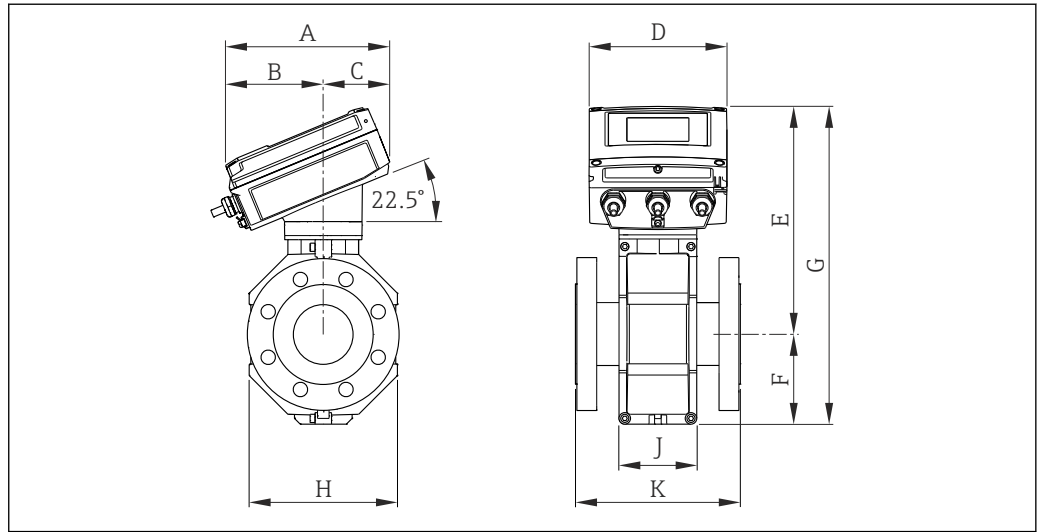


DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	H [in]	J [in]
14	7.60	4.06	3.54	6.57	15.2	11.4	21.6
15	7.60	4.06	3.54	6.57	16.2	11.4	23.6
16	7.60	4.06	3.54	6.57	16.2	11.4	23.6
18	7.60	4.06	3.54	6.57	17.3	11.4	23.6
20	7.60	4.06	3.54	6.57	18.3	11.4	23.6
24	7.60	4.06	3.54	6.57	19.9	11.4	23.6
28	7.60	4.06	3.54	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	26.2	39.4
42	7.60	4.06	3.54	6.57	30.0	29.9	41.3
48	7.60	4.06	3.54	6.57	33.1	32.8	47.2

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	H [in]	J [in]
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
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	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	10K [in]	20K [in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	[in]	10K [in]
14	24.8	25.1	27.6	25.7	25.5	23.74	25.71	19.3	19.9	20.5	21.0	20.7	19.29	21.26
15	-	-	-	-	27	-	-	-	-	-	-	21.7	-	-
16	26.8	27.3	30.0	27.0	27.6	26.50	28.27	21.3	22.2	22.8	23.5	22.8	22.05	23.82
18	29.0	29.4	32.4	29.8	29.9	28.86	31.02	23.4	24.2	25.2	25.0	25.2	24.41	26.57
20	31.0	31.5	36.5	32.0	32.1	31.02	33.19	25.4	26.4	28.1	27.5	27.8	26.57	28.74
24	34.7	35.3	40.4	35.9	36.1	35.75	37.72	29.7	30.7	33.1	32.0	32.5	31.30	33.27
28	39.4	40.1	45.1	40.7	40.4	40.08	-	33.9	35.2	35.8	36.5	35.8	35.63	-
30	-	-	-	43.3	43.5	42.64	-	-	-	-	38.7	39.2	38.19	-
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	49.4	50.7	49.4	-	-
42	-	-	-	56.5	-	-	-	-	-	-	53.0	-	-	-
48	60.8	61.7	62.4	62.9	62.4	-	-	55.3	57.3	58.5	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, aluminum, coated, inclined"



A0020353

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

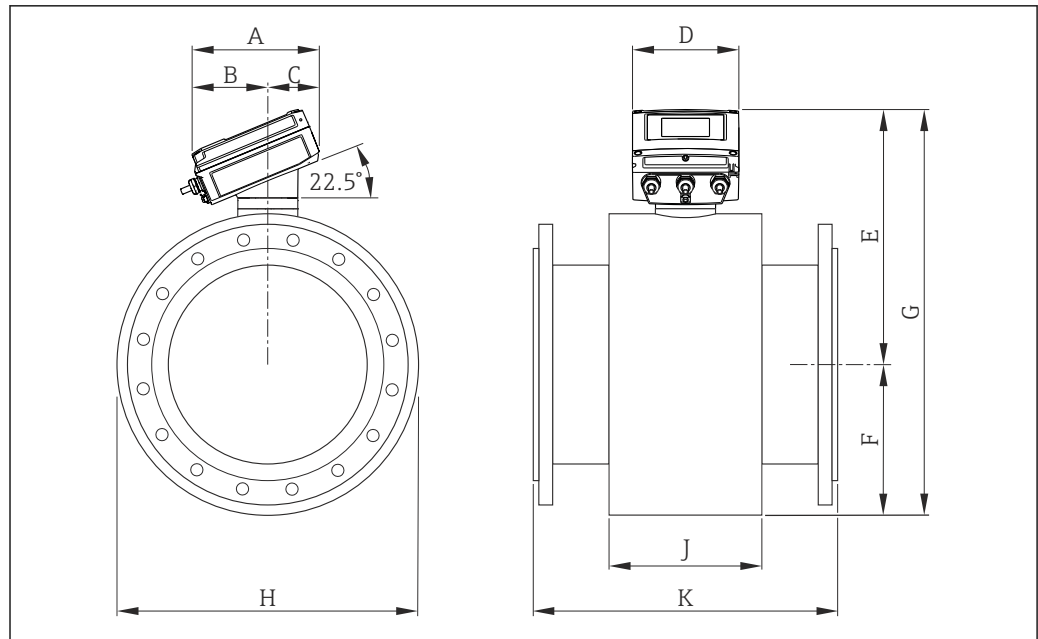
DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	7.83	4.69	3.15	6.57	9.76	3.31	13.1	4.72	3.70	7.87
1 ½	7.83	4.69	3.15	6.57	9.76	3.31	13.1	4.72	3.70	7.87
2	7.83	4.69	3.15	6.57	9.76	3.31	13.1	4.72	3.70	7.87
3	7.83	4.69	3.15	6.57	10.7	4.29	15.0	7.09	3.70	7.87
4	7.83	4.69	3.15	6.57	10.7	4.29	15.0	7.09	3.70	9.84
6	7.83	4.69	3.15	6.57	12.3	5.91	18.2	10.2	5.51	11.8
8	7.83	4.69	3.15	6.57	13.3	7.09	20.4	12.8	6.14	13.8
10	7.83	4.69	3.15	6.57	14.3	8.07	22.4	15.8	6.14	17.7
12	7.83	4.69	3.15	6.57	15.3	9.06	24.3	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 "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
2	7.83	4.69	3.15	6.57	9.76	3.31	13.1	4.72	3.70	7.87
3	7.83	4.69	3.15	6.57	10.7	4.29	15.0	7.09	3.70	7.87
4	7.83	4.69	3.15	6.57	10.7	4.29	15.0	7.09	3.70	9.84
6	7.83	4.69	3.15	6.57	10.7	4.29	15.0	7.09	3.70	11.8
8	7.83	4.69	3.15	6.57	12.3	5.91	18.2	10.2	5.51	13.8
10	7.83	4.69	3.15	6.57	12.3	5.91	18.2	10.2	5.51	17.7
12	7.83	4.69	3.15	6.57	13.3	7.09	20.4	12.8	6.14	19.7

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

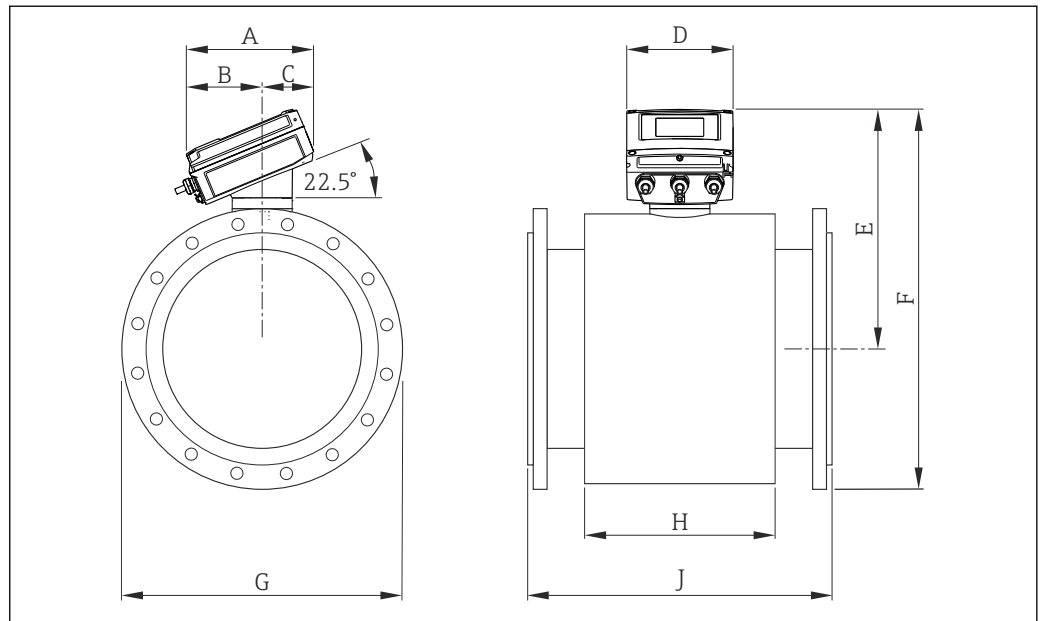


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DN ¹⁾	A	B	C	D	E	F	G	H	J	K ²⁾
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
14	7.83	4.69	3.15	6.57	18.8	11.1	29.9	22.2	11.3	21.7
15	7.83	4.69	3.15	6.57	19.8	12.1	31.9	24.2	11.3	23.6
16	7.83	4.69	3.15	6.57	19.8	12.1	31.9	24.2	11.3	23.6
18	7.83	4.69	3.15	6.57	20.8	13.1	33.9	26.2	11.5	25.6
20	7.83	4.69	3.15	6.57	21.8	14.1	35.9	28.2	11.5	25.6
24	7.83	4.69	3.15	6.57	23.8	16.2	40.0	32.3	15.8	30.7
28	7.83	4.69	3.15	6.57	27.8	20.2	48.0	40.3	23.2	35.8
30	7.83	4.69	3.15	6.57	27.8	20.2	48.0	40.3	24.6	38.4
32	7.83	4.69	3.15	6.57	28.7	21.0	49.7	42.0	25.5	40.9
36	7.83	4.69	3.15	6.57	32.7	24.0	55.7	48.0	30.9	46.0
40	7.83	4.69	3.15	6.57	34.7	27.0	61.7	54.0	33.9	51.2
42	7.83	4.69	3.15	6.57	35.7	28.0	63.7	56.0	35.9	53.7
48	7.83	4.69	3.15	6.57	39.6	31.9	71.5	63.8	39.0	61.4
54	7.83	4.69	3.15	6.57	43.6	35.9	79.5	71.8	42.3	69.1
60	7.83	4.69	3.15	6.57	47.5	39.8	87.3	79.6	54.8	76.8
66	7.83	4.69	3.15	6.57	50.7	43.0	93.7	86.0	58.4	84.4
72	7.83	4.69	3.15	6.57	54.4	46.8	101.2	93.5	64.2	92.1
78	7.83	4.69	3.15	6.57	56.4	48.8	105.2	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 "Housing", option Q "Compact, polycarbonate, inclined" or option R "Compact, aluminum, coated, inclined"; order code for "Design", option A "Insertion length short"



A0020393

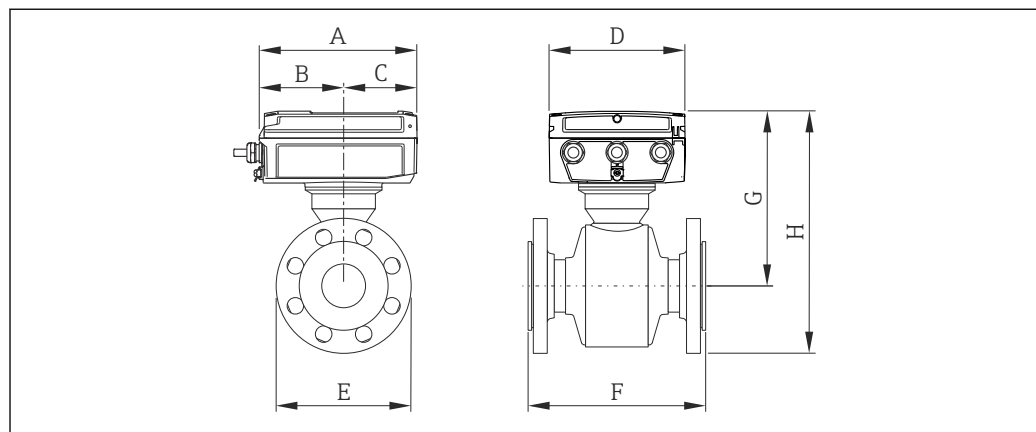
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	H [in]	J [in]
14	7.83	4.69	3.15	6.57	17.0	11.4	21.6
15	7.83	4.69	3.15	6.57	18.0	11.4	23.6
16	7.83	4.69	3.15	6.57	18.0	11.4	23.6
18	7.83	4.69	3.15	6.57	19.1	11.4	23.6
20	7.83	4.69	3.15	6.57	20.1	11.4	23.6
24	7.83	4.69	3.15	6.57	21.7	11.4	23.6
28	7.83	4.69	3.15	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	26.2	39.4
42	7.83	4.69	3.15	6.57	31.8	29.9	41.3
48	7.83	4.69	3.15	6.57	34.9	32.8	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
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	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	10K [in]	20K [in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	10K [in]	20K [in]
14	26.6	26.9	24.3	27.5	27.3	23.74	25.71	19.3	19.9	20.5	21.0	20.7	19.29	21.26
15	-	-	-	-	28.8	-	-	-	-	-	-	21.7	-	-
16	28.6	29.1	26.5	28.8	29.4	26.50	28.27	21.3	22.2	22.8	23.5	22.8	22.05	23.82
18	30.8	31.2	28.8	31.6	31.7	28.86	31.02	23.4	24.2	25.2	25.0	25.2	24.41	26.57
20	32.8	33.3	31.3	33.8	33.9	31.02	33.19	25.4	26.4	28.1	27.5	27.8	26.57	28.74
24	36.5	37.1	35.4	37.7	37.9	35.75	37.72	29.7	30.7	33.1	32.0	32.5	31.30	33.27
28	41.2	41.9	39.7	42.5	42.2	40.08	-	33.9	35.2	35.8	36.5	35.8	35.63	-
30	-	-	-	45.1	45.3	42.64	-	-	-	-	38.7	39.2	38.19	-
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	-	-	-

Order code for "Sensor option", option CA in combination with order code for "Calibration flow", options A/B/D/E/F/G/H/K/M/N



- Order code for "Calibration flow", options A/B/D/E/F/G/H/K/M/N available for order in conjunction with order code for "Housing", option M "Compact, polycarbonate"
- Order code for "Calibration flow", options H/K also available for order in conjunction with order code for "Housing", option A "Compact, aluminum, coated"



A0021328

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

DN [in]	A [in]	B [in]	C [in]	D [in]	F [in]	G [in]
1	7.60	4.06	3.54	6.57	7.87	8.31
2	7.60	4.06	3.54	6.57	7.87	8.31
3	7.60	4.06	3.54	6.57	7.87	9.00
4	7.60	4.06	3.54	6.57	9.84	9.49
6	7.60	4.06	3.54	6.57	11.8	10.8
8	7.60	4.06	3.54	6.57	13.8	11.9
10	7.60	4.06	3.54	6.57	17.7	13.2
12	7.60	4.06	3.54	6.57	19.7	14.2

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN [in]	A [in]	B [in]	C [in]	D [in]	F [in]	G [in]
2	7.60	4.06	3.54	6.57	7.87	8.31
3	7.60	4.06	3.54	6.57	7.87	9.00
4	7.60	4.06	3.54	6.57	9.84	9.00
6	7.60	4.06	3.54	6.57	11.8	9.49
8	7.60	4.06	3.54	6.57	13.8	10.0
10	7.60	4.06	3.54	6.57	17.7	10.8
12	7.60	4.06	3.54	6.57	19.7	11.9

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	-	9.25	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


Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

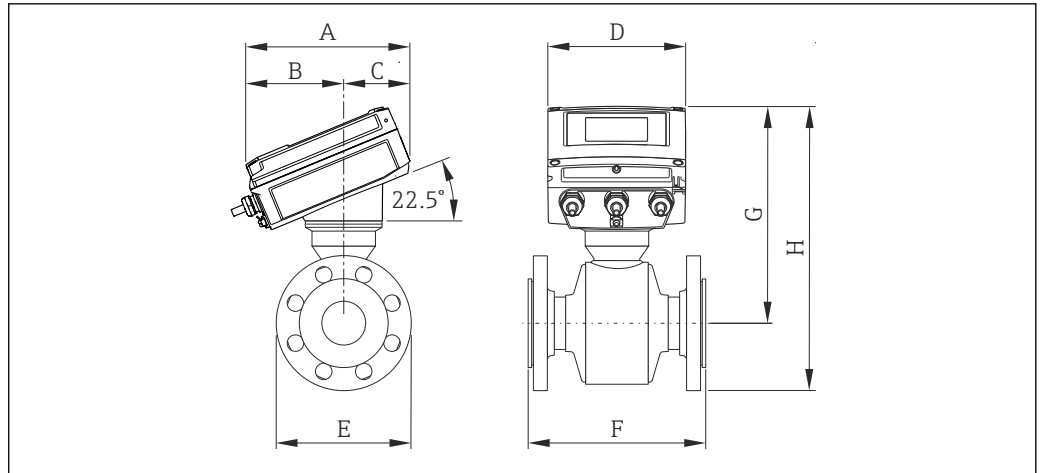
Dimension H										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	-	-	-	11.1	11.1	10.2	-	-	11.1	10.2
2	-	-	-	11.6	11.3	10.6	-	-	11.4	10.4
3	-	12.9	-	-	12.7	12.2	12.6	12.6	12.6	12
4	-	13.8	-	-	14.0	13.5	13.7	13.7	13.6	13
6	-	16.5	-	-	16.4	16.1	16.4	16.4	16.4	15.9
8	17.6	18.5	18	-	18.6	-	18.4	18.4	18.3	17.8
10	20	21.1	20.6	-	21.1	-	21.1	21.1	21.0	20.7
12	22	23.2	22.8	-	23.7	-	23.1	23.1	22.9	22.7

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Dimension H						
DN	EN (DIN)		ASME	AS		JIS
	PN 16	PN 40	Class 150	Table E	PN 16	10K
[in]	[in]	[in]	[in]	[in]	[in]	[in]
2	-	11.6	11.3	-	-	11.4
3	12.9	-	12.7	12.6	12.6	12.6
4	13.1	-	13.3	13.0	13.0	12.9
6	15.1	-	15.0	15.0	15.0	15.0
8	16.7	-	16.8	16.6	16.6	16.5
10	18.8	-	18.8	18.8	18.8	18.7
12	20.9	-	21.4	20.8	20.8	20.6

Order code for "Sensor option", option CA in combination with order code for "Calibration flow", options A/B/D/E/F/G/H/K/M/N

-  Order code for "Calibration flow", options A/B/D/E/F/G/H/K/M/N available for order in conjunction with order code for "Housing", option Q "Compact, polycarbonate, inclined"
- Order code for "Calibration flow", options H/K also available for order in conjunction with order code for "Housing", option R "Compact, aluminum, coated, inclined"



A0021329

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

DN [in]	A [in]	B [in]	C [in]	D [in]	F [in]	G [in]
1	7.83	4.69	3.15	6.57	7.87	10.6
2	7.83	4.69	3.15	6.57	7.87	10.6
3	7.83	4.69	3.15	6.57	7.87	11.2
4	7.83	4.69	3.15	6.57	9.84	11.7
6	7.83	4.69	3.15	6.57	11.8	13.1
8	7.83	4.69	3.15	6.57	13.8	14.1
10	7.83	4.69	3.15	6.57	17.7	15.4
12	7.83	4.69	3.15	6.57	19.7	16.4

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN [in]	A [in]	B [in]	C [in]	D [in]	F [in]	G [in]
2	7.83	4.69	3.15	6.57	7.87	10.6
3	7.83	4.69	3.15	6.57	7.87	11.2
4	7.83	4.69	3.15	6.57	9.84	11.1
6	7.83	4.69	3.15	6.57	11.8	11.7
8	7.83	4.69	3.15	6.57	13.8	12.2
10	7.83	4.69	3.15	6.57	17.7	13.1
12	7.83	4.69	3.15	6.57	19.7	14.1

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

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]
3	-	7.87	-	7.87	7.52	8.27	7.28	7.28	7.28	7.87
4	-	8.66	-	9.25	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

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

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	-	-	-	13.3	13.2	12.3	-	-	13.3	12.3
2	-	-	-	13.8	13.5	12.8	-	-	13.6	12.6
3	-	15.2	-	-	15.0	14.3	14.9	14.9	14.9	14.1
4	-	16.1	-	-	16.3	15.7	16.0	16.0	15.9	15.2
6	-	18.7	-	-	18.6	18.3	18.6	18.6	18.6	18.1
8	19.8	20.8	20.2	-	20.9	-	20.7	20.7	20.6	20.0
10	22.2	23.4	22.8	-	23.4	-	23.4	23.4	23.3	22.8
12	24.1	25.5	24.9	-	26.0	-	25.4	25.4	25.2	24.8

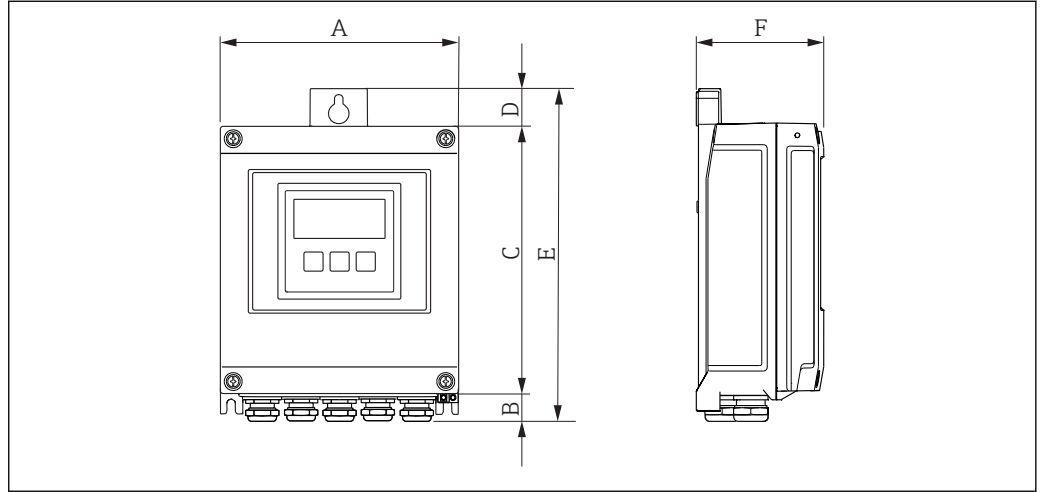
Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Dimension H						
DN	EN (DIN)		ASME	AS		JIS
	PN 16	PN 40	Class 150	Table E	PN 16	10K
[in]	[in]	[in]	[in]	[in]	[in]	[in]
2	-	13.8	13.6	-	-	13.6
3	15.2	-	15.0	14.9	14.9	14.9
4	15.4	-	15.6	15.3	15.3	15.2
6	17.3	-	17.3	17.3	17.3	17.3
8	18.9	-	19.0	18.9	18.9	18.7
10	21.1	-	21.1	21.1	21.1	21.0
12	23.2	-	23.6	23.1	23.1	22.9

Remote version

Transmitter remote version

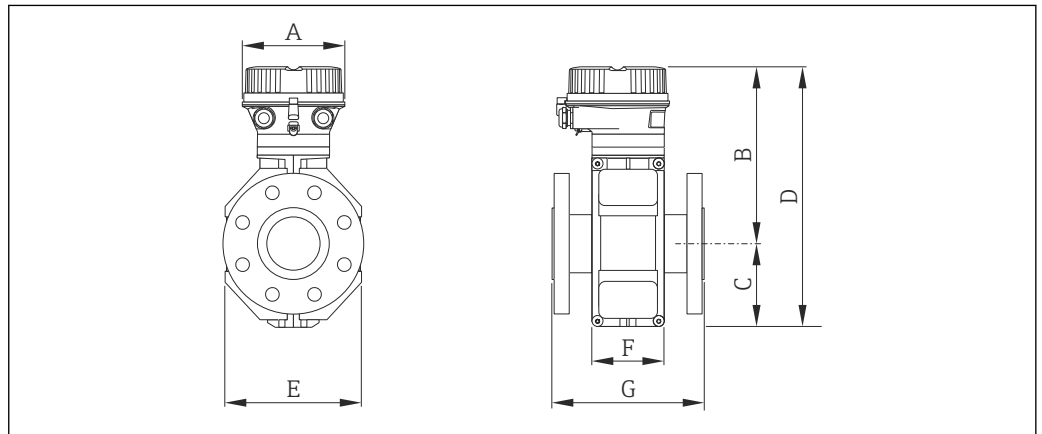
Order code for "Housing", option N "Remote, polycarbonate" or option P "Remote, aluminum coated"



A0020522

A [in]	B [in]	C [in]	D [in]	E [in]	F [in]
6.57	0.83	7.36	0.94	9.13	3.15

Sensor remote version



A0017282

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ²⁾ [in]
1	5.35	7.87	3.31	11.2	4.72	3.70	7.87
1 ½	5.35	7.87	3.31	11.2	4.72	3.70	7.87
2	5.35	7.87	3.31	11.2	4.72	3.70	7.87
3	5.35	8.86	4.29	13.1	7.09	3.70	7.87
4	5.35	8.86	4.29	13.1	7.09	3.70	9.84
6	5.35	10.4	5.91	16.3	10.2	5.51	11.8

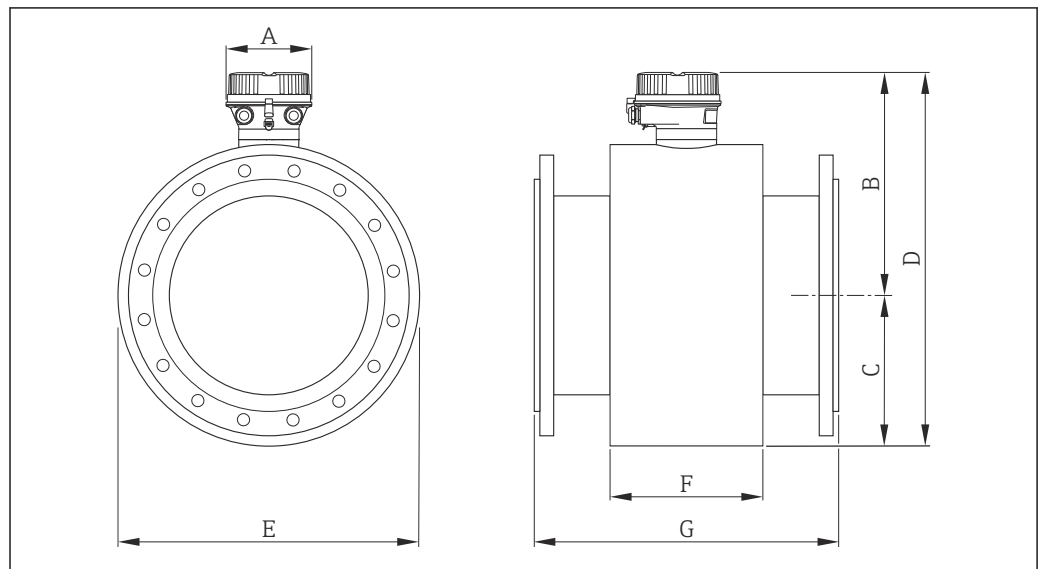
DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ²⁾ [in]
8	5.35	11.4	7.09	18.5	12.8	6.14	13.8
10	5.35	12.4	8.07	20.5	15.8	6.14	17.7
12	5.35	13.4	9.06	22.4	18.1	6.54	19.7

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

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ²⁾ [in]
2	5.35	7.87	3.31	11.2	4.72	3.70	7.87
3	5.35	8.86	4.29	13.1	7.09	3.70	7.87
4	5.35	8.86	4.29	13.1	7.09	3.70	9.84
6	5.35	8.86	4.29	13.1	7.09	3.70	11.8
8	5.35	10.4	5.91	16.3	10.2	5.51	13.8
10	5.35	10.4	5.91	16.3	10.2	5.51	17.7
12	5.35	11.4	7.09	18.5	12.8	6.14	19.7

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



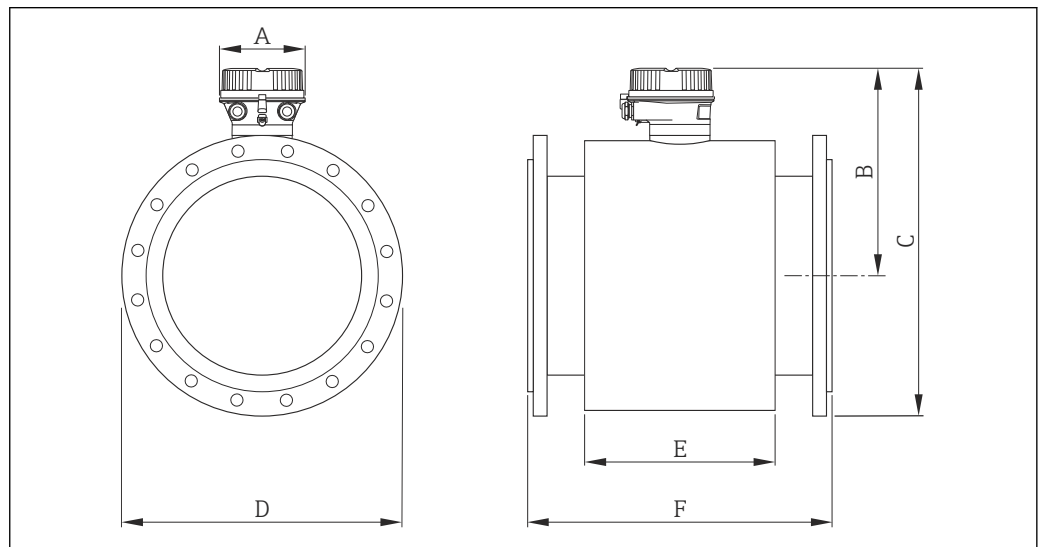
A0017283

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	11.3	21.7
15	5.35	17.0	12.1	31.3	24.2	11.3	23.6
16	5.35	17.0	12.1	31.3	24.2	11.3	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

DN ¹⁾ [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ²⁾ [in]
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"



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

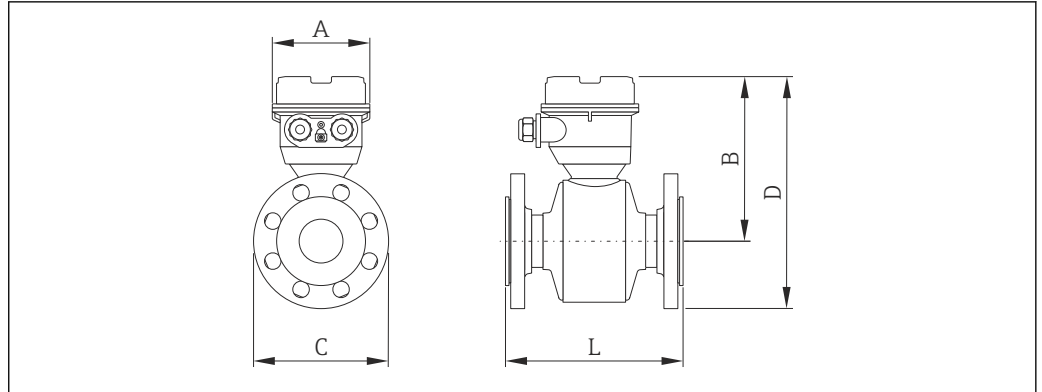
DN [in]	A [in]	B [in]	E [in]	F [in]
30	5.35	23.0	17.9	29.5
32	5.35	23.6	19.7	31.5
36	5.35	25.6	22.8	35.4
40	5.35	27.5	26.2	39.4
42	5.35	28.9	29.9	41.3
48	5.35	32.0	32.8	47.2
54	5.35	36.4	39.6	53.1
60	5.35	40.4	45.2	59.0
66	5.35	42.4	50.6	64.9
72	5.35	44.6	54.2	70.8
78	5.35	49.0	61.8	78.7

DN [in]	Dimension C							Dimension D						
	EN (DIN)			ASME	AS	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	10K [in]	20K [in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	10K [in]	20K [in]
14	23.7	24.0	24.3	24.6	24.4	23.74	25.71	19.3	19.9	20.5	21.0	20.7	19.29	21.26
15	-	-	-	-	25.9	-	-	-	-	-	-	21.7	-	-
16	25.8	26.2	26.5	26.9	26.5	26.50	28.27	21.3	22.2	22.8	23.5	22.8	22.05	23.82
18	27.9	28.3	28.7	28.7	28.8	28.86	31.02	23.4	24.2	25.2	25.0	25.2	24.41	26.57
20	29.9	30.4	31.1	30.9	31.1	31.02	33.19	25.4	26.4	28.1	27.5	27.8	26.57	28.74
24	33.7	34.2	35.6	34.8	35.0	35.75	37.72	29.7	30.7	33.1	32.0	32.5	31.30	33.27
28	38.5	39.2	39.7	39.8	39.5	40.08	-	33.9	35.2	35.8	36.5	35.8	35.63	-
30	-	-	-	42.4	42.4	42.64	-	-	-	-	38.7	39.2	38.19	-
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 "Sensor option", option CA...CE "Corrosion protection"

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/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3

Option	Description
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 Im2/Im3



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Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

DN [in]	A [in]	B [in]	E [in]
1	4.41	7.40	7.87
2	4.41	7.40	7.87
3	4.41	8.11	7.87
4	4.41	8.58	9.84
6	4.41	9.96	11.8
8	4.41	10.9	13.8
10	4.41	12.3	17.7
12	4.41	13.3	19.7

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

DN [in]	A [in]	B [in]	E [in]
2	4.41	7.40	7.87
3	4.41	8.11	7.87
4	4.41	7.91	9.84
6	4.41	8.58	11.8
8	4.41	9.09	13.8
10	4.41	9.96	17.7
12	4.41	10.9	19.7

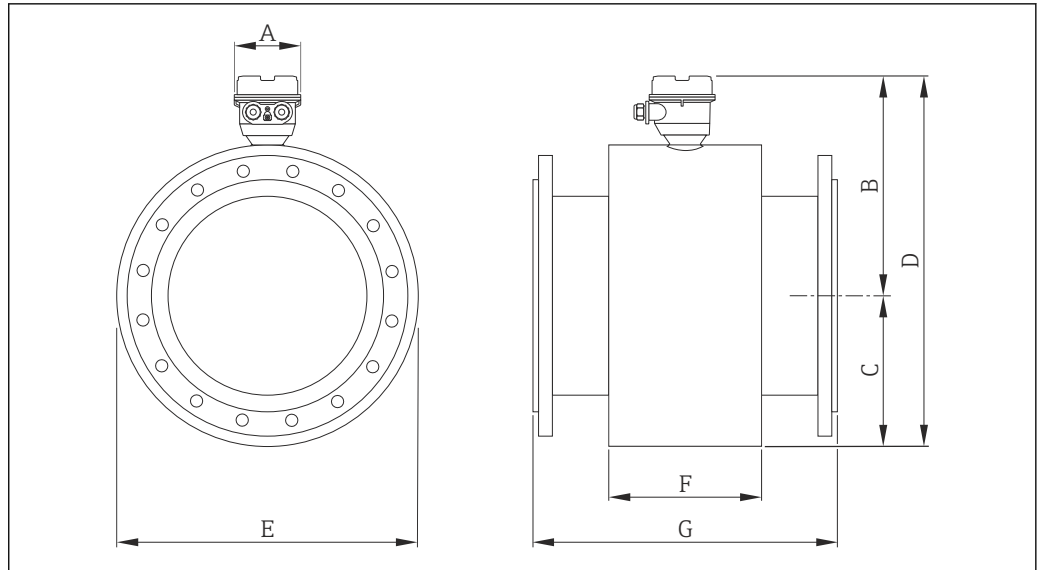
Dimension C										
DN	EN (DIN)				ASME		AS		JIS	
	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300	Table E	PN 16	10K	20K
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	-	-	-	5.51	4.33	5.51	5.51	-	5.51	5.51
2	-	-	-	6.50	5.91	6.50	5.91	5.91	6.10	6.10
3	-	7.87	-	7.87	7.48	8.25	7.28	7.28	7.28	7.87
4	-	8.66	-	12.8	9.06	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	-	13.6	-	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	-	19.1	-	17.9	17.9	17.5	18.9

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

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
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
1	-	-	-	10.2	10.2	10.2	-	-	10.2	10.2
2	-	-	-	10.6	10.4	10.7	-	-	10.5	10.5
3	-	12.0	-	-	11.8	12.2	11.7	11.7	11.7	12.1
4	-	12.9	-	-	13.1	13.6	12.8	12.8	12.7	13.1
6	-	15.6	-	-	15.5	16.2	15.5	15.5	15.5	16.0
8	17.7	17.6	18.1	-	17.7	-	17.5	17.5	17.4	17.9
10	20.1	20.2	20.7	-	20.2	-	20.2	20.2	20.1	20.8
12	22.0	22.3	22.8	-	22.8	-	22.2	22.2	22.0	22.8

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Dimension D						
DN	EN (DIN)		ASME	AS		JIS
	PN 16	PN 40	Class 150	Table E	PN 16	10K
[in]	[in]	[in]	[in]	[in]	[in]	[in]
2	-	10.6	10.4	-	-	10.5
3	12.0	-	11.8	11.7	11.7	11.7
4	12.2	-	12.4	12.1	12.1	12.0
6	14.2	-	14.1	14.1	14.1	14.1
8	15.8	-	15.9	15.7	15.7	15.6
10	17.9	-	17.9	17.9	17.9	17.8
12	20.0	-	20.5	19.9	19.9	19.7



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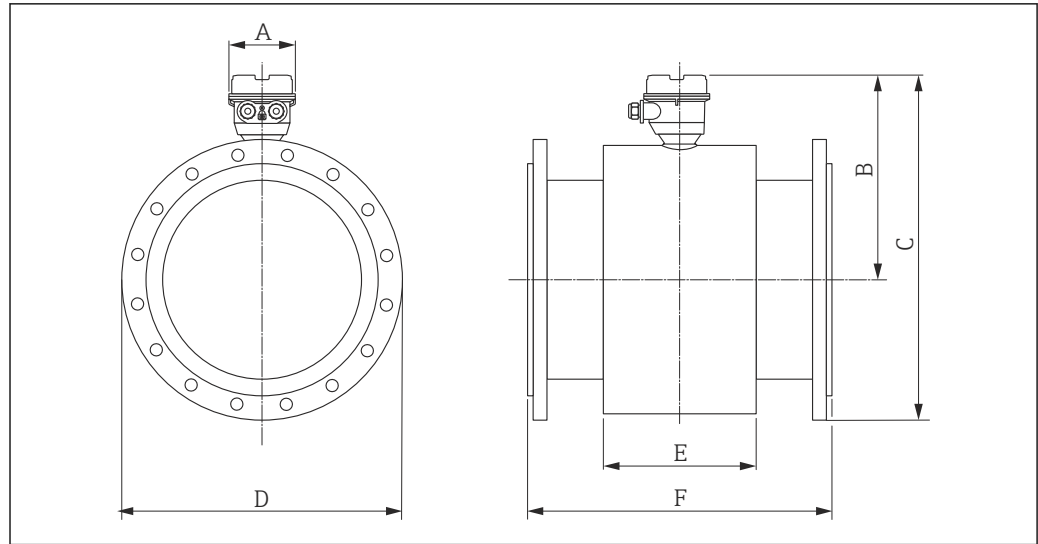
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G ¹⁾ [in]
14	4.41	15.6	11.1	26.7	22.2	11.3	21.7
15	4.41	16.6	12.1	28.7	24.2	11.3	23.6
16	4.41	16.6	12.1	28.7	24.2	11.3	23.6
18	4.41	17.6	13.1	30.7	26.2	11.5	25.6
20	4.41	18.6	14.1	32.7	28.2	11.5	25.6
24	4.41	20.6	16.2	36.8	32.3	15.8	30.7
28	4.41	24.6	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
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.

Order code for "Design", option A "Insertion length short" and order code for "Sensor option", option CA...CE "Corrosion protection"

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/Im1/Im2/Im3
CC	IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 C5-M/Im1/Im2/Im3

Option	Description
CD	Buried IP68, Type 6P, fact-potted; corrosion protection EN ISO 12944 Im2/Im3
CE	Buried IP68, Type 6P, cust-potted; corrosion protection EN ISO 12944 Im2/Im3



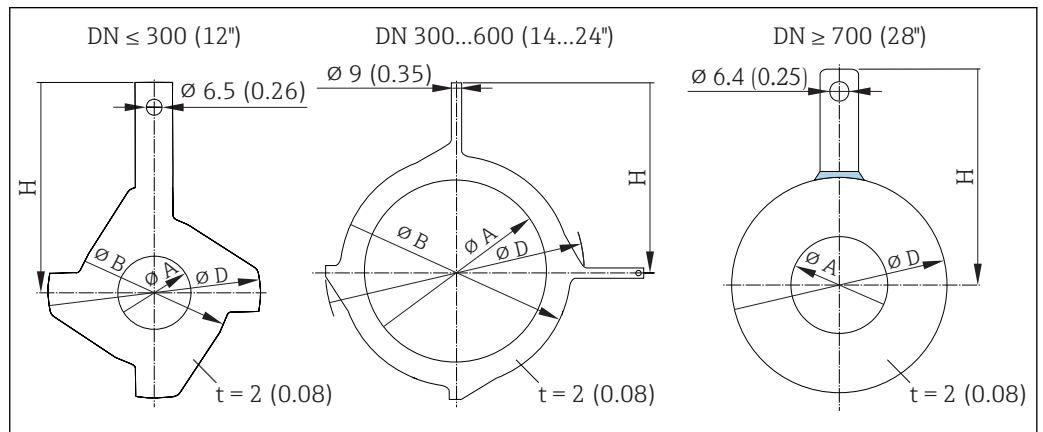
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DN [in]	A [in]	B [in]	E [in]	F [in]
14	4.41	13.8	11.4	21.7
15	4.41	14.8	11.4	23.6
16	4.41	14.8	11.4	23.6
18	4.41	15.9	11.4	23.6
20	4.41	16.9	11.4	23.6
24	4.41	18.8	11.4	23.6
28	4.41	21.6	16.7	27.6
30	4.41	23.1	17.9	29.5
32	4.41	23.8	19.7	31.5
36	4.41	25.8	22.8	35.4
40	4.41	27.8	26.2	39.4
42	4.41	29.2	29.9	41.3
48	4.41	32.2	32.8	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	JIS		EN (DIN)			ASME	AS	JIS	
	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	10K [in]	20K [in]	PN 6 [in]	PN 10 [in]	PN 16 [in]	AWWA [in]	[in]	10K [in]	20K [in]
14	23.4	23.7	24.0	-	24.1	23.74	25.71	19.3	19.9	20.5	-	20.7	19.29	21.26
15	-	-	-	-	25.6	-	-	-	-	-	-	21.7	-	-
16	25.4	25.9	26.2	-	26.2	26.50	28.27	21.3	22.2	22.8	-	22.8	22.05	23.82
18	27.6	28.0	28.5	-	28.5	28.86	31.02	23.4	24.2	25.2	-	25.2	24.41	26.57
20	29.6	30.0	30.9	-	30.7	31.02	33.19	25.4	26.4	28.1	-	27.8	26.57	28.74
24	33.7	34.2	35.4	-	35.1	35.75	37.72	29.7	30.7	33.1	-	32.5	31.30	33.27
28	38.5	39.2	39.5	39.8	39.5	40.08	-	33.9	35.2	35.8	36.5	35.8	35.63	-
30	-	-	-	42.4	42.7	42.64	-	-	-	-	38.7	39.2	38.19	-
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	-	-	-

Accessories

Ground disks for flange connections



39 Engineering unit mm (in)

DN [in]	Pressure rating	A [in]	B [in]	D [in]	H [in]
1	1)	1.02	2.44	3.05	3.44
1 ¼	1)	1.38	3.15	3.44	3.72
1 ½	1)	1.61	3.23	3.98	4.06

DN [in]	Pressure rating	A [in]	B [in]	D [in]	H [in]
2	¹⁾	2.05	3.98	4.55	4.25
2 ½	¹⁾	2.68	4.76	5.18	4.65
3	¹⁾	3.15	5.16	6.08	5.31
4	¹⁾	4.09	6.14	7.34	6.02
5	¹⁾	5.12	7.36	8.13	6.30
6	¹⁾	6.22	8.54	10.1	7.24
8	¹⁾	8.11	10.5	11.3	8.07
10	¹⁾	10.2	12.9	14.1	9.45
12	¹⁾	12.3	14.8	16.3	10.8
14	DIN, PN 6	13.5	16.5	18.9	14.4
14	DIN, PN 10	13.5	15.8	18.9	14.4
14	ASME, Class 150	13.5	15.8	18.9	14.4
16	DIN, PN 6	15.5	18.5	21.3	15.6
16	DIN, PN 10	15.5	18.5	21.3	15.6
16	ASME, Class 150	15.5	18.5	21.3	15.6
18	DIN, PN 6	17.3	20.7	23.0	16.4
18	DIN, PN 10	17.3	21.1	23.0	16.4
18	ASME, Class 150	17.3	21.1	23.0	16.4
20	DIN, PN 6	19.4	23.3	25.6	18.1
20	DIN, PN 10	19.4	23.2	25.6	18.1
20	ASME, Class 150	19.4	23.2	25.6	18.1
24	DIN, PN 6	23.4	27.3	30.2	20.6
24	DIN, PN 10	23.4	27.1	30.2	20.6
24	ASME, Class 150	23.4	27.1	30.2	20.6
28	DIN, PN 6	27.4	-	30.9	18.1
28	DIN, PN 10	27.3	-	32.0	18.9
28	AS, PN 16	27.1	-	31.8	19.3
28	AWWA, Class D	27.3	-	32.8	19.5
30	AWWA, Class D	29.3	-	32.8	20.6
32	DIN, PN 6	31.5	-	35.2	20.5
32	DIN, PN 10	31.3	-	36.2	21.3
32	AS, PN 16	31.1	-	36.0	21.7
32	AWWA, Class D	31.3	-	37.0	22.1
36	DIN, PN 6	35.3	-	39.1	22.4
36	DIN, PN 10	35.2	-	40.2	23.2
36	AS, PN 16	34.9	-	39.9	23.4
36	AWWA, Class D	35.2	-	41.3	24.2
40	DIN, PN 6	39.3	-	43.0	24.4
40	DIN, PN 10	39.2	-	44.4	25.6

DN [in]	Pressure rating	A [in]	B [in]	D [in]	H [in]
40	AS, PN 16	38.9	-	44.5	26.0
40	AWWA, Class D	39.2	-	45.8	26.6
42	AWWA, Class D	41.1	-	48.0	27.7
48	DIN, PN 6	47.4	-	51.6	28.9

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

Weight

All values (weight exclusive of packaging material) refer to devices for standard pressure ratings. Different values due to different transmitter versions:

Compact version

Weight data:

- Including the transmitter
 - Order code for "Housing", option **M, Q**: 1.3 kg (2.9 lb)
 - Order code for "Housing", option **A, R**: 2.0 kg (4.4 lb)
- Excluding packaging material

Weight in SI units

Standard version

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

EN 1092-1		
DN [mm]	Pressure rating	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
25	PN 40	5
32	PN 40	6
40	PN 40	8
50	PN 40	9
65	PN 16	10
80	PN 16	12
100	PN 16	14
125	PN 16	20
150	PN 16	24
200	PN 10	43
250	PN 10	63
300	PN 10	68
350	PN 6	105
375	PN 6	120
400	PN 6	120
450	PN 6	161
500	PN 6	156
600	PN 6	208
700	PN 6	304
800	PN 6	357

EN 1092-1		
DN [mm]	Pressure rating	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
900	PN 6	485
1000	PN 6	589
1200	PN 6	850
1400	PN 6	1300
1600	PN 6	1700
1800	PN 6	2200
2000	PN 6	2800

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

EN 1092-1 (DIN 2501)		
DN [mm]	Pressure rating	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
50	PN 40	9.6
65	PN 16	11.0
80	PN 16	13.4
100	PN 16	15.0
125	PN 16	24.0
150	PN 16	29.3
200	PN 16	51.3
250	PN 16	80.1
300	PN 16	93.7

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

AS 4087, PN 16	
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
80	12
100	14
150	24

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

AS 4087, PN 16	
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
80	13.4
100	15.0
150	29.3

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

JIS B2220, 10K	
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
25	5
32	5
40	6
50	7
65	9
80	11
100	13
125	19
150	23
200	40
250	68
300	70
350	79
400	100
450	128
500	142
600	188
700	280
750	331

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

JIS B2220, 10K	
DN [mm]	Weight [kg]
	Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
50	7.6
65	10.0
80	12.4
100	14.8
125	23.4
150	30.0
200	49.2
250	82.9
300	88.2

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option A

Option A "Insertion length short; ISO/DVGW to DN400, DN450-2000 1:1"

EN 1092-1			
DN [mm]	Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾		
	Weight [kg]		
	PN 6	PN 10	PN 16
450	100	115	145
500	115	133	185
600	156	166	274
700	198	253	307
800	262	343	416
900	345	431	525
1000	446	560	725
1200	639	837	1192
1400	1036	1348	1713
1600	1384	1985	2448
1800	1829	2570	3300
2000	2506	3178	4168

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

AS 2129, Table E	
DN [mm]	Weight [kg]
	Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
450	147
500	183

AS 2129, Table E	
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
600	267
700	347
750	434
800	494
900	691
1000	786
1200	1246

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

AS 4087, PN 16	
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
450	137
500	185
600	265
700	368
750	446
800	523
900	703
1000	784
1200	1228

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Calibration flow", options H and K, or options H/K or order code for "Sensor option", option CA

Option	Description
H	MID Type Examination Cert MI-001
K	OIML R49 Class 2
CA	IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

EN 1092-1		
DN [mm]	Pressure rating	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
25	PN 40	9
32	PN 40	10
40	PN 40	11

EN 1092-1		
DN [mm]	Pressure rating	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
50	PN 40	12
65	PN 16	13
80	PN 16	15
100	PN 16	17
125	PN 16	22
150	PN 16	27
200	PN 10	38
250	PN 10	51
300	PN 10	60

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

EN 1092-1 (DIN 2501)		
DN [mm]	Pressure rating	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
50	PN 40	12.6
65	PN 16	14.0
80	PN 16	16.4
100	PN 16	18.0
125	PN 16	26.0
150	PN 16	32.3
200	PN 16	46.3
250	PN 16	68.1
300	PN 16	85.7

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

AS 2129, PN 16		
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾	
80	15	
100	17	
150	27	

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

AS 2129, PN 16	
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
80	16.4
100	18.0
150	32.3

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

JIS B2220, 10K	
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
25	9
32	10
40	10
50	11
65	12
80	13
100	15
125	20
150	25
200	34
250	50
300	57
350	79
400	100
450	128
500	142
600	188
700	280
750	331

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

JIS B2220, 10K	
DN [mm]	Weight [kg] Order code for "Housing", option M, Q Polycarbonate plastic¹⁾
50	11.6
65	13.0
80	14.4
100	16.8
125	24.4
150	32.0
200	43.2
250	64.9
300	75.2

1) Values for aluminum transmitter, AlSi10Mg, coated: + 0.7 kg

Weight in US units

Standard version

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

ASME B16.5, Class 150	
DN [in]	Weight [lbs] Order code for "Housing", option M, Q Polycarbonate plastic¹⁾
1	11
1½	18
2	20
3	26
4	31
6	53
8	95
10	161
12	238
14	386
16	452
18	562
20	628
24	893

1) Values for aluminum transmitter, AlSi10Mg, coated: + 1.5 lbs

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

ASME B16.5, Class 150	
DN [in]	Weight [lbs] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
2	21.3
3	29.1
4	35.6
6	68.4
8	116.2
10	198.9
12	285.2

1) Values for aluminum transmitter, AlSi10Mg, coated: + 1.5 lbs

AWWA C207, Class D	
DN [in]	Weight [lbs] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
28	882
30	1 014
32	1 213
36	1 764
40	1 985
42	2 426
48	3 087
54	4 851
60	5 954
66	8 159
72	9 041
78	10 143

1) Values for aluminum transmitter, AlSi10Mg, coated: + 1.5 lbs

Order code for "Design", option A

Option A "Insertion length short; ISO/DVGW to DN400, DN450-2000 1:1"

ASME B16.5, Class 150	
DN [in]	Weight [lbs] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
18	423
20	505
24	668

1) Values for aluminum transmitter, AlSi10Mg, coated: + 1.5 lbs

AWWA C207, Class D	
DN [in]	Weight [lbs] Order code for "Housing", option M, Q Polycarbonate plastic ¹⁾
28	589
30	703
32	847
36	1039
40	1346
42	1567
48	2062
54	2895
60	3595
66	4931
72	5709
78	6928

1) Values for aluminum transmitter, AlSi10Mg, coated: + 1.5 lbs

Order code for "Sensor option", option CA

Option CA "IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
1	17.6
1½	19.8
2	24.3
3	33.1
4	41.9
6	61.7
8	97.0
10	134.5
12	189.6

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
2	25.6
3	36.2
4	46.5
6	77.1
8	118.2

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
10	172.4
12	236.8

Transmitter remote version

Wall-mount housing

Depends on the material of the wall-mount housing:

- Polycarbonate plastic: 1.3 kg (2.9 lb)
- Aluminum, AlSi10Mg, coated: 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

Standard version

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

EN 1092-1		
DN [mm]	Pressure rating	Weight [kg]
25	PN 40	5
32	PN 40	6
40	PN 40	7
50	PN 40	9
65	PN 16	10
80	PN 16	12
100	PN 16	14
125	PN 16	20
150	PN 16	24
200	PN 10	43
250	PN 10	63
300	PN 10	68
350	PN 6	103
375	PN 6	118
400	PN 6	118
450	PN 6	159
500	PN 6	154
600	PN 6	206
700	PN 6	302
800	PN 6	355
900	PN 6	483

EN 1092-1		
DN [mm]	Pressure rating	Weight [kg]
1000	PN 6	587
1200	PN 6	848
1400	PN 6	1298
1600	PN 6	1698
1800	PN 6	2198
2000	PN 6	2798

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

EN 1092-1		
DN [mm]	Pressure rating	Weight [kg]
50	PN 40	9.6
65	PN 16	11.0
80	PN 16	13.4
100	PN 16	15.0
125	PN 16	24.0
150	PN 16	29.3
200	PN 16	51.3
250	PN 16	80.1
300	PN 16	93.7

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

AS 4087, PN 16	
DN [mm]	Weight [kg]
80	12
100	14
150	24

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

AS 4087, PN 16	
DN [mm]	Weight [kg]
80	13.4
100	15.0
150	29.3

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

JIS B2220, 10K	
DN [mm]	Weight [kg]
25	5
32	5
40	6
50	7
65	9
80	11
100	13
125	19
150	23
200	40
250	67
300	70
350	79
400	100
450	128
500	142
600	188
700	280
750	331

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

JIS B2220, 10K	
DN [mm]	Weight [kg]
50	7.6
65	10.0
80	12.4
100	14.8
125	23.4
150	30.0
200	49.2
250	81.9
300	88.2

Order code for "Design", option A

Option A "Insertion length short; ISO/DVGW to DN400, DN450-2000 1:1"

EN 1092-1			
DN [mm]	Weight [kg]		
	PN 6	PN 10	PN 16
450	98	115	145
500	113	131	188
600	154	166	274
700	198	253	307
800	262	343	416
900	345	431	525
1000	446	560	725
1200	639	837	1192
1400	1036	1348	1713
1600	1384	1985	2448
1800	1829	2570	3300
2000	2506	3178	4168

AS 2129, Table E	
DN [mm]	Weight [kg]
450	147
500	181
600	263
700	345
750	432
800	492
900	689
1000	786
1200	1246

AS 4087, PN 16	
DN [mm]	Weight [kg]
450	137
500	185
600	265
700	366
750	444
800	523
900	701
1000	784
1200	1228

Order code for "Calibration flow", options H and K or order code for "Sensor option", option CA

Option	Description
H	MID Type Examination Cert MI-001
K	OIML R49 Class 2
CA	IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

EN 1092-1		
DN [mm]	Pressure rating	[kg]
25	PN 40	6.5
32	PN 40	8
40	PN 40	8.5
50	PN 40	10
65	PN 16	11
80	PN 16	13
100	PN 16	15
125	PN 16	20
150	PN 16	25
200	PN 10	36
250	PN 10	49
300	PN 10	58

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

EN 1092-1		
DN [mm]	Pressure rating	[kg]
50	PN 40	10.6
65	PN 16	12.0
80	PN 16	14.4
100	PN 16	16.0
125	PN 16	24.0
150	PN 16	30.3
200	PN 16	44.3
250	PN 16	66.1
300	PN 16	83.7

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

AS 4087, PN 16	
DN [mm]	[kg]
80	13
100	15
150	25

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

AS 4087, PN 16	
DN [mm]	[kg]
80	14.4
100	16.0
150	30.3

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

JIS B2220, 10K	
DN [mm]	Weight [kg]
25	6.5
32	7.5
40	7.5
50	9
65	10
80	11
100	13
125	18
150	23
200	32
250	48
300	55
350	79
400	100
450	128
500	142
600	188
700	280
750	331

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

JIS B2220, 10K	
DN [mm]	Weight [kg]
50	9.6
65	11.0
80	12.4
100	14.8
125	22.4
150	30.0
200	41.2
250	62.9
300	73.2

Weight in US units

Standard version

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
1	11
1½	15
2	20
3	26
4	31
6	53
8	95
10	161
12	238
14	381
16	448
18	558
20	624
24	889

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
2	21.3
3	29.1
4	35.6

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
6	68.4
8	116.2
10	198.9
12	285.2

AWWA C207, Class D	
DN [in]	Weight [lbs]
28	878
30	1010
32	1208
36	1760
40	1980
42	2421
48	3083
54	4847
60	5949
66	8154
72	9036
78	10139

Order code for "Design", option A

Option A "Insertion length short; ISO/DVGW to DN400, DN450-2000 1:1"

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
18	420
20	501
24	721

AWWA C207, Class D	
DN [in]	Weight [lbs]
28	606
30	740
32	881
36	1093
40	1463
42	1695
48	2277
54	3165

AWWA C207, Class D	
DN [in]	Weight [lbs]
60	3930
66	5425
72	6295
78	7782

Order code for "Sensor option", option CA

Option CA "IP66/67, Type 4X, fully welded; corrosion protection EN ISO 12944 C5-M"

Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
1	13
1½	15.5
2	20
3	29
4	37
6	57
8	93
10	130
12	185

Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

ASME B16.5, Class 150	
DN [in]	Weight [lbs]
2	21.3
3	32.1
4	41.6
6	72.4
8	114.2
10	167.9
12	232.2

Measuring tube specification

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]
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

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]
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 ¹⁾	8	PN 10	Class 150	Table E, PN 16	10K	204	8.03	204	8.03
200 ²⁾	8	PN 16	Class 150	Table E, PN 16	10K	201	7.91	-	-
250 ¹⁾	10	PN 10	Class 150	Table E, PN 16	10K	258	10.2	258	10.2
250 ²⁾	10	PN 16	Class 150	Table E, PN 16	10K	251	9.88	-	-
300 ¹⁾	12	PN 10	Class 150	Table E, PN 16	10K	309	12.2	309	12.2
300 ²⁾	12	PN 16	Class 150	Table E, PN 16	10K	309	12.2	-	-
350	14	PN 6	Class 150	Table E, PN 16	10K	337	13.3	342	13.5
375	15	-	-	PN 16	10K	389	15.3	-	-
400	16	PN 6	Class 150	Table E, PN 16	10K	387	15.2	392	15.4
450	18	PN 6	Class 150	-	10K	436	17.1	437	17.2
500	20	PN 6	Class 150	Table E, PN 16	10K	487	19.1	492	19.4
600	24	PN 6	Class 150	Table E, PN 16	10K	585	23.0	594	23.4
700	28	PN 6	Class D	Table E, PN 16	10K	690	27.1	692	27.2
750	30	-	Class D	Table E, PN 16	10K	741	29.1	742	29.2
800	32	PN 6	Class D	Table E, PN 16	-	788	31.0	794	31.3
900	36	PN 6	Class D	Table E, PN 16	-	889	35.0	891	35.1
1000	40	PN 6	Class D	Table E, PN 16	-	991	39.0	994	39.1
-	42	-	Class D	-	-	1043	41.1	1043	41.1
1200	48	PN 6	Class D	Table E, PN 16	-	1191	46.9	1197	47.1
-	54	-	Class D	-	-	1339	52.7	-	-
1400	-	PN 6	-	-	-	1402	55.2	-	-
-	60	-	Class D	-	-	1492	58.7	-	-
1600	-	PN 6	-	-	-	1600	63.0	-	-
-	66	-	Class D	-	-	1638	64.5	-	-
1800	72	PN 6	Class D	-	-	1786	70.3	-	-
2000	78	PN 6	Class D	-	-	1989	78.3	-	-

- 1) Order code for "Design", option A "Insertion length short, ISO/DVGW to DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW to DN400, DN450-2000 1:1.3"
- 2) Order code for "Design", option C "Insertion length short ISO/DVGW to DN300, without inlet/outlet runs, constricted meas.tube"

Materials

Transmitter housing

Compact version, standard

- Order code for "Housing", option **A** "Compact, aluminum coated":
Aluminum, AlSi10Mg, coated
- Order code for "Housing", option **M**: polycarbonate plastic
- Window material:
 - For order code for "Housing", option **A**: glass
 - For order code for "Housing", option **M**: plastic

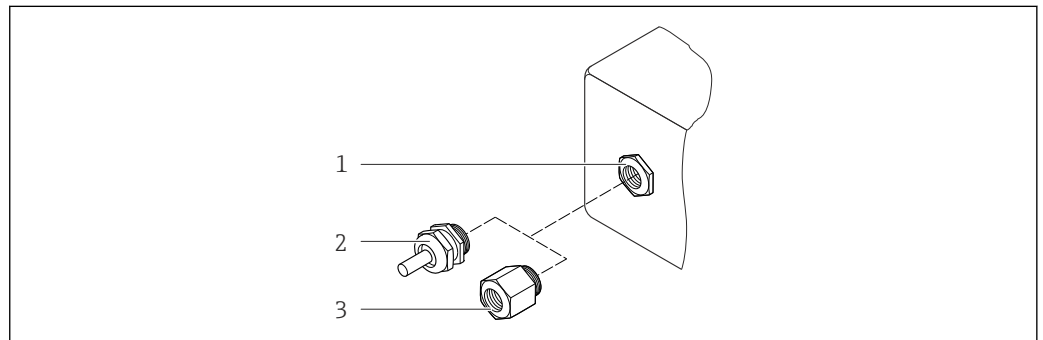
Compact version, inclined

- Order code for "Housing", option **R** "Compact, aluminum coated":
Aluminum, AlSi10Mg, coated
- Order code for "Housing", option **Q**: polycarbonate plastic
- Window material:
 - For order code for "Housing", option **R**: glass
 - For order code for "Housing", option **Q**: plastic

Remote version (wall-mount housing)

- Order code for "Housing", option **P** "Compact, aluminum coated":
Aluminum, AlSi10Mg, coated
- Order code for "Housing", option **N**: polycarbonate plastic
- Window material:
 - For order code for "Housing", option **P**: glass
 - For order code for "Housing", option **N**: plastic

Cable entries/cable glands



40 Possible cable entries/cable glands

- 1 Female thread M20 × 1.5
- 2 Cable gland M20 × 1.5
- 3 Adapter for cable entry with internal thread G ½" or NPT ½"

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 connection housing

- Standard: aluminum, AlSi10Mg, coated (IP66/67)
- Option:
 - 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 housing

- DN 25 to 300 (1 to 12"):
 - Aluminum, AlSi10Mg, coated
 - Carbon steel with Al/Zn protective coating
- DN 25 to 300 (1 to 12"):
 - Carbon steel with protective varnish (IP68)
- DN 350 to 2000 (14 to 78"):
 - Carbon steel with protective varnish

Measuring tubes

- DN 25 to 300 (1 to 12")¹⁾: stainless steel, 1.4301/1.4306/304/304L
- DN 350 to 1200 (14 to 48")¹⁾: stainless steel, 1.4301/304
- DN 1350 to 2000 (54 to 78")¹⁾: stainless steel, 1.4301 similar to 304

Liner

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

Electrodes

- Stainless steel, 1.4435 (316L)
- Alloy C22, 2.4602 (UNS N06022)
- Tantalum

Process connections*EN 1092-1 (DIN 2501)*

- DN 25 to 300¹⁾:
 - Stainless steel, 1.4571/F316L
 - Carbon steel, S235JRG2/S235JR+N/P250GH/E250C
- DN 350 to 600¹⁾:
 - Stainless steel, 1.4571/F316L
 - Carbon steel, P245GH
- >DN 600²⁾:
 - Stainless steel, 1.4404/F316L
 - Carbon steel, P245GH

1) For carbon steel flange material with Al/Zn protective coating (DN 25 to 300 (1 to 12")), protective varnish (IP68) (DN 50 to 300 (2 to 12")) or protective varnish ≥ DN 350 (14")

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

ASME B16.5

- DN 25 to 1200 (1 to 48"): Stainless steel, F316L similar to 1.4404
- DN 25 to 300 (1 to 12")²⁾: Carbon steel, A105 similar to 1.0432
- DN 350 to 1200 (14 to 48")²⁾: Carbon steel, A105

AWWA C207

DN 48 to 78"²⁾:
Carbon steel, P265GH/S275JR/A105/A181 Class 70/E250C

AS 2129

- DN 50 to 1200: Carbon steel, A105/S235JRG2
- DN 350 to 1200²⁾: Carbon steel, P235GH/P265GH/A105

AS 4087

- DN 50 to 1200: Carbon steel, A105/S275JR
- DN 350 to 1200²⁾: Carbon steel, A105/P265GH/S275JR

JIS B2220

- Stainless steel, F316L similar to 1.4404
- Carbon steel, A105/A350LF2¹⁾

Seals

As per DIN EN 1514-1, form IBC

Accessories

Display protection

Stainless steel, 1.4301 (304L)

Ground disks

- Stainless steel, 1.4435 (316L)
- Alloy C22, 2.4602 (UNS N06022)
- Tantalum

Fitted electrodes

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

- 1.4435 (316L)
- Alloy C22, 2.4602 (UNS N06022)
- Tantalum


Process connections

- EN 1092-1 (DIN 2501)³⁾
 - DN ≤ 300: fixed flange (PN 10/16/25/40) = form A
 - DN ≥ 350: fixed flange (PN 6/10/16/25) = flat face
 - DN 450 to 2000⁴⁾: 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 48 to 72": fixed flange (Class D)
 - DN 48 to 78"⁴⁾: fixed flange (Class D)

3) Dimensions as per DIN 2501, DN 65 (2 ½") PN 16 and DN 600 (24") PN 16 only as per EN 1092-1

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

- AS 2129
 - DN 50 to 1200: fixed flange (Table E)
 - DN 350 to 1200 ⁴⁾: fixed flange (Table E)
- AS 4087
 - DN 50 to 1200): fixed flange (PN 16)
 - DN 350 to 1200 ⁴⁾: fixed flange (PN 16)
- JIS B2220
 - DN 50 to 750: fixed flange (10K)
 - DN 25 to 600: fixed flange (20K)

 For information on the different materials used in the process connections

Surface roughness

Electrodes with 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum:
 ≤ 0.3 to 0.5 µm (11.8 to 19.7 µin)
 (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

Fast and safe commissioning

- Guided menus ("Make-it-run" wizards) for applications
- Menu guidance with brief descriptions of the individual parameter functions
- Device access via Web server or SmartBlue app →  127
- WLAN access to the device via mobile handheld terminal, tablet or smart phone

Reliable operation

- Operation in local language
- Uniform operating philosophy applied to device and operating tools
- If replacing electronic modules, transfer the device configuration via the integrated memory (HistoROM backup) which contains the process and measuring device data and the event logbook. No need to reconfigure.

Efficient diagnostics increase measurement availability

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

Languages

Can be operated in the following languages:

- Via local operation:
 - English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech, Swedish
- Via "FieldCare", "DeviceCare" operating tool:
 - English, German, French, Spanish, Italian, Chinese, Japanese
- Via Web browser (only available for device versions with HART, PROFIBUS DP and EtherNet/IP):
 - English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech, Swedish

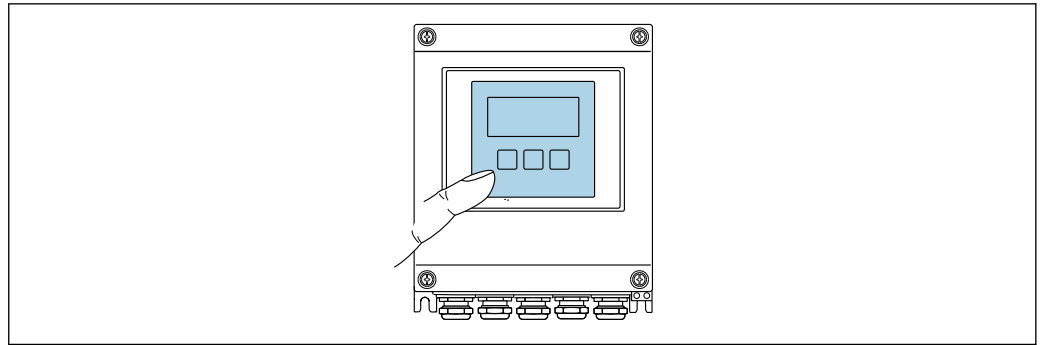
Local display

Via display module

Two display modules are available:

- Standard:
 - 4-line, illuminated, graphic display; touch control
- Optionally via order code for "Display", option **W1** "WLAN display":
 - 4-line, illuminated, graphic display; touch control + WLAN

 Information about WLAN interface →  119



A0032074

41 Operation with touch control

Display elements

- 4-line, illuminated, graphic 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 +60 °C (-4 to +140 °F)
The readability of the display may be impaired at temperatures outside the temperature range.

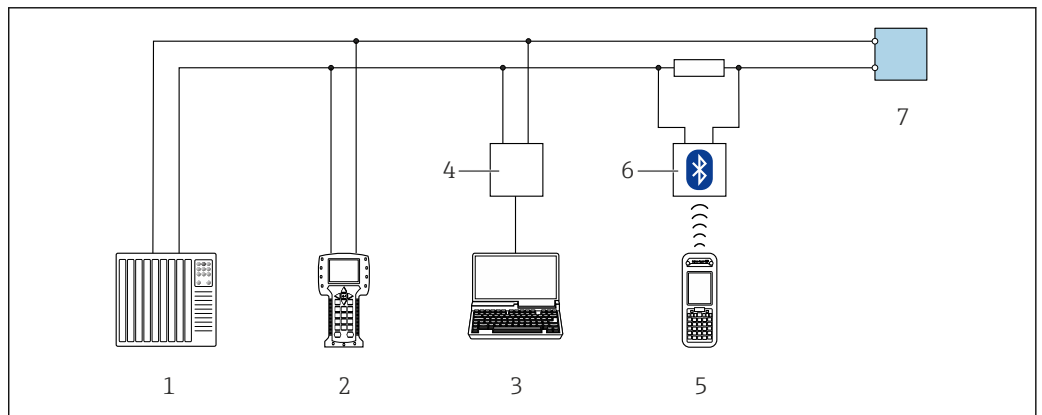
Operating elements

- External operation via touch control (3 optical keys) without opening the housing: +, □, ▢
- Operating elements also accessible in the various zones of the hazardous area

Remote operation

Via HART protocol

This communication interface is available in device versions with a HART output.



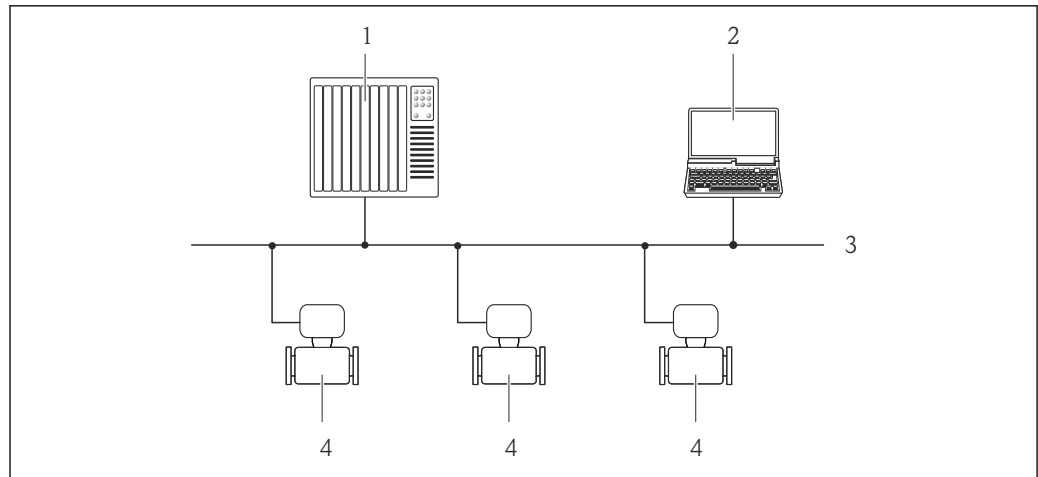
A0028747

42 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 SFX350 or SFX370
- 6 VIATOR Bluetooth modem with connecting cable
- 7 Transmitter

Via PROFIBUS DP network

This communication interface is available in device versions with PROFIBUS DP.



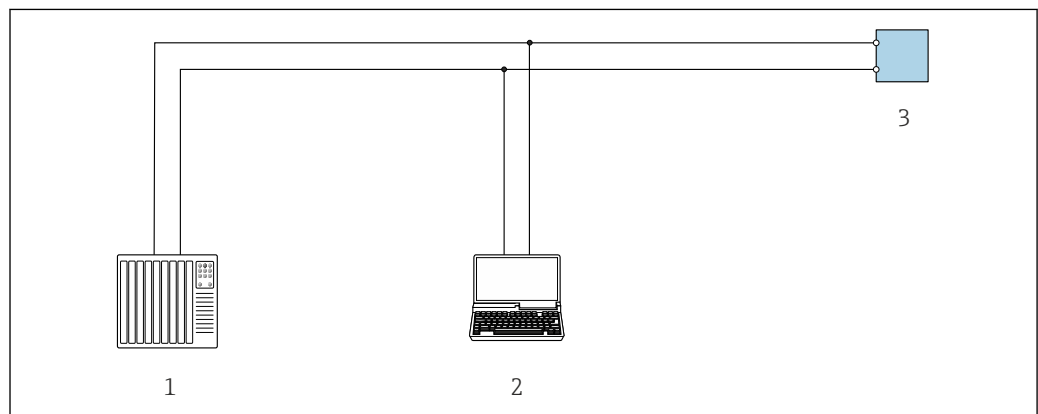
A0020903

▣ 43 Options for remote operation via PROFIBUS DP network

- 1 Automation system
- 2 Computer with PROFIBUS network card
- 3 PROFIBUS DP network
- 4 Measuring device

Via Modbus RS485 protocol

This communication interface is available in device versions with a Modbus-RS485 output.



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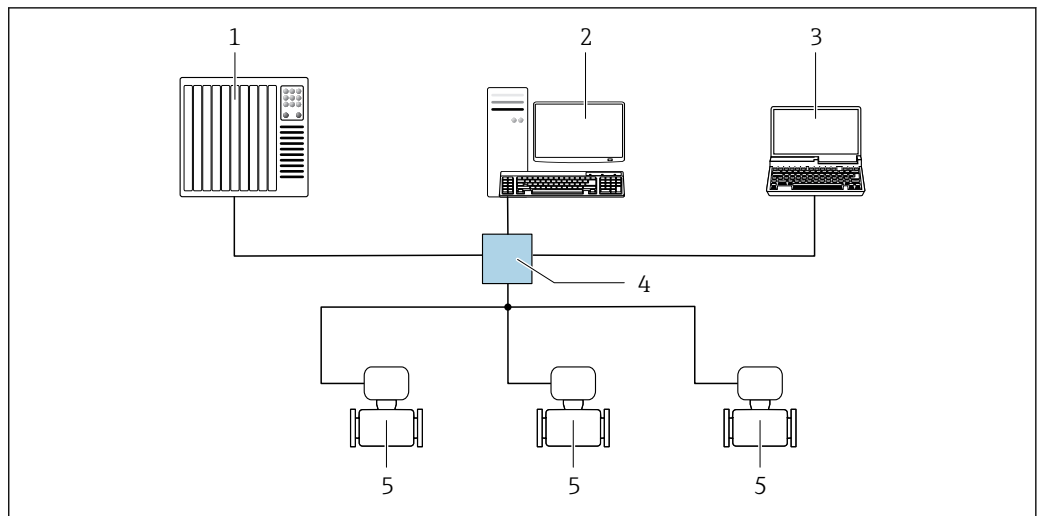
▣ 44 Options for remote operation via Modbus-RS485 protocol (active)

- 1 Control system (e.g. PLC)
- 2 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated device Web server or with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 3 Transmitter

Via EtherNet/IP network

This communication interface is available in device versions with EtherNet/IP.

Star topology



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45 Options for remote operation via EtherNet/IP network: star topology

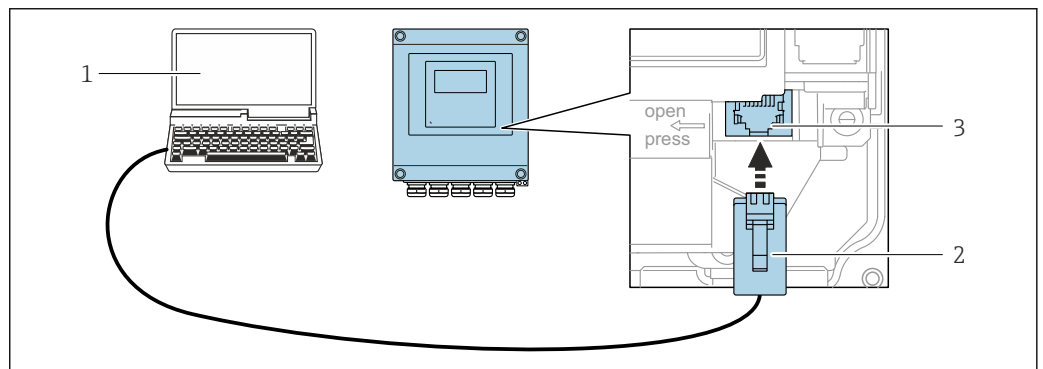
- 1 Automation system, e.g. "RSLogix" (Rockwell Automation)
- 2 Workstation for measuring device operation: with Custom Add-On Profile for "RSLogix 5000" (Rockwell Automation) or with Electronic Data Sheet (EDS)
- 3 Computer with Web browser (e.g. Internet Explorer) for accessing the integrated device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

Service interface

Via service interface (CDI-RJ45)

This communication interface is present in the following device version:

- Order code for "Output", option **H**: 4-20/0-20 mA HART, pulse/frequency/switch output
- Order code for "Output", option **I**: 4-20/0-20 mA HART, pulse/frequency/switch output, status input
- Order code for "Output", option **L**: PROFIBUS DP
- Order code for "Output", option **N**: EtherNet/IP
- Order code for "Output", option **M**: Modbus RS485



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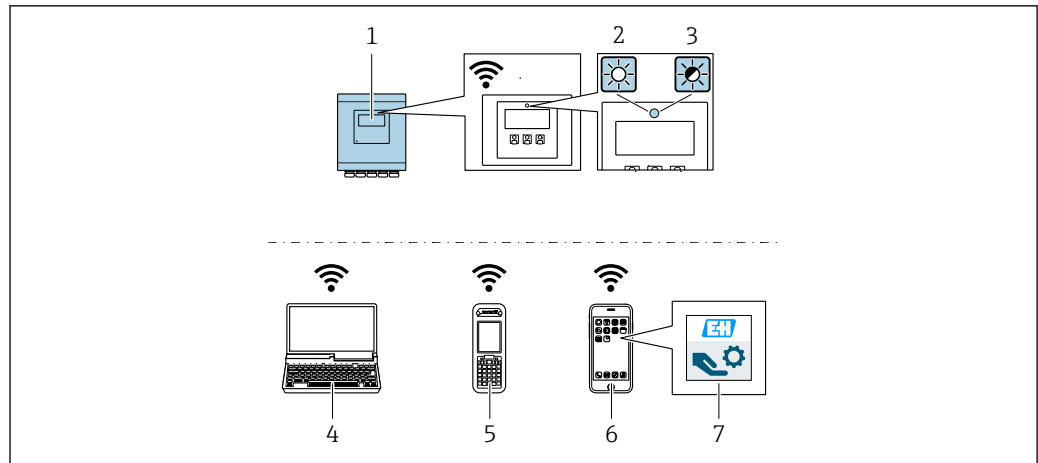
46 Connection via service interface (CDI-RJ45)

- 1 Computer with Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or with "FieldCare", "DeviceCare" operating tool with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 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 WLAN interface


The optional WLAN interface is available on the following device version:

- Order code for "Display", option **W1** "WLAN display":
 4-line, illuminated, graphic display; touch control + WLAN





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- 1 Transmitter with integrated WLAN antenna
- 2 LED lit constantly: WLAN reception is enabled on measuring device
- 3 LED flashing: WLAN connection established between operating unit and measuring device
- 4 Computer with WLAN interface and Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or with operating tool (e.g. FieldCare, DeviceCare)
- 5 Mobile handheld terminal with WLAN interface and Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or operating tool (e.g. FieldCare, DeviceCare)
- 6 Smartphone or tablet
- 7 SmartBlue App

Function	WLAN: IEEE 802.11 b/g (2.4 GHz) <ul style="list-style-type: none"> ▪ Access point with DHCP server (default setting) ▪ Network
Encryption	WPA2-PSK/AES 128 bit
Configurable WLAN channels	1 to 11
Degree of protection	IP67
Available antennas	<ul style="list-style-type: none"> ▪ Internal antenna ▪ External antenna (optional) In the event of poor transmission/reception conditions at the place of installation. Available as an accessory . <p> Only one antenna active in each case!</p>
Max. range	50 m (164 ft)
Materials: External WLAN antenna	<ul style="list-style-type: none"> ▪ Antenna: ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel-plated brass ▪ Adapter: Stainless steel and nickel-plated brass ▪ Cable: Polyethylene ▪ Connector: Nickel-plated brass ▪ Angle bracket: Stainless steel

Supported operating tools

Different operating tools can be used for local or remote access to the measuring device. Depending on the operating tool used, access is possible with different operating units and via a variety of interfaces.

Supported operating tools	Operating unit	Interface	Additional information
Web browser	Notebook, PC or tablet with Web browser	<ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Ethernet-based fieldbus (EtherNet/IP) 	Special Documentation for device
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Fieldbus protocol 	→  127
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> ■ CDI-RJ45 service interface ■ WLAN interface ■ Fieldbus protocol 	→  127
Device Xpert	Field Xpert SFX 100/350/370	HART and FOUNDATION Fieldbus fieldbus protocol	Operating Instructions BA01202S Device description files: Use update function of handheld terminal



Other operating tools based on FDT technology with a device driver such as DTM/iDTM or DD/EDD can be used for device operation. These operating tools are available from the individual manufacturers. Integration into the following operating tools, among others, is supported:

- FactoryTalk AssetCentre (FTAC) by Rockwell Automation → www.rockwellautomation.com
- Process Device Manager (PDM) by Siemens → www.siemens.com
- Asset Management Solutions (AMS) by Emerson → www.emersonprocess.com
- FieldCommunicator 375/475 by Emerson → www.emersonprocess.com
- Field Device Manager (FDM) by Honeywell → www.honeywellprocess.com
- FieldMate by Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The associated device description files are available at: www.endress.com → Downloads


Web server

Thanks to the integrated Web server, the device can be operated and configured via a Web browser and via a service interface (CDI-RJ45) or via a WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is also displayed and allows the user to monitor the status of the device. Furthermore the device data can be managed and the network parameters can be configured.

A device that has a WLAN interface (can be ordered as an option) is required for the WLAN connection: order code for "Display", option **W1** "WLAN display": 4-line, illuminated; touch control + WLAN. The device acts as an Access Point and enables communication by computer or a mobile handheld terminal.

Supported functions


Data exchange between the operating unit (such as a notebook for example) and the measuring device:

- Upload the configuration from the measuring device (XML format, configuration backup)
- Save the configuration to the measuring device (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file or PDF file, document the measuring point configuration)
- Export the Heartbeat verification log (PDF file, only available with the "Heartbeat Verification" application package)
- Flash firmware version for device firmware upgrade, for instance
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package →  125)



Webserver special documentation

HistoROM data management The measuring device features HistoROM data management. HistoROM data management comprises both the storage and import/export of key device and process data, making operation and servicing far more reliable, secure and efficient.

-  When the device is delivered, the factory settings of the configuration data are stored as a backup in the device memory. This memory can be overwritten with an updated data record, for example after commissioning.

Additional information on the data storage concept

There are different types of data storage units in which device data are stored and used by the device:

	Device memory	T-DAT	S-DAT
Available data	<ul style="list-style-type: none"> ▪ Device firmware package ▪ Driver for system integration e.g.: <ul style="list-style-type: none"> – DD for HART – GSD for PROFIBUS DP – EDS for EtherNet/IP 	<ul style="list-style-type: none"> ▪ Event history, such as diagnostic events ▪ Measured value memory ("Extended HistoROM" order option) ▪ Current parameter data record (used by firmware at run time) ▪ Maximum indicators (min/max values) ▪ Totalizer values 	<ul style="list-style-type: none"> ▪ Sensor data: diameter etc. ▪ Serial number ▪ User-specific access code (to use the "Maintenance" user role) ▪ Calibration data ▪ Device configuration (e.g. SW options, fixed I/O or multi I/O)
Storage location	Fixed on the user interface board in the connection compartment	Can be plugged into the user interface board in the connection compartment	In the sensor plug in the transmitter neck part

Data backup

Automatic

- The most important device data (sensor and transmitter) are automatically saved in the DAT modules
- If the transmitter or measuring device is replaced: once the T-DAT containing the previous device data has been exchanged, the new measuring device is ready for operation again immediately without any errors
- If the sensor is replaced: once the sensor has been replaced, new sensor data are transferred from the S-DAT in the measuring device and the measuring device is ready for operation again immediately without any errors

Data transfer

Manual

- Transfer of a device configuration to another device using the export function of the specific operating tool, e.g. with FieldCare, DeviceCare or Web server: to duplicate the configuration or to store in an archive (e.g. for backup purposes)
- Transmission of the drivers for system integration via Web server, e.g.:
 - GSD for PROFIBUS DP
 - EDS for EtherNet/IP

Event list

Automatic

- Chronological display of up to 20 event messages in the events list
- If the **Extended HistoROM** application package (order option) is enabled: up to 100 event messages are displayed in the events list along with a time stamp, plain text description and remedial measures
- The events list can be exported and displayed via a variety of interfaces and operating tools e.g. DeviceCare, FieldCare or Web server




Data logging

Manual

If the **Extended HistoROM** application package (order option) is enabled:

- Record up to 1 000 measured values via 1 to 4 channels
- User configurable recording interval
- Record up to 250 measured values via each of the 4 memory channels
- Export the measured value log via a variety of interfaces and operating tools e.g. FieldCare, DeviceCare or web server

Certificates and approvals

CE mark	<p>The measuring system is in conformity with the statutory requirements of the applicable EU Directives. These are listed in the corresponding EU 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>
Ex approval	<p>The measuring device is certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate.</p> <p> The separate Ex documentation (XA) containing all the relevant explosion protection data is available from your Endress+Hauser sales center.</p> <p>ATEX, IECEX</p> <p>Currently, the following versions for use in hazardous areas are available:</p>
Drinking water approval	<ul style="list-style-type: none"> ■ ACS ■ KTW/W270 ■ NSF 61 ■ WRAS BS 6920
HART certification	<p>HART interface</p> <p>The measuring device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ■ Certified according to HART 7 ■ The device can also be operated with certified devices of other manufacturers (interoperability)
Certification PROFIBUS	<p>PROFIBUS interface</p> <p>The measuring device is certified and registered by the PNO (PROFIBUS User Organization Organization). The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ■ Certified in accordance with PROFIBUS PA Profile 3.02 ■ The device can also be operated with certified devices of other manufacturers (interoperability)
Modbus RS485 certification	<p>The measuring device meets all the requirements of the MODBUS/TCP conformity test and has the "MODBUS/TCP Conformance Test Policy, Version 2.0". The measuring device has successfully passed all the test procedures carried out.</p>
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)
Radio approval	<p>The measuring device has radio approval.</p> <p> For detailed information on the radio approval, see the Special Documentation →  128</p>
Measuring instrument approval	<p>The measuring device 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>The measuring device is qualified to OIML R49: 2006 and has an OIML Certificate of Conformity (optional).</p>


Other standards and guidelines

- EN 60529
Degrees of protection provided by enclosures (IP code)
- EN 61010-1
Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
- 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 -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

 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

Product generation index

Release date	Product root	Modification
01.07.2012	5W4B	Original
01.11.2016	5W4C	<ul style="list-style-type: none"> ■ Web server: current version ■ Logbook: current concept, including Parameter Change ■ Upload/download: current concept ■ Heartbeat Technology: new hardware, diagnostics, events ■ Security concept: encrypted password transmission ■ WLAN ■ Custody transfer mode

 More information is available from your Sales Center or at:

www.service.endress.com → Downloads

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 with the device or subsequently from Endress+Hauser. 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.

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 application package is designed to AVOID build up of highly conductive matter and thin layers (typical of magnetite).

Package	Description
Extended HistoROM	Comprises extended functions concerning the event log and the activation of the measured value memory. Event log: Memory volume is extended from 20 message entries (standard version) to up to 100 entries. Data logging (line recorder): <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. ▪ Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.


Package	Description
Heartbeat Verification +Monitoring	<p>Heartbeat Verification Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment".</p> <ul style="list-style-type: none"> ▪ Functional testing in the installed state without interrupting the process. ▪ Traceable verification results on request, including a report. ▪ Simple testing process via local operation or other operating interfaces. ▪ Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications. ▪ Extension of calibration intervals according to operator's risk assessment. <p>Heartbeat Monitoring Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to:</p> <ul style="list-style-type: none"> ▪ Draw conclusions - using these data and other information - about the impact process influences (such as corrosion, abrasion, buildup etc.) have on the measuring performance over time. ▪ Schedule servicing in time. ▪ Monitor the process or product quality, e.g. gas pockets.

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	Is used to protect the display against impact or scoring from sand in desert areas.  For details, see Special Documentation SD00333F
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.
Post mounting kit	Post mounting kit for transmitter.
Compact → Remote conversion kit	For converting a compact device version to a remote device version.
Conversion kit Promag 50/53 → Promag 400	For converting a Promag with transmitter 50/53 to a Promag 400.

For the sensor




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

Communication-specific accessories


Accessories	Description
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare via the USB interface.  For details, see "Technical Information" TI00404F
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop.  For details, see the "Technical Information" document TI405C/07
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values.  For details, see "Technical Information" TI00429F and Operating Instructions BA00371F
Wireless HART adapter SWA70	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.  For details, see Operating Instructions BA00061S
Fieldgate FXA320	Gateway for the remote monitoring of connected 4 to 20 mA measuring devices via a Web browser.  For details, see "Technical Information" TI00025S and Operating Instructions BA00053S
Fieldgate FXA520	Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser.  For details, see "Technical Information" TI00025S and Operating Instructions BA00051S

Field Xpert SFX350	Field Xpert SFX350 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices and can be used in non-hazardous areas.  For details, see Operating Instructions BA01202S
Field Xpert SFX370	Field Xpert SFX370 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices and can be used in the non-hazardous area and in the hazardous area.  For details, see Operating Instructions BA01202S


Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: <ul style="list-style-type: none"> ▪ Choice of measuring devices for industrial requirements ▪ Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and accuracy. ▪ Graphic illustration of the calculation results ▪ Determination of the partial order code, administration, documentation and access to all project-related data and parameters over the entire life cycle of a project. Applicator is available: <ul style="list-style-type: none"> ▪ Via the Internet: https://wapps.endress.com/applicator ▪ As a downloadable DVD for local PC installation.
W@M	W@M Life Cycle Management Improved productivity with information at your fingertips. Data relevant to a plant and its components is generated from the first stages of planning and during the asset's complete life cycle. W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access for your staff to current, in-depth data shortens your plant's engineering time, speeds up procurement processes and increases plant uptime. Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, visit www.endress.com/lifecyclemanagement
FieldCare	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.  For details, see Operating Instructions BA00027S and BA00059S
DeviceCare	Tool for connecting and configuring Endress+Hauser field devices.  For details, see Innovation brochure IN01047S
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop.  For details, see "Technical Information" TI00405C

System components

Accessories	Description
Memograph M graphic data manager	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.  For details, see "Technical Information" TI00133R and Operating Instructions BA00247R

Supplementary documentation

-  For an overview of the scope of the associated Technical Documentation, refer to the following:
- The *W@M Device Viewer* : Enter the serial number from the nameplate (www.endress.com/deviceviewer)
 - The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

Standard documentation

Brief Operating Instructions

Brief Operating Instructions for the sensor

Measuring device	Documentation code
Proline Promag W	KA01266D

Transmitter Brief Operating Instructions

Measuring device	Documentation code			
	HART	PROFIBUS DP	Modbus RS485	EtherNet/IP
Proline D 400	KA01263D		KA01112D	
Proline L 400			KA01113D	
Proline W 400			KA01114D	

Operating Instructions

Measuring device	Documentation code			
	HART	PROFIBUS DP	Modbus RS485	EtherNet/IP
Promag W 400	BA01063D	BA01234D	BA01231D	BA01214D

Description of device parameters

Measuring device	Documentation code			
	HART	PROFIBUS DP	Modbus RS485	EtherNet/IP
Promag 400	GP01043D	GP01044D	GP01045D	GP01046D

Supplementary device-dependent documentation

Special Documentation

Content	Documentation code
Heartbeat Technology	SD01847D
Display modules A309/A310	SD01793D
Information on Custody Transfer Measurement	SD01230D

Content	Documentation code			
	HART	PROFIBUS DP	Modbus RS485	EtherNet/IP
Web server	SD01811D	SD01813D	SD01812D	SD01814D

Installation Instructions

Contents	Comment
Installation instructions for spare part sets and accessories	Documentation code: specified for each individual accessory .

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